Castle Rock Water
Drought Management Plan

November 2024

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ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

LIST OF TABLES

TABLE OF FIGURES

1. INTRODUCTION

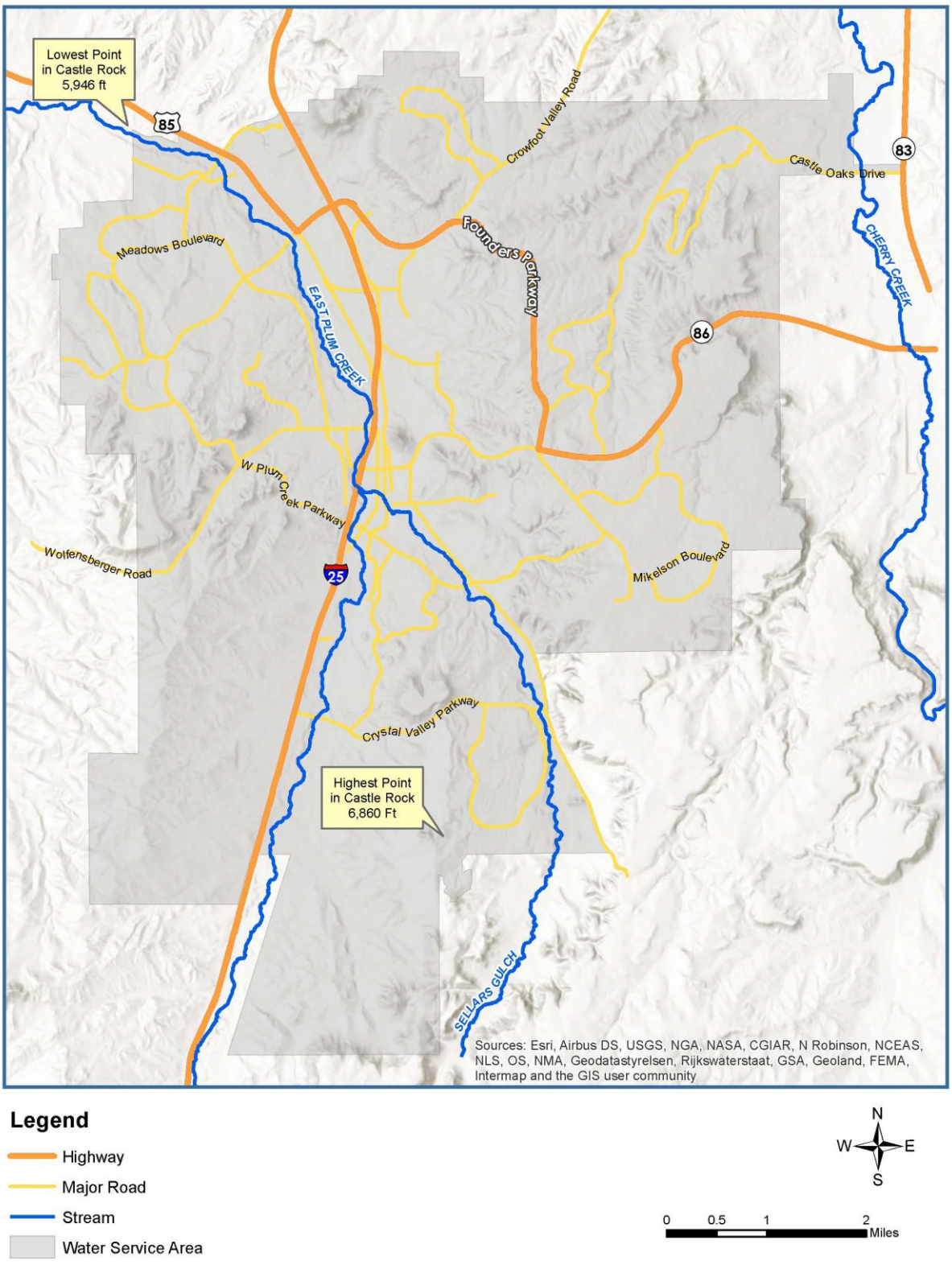
1.1. Profile of Existing System

The Town of Castle Rock (Castle Rock) is located south of Denver in Douglas County, midway between Denver and Colorado Springs. Incorporated in 1881, Castle Rock currently provides water and wastewater services to a population of roughly 85,000 people (2023 estimate). Castle Rock Water services 27,000 connections, of which 25,295 are single family homes. Figure 1 shows a map of the Castle Rock service area.

Castle Rock provides treated water and wastewater collection services to a 34-square mile service area within the Town's municipal boundaries as well as a number of extraterritorial service areas within unincorporated Douglas County. The current population is expected to grow due to Castle Rock's quality of living, growing job opportunities, recreation activities, and location between the Denver and Colorado Springs metropolitan areas.

Castle Rock currently obtains around 65% of its water supply from the Town's 63 deep Denver Basin groundwater wells, while the other 35% comes from renewable sources such as wells within the East Plum Creek alluvium, a surface water diversion (CR-1) on East Plum Creek, a surface water diversion on Plum Creek, and Water Infrastructure and Supply Efficiency (WISE) water from Aurora and Denver. Castle Rock began using Advanced Treatment at the Plum Creek Water Purification Facility (PCWPF) in 2021 and now indirectly reuses most of the water supplies available to the Town. Although active aquifer storage and recovery (ASR) projects are ongoing within the Denver Basin, it is still considered to be a non-renewable water source, and the Town will ultimately not be able to meet water supply demands without transitioning to more renewable sources such as surface water, reuse water, and cooperative agreements with other municipal entities. The Town has set a master planning goal of expanding sustainable sources to make up 75% of the Town's supply by 2050 and 100% of the Town's supply by 2065. While these changes will provide a more diverse and reliable long-term water supply, it also subjects the Town to potentially larger impacts from drought, making the protection of Castle Rock's non-renewable and drought proof Denver Basin Aquifer as well as the updating and continued implementation of a Drought Management Plan even more important.

Figure 1: Castle Rock Water Service Area



Castle Rock's average annual water deliveries for 2017-2023 were approximately 9,437-acre-feet (AF), or about 3,075 million gallons. As shown in Table 1, single-family residential housing comprises 92% of Castle Rock's customer base and multi-family housing comprises 2% of Castle Rock's customer base. Commercial/industrial is the largest non-residential use followed by irrigation and bulk. Table 1 summarizes the last seven years of water usage, in millions of gallons, per sector:

Table 1: Water Use by Sector (Million Gallons)

Year	Residential	Multifamily	Commercial	Irrigation	Bulk	Total
2017	1,640	191	275	317	52	2,475
2018	1,755	193	285	358	99	2,690
2019	1,702	195	283	341	115	2,636
2020	2,041	218	266	423	64	3,012
2021	1,961	222	287	366	68	2,904
2022	2,115	231	314	410	99	3,169
2023	1,830	235	303	295	68	2,731

Source: Town of Castle Rock

The Town has been proactive in its planning efforts to ensure the community's water future and obtain a continuous, sustainable water supply. Castle Rock updated the Water Resources Strategic Master Plan in 2021, and its Water Efficiency Master Plan in 2023. Much of the information presented in this plan was obtained from those documents. The Water Resources Strategic Master Plan includes strategies for ensuring and diversifying a long-term water supply and optimizing infrastructure performance, both of which relate to long-term drought mitigation. The Town's Comprehensive Master Plan (Dated 2017) also has goals and policies for water supply that include the recovery and reuse of treated wastewater as a key part of the long-term renewable water supply strategy.

The four largest customers in the Town of Castle Rock in terms of annual water use are:

1. Homeowners Associations (HOA)
2. Rental apartment communities
3. Hospitals
4. Government entities

1.2. Population

Population data from the past four decennial censuses are presented in Table 2, and projections out to the year 2050 are presented in Table 3.

Table 2: Past Population per U.S. Decennial Census

Census	Population
1990	8,708
2000	20,224
2010	48,231
2020	73,158

Table 3: Projected Population

Year	Projected Population
2030	90,000
2040	122,500
2050	155,000

The current (2023) population estimate is approximately 85,090, based on Douglas County's Population and Development report from July 2024. Castle Rock's population specifically changed 31.8% from 2017 to 2023.

Projected future growth is based on a 75% to 100% Town buildout and service of additional extraterritorial service areas which corresponds to a 2050 projected service population of up to 155,000.

1.3. Drought Mitigation and Response Planning

Drought may be defined as "a period of abnormally dry weather sufficiently long enough to cause a serious hydrological imbalance."[1] This occurs when precipitation is below average based on historical weather records and there are not sufficient supplies to satisfy a water provider's typical customer water demands, which results in a water shortage. A drought's impacts on society and the surrounding environment can be tempered through drought preparedness. Castle Rock's water supply consists largely of Denver Basin groundwater. The Denver Basin aquifers are a deep, non-renewable water source. The Town has added and is planning additional new water supplies that will largely originate from alluvial and surface water (renewable) sources. A reduction of winter snowfall resulting in droughts will make these new water sources potentially less reliable. This includes more severe water shortages that may occur as a result of multi-year droughts. This can result in greater reliance on storage, which can also be significantly reduced during droughts due to below-average snowpack and runoff coupled with above-average evaporation. Storage reserves may be stressed to a greater extent during multi-year droughts, which emphasizes the benefit of having sufficient storage to meet demands over multiple years. On the demand side, outdoor water uses can increase if the summer irrigation season is exceptionally dry. Effective drought management planning is necessary to ensure adequate water supplies for the community and reduce drought related impacts.

[1] Source: Glossary of Meteorology, 2nd edition. 2000. American Meteorological Society

The main purpose of drought mitigation and response planning is to preserve essential public services and minimize the adverse effects of drought on public health and safety, economic activity, environmental resources, and individual lifestyles during a drought event. Effective drought management plans remove the "crisis" from drought response efforts, reduce the hardship caused by water shortages, and raise public confidence in the actions taken to address the water supply shortage. Drought mitigation refers to actions taken in advance of a drought that reduce potential drought-related impacts when the event occurs. Conversely, drought response planning refers to the conditions under which a drought-induced water supply shortage occurs and specifies the actions that should be taken in response. This Drought Management Plan (Plan) includes both drought mitigation and response planning; however, it does not address emergency water shortage events as a result of acute catastrophes such as an unexpected failure of a major raw water conveyance facility. It is also important to note this Plan is effective in drought and non-drought years. Drought mitigation, monitoring of drought indicators, and drought public education are implemented on an annual basis regardless of whether it is a dry or wet year.

This Plan was developed in close coordination with Douglas County's multi-hazard mitigation and emergency operations plans in order to reduce redundancy and capitalize on joint efforts. Douglas County's multi-hazard mitigation plans address drought aspects on a county-wide level, and Castle Rock Water's Water Efficiency Master Plan, Water Resources Strategic Master Plan, and Emergency Operations Plan expand on those aspects in areas where Castle Rock Water operates. This Plan incorporates some of the county-level drought impact information presented in the multi-hazard mitigation plans, and coordinates with the County's drought-related response actions as well. This Plan also is coordinated with State responses to drought as led by the Colorado State Drought Task Force of which Castle Rock Water is a member and also utilizes best practices developed by the Colorado Water Conservation Board including the Drought Management Planning: A Guide for Water Providers published in June of 2020.

1.4. Historical Drought Planning Efforts

Castle Rock implemented its first Drought Management Plan in 2018, but conservation measures have been in place since the 1980s. In April 1992, the Town produced a Water Resources Management Plan which outlined conservation as a viable method for extending water supply. In June 1996 the Town adopted a Water Conservation Plan that set water conservation goals. In December 2006 the Town adopted a Water Conservation Master Plan. While not a specific response to the 2012-2013 drought period, Castle Rock commissioned the Plum Creek Water Purification Facility in 2013 and brought on several alluvial wells that same year. Castle Rock Water has made outdoor irrigation restriction periods for its customers part of the scope of normal business operations which are some of the most stringent in Colorado.

The Town has a significant wildfire hazard, and wildfires are exacerbated by drought. Wildfires can stress the water supply system in three ways: one, the water resources required to fight a wildfire are significant; two, the ash and debris left behind by the fire can pollute water supplies (particularly sedimentation in streams and reservoirs) for years to come; and three, damage can be done to above ground and underground water infrastructure, especially by fires which cross

over the interface between wildlands and urban areas. In June 2002 the Hayman fire in unincorporated Douglas and Jefferson counties west of Castle Rock grew to be the largest documented forest fire in Colorado on record (217 square miles) at that time. This resulted in smoke and ash to be present in the Town and along the Front Range for several weeks. While wildfires do not necessarily cause a reduction in water quantity, the ash and debris can have a major impact on water quality. The Douglas County multi-hazard mitigation plan acknowledges this risk. The Town has also developed a Community Wildfire Protection Plan.

Based on the Douglas County Hazard Mitigation Plan (HMP) (2021) there have been seven significant droughts in the last 121 years (1893-2014) in the planning area. Based on national annual data from 1895 to 1995, Douglas County underwent severe or extreme drought conditions approximately 15 to 20% of the time, which are among some of the highest frequencies across the entire country. Based on the 15 recorded drought events over 20 years, Douglas County typically experiences some kind of drought conditions (D1-D4) in any given year. Some drought events have lasted multiple years. Information from NOAA-NCEI storm events database, the 2018 State of Colorado HMP, the 2015 Douglas County HMP, and the Drought Monitor were used to identify the number of drought events that occurred between 2000 and 2020. Based on 15 recorded events during this period of time in Douglas County, a drought event has a 71% chance of occurring in any given year in Douglas County. From the historic data, it is apparent there has been a shift in trend with regards to occurrences of drought in the last few decades, where dry periods are becoming more common/frequent.

1.5. Drought Planning and Water Conservation

Water conservation and drought planning both involve a combination of strategies for reducing water demand. However, the main objective of a water conservation plan is to achieve continuing, long-term improvement in water use efficiency while reducing overall water demands. A drought management plan focuses on long-term drought mitigation in addition to response strategies that provide short-term responses to temporary drought-related water supply shortages. Nevertheless, conservation measures that result in an ongoing reduction in water demand can provide long-term drought mitigation benefits and can be considered as both conservation and drought mitigation measures. Strategies proposed and implemented also include incentive-based programs that encourage existing properties to be water efficient and aesthetically pleasing. Water efficiency activities put in place by the Town are listed in Table 12 under Section 8.1. These activities are outlined in the 2023 Water Efficiency Master Plan.

Castle Rock's five-year average water consumption rate for 2018 to 2023 was 112.6 gallons per capita per day (gpcd). The Town has set a master planning goal of reducing this rate further to 100 gpcd by 2050. Maintaining this up-to-date Drought Management Plan is part of Castle Rock's overall strategy to help achieve that goal.

The planned and proposed conservation measures also provide drought mitigation benefits by providing water savings that can extend into subsequent years. For example, savings achieved through the installation of rotary irrigation nozzles, or ultra-high efficiency toilets provide water

savings for the service life of the device. These savings may reduce stress on Castle Rock's system during drought years. A portion of the water saved through these conservation measures is planned to be stored as drought reserves in Castle Rock reservoirs, Rueter-Hess Reservoir, Chatfield Reservoir, Castle Rock Reservoirs No. 1 and No. 2, Walker Reservoir and the Denver Basin aquifer storage and recovery wells.

2. STAKEHOLDERS, OBJECTIVES AND PRINCIPLES

2.1. Drought Planning Committee

Drought management plans that are developed by one or just a few individuals risk the potential of unforeseen community conflict and/or complications with the water supply system during times of drought. An interactive, collaborative process consisting of stakeholders throughout the Town provides valuable insight and perspectives necessary for a more robust and comprehensive drought management plan.

During the update of this Plan, a Drought Committee (Table 4) was reconvened to review proposed updates and changes to the Plan and provide feedback. Committee members were selected by Castle Rock Water based on their expertise, customer type, and professional position. The following members include senior staff of various departments impacted in the Town, members of the Castle Rock Water Commission and representatives from local water users.

Table 4: Drought Committee Members

Name	Position	Agency
Mark Marlowe	Director of Castle Rock Water	Castle Rock Water
David Van Dellen	Assistant Director of Castle Rock Water	Castle Rock Water
Matt Benak	Water Resources Manager	Castle Rock Water
Nichol Bussey	Castle Rock Water	Business Solutions and Support Manager
Lauren Moore	Water Resources Project Manager	Castle Rock Water
Zuzana Howard	Water Resources Program Analyst	Castle Rock Water
Adriana Alfaro	Water Resources Program Analyst	Castle Rock Water
Sandra Sandman	Customer Relations Program Manager	Castle Rock Water
Rick Schultz	Water Conservation Supervisor	Castle Rock Water
Courtney Convy	Water Conservation Specialist	Castle Rock Water
TJ Kucewesky	Assistant Director	Town of Castle Rock Development Services
Bob Maloney	Parks Superintendent	Town of Castle Rock Parks and Recreation
Bart Chambers	Division Chief/Fire Marshall	Castle Rock Fire & Rescue Department

Name	Position	Agency
Jeff Hood	Captain, Assistant Chief of Accreditation & Emergency Management	Town of Castle Rock, Fire & Rescue Department
Tim Gorman	Commander	Town of Castle Rock Police
Carrie Mahan Groce	Sr. Communications Specialist	Town of Castle Rock, Communications
Karl Kasch	Representative	Villages at Castle Rock Metro District
Michele Ray-Brethower	Representative	The Meadows Neighborhood Company
Tony Rathbun	Representative	Castle Rock Water Commission
John Holland	Golf Maintenance Superintendent	Town of Castle Rock Parks and Recreation
Steve Datweyler	Golf Course Superintendent	Ravenna Golf Club
Jill Allen	Executive Director	The Meadows Neighborhood Co.
Angie Brown	Member	Castle Rock Water Commission
Kati Carter	Asst Director of Planning Resources	Douglas County
Kati Egly	Assistant Director	The Meadows Neighborhood Co.
Tim Hallmark	Director of Facilities, Fleet, and Emergency Support Services	Douglas County
Michelle Peck	Owner and Community Manager	TMMC Property Management
Jake Schroeder	Community Developer	Westside Investment Partners
Stacey Weaks	Principal	Norris Design

Two meetings were held with the Drought Committee as the Plan was being updated. These meetings focused on the proposed changes to the Plan and facilitated a means to collect and review data and receive feedback on specific aspects of the proposed changes to the Plan. The Drought Committee also had the opportunity to review and comment on the draft Plan update in its entirety prior to finalization. The meetings focused on the following material:

- Meeting No. 1 – Introductions, review of the 2018 Plan, updates to local drought definition, water use priorities, plan objectives, and operating principles.
- Meeting No. 2 – Historical drought information, lessons learned from past droughts, identification of historical and potential future drought impacts, and updates to mitigation and response strategies, notably the decrease in customer's water budget at various drought stages.

2.2. Drought Definition

The Castle Rock Drought Committee members decided to expand the definition of drought beyond the traditional hydrologic definition. For the purposes of this plan, drought is defined as:

"A period of below normal precipitation or extended warm temperatures at times and locations that could result in water supply shortages. This could also include the inability to maintain or deliver adequate supplies of water."

For the purposes of this plan this includes other circumstances beyond the traditional hydrologic shortage, such as unanticipated increases in water demand or damage to water supply infrastructure that could trigger a drought response.

2.3. Objectives of the Drought Management Plan

The Plan objectives and operating principles are reflective of Castle Rock's water use priorities and played an important role in guiding the updates to the Plan. The Drought Committee reconfirmed the allocation and prioritization of Castle Rock's water usage into the four categories shown in Table 5.

Table 5: Water Use Priorities

Priority	End Use	Description
1	Health and Safety	Indoor residential, water treatment plants, hydrants (for emergency use), wastewater treatment plants, schools, hospitals, and other emergency services.
2	Business Indoor Use	Indoor use by the commercial and public sector, stores, offices, hotels, restaurants, etc.
3	Outdoor irrigation – Public spaces	Parks, sports fields, landscapes, swimming pools, HOA parks, and open/recreational spaces. Trees prioritized over turf. Outdoor commercial business or business enterprise (including golf courses), as well as construction purposes.
4	Outdoor irrigation – Residential and Commercial	Outdoor irrigation in the single- and multi-family residences, and public and commercial sectors (including car wash facilities). HOA streetscapes/greenbelts. Reasonable environmental protection.

Essential uses for the health and safety of the community continued to be given the highest priority. Water uses for existing businesses (in the form of indoor use) were assigned a second priority, and outdoor irrigation, water use for public spaces, and residential and commercial water supplies were assigned lower priorities.

The objectives of the Plan are as follows:

- Plan for droughts before they occur.
- Protect the public health and safety, and minimize the adverse effects of a water supply shortage.
- Provide comprehensive and flexible guidance for drought response, allowing for an appropriate range of actions to respond.

- Identify and determine the severity of droughts through a clear definition of triggers.

- Provide effective communication to customers, the public and governmental departments/agencies, so they clearly understand the situation and the actions taken.

The operating principles provide a set of guidance criteria that continue to govern the Plan. These criteria also provide guidance during implementation of the drought response during periods of drought. These operating principles are as follows:

- Any drought-related actions will be carried out in a way that respects the priorities established by the plan, with the highest priority being health and safety.

- Any drought-related actions need coordination and communication for success. This includes coordination and communication with staff across the Town's various departments. The Town's water customers and the public need to have a clear understanding of any actions taken.

- When possible, any drought-related actions will preserve the Town's large capital improvements, such as trees in parks and streetscapes.

This plan is intended to be a guide to facilitate decision making. Decision makers should remain flexible, and respond as needed to each drought event on a case-by-case basis.

3. HISTORIC DROUGHT AND IMPACT ASSESSMENT

3.1. Historical Assessment of Drought, Available Supplies and Demands

Based on the history of events and input from the Core Planning Team for the Douglas County HMP (2021), the probability for drought occurring in the County is considered frequent (hazard event is likely to occur within 25 years). The 2002 drought was by far the worst drought year on record statewide in terms of streamflow. As Castle Rock's water supply has primarily been Denver Basin groundwater, the 2002 drought had less impact on the Town than other municipalities that relied more on surface water. Castle Rock plans to develop extensive shallow alluvial and surface water sources, so that these renewable resources will account for 75% of the Town's water by 2050 and 100% by 2065. Although a positive aspect of using renewable water resources means ensuring the water lasts long-term, a downside of moving towards surface water means that future droughts can potentially have a much larger impact on the Town than in the past.

Many of the personnel currently at Castle Rock Water were not at the Town during the 2002 drought, and there is limited information about specific policies put in place during that time. However, there is evidence that the drought did have a significant impact on the Town as well as on nearby regions, including Aurora and the Denver south metro area. The 2021 Water

Resources Strategic Master Plan shows that Town demand was 165 gpcd, prior to 2006, and decreased to 122 gpcd as of the 2011-2016 average, and 118 per the most recent five-year period 2018-2023. The plan notes that the reduction in water usage per account since 2002 is most likely attributable to the public's response to the drought and the Town's focus on conservation efforts. In addition, both the 2023 Water Efficiency Master Plan and the 2021 Water Resources Strategic Master Plan state that the Town intends to reduce consumption further to reach the 100 gpcd goal (and save the community about $70 million in long term capital investment and infrastructure).

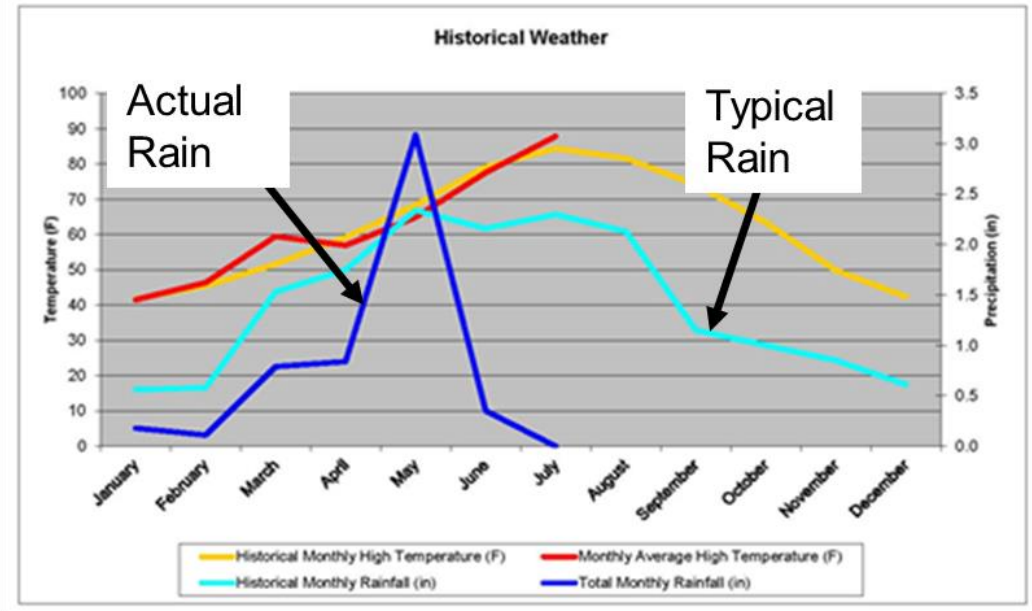
The 2012-2013 drought years also affected the Town. While not a specific response to the 2012-2013 drought period, Castle Rock commissioned the Plum Creek Water Purification Facility in 2013 and brought on several alluvial wells that same year. Castle Rock Water has made outdoor irrigation restriction periods permanent regardless of drought conditions.

3.1.1. 2017 "Flash" Drought

Hot, dry weather and a lack of rain in May and June 2017 led to record low levels of renewable water sources (e.g., East Plum Creek) and excessive demand on the Town's water system. As a result, residents, homeowner's associations (HOAs), and commercial/industrial customers used 25% more water than usual. Infrastructure could not keep up with the peak demand of 16.5 million gallons per day, compared to typical summer usage of 12.4 million gallons per day. Figure 2 displays the temperature and precipitation patterns observed during the 2017 year, broken up by month, and compared to traditional rainfall expectations. In the transition between May and June we began to see a significant decline in the total monthly rain, followed by rising temperatures. Due to the high temperatures and lack of precipitation, East Plum Creek began to suffer accordingly, with shortages in expected flow to support available water resources for the Town. Stream flow decline began in June, lasting through July (portrayed in Figure 3).

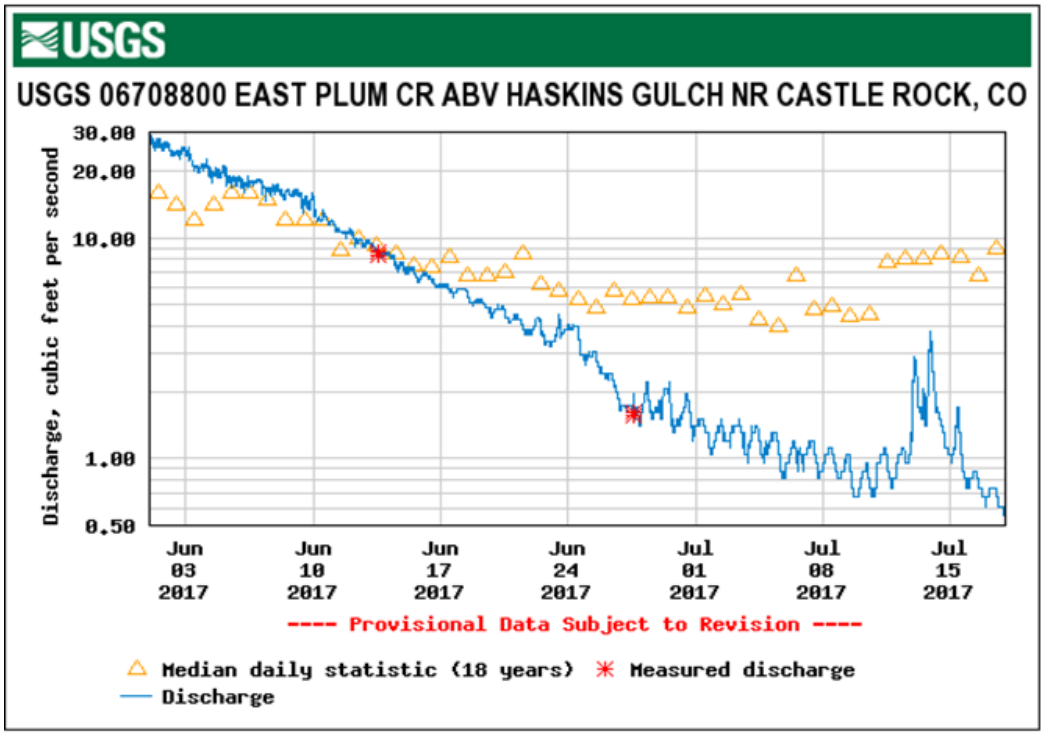
In response to these conditions, Castle Rock Water enacted additional water restrictions for residents, HOAs, and commercial/industrial customers. HOAs and commercial/industrial customers were put on a three-day-a-week schedule, and residents (who were already on an every-third-day watering schedule) were encouraged to reduce irrigation by 20%. Enacting these supporting measures helped keep tank levels in line with the summer operations plan.

Figure 2: 2017 Observed Temperatures and Precipitation as of July



Source: Castle Rock Water

Figure 3: East Plum Creek Stream Flow Jun-July 2017



Source: United States Geological Survey (USGS)

4. DROUGHT VULNERABILITY ASSESSMENT

4.1. Water Supply Reliability and Drought Management Planning

Castle Rock's water supply reliability planning efforts have recently focused on the long-term sustainability and renewability of the water supply. The Denver Basin Aquifer, which currently supplies up to 65% of the Town's water, does not recharge quickly and is hence not considered to be a renewable resource. For that reason, the Town has set a goal of having 75% of its water supply come from renewable alluvial and surface water supplies by 2050 and 100% by 2065. This change in water sources potentially exposes the Town to more impacts from future drought. To buffer these potential impacts, it will be critical for the Town to maintain and potentially improve its nonrenewable groundwater supplies and infrastructure into the future.

The reliability of these renewable water supplies depends on a multitude of factors including the Town's seniority of water rights, storage capacities, infrastructure conditions, and rate of customer demand growth. Water supply reliability planning is an important component of ensuring sufficient supplies during times of drought and, to some extent, overlaps with this drought management planning process. However, this Plan focuses on drought within the context of drought monitoring, mitigation actions, and drought response to lessen drought impacts. Consequently, this Plan does not take the place of water supply reliability planning but rather is closely coordinated with Castle Rock's water supply reliability planning efforts.

4.2. Drought Impact Assessment and Climate Change

Castle Rock could experience a variety of drought-related impacts in the future, which may be similar to those experienced in the past. These possible impacts and level of severity are outlined in Table 6 through Table 9. The potential severity of many of these impacts could be significant depending on the magnitude and duration of the drought, climate variability trends, and how effectively the drought mitigation and response efforts reduce the impact.

Predictions for future precipitation change are divergent in Colorado. Using two different emission scenarios, Representative Concentration Pathways (RCP) 4.5 and 8.5, which model moderate and high emissions scenarios, annual precipitation changes are projected. An RCP emission scenario is a way to predict future climate changes by estimating how much greenhouse gas emissions might increase or decrease over time and are commonly used by organizations like the Intergovernmental Panel on Climate Change, NOAA, and other research institutions. Under RCP 4.5 annual changes are between -5% and +6% and under RCP 8.5 annual changes are between -3% and +8% by 2050. These projections also anticipate increased winter precipitation and decreased precipitation during the growing season (May – September) by 2050. Winter precipitation will likely include more rain than snowfall due to warmer temperatures. Additionally, projections indicate that average annual streamflow for most Colorado river basins will decrease by up to 30% due to the impacts of warmer temperatures on streamflow. However, it is possible the increased winter precipitation will compensate for this warming by increasing runoff.

With a warmer climate, droughts can become more frequent, more severe, and longer-lasting. According to the National Climate Assessment, variable precipitation and rising temperatures are intensifying droughts, increasing heavy downpours, reducing snowpack, and causing declines in water survey quality. Future warming will add to the stress on water supplies and impact the availability of water supply[2].

Nevertheless, Colorado's general hydrology and water resources are extremely sensitive to climate. For Castle Rock, multifaceted stress on water supply such as stemming from irrigation and municipal demands, combined with overall climate variability and change, are increasing the importance of supply forecasting to water managers and business markets. While the scientific understanding of climate change is ever evolving and entails many complexities when linking it with specific future trends in drought, in general, climate change is projected to increase the frequency and probability of drought events across Colorado. As a result of increasing temperatures, water yields will generally decrease. Warmer temperatures will likely result in precipitation occurring as rain rather than snow, decreased high-elevation snow packs, an earlier spring melt of the decreased snowpack, more intense and damaging precipitation events (e.g., flash floods), and increased evapotranspiration[3]. The following list presents a breakdown of these projected drought-related changes in terms of the hazard's location, extent/intensity, frequency, and duration, based on climate change impacts to Colorado and Castle Rock:

Location: Mountains and plains both experience drought. Drought changes geographically from year to year and decade to decade. Location is not projected to change but could vary across the Town based on local resources and water infrastructure (e.g., if pumps were to fail).

Extent/Intensity: Drought can lead to property damage that does not threaten structural integrity. Little to no impact to critical services or facilities is expected in the Town. Economic and water resource impacts are often foreseen. Overall extent of drought due to changing climate is not projected to significantly change.

Frequency and Probability: Droughts across Colorado are projected to increase in frequency due to shifts in seasonal precipitation patterns, including drier summers and less precipitation falling as snow in early spring/late fall. Specifically, Castle Rock would be more affected by this category as we continue to rely more heavily on renewable water resources.

Duration: Future droughts are projected to have longer durations due to a changing climate (e.g., shifts in seasonal precipitation patterns due to higher temperatures and less precipitation in the form of snow). This will increase the impact to Castle Rock and highlights the importance of

[2] Source: Fourth National Climate Assessment
[3] Source: Colorado Water Plan | DNR CWCB

protecting and improving non-renewable Denver Basin supplies and infrastructure for these events as these supplies are not directly impacted by the drought.

Table 6: Water Provider Historical and Potential Future Drought Impacts of the Utility[4]

Historical, Existing, and Potential Drought impacts	Historical Impact	Ranking of Drought Impact Severity*	Potential Impact Priority	Mitigation Action	Response Strategies
Loss of revenue from reduction in water sales	x	M	M	Utilize reserves.	Budget for reserves. Implement drought rates
Increase in municipal water demand	x	M	L	Implement watering restrictions and drought rates to reduce demand.	Decrease reliance on ground water. Diversify supplies.
Reduction in storage reserves	x	M	L	Implement watering restrictions to reduce demand.	Minimize reduction. Maintain levels in reservoirs during non-drought periods
Disruption of water supplies	x	M to H	L	Restore services and lift restrictions as soon as possible.	Minimize disruptions. Diversification of Supplies
Degraded raw water quality	x	M	L	Curtail direct diversions off creek.	Pump Denver Basin Wells. Use alluvial wells, and reservoir supplies.
Higher water pumping costs	x	L	L	Return to normal operations as soon as possible. Budget for additional staff time. Budget for reserves.	Budget for additional costs.
Increased costs and staff time to implement drought plan	x	M	M	Return to normal operations as soon as possible. Budget for additional staff time. Budget for reserves.	Budget for increased costs.
Increased data/information needs to monitor and implement drought management plan	x	M	M	Return to normal operations as soon as possible. Budget for additional staff time. Budget for reserves.	Utilize staff to address data/information needs.
Costs to acquire/develop new water supplies/water rights transfers	x	H	L	Proactively acquire and develop additional supplies.	Budget for and take advantage of sensible opportunities.

[4] Drought Severity Definitions:
(L) – Low: very little impact, did not require much staff time
(M) – Medium: some impact, required more staff time to address
(H) – High: key impact, occupied significant staff time
x – indicates historical impact

Historical, Existing, and Potential Drought impacts	Historical Impact	Ranking of Drought Impact Severity*	Potential Impact Priority	Mitigation Action	Response Strategies
Costs to increase water use efficiency	x	L	L	Increase public awareness of the need. Budget for water conservation measures.	Implement over a long period of time. Focus on non-functional turf reductions
Public favorable/unfavorable perception of provider regarding drought response	x	M	L	Increase public education.	Maintain transparency and education efforts.
Scarcity of equipment and other water related services (e.g., contractors to repair wells)	x	L	L	Emergency services contract.	Utilize multiple contractors.

Table 7: Community and Societal Historical and Potential Future Drought Impacts of the Utility[5]

Historical, Existing, and Potential Drought impacts	Historical Impact	Ranking of Drought Impact Severity*	Potential Impact Priority	Mitigation Action	Response Strategies
Domestic landscaping stressed or killed	x	M	L	Drought tolerant landscaping.	Continue to implement drought tolerant landscaping.
Public landscaping stressed or killed	x	M	L	Drought tolerant landscaping.	Continue to implement drought tolerant landscaping.
Reduced firefighting capability	x	L	M	Minimize restrictions.	Maintain storage for firefighting at all times.
Cross-connection contamination as a result of lower pressures		L	L	Increased sampling.	Maintain positive pressure in system at all times.
Increased pollutant concentrations		L	L	Increased sampling and monitoring.	Meet primary drinking water standards at all times.
Reduced quality of life	x	L	L	Minimize restrictions.	Drought planning.
Loss of human life (e.g., heat stress)		L	L	Minimize restrictions. Restore services as soon as possible.	Minimize restrictions. Restore services as soon as possible.

[5] Drought Severity Definitions:
(L) – Low: very little impact, did not require much staff time
(M) – Medium: some impact, required more staff time to address
(H) – High: key impact, occupied significant staff time
x – indicates historical impact

Historical, Existing, and Potential Drought impacts	Historical Impact	Ranking of Drought Impact Severity*	Potential Impact Priority	Mitigation Action	Response Strategies
Increased Risk to Public safety from wildfires		L	L	Maintain firefighting capabilities.	Maintain firefighting capabilities.
Increased disease caused by wildlife concentrations		L	L	Minimize restrictions.	Minimize restrictions.
Mental and physical stress	x	L	L	Minimize restrictions. Increase education.	Minimize restrictions. Increase education.
Increased political conflict	x	L	L	Minimize restrictions. Transparency.	Minimize restrictions. Transparency.
Reduction or modification of recreational activities	x	L	L	Minimize restrictions.	Minimize restrictions.
Unequal distribution of drought response measure implementation	x	L	L	Minimize restrictions. Increase education. Drought planning.	Minimize restrictions. Increase education. Drought planning.
Heightened awareness about water conservation	x	L	L	Increase education.	Increase education.
Change in water use behavior to conserve water	x	L	L	Increase education.	Increase education.
Re-evaluation of social values (priorities, needs, rights)	x	L	L	Drought planning.	Drought planning.

Table 8: Economic Historical and Potential Future Drought Impacts of the Utility[6]

Historical, Existing, and Potential Drought impacts	Historical Impact	Ranking of Drought Impact Severity*	Potential Impact Priority	Mitigation Action	Response Strategies
Decreased land prices			L	Minimize restrictions. Transparency. Drought planning. Public education.	Minimize restrictions. Transparency. Drought planning. Public education.

[6] Drought Severity Definitions:
(L) – Low: very little impact, did not require much staff time
(M) – Medium: some impact, required more staff time to address
(H) – High: key impact, occupied significant staff time
x – indicates historical impact

Historical, Existing, and Potential Drought impacts	Historical Impact	Ranking of Drought Impact Severity*	Potential Impact Priority	Mitigation Action	Response Strategies
Income loss to farmers that indirectly affects municipal businesses	x	L	L	Minimize restrictions. Transparency. Drought planning. Public education.	Minimize restrictions. Transparency. Drought planning. Public education.
Loss to recreation and tourist industry	x	L	L	Minimize restrictions. Transparency. Drought planning. Public education.	Minimize restrictions. Transparency. Drought planning. Public education.
Reduction of economic development		L	L	Minimize restrictions. Transparency. Drought planning. Public education.	Minimize restrictions. Transparency. Drought planning. Public education.
Increase in food prices	x		L	Minimize restrictions. Restore services as soon as possible.	Minimize restrictions. Restore services as soon as possible.
Restrictions/limitations on landscaping when it harms landscaping companies	x	L	L	Minimize restrictions. Transparency. Drought planning. Public education.	Minimize restrictions. Transparency. Drought planning. Public education.
Impacts to large scale commercial water users (e.g., golf courses)	x	M	L	Minimize restrictions. Transparency. Drought planning. Public education.	Minimize restrictions. Transparency. Drought planning. Public education.

Table 9: Environmental and Recreational Historical and Potential Future Drought Impacts of the Utility[7]

Historical, Existing, and Potential Drought impacts	Historical Impact	Ranking of Drought Impact Severity*	Potential Impact Priority	Mitigation Action	Response Strategies
Increased risk of frequency and severity of wildfires	x	L	L	Maintain firefighting capacity	Maintain firefighting capacity
Stress to surrounding natural environment	x	L	L	Minimize restrictions.	Minimize restrictions.

[7] Drought Severity Definitions:
(L) – Low: very little impact, did not require much staff time
(M) – Medium: some impact, required more staff time to address
(H) – High: key impact, occupied significant staff time
x – indicates historical impact

Historical, Existing, and Potential Drought impacts	Historical Impact	Ranking of Drought Impact Severity*	Potential Impact Priority	Mitigation Action	Response Strategies
Loss of wetlands	x	L	L	Minimize restrictions.	Minimize restrictions.
Lower streamflows	x	L	L	Drought planning.	Drought planning.
Lower lake/reservoir levels	x	L	L	Drought planning.	Drought planning.
Increased susceptibility to plant disease	x	L	L	Drought resistant landscaping.	Drought resistant landscaping.
Increased wind and water erosion	x	L	L	Drought resistant landscaping.	Drought resistant landscaping.
Air quality effects (e.g. dust and pollutants)	x	L	L	Minimize restrictions. Transparency. Drought planning. Public education.	Minimize restrictions. Transparency. Drought planning. Public education.
Visual and landscape quality (e.g., dust, vegetative cover)	x	L	L	Drought tolerant landscaping.	Drought tolerant landscaping.
Stress to fish and other wildlife		L	L	Drought planning.	Drought planning.
Lower water quality in streams and/or lakes/reservoirs		L	L	Drought planning.	Drought planning.
Outdoor burning bans		L	M	Follow Municipal Code.	Follow Municipal Code.

The Castle Rock community could also experience a variety of future drought-related impacts. Some of the more significant impacts include:

- Damage to public and private landscaping.
- Unequal impacts of water restrictions and other drought response measures upon certain businesses/individuals. For example, large irrigators that depend on irrigation may be more vulnerable.
- Increased risk of wildfire that threatens the safety, air quality and overall environment of the surrounding area.
- Increased public awareness on drought response efforts, importance of water conservation and positive reduction in water usage.

While some of these impacts are beyond the immediate control of Castle Rock Water, drought mitigation activities and daily operational adjustments during future droughts may be made to alleviate some of these impacts. This is discussed in further detail in Section 5.

5. DROUGHT MITIGATION AND RESPONSE STRATEGIES

As previously mentioned, drought mitigation refers to actions taken in advance of a drought that reduce potential drought-related impacts when the event occurs. In contrast, drought response planning refers to the conditions under which a drought-induced water supply shortage occurs and specifies the actions that should be taken in response.

Mitigation and response strategies that focus on the management of the water supply system are generally referred to as supply-side actions; whereas demand-side mitigation and response strategies focus on actions that Castle Rock Water can take to promote or enforce reductions in customer water demands. This section presents the mitigation and response strategies selected following a screening process. The response strategies are further refined into a staged drought response program discussed in Section 7.

5.1. Drought Mitigation Measures

The drought mitigation measures were selected by developing a preliminary list of potential mitigation measures and conducting a screening process to select the measures most conducive for Castle Rock. The preliminary list was developed using the Colorado Water Conservation Board's (CWCB) Drought Management Guidance Document and accompanying worksheets, as well as incorporating Castle Rock's water supply reliability and conservation planning efforts[8]. Potential impacts identified in Section 4.2 were also used to generate new ideas for mitigation options. The preliminary mitigation list was screened and further refined using the following criteria:

[8] Source: Municipal Water Efficiency Plan Guidance Document | DNR CWCB

- Technical feasibility – Is the selected mitigation or response strategy technically feasible and will it work as intended? Can implementation occur in a timely manner? Is there staff to implement the action?

- Perceived benefits – Will the selected mitigation or response strategy provide an adequate amount of water supplies and/or water savings?

- Cost effectiveness – How does the implementation cost compare with the benefits? This may simply be a qualitative assessment or quantitative comparison of ratios of implementation costs to the water savings cost benefit.

- Public acceptance – How favorably will the public react to the selected mitigation/response strategy? A review process of alternative means to engage the public would be beneficial to assess general public acceptance.

- Environmental sensitivity and other impacts – What are the environmental benefits/costs to implementing the mitigation and/or response strategy? Is there an environmental issue or other impacts that should be further considered?

The final step of the screening process assessed the selected group of mitigation actions to ensure that the final combination collectively met the following criteria:

- Compatible with Castle Rock's water supply system and is feasible from an implementation standpoint;

- Consistent with the operating principles and objectives of the drought management plan;

- Fairly represents the needs of affected individuals and groups; and

- Sufficiently addresses potential water shortages and future impacts.

The final mitigation measures (which include conservation efforts) are provided in the next section.

5.1.1. Mitigation Measures

- Drought mitigation and management planning – The major components of this Plan provide an effective means for Castle Rock to prepare for and manage water during drought. When done in advance of a drought, planning is considered drought mitigation. These components include the objectives and operating principles; assessment of historical and potential drought impacts; drought-related monitoring; drought stages, trigger points and response targets; declaration of a drought;

development of drought-related ordinances; and the public drought education campaign.

- Ongoing monitoring of drought indicators – Castle Rock's monitoring plan is outlined in Section 6.1.

- Development of new water supplies – Castle Rock is planning to develop additional water supplies for drought protection and to meet the growing water demands of the community. New water supply options focus on the inclusion of additional renewable water sources, including additional Lawn Irrigation Return Flows (LIRF), Cherry Creek supplies from the Cherry Creek Project Water Authority, water supplies from the Box Elder project, South Platte water rights collected in Chatfield Reservoir and pumped back to Castle Rock, and additional water rights along Plum Creek and its tributaries.

- Develop cooperative sharing agreement opportunities with neighboring communities during periods of drought – Castle Rock's water supply yields may be increased by making some adjustments to how water rights are traditionally managed and through other synergies developed via cooperative agreements with other local water users. Where possible, these agreements will be established in advance of a drought as part of the mitigation effort and activated during drought periods[9]. The Town has been a member of the Water Infrastructure Supply Efficiency (WISE) project since 2009, a regional water supply effort between Aurora Water, Denver Water, and the South Metro Water Supply Authority (SMWSA). SMWSA was an earlier partnership that formed in 2004, and in turn is composed of 13 water provider members, including a majority of Douglas County[10]. In addition, importing water from the South Platte River can provide a source of renewable surface water for the Town, as specified in the Box Elder Well Field project located in Weld County. Castle Rock is also a key member in the Chatfield Reservoir Mitigation Company, which has implemented the Chatfield Reallocation Project. The Town has also formed partnerships with Dominion Water and Sanitation District (DWSD); Parker Water and Sanitation District (PWSD); Castle Pines Metropolitan District; the Pinery; Douglas County; and others to develop key pieces of infrastructure and to cost-share in projects. Appropriate Substitute Water Supply Plans and/or water court filings may occur to ensure that the agreement(s) are viable under Colorado Water Law.

[9] Activation of these agreements and identification of additional temporary arrangements during drought periods would be a component of the drought response which is addressed in Sections 5.2 and 7.

[10] SMWSA's 13 current members include Arapahoe County Water and Wastewater Authority, Castle Pines North Metropolitan District, Centennial Water and Sanitation District (serving Highlands Ranch), Cottonwood Water and Sanitation District, Dominion Water and Sanitation District, East Cherry Creek Valley Water and Sanitation District, Inverness Water and Sanitation District, Meridian Metropolitan Districts, Parker Water and Sanitation District, Pinery Water and Wastewater District, Rangeview Metropolitan District, Stonegate Village Metropolitan District, and the Town of Castle Rock.

- Existing operation and maintenance activities that improve water efficiency – Castle Rock Water currently conducts annual audits on their water distribution system, routinely repairs leaks on an as-needed basis, monitors and replaces inaccurate meters, and strategically operates its water supply system to avoid reservoir spills (releasing reservoir water when not necessary for water supply purposes). One key strategy would be to manage the Town's reservoir storage program to optimize the placement of supplies during periods when they are not needed. Current storage space includes Rueter-Hess Reservoir (8,000 AF), Chatfield Reservoir (848 AF, expandable to 2,000 AF under an option agreement with the State), Castle Rock Reservoir No. 1 (240 AF), Walker Reservoir (150 AF), and 4 aquifer storage and recovery (ASR) wells within the Denver Basin. Additionally, the Town is implementing raw water collection and line flushing to reduce plugging and periodic alluvial well cleaning.

- New operation and maintenance activities that improve water efficiency – The addition of new water supplies to Castle Rock's system will require modifications to current daily operations. Such operational changes are evaluated through the 2023 Water Master Plan, with the objective of optimizing operations to improve the efficiency and overall distribution of water supplies, when the new water supplies are developed. The water supply strategy, however, is predicted to require a steady increase in customer rates and fees, as the current long-term Water Master Plan expects the Town to spend over $475 million through 2065, to meet the desired goals. Further, the Town's 2030 Comprehensive Master Plan approved guidelines to define long-term water conservation and resource performance goals based on existing and future growth, development, and planning efforts. One new reservoir is under construction, Castle Rock Reservoir No. 2 (790 AF), and Castle Rock Reservoir No. 1 is being expanded to 560 AF.

- Conservation measures specified in both the Water Efficiency and Conservation Plans – The conservation measures shown in Table 7 serve the dual purpose of conserving water while also providing drought protection. These conservation and mitigation measures are enforced by the Town staff. A portion of the water saved through these conservation measures can be stored as drought reserves in each of Castle Rock's raw water storage facilities (e.g., ASRs, Chatfield Reservoir, Rueter-Hess Reservoir, Walker Reservoir, and Castle Rock Reservoir No. 1).

- Standard practices of Castle Rock Water and Castle Rock Town Staff – Castle Rock's management and operations reflect the Town's values of sustainability and environmental stewardship. Many of Castle Rock Water's standard operations focus on water conservation and efficient water use guidelines, providing multi-year water savings and drought mitigation during dry periods. These include irrigation audits on Town-owned parks, routine education of Town staff on how to save water, use of low volume irrigation (e.g., drip irrigation) instead of sprinklers and misters where appropriate, and training all Town staff on enforcing related water regulations. In

addition, the 2024 Water Use Management Plan (WUMP) outlines components related to the Town's irrigation procedures, enforcement rules, special water related circumstances, and more. The WUMP is updated and adopted by Council Resolution every year. As such, WUMP guidelines may be in addition to those explained in Table 10.

Table 10: Castle Rock's Conservation and Water Efficiency Guidelines

Guideline	Type of Restriction	Restriction Periods	Description
Watering related	General watering schedule[11] (Subject to change)	May 1 through September 30	Watering is limited to every-third-day for residential users, and three times a week for nonresidential users, during designated months (i.e., typical irrigation seasons)
	Applies to outdoor irrigation	Between 8pm to 8am	During the restriction period, outdoor irrigation is permitted before 8 a.m. and / or after 8 pm
	Hand watering	Any time and on any day	Allowed only as long as no water waste is occurring. Hand watering does not include irrigation with a hose and sprinkler or manual operation of an automated irrigation system
	Car washing	n/a	Using a commercial car wash is suggested, but homeowner car washing is allowed with automatic shut off nozzles, recommended use of wash bucket and sponge, and no water waste
	Pressure washing	n/a	Only with high-efficiency and low-water-use equipment with no excessive water runoff
Decorative fountains (i.e., water features)	Use and water circulation	n/a	Single-family and two-family residential: when present, swimming pools and water features will reduce the total amount of turf allowed by an equal area Non-residential properties: water features are not allowed Streetscapes, rights-of-way, and tracts along rights-of-way: Water features are not allowed
Playing in the sprinklers	Waste related	n/a	Water used for entertainment is allowed as long as a person is present and water waste is not occurring (such as water running down the street.)
Preferred ColoradoScape plants	Plant types	n/a	The Landscape and Irrigation Performance Standards and Criteria Manual identifies plants that perform well in Colorado's semi-arid, high desert climate. These guidelines should be of assistance with landscape design
New lawn installations	Irrigation exemptions	Up to 21 consecutive days for new turf, and up to 30 consecutive days for seed or other plant material	Irrigation exemptions allow residents to conduct daily watering through the specified exemption period. This exemption does not affect the volume of water allocated, only the days in which to apply it. Watering time restrictions, if in place, still apply. Irrigation exemptions will not be issued or applicable between July 1 and July 31
Nonresidential and public areas	Permissible hours or irrigation	Between 10pm and 6am	This restriction applies during irrigation season for regular nonresidential, common, and public areas, and is based on the East and West of I-25 division (where the West may irrigate Monday, Wednesday,

[11] High priority parks may be on different schedules

Guideline	Type of Restriction	Restriction Periods	Description
			and Friday, and the East on Tuesday, Thursday, and Saturday)

5.2. Supply-Side Response Strategies

The same process and screening criteria used to develop the mitigation measures described in Section 5.1 were used to identify and select the final supply-side response strategies. The final supply-side response strategies in Table 11**Error! Reference source not found.** consist of technical and financial assistance opportunities, water rights management and cooperative agreements, and improvements to water distribution efficiency. Some of these strategies are already in place and some would be new strategies employed during drought. It was noted that some of the measures listed below would require approval of a substitute water supply plan by the Division Engineer and/or approval of a change decree by the Water Court. Each of these strategies reflects the operating principles disclosed in Section 2.2 and is refined into a staged drought management program in Section 7.

Table 11: Supply-Side Response Strategies[12]

Supply-Side Mitigation and Response Strategies	Long-term Mitigation Actions	Short-term Response Strategy	Preliminary Selection of Mitigation and Response Strategies	Relative Effectiveness Value [1]
Elements of a Drought Management Plan				
Establish drought response principles, objectives, and priorities	X		Existing	H
Establish authority and process for declaring a drought emergency	X		Existing	H
Develop drought stages, trigger points, and response targets	X		Existing	H
Prepare ordinances on drought measures	X		Existing	H
Evaluate historical drought impacts	X		Existing	H
Monitor drought indicators (groundwater well levels, streamflow, etc.)	X	X	Existing	H
Monitor water quality	X	X	Existing	H
Track public perception and effectiveness of drought measures	X	X	New	H
Improve accuracy of runoff and water supply forecasts	X		New	H
Emergency Response				
Declare a drought emergency		X	New	M
Identify state and federal assistance	X	X	New	H

[12] Relative Effectiveness values:
L = Low, where the mitigation response strategy only meets one of the five screening criteria (explained below)
M = Medium, where the mitigation response strategy meets two or three of the five screening criteria (explained below)
H = High, where the mitigation response strategy meets all five screening criteria (explained below)
X = Indicates either a long-term mitigation action or a short-term response strategy (based on the respective marked column)

Screening Criteria:
Technical feasibility – Refers to whether the mitigation or response strategy will work as intended and in a timely manner. Can also refer to staff availability to implement the action
Perceived benefits – How the selected mitigation or response strategy provides an adequate amount of water savings
Cost effectiveness – An assessment of cost versus water savings
Public acceptance – How the public will accept and embrace the selected mitigation or response strategy

Supply-Side Mitigation and Response Strategies	Long-term Mitigation Actions	Short-term Response Strategy	Preliminary Selection of Mitigation and Response Strategies	Relative Effectiveness Value [1]
Public Education and Relations				
Utilize Castle Rock Water Commission as a public advisory committee	X	X	Existing	H
Develop Drought Public Education Campaign with long- and short-term strategies. (See Worksheet D)	X	X	New	H
Water Supply Augmentation				
Establish drought reserves	X		Existing	H
Draw from drought reserves		X	Existing	L
Increase groundwater pumping		X	Existing	L
Replace or drill new wells	X	X	Existing	L
Develop supplemental groundwater/conjunctive use	X		Existing	M
Blend primary supply with water of lesser quality to increase supply		X	New	H
Rehabilitate operating wells	X	X	Existing	H
Increase use of recycled water	X	X	Existing	M
Maximize use of recycled water through direct potable reuse	X	X	New	M
Build new facilities to enhance diversion or divert new supplies	X		Existing	M
Acquire additional storage	X		Existing	M
Water Rights Management and Cooperative Agreements				
Call back water rights that others are allowed to use		X	New	L
Pay senior water user to not place a "call" on the river		X	New	L
Pay upstream water user to allow diversion of more water		X	New	L
Purchase water from other entities (e.g., neighboring cities, federal projects)		X	New	M
Arrange for exchanges	X	X	Existing	M
Develop Collaborative Water Sharing Agreements	X		New	M
Invoke drought reservations that allow reduction in bypass requirements		X	New	L

Supply-Side Mitigation and Response Strategies	Long-term Mitigation Actions	Short-term Response Strategy	Preliminary Selection of Mitigation and Response Strategies	Relative Effectiveness Value [1]
Negotiate purchases or 'options'	X	X	Existing	M
Renegotiate contractually controlled supplies	X	X	Existing	M
Develop water transfers with other entities	X	X	Existing	M
Develop water bank to facilitate water transfers in times of drought	X		Existing	M
Develop interconnects with other entities	X	X	Existing	H
Trade water supplies with other entities to increase yield		X	New	M
Improve Water Distribution Efficiency				
Conduct distribution system water audit	X	X	Existing	H
Repair leaks in distribution system	X	X	Existing	H
Replace inaccurate meters	X		Existing	H
Calibrate all production, commercial/industrial, and zone meters	X		Existing	H
Minimize reservoir spills	X	X	Existing	M
Change operations to optimize efficiency and distribution of supplies	X	X	Existing	M
Change pattern of water storage and release operations to optimize efficiency	X	X	Existing	M
Reduce reservoir evaporation (i.e., reduce storage in reservoirs with high evaporation rates or cover storage facilities with solar panels or other items to reduce evaporation)	X	X	New	M
Reduce reservoir seepage (i.e., reduce storage in reservoirs with high seepage rates)	X	X	New	M
Recirculate wash water	X		Existing	M
Enhance efficiency of water treatment facilities	X		Existing	H

5.3. Demand-Side Response Strategies

The same process and screening criteria used to develop the mitigation measures described in Section 5.1 were used to identify and select the final demand-side response strategies. The final demand-side response strategies shown in Table 12 consist of actions taken by Town staff to conserve water and place water use limitations on residential and commercial/industrial customers. These strategies are refined into specific drought response measures in Section 7. Some of these strategies are already in place and some would be new strategies employed during drought. Each of these strategies reflects the operating principles disclosed in Section 2.2 and is refined into a staged drought management program in Section 7.

Table 12: Demand-Side Response Strategies[13]

Mitigation and Demand-Side Response Strategies	Type of Strategy		Selection of Mitigation and Response Strategies				Relative Effectiveness Value
	Long-term Mitigation Actions	Short-term Response Strategy	Promote/ Voluntary	Incentive Based	Mandatory	Coordinate with Other Entities	
Provider/Municipality							
Develop drought public education campaign with long-term and short-term demand management strategies	X	X	Existing				H
Identify high water use customers and develop water saving targets	X	X			Existing		H
Implement conservation measures that also provide water saving benefits during drought periods (e.g., water fixture rebates)	X			Existing	Existing		H
Conduct irrigation audits on Provider/Municipal parks and open spaces	X	X			Existing		H
Educate provider/municipal staff on how to save water	X	X	Existing				H
Provide instructional resources to business on developing an office/business specific drought mitigation and response plan	X	X	New				M
Eliminate/reduce irrigation on provider/municipal owned parks and landscaping	X	X	New			Existing	M
Limit outdoor watering to specific times of the day	X	X			Existing		H

[13] Relative Effectiveness values:
L = Low, where the mitigation response strategy only meets one of the five screening criteria (explained below)
M = Medium, where the mitigation response strategy meets two or three of the five screening criteria (explained below)
H = High, where the mitigation response strategy meets all five screening criteria (explained below)
X = Indicates either a long-term mitigation action or a short-term response strategy (based on the respective marked column)

Screening Criteria:
Technical feasibility – Refers to whether the mitigation or response strategy will work as intended and in a timely manner. This section also takes into account staff availability to implement the action
Perceived benefits – How the selected mitigation or response strategy provides an adequate amount of water savings
Cost effectiveness – An assessment of cost versus water savings
Public acceptance – How the public will accept and embrace the selected mitigation or response strategy

Mitigation and Demand-Side Response Strategies	Type of Strategy		Selection of Mitigation and Response Strategies				Relative Effectiveness Value
	Long-term Mitigation Actions	Short-term Response Strategy	Promote/ Voluntary	Incentive Based	Mandatory	Coordinate with Other Entities	
Limit number of watering days per week	X	X			Existing		H
Set time limit for watering	X	X			Existing		H
Prohibit watering during fall, winter, and early spring		X	New				M
Convert sprinklers to low volume irrigation where appropriate	X			Existing			H
Restrict outdoor misting devices		X			Existing		H
Reduce street cleaning, sidewalk, and driveway washing		X			Existing		H
Install water saving fixtures, toilets, and/or appliances in provider/municipal-owned buildings	X				Existing		H
Water violation costs will double from Drought Stage 2 and higher		X			New		
Conduct indoor water audits	X	X		New			H
Residential							
Enforce landscape watering restrictions	X	X			Existing		H
Reduce available water budget for outdoor use (results in higher rates for water purchased over reduced water budget), reduce surcharge threshold and increase Tier 3 and surcharge rates by 10%		X		New			H
Limit outdoor watering to specific times of the day	X	X			Existing		H
Limit number of watering days per week	X	X			Existing		H
Set time limit for watering	X	X			Existing		H
Limit watering to hand-held hose or no-volume non-spray device		X			Existing		H
Promote outdoor water audits	X	X	New				M
Convert sprinklers to low volume irrigation where appropriate	X	X		Existing			H
Limit/restrict outdoor misting devices	X	X			Existing		H
Limit/prohibit installation of new sod, seeding, and/or other landscaping		X			New strategy		H

Mitigation and Demand-Side Response Strategies	Type of Strategy		Selection of Mitigation and Response Strategies				Relative Effectiveness Value
	Long-term Mitigation Actions	Short-term Response Strategy	Promote/ Voluntary	Incentive Based	Mandatory	Coordinate with Other Entities	
Enforce policy guidelines/limitations for installation of new sod and/or other landscaping	X	X			Existing		H
Enforce restrictions on spraying of impervious surfaces		X			Existing		H
Promote indoor water audits	X	X		New			M
Promote/require installation of water efficient appliances (e.g., dishwashers, clothes washer)	X	X			Existing		H
Promote/require graywater use	X	X	New				M
Provide acoustical meters to assist customers in identifying leaks	X	X	Existing				H
Require water efficient fixtures and/or appliances on house resale or remodeling	X				Existing		H
Provide historical monthly water usage on water bills	X	X			Existing		H
Provide real-time water metering information	X		New	New			M
Commercial/Industrial							
Prohibit/limit use of construction water		X				New	M
Reduce available water budget for outdoor use (results in higher rates for water purchased over reduced water budget), reduce surcharge threshold and increase Tier 3 and surcharge rates by 10%		X		New			H
Enforce policy guidelines/limitations for installation of new sod and/or other landscaping	X	X				New	H
Enforce outdoor landscape watering restrictions	X	X			Existing		H
Promote/require indoor and outdoor water audits where applicable	X	X	Existing				H
Turn off indoor and outdoor ornamental fountains		X				Existing	H
Promote/enforce installation of water efficient fixtures and appliances (e.g., toilets, faucets)	X	X			Existing		H
Promote commercial car washes to install water recycling technology and/or other BMPs	X	X			Existing		H

Mitigation and Demand-Side Response Strategies	Type of Strategy		Selection of Mitigation and Response Strategies				Relative Effectiveness Value
	Long-term Mitigation Actions	Short-term Response Strategy	Promote/ Voluntary	Incentive Based	Mandatory	Coordinate with Other Entities	
Promote/enforce service of water in restaurants only upon request	X	X	New				M
Promote/enforce reduction in frequency of linen and towel washing in hotels	X	X	New				M
Provide instructional resources on developing a business/office specific conservation plan	X	X	New				H

5.4. Drought Public Information and Educational Campaign

Castle Rock's water demands were significantly reduced during the 2002 drought as a result of the public's awareness and responsiveness to reduce water consumption. The public drought information and educational campaign (public drought campaign) will be one of Castle Rock's largest drought management efforts. Currently, the Water Wiser program is the Town's campaign related to educating customers on water conservation, mitigation, and general watering guidelines. Water Wiser includes an interactive, hands-on workshop aimed at residential populations. The workshop introduces the seven principles of ColoradoScape and focuses on irrigation efficiency and water management to provide customers with easy to implement conservation techniques. Additionally, Castle Rock has a conservation website[14] – which also advertises the Water Wiser program and related benefits – dedicated to pushing forth conservation efforts and educating local water users. Information such as data collected from weather stations, preferred plant lists to utilize in the Town, and irrigation recommendations are all available at the website.

The public drought campaign will be closely coordinated with Castle Rock's current conservation education programs and other related programs providing information on sustainability, weather, climate change, etc. When reasonable, these programs may be integrated into a single program by the Communications Department and Castle Rock Water to integrate efforts and enhance efficiencies. These program(s) will promote the importance of conserving water and achieving water savings in both normal and drought years. During non-drought years the drought campaign component will simply provide a general overview on drought and the importance of drought preparedness. During a drought, the drought messages will increase in frequency and intensity and will be expanded to include information on the staged drought response program and the necessity to conserve supplies.

The objectives of the public drought campaign are:

- Provide concise effective drought information to Castle Rock customers (individuals as well as the commercial/industrial sector) and the media.
- Adjust the intensity of the public outreach effort in accordance to the severity of the drought (drought stage).
- Coordinate campaign efforts with nearby municipal entities and other conservation-oriented entities to capitalize on synergistic opportunities and convey, where appropriate, a consistent drought message.
- Clarify drought-related policies affecting landscaping and property maintenance, including notification that brown or dormant turf may result from compliance with drought restrictions and that common interest communities (such as HOAs or metro

[14] Conserve Castle Rock, CO | Official Website

districts) enforcement actions related to such conditions are prohibited during declared drought stages, as provided in Municipal Code §13.15.080(D).

The public drought campaign will provide the basic foundational drought information during non-drought periods outlined in Table 13. Castle Rock Water will monitor the drought messages and information conveyed by other local providers to ensure that differences in drought-related messages may be explained, if necessary. Information from other providers may also serve as a means to generate new ideas of how Castle Rock's public drought campaign and overall drought response could be improved.

Table 13: Public Drought Campaign Messages (Pre-Drought and Continuing During Drought Periods)

Drought Information	Coordination with Other Entities
Status of current drought conditions and corresponding drought stage, available live every day on CRW's website as the water supply index[15]	Be aware of messages conveyed by neighboring providers in order to explain, if necessary, why there are differences in the messages as well as in the overall drought response.
Colorado State Drought Task Force (group of State Departments and Agencies and over 700 water providers that coordinate on drought response, Castle Rock Water is a member)	Ensure that Castle Rock Water is coordinating and consistent with the messaging and responses that are taken through the Colorado State Drought Task Force with modifications for local needs
Long-term sustainability of water supply system	Coordination with water partners
Location of where customers may access the Drought Management Plan	n/a
Factors that could influence water supply services and cost of services	Neighboring communities and providers
Water provider's actions to save water and/or acquire new water	Be aware of other local providers' drought mitigation efforts. This may be helpful to generate new ideas to improve the Town's public drought campaign and overall mitigation efforts.
Drought policies, requirements, and penalties	n/a
Historical consumption information on water bills	n/a

During drought periods, the intensity of both the conservation public education program and public drought campaign will increase. Particular messages as well as the means in which the information is conveyed to the public will be customized to the severity of the drought and public informational needs at that time. Information Castle Rock intends to convey to the public during drought periods, as shown in Table 14, consists of educating customers of drought policies (water restrictions), enforcement, landscaping tips, and an expansion of the Water Wiser Program established via the Conservation Plan. Public messaging will also address potential conflicts between Town drought regulations and common interest communities requirements,

[15] Drought Management | Castle Rock, CO - Official Website

clearly communicating that compliance with Town-imposed water restrictions takes precedence during declared drought conditions.

The Water Wiser Program advertises and promotes businesses that practice a strong water conservation ethic. This may encompass installing water efficient appliances/fixtures, ColoradoScape landscaping, water conservation education to staff, and other ideas. During droughts, this program will be expanded to advertise and promote businesses that are going the extra mile to conserve water and adhere to voluntary drought response measures.

Coordination with other entities will be an important component of the public drought campaign during periods of drought. Efforts will be made to take advantage of synergies associated with consistent drought-related messages shared among neighboring providers and collectively contributing to a regional drought outreach effort. During this period, it will also be important to be aware of drought conditions in neighboring counties. This information along with information regarding drought trends by county is available on the US Drought Monitor website[16] for Colorado. This will enable Castle Rock to explain any differences among their drought response efforts and maintain integrity with the public. Additionally, other entities may be able to provide assistance with the advertisement of drought related information. For example, several landscaping companies in Castle Rock may be able to provide landscaping tips during a drought and what to do to revive landscape following droughts.

Table 14: Public Drought Campaign Response Information to Convey During a Drought

Drought Information	Coordination with other Entities
Measures and/or impacts which customers can expect if drought continues or intensifies	Be aware of the drought response measures implemented by other local providers. This will assist in addressing public concerns and questions.
Increase advertisement of water conservation promotion and incentives specified in the conservation and drought plans	Identify synergies/benefits of working with other entities on this advertisement campaign.
Landscaping tips during a drought (e.g., which plants to convert to drip, which to save, which to let die)	Research information that is currently available and identify whether there are other entities that can assist with this effort.
Post-drought landscape revival information	Research information that is currently available and identify whether there are other entities that can assist with this effort.
Encourage intense public discussion and media involvement concerning ways to reduce water use while minimizing impacts (e.g., landscaping impacts)	The Town's Communications Department
Explain rate increases/drought surcharges if applicable (this can concern both drought and post-drought years)	Be aware of other provider's rates and drought surcharges, if applicable
Publicize efforts of individuals and businesses as examples of how to reduce water use.	The Town's Communications Department

[16] Colorado | U.S. Drought Monitor

Drought Information	Coordination with other Entities
Response measure notifying customers who are in the top 10-25% of users for their customer class. Offer audit and leak detection assistance.	The Town's Communications Department.

Castle Rock Water will coordinate efforts with the Communications Department to ensure that accurate information is being conveyed to the media and to customers, and that educational and outreach opportunities are maximized. The Communications Department will be responsible for developing regular action plans detailing the specific drought-related messages delivered to the targeted audiences both prior to and during a drought. This will be an evolving process that could change on a seasonal basis depending on weather and public concerns. The basic targeted audiences and communication tools intended to be used by the Communications Department are shown in Table 15. Outreach will mainly consist of website communications, social networking media, and emailing lists with informational emails during non-drought periods. Communication tools will likely be expanded to newspaper articles, television ads, water bill inserts, emails targeted to specific water users, the introduction of a drought or water-related hotline, booths at special events, public meetings or special events, and school programs during a drought.

Table 15: Public Drought Campaign Audiences and Communication Tools

Targeted Audience	Long-term Mitigation	Short-term Response Strategy
Decision/policy makers, Town departments (Parks and Recreation, Finance, etc.)	Email	Email Meetings
Media	Website Social networking media Interviews	Websites Newspaper articles Social networking media Interviews Television ads
Water Customers (Single and multi-family, HOAs, commercial)	Website Broadly distributed emails Social networking media Water Wiser program Contests	Websites Broadly distributed emails Social networking media Public meetings Bill inserts Newspaper articles Billboards Booths at special events Targeted emails/mailings
Targeted business owner customers (recreation facilities, nurseries, health facilities, schools)	Website Social networking media Water Wiser program	Websites Emails targeted for business owners Social networking media Phone calls Meetings Direct mailings for targeted audiences

Targeted Audience	Long-term Mitigation	Short-term Response Strategy
Large water users (golf courses, water-intensive industrial/commercial customers)	Website Social networking media Water Wiser program	Websites Emails targeted for large water users Social networking media Meetings Phone calls Direct mailings for targeted audiences
Commercial business employees	Website Broadly distributed emails Social networking media	Websites Broadly distributed emails Social networking media
School children	Water educational curricula for teachers Water educational programs for students Water festivals	School programs Booths at special events for children

6. DROUGHT STAGES, TRIGGER POINTS AND RESPONSE TARGETS

Droughts can vary significantly in spatial extent, severity, and duration. The drought stages in Table 17 were developed to capture this variability and identify an appropriate level of response, according to drought severity. The five stages increase in intensity from advisory, to watch, to warning, to emergency, to critical/crisis. The response target (targeted water savings) also increases with each stage, with a 10% water savings target under the advisory drought stage and a 60%+ water savings target under the critical/crisis drought stage.

The drought trigger points are based on a water supply index that compares supply to demand. Supply includes Denver Basin groundwater, alluvial water from East Plum Creek, surface water direct flow (such as Castle Rock East Plum Creek diversion [CR-1] or the Plum Creek diversion near Sedalia), reusable water supplies captured at the Plum Creek diversion, water stored in Castle Rock Reservoir No. 1, water from the WISE project, and water delivered from supplies stored in Rueter Hess Reservoir from Parker's Rueter Hess Reservoir Water Purification Facility. Table 13 shows the supply sources and their approximate yields. (Note: MGD = Millions of Gallons per Day, AF = Acre Feet, and gpcd = gallons per capita per day.)

Table 16: Current Sources of Supply (as of 2024)

Supply Source	Firm or Reliable Yield
Denver Basin well system (deep groundwater wells)[17]	20.3 MGD, or ~22,738 AF per year
Alluvial well system along East Plum Creek	0.821 MGD, or ~919 AF per year

[17] Per the 2021 Water Resources Strategic Master Plan (2016 Water Plan), the Town's access to this water is limited by infrastructure and aquifer water levels.

Surface water from East Plum Creek and Plum Creek including reusable water captured at the Plum Creek Diversion	2.3 MGD, or ~2,576 AF per year
WISE	0.65 MGD, or ~728 AF per year
Castle Rock's Rueter Hess Reservoir water treated by Parker Water	0.65 MGD, or ~728 AF per year
Total	24.72 MGD, or ~27,691 AF per year

As shown in Table 16, the current (as of 2024) total daily available supply for the Town ranges from around 19.27 to 24.09 MGD.

Current and future demand is projected in the 2021 Water Resources Strategic Master Plan. In 2023, the population was 84,792 and the peak daily water demand was 18.3 MGD and in 2022 it was 19.2 MGD. The total future population is projected to be as high as 155,000 people in 2050. Water demand is estimated to range from a low of 100 gpcd to 135 gpcd, resulting in a range of future (2050) demand of 15,600 to 24,750 AF/year, or 15.5 to 30 MGD, on average.

A Water Supply Index (WSI) based on the Town's supply versus demand was developed for this drought management plan, as a running index to define thresholds for the five drought stages. The WSI calculation for Castle Rock can be written as follows:

$$WSI = \frac{Supply}{Demand} = \frac{Deep\ groundwater + Alluvial\ wells + \ Surface\ water\ + Imported}{Maximum\ daily\ demand}$$

Maximum daily demand was used as the demand metric because it accounts for the highest possible water use required to meet the Town's needs on a regular basis. From 2021 to 2023, the Town's daily maximum demand averaged 18.6 MGD. Projected demands for maximum daily use are expected to be in the range of 20 to 23 MGD over the next five years. This drought plan assumes that maximum daily demands will be met via flexibility in day-to-day operations, though demands always vary seasonally and according to population changes/growth. The Town will monitor the WSI in real time. The Town will use the ten-day rolling average of the continuously-calculated WSI as the basis for a drought declaration. The rolling average is used to smooth the variations in the WSI calculation, so that day-to-day fluctuations in the WSI do not unnecessarily trigger a drought declaration.

The WSI is useful for evaluating the Castle Rock Water's capability to meet demands, given direct (e.g., groundwater) and indirect (e.g., from the WISE partnership) water resources available. For example, in 2017 the WSI hovered around four in January and February and three in the early spring before dipping below two during the flash drought in May and June. Because daily supply and demand fluctuates, the Town will use both quantitative (WSI) and qualitative (professional judgement) guideposts to determine when to trigger a drought stage. In general, as long as the WSI is above 1.1, Castle Rock Water may not need to enact water savings or other such measures. Once the WSI drops below the trigger point guidelines shown in Table 17, and

Castle Rock Water staff observe the WSI trend to be stagnant and hence not improving (i.e., the trajectory of the line is either flat or going down), an appropriate drought stage shall be called.

Table 17: Drought Stages, Trigger Point Guidelines and Response Targets

Drought Stage	WSI	Response Targets[18]	Key Restrictions
Advisory	1.09 to 1.05	10% water savings	Voluntary water use reductions.
Watch	1.04 to 1.00	25% water savings	Outdoor watering limited to 2 times per week. This includes a 2x/wk limit on hand watering and no exemptions for "Water Wise" customers.
Warning	0.99 to 0.95	40% water savings	Outdoor watering limited to 1 time per week. This includes a 1x/wk limit on hand watering and no exemptions for "Water Wise" customers.
Emergency	0.94 to 0.90	50% water savings	All outdoor watering/irrigation banned.
Critical/Crisis	<0.90	60+% water savings	All outdoor watering/irrigation banned, plus some indoor water use restrictions.

A WSI of 1.04 to 1.00 is the quantitative trigger to the Watch Drought Stage and means that supply is nearly equal to demand. In this stage, the Town would continue measures started in the Advisory stage and begin additional measures with the goal of reducing demand by 25%.

A WSI of 0.99 to 0.95 is the quantitative trigger to the Warning Drought Stage and means that supply is now less than demand, by 1% to 5%. In this stage, the Town would continue measures started in the Advisory and Watch stages and begin additional measures with the goal of reducing demand by about 40%. At the Town's discretion, measures to increase supply may also be considered.

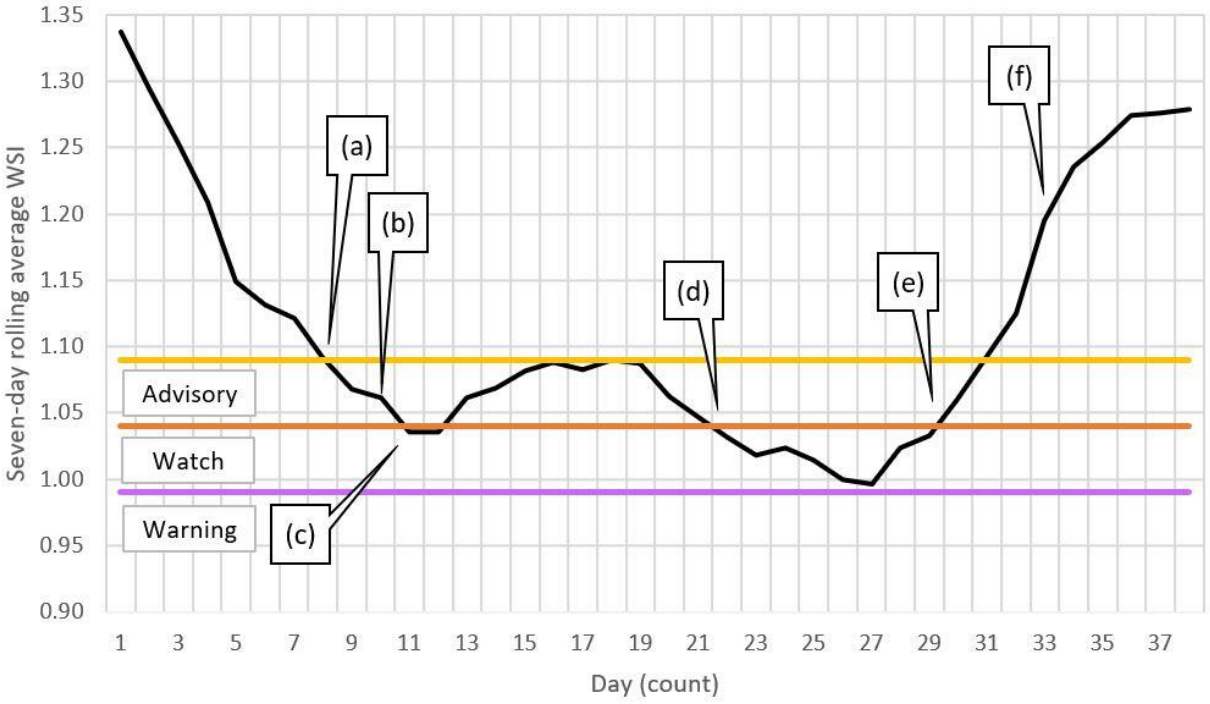
A WSI of 0.90 to 0.94 is the quantitative trigger to the Emergency Drought Stage and means that supply is up to 10% less than demand. In this stage, the Town would continue measures started in the Advisory, Watch, and Warning stages and begin additional measures with the goal of reducing demand by about 50%. Measures to increase supply will also be considered.

A WSI of less than 0.90 triggers the Critical/Crisis Drought Stage, and means that supply is less than 90% of demand. In this stage, the Town would take all available measures to minimize demand while actively seeking to obtain supplemental supplies, with the goal of bringing the WSI above 1.0. Once supply equals demand, water conservation measures can remain in place until the WSI is back above 1.1 and the drought stage can be lifted.

[18] Percentage water savings is measured as the most recent month or months of total retail water sales divided by the retail water sales used in the original WSI calculation.

In all drought stages, the Town will have the ability to take measures to both increase supply and decrease demand, with the goal of reaching and maintaining a WSI of 1.1 or greater. Section 7 presents specific measures to be taken in each stage. Figure 4 shows a hypothetical WSI scenario, and illustrates how the Town could respond at each stage.

Figure 4: Hypothetical Water Supply Index (WSI) Scenario



Notes:

(a) WSI first dips below 1.1. Town staff monitor the situation for a few days to see which direction supply and demand will follow.

(b) On the third day of WSI below 1.1, Town triggers the Advisory drought stage. Castle Rock Water communicates water restrictions to customers.

(c) WSI dips below 1.05 for two days. Town staff monitor the situation. The WSI recovers above 1.05 after two days, and the drought stage is not switched to Watch.

(d) WSI again dips below 1.05. Town staff monitor the situation and trigger the Watch drought stage after the WSI fails to improve. Castle Rock Water communicates additional water restrictions to customers.

(e) Although the WSI has climbed above 1.05, Town staff do not immediately transition from "Watch" to "Advisory", opting instead to wait and see what happens.

(f) After observing the WSI above 1.1 for three days, and noting the upward trajectory of the graph, the "Watch" drought stage is lifted. Castle Rock Water notifies customers that the water restrictions specific to the drought have been lifted.

In all cases, after a drought stage has been triggered, the Town would recalculate the WSI frequently with updated supply and demand information to evaluate if the drought stage is still appropriate. The Town may also choose to slightly modify the WSI calculation to account for monthly or even yearly water supply and demand variations, and put together appropriate drought prediction reports.

In evaluating the Town's supply, several direct and indirect indicators should be considered. While the WSI metric provides the direct indicators and hence the points at which to trigger drought stages, additional (indirect/qualitative) indicators are useful to determine conditions in more detail. These are discussed in Section 6.1, and include the reservoir and storage tank levels (e.g. Rueter-Hess Reservoir, Chatfield Reservoir, Castle Rock Reservoir No. 1, Castle Rock Reservoir No. 2 and Walker Reservoir), temperature and precipitation records, higher than anticipated water demands, streamflows (e.g., from East Plum Creek, Plum Creek and Cherry Creek), infrastructure-based or water supply service interruptions, or other additional resources provided by the CWCB's website or the National Integrated Drought Information System (NIDIS) drought portal. Monitoring is discussed further in Section 6.2. Although the WSI is a snapshot in time using current supply and demand values, it is critical in the Town's planning and response to a drought.

As the Town continues to shift from deep groundwater for a significant portion of its supply, the supply side of the WSI will be more static. As Castle Rock Water continues to bring on less reliable but renewable surface water, reuse water, and imported sources, the Town's WSI may not always be comfortably above 1.1. As supplies continue to shift, the key indicators mentioned above and detailed in Section 6.1 will take on greater significance. Another advantage of the WSI approach is that it can reflect equipment failures such as a well pump failure, independent of weather conditions which may necessitate water restrictions similar to a drought response.

The drought trigger levels in Table 17 are general guidelines. Sustained, multi-year droughts could require a significant modification to the drought triggers based on the duration and severity of the drought as well as Castle Rock Water staff's historical experience managing the Town's water supply systems. In addition, future weather change events could additionally affect water restoration levels, or have an impact on water demands, water infrastructure, or service interruptions. The declaration of a drought, timing of the declaration, and corresponding drought stage will ultimately be a decision based on a combination of factors and informed judgement. The decision will be based on a combination of the drought trigger guidelines, historical staff experience, and other drought indicator data described in Section 6.1. Drought declaration is also discussed in Section 8.2.

6.1. Monitoring of Direct and Indirect Drought Indicators

Castle Rock Water is responsible for recording and evaluating drought indicator data. Monitoring data are collected throughout the year. These data are critical in characterizing Castle Rock's water supplies under various hydrologic conditions, and aid in predicting drought in a timely manner. Table 18 summarizes the main drought indicators used to monitor drought. Typically, these data are recorded and assessed at the end of each month; however, the frequency may increase during dry periods and in the spring and summer when runoff and river administration conditions are accounted for in the overall availability of Castle Rock's supplies. These data are processed frequently and stored electronically on the Town's server according to the Town's standard electronic filing protocol. Downloaded raw data are saved independently of other processed files to maintain the integrity of the original monitoring data.

Prior to May, Castle Rock Water develops a Summer Operations Plan which provides updated available supplies for the coming irrigation season. This tool is critical for planning in preparation for a potential drought. Starting in early May and continuing through October, Castle Rock Water specifically monitors trends in temperature, precipitation, daily demands, available supplies, storage tanks and reservoirs, and streamflows, among others, and makes projections of expected future storage. Castle Rock Water recognizes that drought responses should be formulated and announced as early as possible in order to maximize their effectiveness.

Castle Rock Water may also rely on other data sources, in addition to the primary drought monitoring data used to calculate the Water Supply Index described in the previous section, to predict and declare a drought. This may include regional weather/hydrologic data (e.g., from NIDIS Drought Portal, Colorado Water Availability Task Force reports), drought indices such as the Modified Palmer Drought Severity Index when appropriate, information from other nearby water users, long-term weather forecasts, etc.

Table 18: Monitoring of Drought Indicators (Direct and Indirect Sources)

Drought Indicators	Type of Data
Water Supply Index (WSI)	Indicator of the total (maximum) available water supply and demand in the Town – this is the primary metric used to predict drought (and trigger drought stages)
Storage tank levels and reservoirs	Levels in storage tanks and reservoirs such as Rueter-Hess, Chatfield, Castle Rock No. 1, Castle Rock No. 2, and Walker Reservoirs.
Precipitation and temperature records	Inches of rainfall from weather gages as well as other temperature and weather records from sources such as the National Integrated Drought Information System (NIDIS) and local weather stations[19]
Higher than anticipated water demands	Castle Rock's demand forecasting includes a multi-month (May through October) forecasting procedure based on precipitation, short- and long-term temperature outlooks, and a close monitoring phase during the summer months. The Summer Operations Plan helps predict what the summer demands will look like based on new water supplies, weather projections and other changes in the community.
Streamflows	Average daily flow rate at the Plum Creek stream gage stations (Haskins Gulch, West Plum Creek Bridge, Titan Road)
Major infrastructure or water supply service interruptions	Information on major interruptions to water services or infrastructure that may prevent water from being pumped, processed (e.g., sanitized), or delivered to users
US Drought Monitor	Aggregate of a variety of indices, data, and expert opinion, updated on a weekly basis.

6.2. Drought Declaration and Predictability

Drought can appear quickly or slowly, last for a season or many years, and can occur locally, regionally, or statewide. Furthermore, a drought does not usually have a clearly defined beginning or end and is difficult to predict. Following the 2002 drought, snowpack accumulation in early 2003 was again abnormally low and, if not for a large single snow storm event in late March 2003, many providers throughout Colorado, including Aurora (who are in partnership with the Town regarding water supply) and Denver Water, would have been seriously stressed and under significant water restrictions for the summer of 2003 and beyond. As such it is crucial that droughts, whether presently occurring or predicted to occur, are declared in a timely and effective manner.

It is important to ensure that the official drought declaration and corresponding drought stage designation occurs in a timely manner. If a drought is declared too late or actions are not taken early enough to reduce water use, supplies can be severely depleted and strict water restrictions and economic impacts may be required that could have been avoided. Conversely, premature

[19] The Town of Castle Rock has four primary weather stations identifying data for each micro climate. Castle Rock tends to be higher in altitude and cooler in climate than surrounding areas. Having this specific data provides better calculations to determine evapotranspiration and irrigation needs. The data for temperature, wind, humidity and solar radiation is updated continuously.

drought declarations can result in unnecessary mandatory water restrictions and associated impacts, while customers can lose confidence in the declaration.

Drought declarations are further complicated by the unpredictability of drought and storm events. Droughts may extend over multiple years which could result in response targets greater than what are provided in Table 17. The declaration of a drought and corresponding drought stage will be a real-time decision using the drought trigger guidelines in Table 17, historical experience, and other drought indicators discussed in Section 6.

The drought stage may also be de-escalated (e.g., changed from the critical to the warning stage) and/or the drought declaration may be terminated if storm events or other hydrologic conditions sufficiently reduce stress to Castle Rock's water supplies. This decision will be based on drought monitoring data, the WSI, and Castle Rock Water staff's historical experience and professional judgment in managing Castle Rock's supplies.

7. STAGED DROUGHT RESPONSE PROGRAM

The staged drought response program defines the specific response measures to be taken according to drought stage. This section outlines the supply and demand-side measures and associated enforcement levels by drought stage. It is important to note that crucial components of this program include the declaration, implementation, enforcement, and monitoring, which are discussed in Sections 8.2, 8.3, 8.4, and 8.5, respectively. During all drought stages, compliance with Town-imposed water use restrictions may result in brown or dormant turf and other landscape impacts. In accordance with Town Ordinance 2026-XXX, common interest communities (such as HOAs or metro districts) are prohibited from enforcing landscaping standards that conflict with these drought response measures for the duration of the declared drought stage.

In addition, it is important to note that there are several mandatory outdoor water restrictions which are implemented annually regardless of drought stage during the summer months (May 1 through September 30), but which can be superseded by stricter measures or be made to last beyond (as well as begin taking effect before) the currently stated periods, as necessary. The Town enforces the watering and irrigation schedule to enable water conservation, and Castle Rock Water reserves the right to make changes to the schedule and/or response measures as the staff deems appropriate. Table 19 summarizes the watering schedules by address, which apply to residential customers.

Figure 5 portrays the watering guidelines and irrigation schedules for non-residential customers (including commercial/industrial users). For properties east of I-25, designated watering days are

Tuesday, Thursday, and Saturday. For properties west of I-25, designated watering days are Monday, Wednesday, and Friday[20].

Table 19: Annual Summer Water Restrictions for Residential Customers – Watering Guidelines by Address[21]

Designation	Applies If
Square	Address ends in 0, 1, 2, or 3
Circle	Address ends in 4, 5, or 6
Diamond	Address ends in 7, 8, or 9

[20] See the Water Use Management Plan under Water Resources / Conservation at the following website: Plans and Regulations | Castle Rock, CO - Official Website

[21] Watering is permitted every-third day for residential customers, and only between the hours of 8p.m. and 8a.m. Non-residential and commercial/industrial customers (to include common and public areas) may irrigate between the hours of 10p.m. and 6a.m., three days a week. The above schedule applies only to residential customers based on the ending address numbers. (Note that certain streets in Founders Village have special schedules.)

Figure 5: Watering and Irrigation Schedule for Non-Residential Customers

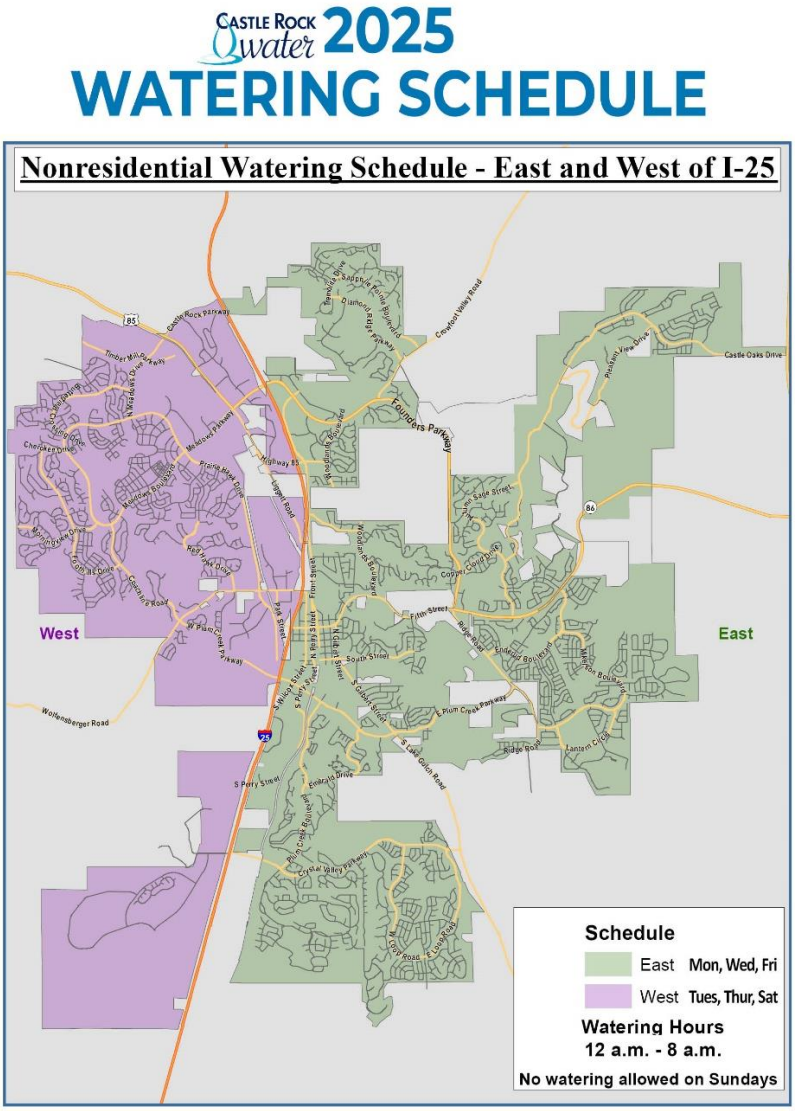


Table 20 through Table 22 contain a summary of the five drought stages with their related response strategies.

Table 20: Supply-Side Measures Summary of the Staged Drought Response Program

	Advisory	Watch	Warning	Emergency	Critical/Crisis
Technical and financial assistance	Seek technical and financial assistance opportunities.	Seek technical and financial assistance opportunities.	Seek technical and financial assistance opportunities.	Seek technical and financial assistance opportunities.	Seek technical and financial assistance opportunities.
Water rights and cooperative agreements	Assess new water rights management, consider use of emergency connections (e.g., Pinery), and cooperative agreement opportunities.	Assess new water rights management, consider use of emergency connections (e.g., Pinery), and cooperative agreement opportunities.	Assess new water rights management, consider use of emergency connections (e.g., Pinery), and cooperative agreement opportunities.	Assess new water rights management, consider use of emergency connections (e.g., Pinery), and cooperative agreement opportunities.	Assess new water rights management, consider use of emergency connections (e.g., Pinery), and cooperative agreement opportunities at a regional and national level.

Table 21: Castle Rock Water Department and General Use Demand-Side Measures Summary of the Staged Drought Response Program

	Advisory	Watch	Warning	Emergency	Critical/Crisis
Drought surcharge	n/a	Implement a drought surcharge design as follows: Reduce ET Factors by half which will reduce the outdoor water budget for all customers putting them into Tier 3 rates for water usage over half their normal outdoor budget.	Implement a drought surcharge design as follows: Reduce ET Factors by half which will reduce the outdoor water budget for all customers putting them into Tier 3 rates for water usage over half their normal outdoor budget. Reduce conservation surcharge to 30,000 gallons and increase Tier 3 rate by 10%.	Implement a drought surcharge design as follows: Eliminate outdoor water budgets for all customers putting them into Tier 3 rates for water usage for any outdoor water use. Reduce conservation surcharge to 15,000 gallons, increase Tier 3 rate by 10%, and increase surcharge by 10%.	Implement a drought surcharge as follows: Eliminate outdoor water budgets for all customers putting them into Tier 3 rates for water usage for any outdoor water use. Reduce conservation threshold to indoor use so that all use in excess of the indoor allowance would be charged at the surcharge, increase Tier 3 rate by 10%, and increase surcharge by 10%. Implement periodic water shutoffs as needed.
Outdoor irrigation	Standard irrigation practices on Town-owned properties that promote efficient water use.	Standard irrigation practices on Town-owned properties that promote efficient water use. Turf irrigation on Town-owned property from September 30 to May 1 is prohibited. Residents are encouraged to forego the installation of new sod, seeding, and landscaping.	Restrict turf irrigation on Town parks and open spaces. Sports fields, trees and shrubs, and preferred "green areas" specified via community outreach efforts may be irrigated on a pre-determined limited basis. Turf irrigation on Town-owned property from September 30 to May 1 is prohibited. New sod, seeding, and landscaping is prohibited.	All outdoor water use and irrigation is prohibited, unless necessary for emergency response operations.	All outdoor water use and irrigation is prohibited, unless necessary for emergency response operations.

	Advisory	Watch	Warning	Emergency	Critical/Crisis
Washing of Town-owned vehicles	Washing of Town-owned field vehicles is limited to once every two weeks and washing of all other vehicles is limited to once per month.	Washing of Town-owned field vehicles is limited to once every two weeks and washing of all other vehicles is limited to once per a month.	Washing of Town-owned vehicles is prohibited.	Washing of Town-owned vehicles is prohibited.	All outdoor water use is prohibited, unless necessary for emergency response operations.
Washing (personal vehicles and impervious surfaces)	Power washing and spraying on impervious surfaces (driveways and sidewalks) should be minimized. Personal vehicles may only be washed using bucket and hand-held hose with shut-off nozzle.	Power washing and spraying on impervious surfaces (driveways and sidewalks) is prohibited. Personal vehicles may only be washed using bucket and hand-held hose with shut-off nozzle.	Power washing and spraying on impervious surfaces (driveways and sidewalks) is prohibited. All washing of personal vehicles is prohibited except at commercial car washes.	Power washing and spraying on impervious surfaces (driveways and sidewalks) is prohibited. All washing of personal vehicles is prohibited except at commercial car washes (which are limited to using up to 20 gallons per vehicle)	All outdoor water use is prohibited, unless necessary for emergency response operations.
Hydrants	n/a	Reduce frequency of hydrant washing and flushing.	Reduce frequency of hydrant flushing.	Hydrant washing and flushing is prohibited unless necessary for public safety reasons.	Use of all water for fire training and of water from the hydrant is prohibited unless essential for public safety.
	n/a	n/a	Use of water for fire department training shall be limited to hand-line training only.	Use of all water for fire training and of water from the hydrant is prohibited unless essential for public safety.	
Fountains	Ornamental fountains and drinking fountains in Town-owned parks are turned off from 10:00 am to 4:00 pm.	Ornamental fountains and drinking fountains in Town-owned parks are turned off. All non-recirculating outdoor fountains must be turned off.	All ornamental fountains and drinking fountains on Town-owned property and Town-owned buildings are to be turned off. Residential fountains must be turned off.	All ornamental fountains, drinking fountains on Town-owned property and Town-owned buildings, and residential fountains are to be turned off.	All outdoor and indoor fountains must be turned off.

	Advisory	Watch	Warning	Emergency	Critical/Crisis
Swimming pools and hot tubs	All private swimming pools and hot tubs should be covered when not in use and maintained to prevent leaks.	All private swimming pools and hot tubs should be covered when not in use and maintained to prevent leaks.	The filling of private swimming pools and hot tubs is discouraged.	The filling of private swimming pools and hot tubs is prohibited.	The filling of all swimming pools and hot tubs is prohibited (residential and commercial/industrial).
Air conditioning	Adjust room temperatures to reduce use of water-cooled air conditioning.	Adjust room temperatures to reduce use of water-cooled air conditioning.	Adjust room temperatures to reduce use of water-cooled air conditioning.	Adjust room temperatures to reduce use of water-cooled air conditioning.	No outdoor or indoor water use not strictly necessary is prohibited.
Indoor restrictions	n/a	n/a	n/a	Residents are limited to 30 gallons per person per day.	Indoor water use is heavily restricted to critical uses only (e.g., drinking, cooking, bathing), and may be periodically shutoff as necessary.

Table 22: Commercial and Institutional Demand-Side Measures Summary of the Staged Drought Response Program

	Advisory	Watch	Warning	Emergency	Critical/Crisis
Bulk Water Station Use	Conserve and prevent wasting of bulk water.	Conserve and prevent wasting of bulk water.	Bulk Water Station use limited to usage in Town of Castle Rock town limits or for private residential use in Douglas County for drinking, cooking and bathing.	Bulk Water Station use limited to usage in Town of Castle Rock town limits or for private residential use in Douglas County for drinking, cooking and bathing.	Bulk Water Station use restricted to public health and emergency protection only.

	Advisory	Watch	Warning	Emergency	Critical/Crisis
Construction water	Conserve and prevent wasting of construction water.	Conserve and prevent wasting of construction water.	Use of all construction water is prohibited unless necessary for air quality and construction reasons. This must be negotiated beforehand with Caste Rock Water.	Use of all construction water is prohibited unless necessary for air quality and construction reasons. This must be negotiated beforehand with Caste Rock Water.	All non-critical water use, including construction water, is prohibited until further notice.
Fountains	n/a	All non-recirculating outdoor fountains must be turned off.	All outdoor and indoor fountains must be turned off.	All outdoor and indoor fountains must be turned off.	All outdoor and indoor fountains must be turned off.
Swimming pools and hot tubs	All commercial swimming pools and hot tubs should be covered when not in use and maintained to prevent leaks.	All commercial swimming pools and hot tubs should be covered when not in use and maintained to prevent leaks.	All commercial swimming pools and hot tubs should be covered when not in use and maintained to prevent leaks.	The filling of commercial swimming pools and hot tubs is prohibited.	All swimming pool filling is prohibited.
Vehicle washing	Commercial car washes encouraged to reduce water use by 10% where technically feasible. Vehicles at car dealerships should be washed using bucket and hand-held hose with shut-off nozzle.	Commercial car washes required to reduce water use by 10% where technically feasible. Vehicles at car dealerships should be washed using bucket and hand-held hose with shut-off nozzle.	All commercial car washes are required to implement best management practices and limit water use to 20 gallons per vehicle. All washing of vehicles on car dealership property is prohibited.	All car washing is prohibited, unless necessary for emergency response operations	All outdoor water use including vehicle washing is prohibited, unless necessary for emergency response operations.
Restaurants	Restaurants encouraged to only serve water when requested by customer.	Restaurants encouraged to only serve water when requested by customer.	All restaurants are not to serve water unless customers specifically ask for it.	All restaurants are not to serve water unless customers specifically ask for it.	All restaurants are not to serve water unless customers specifically ask for it and there is availability.

	Advisory	Watch	Warning	Emergency	Critical/Crisis
Lodging services	Lodging establishments are encouraged to promote conservation and limit frequency of linen washings.	Lodging establishments are encouraged to promote conservation and limit frequency of linen washings.	All lodging establishments must place water conservation cards in every room promoting water conservation (e.g., short showers) as well as not changing linens and towels unless a customer specifically requests the service.	All lodging establishments must place water conservation cards in every room promoting water conservation (e.g., short showers) as well as not changing linens and towels unless a customer specifically requests the service.	All lodging establishments must place water restriction cards in every room, warn about possible periodic water shutoffs, and avoid changing linens and towels.
Indoor	n/a	n/a	Encourage indoor water use limitations to achieve 20% water savings	Encourage indoor water use limitations to achieve 30% water savings	Indoor water use is heavily restricted to critical uses only (e.g., drinking, cooking, bathing), and may be periodically shutoff as necessary.

7.1. Advisory Drought Stage

Drought Trigger Points: Water Supply Index score ranging from 1.09 to 1.05, with all available supplies producing at their maximum capacity.

Drought Stage and Trigger Summary: The Advisory drought stage is the first in a series of five stages. The drought response is to primarily focus on voluntary water savings measures with the objective of reaching a water use reduction target of 10%.

7.1.1. Supply-Side Response Measures

The following supply-side measures will be implemented in the Advisory drought stage:

- Identify technical and financial assistance opportunities – This may include assistance from the public sector at the federal, state, or county level, or from private entities such as non-profit organizations promoting water conservation and drought awareness. Assistance may include grants, loans, technical assistance (e.g., improve the efficiency of capturing indirect reuse water), education, etc. Castle Rock plans to be aware of the technical and financial opportunities before a drought, enabling the Town to take advantage of the opportunities quickly and efficiently when a drought occurs.

- Utilize Castle Rock Water Commission as a public advisory committee – this will allow the Town to track public perception of drought and the effectiveness of drought-related communications.

- Water rights management and cooperative agreements – Castle Rock's water supply yields may be increased by making some adjustments to how water rights are traditionally managed and through other synergies developed via cooperative agreements with other local water users. Castle Rock is already fostering numerous regional partnerships, such as the WISE project, membership in South Metro Water Supply Authority, membership in the Cherry Creek Project Water Authority, membership in the Chatfield Reservoir Mitigation Company, and intergovernmental agreements (IGAs) related to water infrastructure with Parker Water and Sanitation District, Dominion Water and Sanitation District, Castle Pines Metropolitan District, the Pinery, and others. Where possible, these agreements will be established in advance of a drought as part of the mitigation effort and activated during drought periods. However, the activation of these agreements and identification of new arrangements during drought periods will be a component of the drought response. Appropriate Substitute Water Supply Plans will be filed to ensure that the agreement/arrangement(s) are viable under Colorado Water Law. These agreement/arrangement(s) may include the following:

- Transfers and exchanges – one of the objectives of the WISE project is to use multiple entities' water infrastructure in a way that maximizes yield to all participants. Strategies

include developing water transfers with other entities, sharing interconnects and water conveyance systems, and exchanging to minimize loss in the system.

- Acquire water from other entities – Castle Rock's water supply system is situated in such a manner that it could divert and utilize water from other entities via exchange or transfer. Purchase, lease, trade, temporary fallowing, and water transfer arrangements with downstream agricultural users and nearby water providers will be explored as an option during drought periods.

- Pay downstream water users to not place a call on the river – Currently, this refers to entities with East Plum Creek water rights, Plum Creek water rights, or South Platte water rights senior to the Town's, and potentially could include entities with storage rights in Chatfield Reservoir. In the future, this would expand to include senior water rights entities on all of Castle Rock's (future) surface water supplies including Box Elder Creek and Cherry Creek. Establishing a relationship with these senior water rights holders in advance of a drought would allow for smoother communication during a drought.

    - Arrange for water exchanges – Castle Rock's participation in the cooperative agreements listed above will facilitate this response strategy.

    - Lease irrigation rights from farmers.

    - Cancel municipal leases of water to farmers – communication in advance of the planting season is critical to implement this response strategy.

    - Negotiations – some options for the Town to increase their supply include negotiating purchases or "options" of water and renegotiating contractually controlled supplies.

7.1.2. Demand-Side Response Measures

Castle Rock Water

- Public education – As a mitigation strategy, Castle Rock will develop a public education campaign focused on drought, and this campaign will be activated in the Advisory drought stage.

- Identify high water use customers and internally develop water savings targets, in preparation of drought stage worsening.

- Circulate information to customers regarding voluntary outdoor and indoor water audits to encourage signing up for an audit through Castle Rock Water, and potentially qualify for water savings and efficiency rebates/credits.

- Educate municipal staff on how to save water.

- Irrigation of Town-owned property (parks and open spaces) – limit outdoor watering to specific times of day and limit the number of watering days per week.

Residential Voluntary and Mandatory Restrictions for General Use

- Outdoor voluntary restrictions apply during non-summer months – residents are encouraged to voluntarily conserve water, both indoors and outdoors, with the suggested goal of achieving a 10% savings.

- Outdoor mandatory watering restrictions during summer months – residents must follow the mandatory restrictions set to last from May 1 to September 30, where they may only irrigate every-third-day, between the hours of 8 p.m. and 8 a.m.

- Impervious surfaces (driveways, sidewalks, patios, etc.) – recommend minimizing power washing and spraying on impervious surfaces. A broom or mop may be used as a replacement.

- Residents are encouraged not to install new sod, seeding, or other landscaping.

- Residents are encouraged to limit the use of outdoor misting devices.

- Do not allow water to pool in gutters, streets and alleys.

- Do not waste water by letting it spray on concrete and asphalt.

- Repair leaking sprinkler systems immediately.

- Do not irrigate while it is raining or during high winds.

- Use a hose nozzle with a shut-off valve.

- In addition, there are specific outdoor water use guidelines which apply at any time of the year, and are designed to encourage efficient use of water and help meet the Town's conservation goals. These are outlined in Table 10.

Commercial and Institutional (Voluntary and Mandatory Restrictions)

- Construction water – appropriate best management practices should be employed to conserve and prevent wasting of construction water.

- Voluntarily limit the installation of new sod and/or other landscaping.

- Outdoor mandatory watering restrictions – during the entire irrigation season which includes the drier summer months (May 1 through September 30), the Town enforces a watering and irrigation schedule to enable water conservation. Watering is permitted every-third day, and only between the hours of 10 p.m. and 5 a.m. for commercial/industrial customers.

- Outdoor water audits – Castle Rock will encourage commercial and institutional entities to take advantage of their irrigation audit/sprinkler inspection program to provide technical assistance to reduce outdoor water use.

- All commercial swimming pools and hot tubs should be covered when not being used to reduce evaporation. Regular maintenance should minimize leaks and the Town encourages reuse of the water for irrigation when emptying the pool/hot tub.

- Commercial car washes must install water recycling technology and/or other best management practices to reduce water use and/or increase water reuse.

- All restaurants are encouraged to not serve water unless customers specifically ask for it.

- Hotels are encouraged to promote the reduction in frequency of linen and towel washing to their guests.

- Water users must not allow water to pool in gutters, streets and alleys.

- Water users must not waste water by letting it spray on concrete and asphalt.

- Water users must repair leaking sprinkler systems immediately.

- Water users must not irrigate while it is raining or during high winds.

- Water users must use a hose nozzle with a shut-off valve.

- The additional water use guidelines are outlined in Table 10, Section 5.1.1.

7.1.3. Public Campaign

Details of the public drought campaign (outlined in Section 5.4) will be similar to previously developed water conservation campaign material, and will be tailored to specific circumstances at the onset of a drought.

7.2. Watch Drought Stage

Drought Trigger Points: Water Supply Index score ranging from 1.04 to 1.00, with all available supplies producing at their maximum capacity.

Drought Stage and Trigger Summary: The Watch drought stage is the second in a series of five stages. The drought response is to primarily focus on outdoor restriction measures with the objective of reaching a water use reduction target of 25%. Some preparatory supply-side measures are also important in this stage.

7.2.1. Supply-Side Response Measures

The supply-side measures that were triggered under the Advisory drought stage will continue to be active into the Watch drought stage. In addition, Castle Rock will add the following measures:

- Clean and/or rehabilitate Denver Basin wells in preparation for pumping – assuming the full capacity of groundwater rights has not been met via increasing pumping from existing wells, the Town can rehabilitate existing wells to obtain maximum flow rates, and prolong their useful life. Well rehabilitation and maintenance methods may include flushing of water lines (to reduce plugging) and doing general in-house alluvial well cleaning.

- Maximize use of our recycled water supplies.

- Use any water currently available and stored in tanks and reservoirs (e.g., Rueter-Hess, Walker, CRR1 and CRR2).

7.2.2. Demand-Side Response Measures

The demand-side measures that were triggered under the Advisory drought stage will continue to be active into the Watch drought stage. In addition, Castle Rock will add the following measures:

Castle Rock Water

- Implement a drought surcharge design as follows: Reduce ET Factors by half which will reduce the outdoor water budget for all customers putting them into Tier 3 rates for water usage over half their normal outdoor budget.

- Conduct irrigation audits on municipal parks and open spaces.

- Reach out to high water use customers and collaboratively develop water savings targets.

- Provide instructional resources to businesses on developing a drought mitigation and response plan specific to their business/office.

- Restrict outdoor misting devices in public buildings and spaces.

- Reduce public street cleaning.

- Prohibit watering of turf on Town-owned property during fall, winter, and early spring and consider this also for summer depending on conditions.

- Reduce frequency of hydrant flushing.

Residential Voluntary and Mandatory Restrictions for General Use

- Outdoor mandatory restrictions – In addition to the mandatory outdoor watering restrictions imposed during summer months (traditionally from May 1 to September 30), this stage requires stricter outdoor watering limitations. Lawn and other irrigation will be limited to every-fourth day (i.e., twice a week), with the same watering schedule outlined in Table 19.

- Residents will be encouraged to reduce turf and all outdoor irrigation from September 30 to May 1.

- Residents will be encouraged to forego the installation of new sod, seeding, and landscaping until the drought has ceased.

- Power washing and spraying on residential impervious surfaces (driveways, sidewalks, patios, etc.) will be prohibited.

Commercial and Institutional Voluntary and Mandatory Restrictions

- Outdoor mandatory watering restrictions – In addition to the mandatory outdoor watering restrictions imposed during summer months (traditionally from May 1 to September 30), this stage requires stricter outdoor watering limitations. Lawn and other irrigation will be limited to every-fourth day, with the same watering schedule outlined in Table 19.

- Businesses are encouraged to forego the installation of new sod, seeding, and landscaping until the drought has ceased.

- All restaurants are encouraged to not serve water unless customers specifically ask for it. This is intended for public awareness purposes and not expected to result in significant water savings.

- Additional year-round outdoor water use guidelines are outlined in Table 10 in Section 5.1.1.

7.3. Warning Drought Stage

Drought Trigger Points: Water Supply Index score ranging from 0.99 to 0.95, with all available supplies producing at their maximum capacity.

Drought Stage and Trigger Summary: The Warning drought stage is the third in the series of five, and more severe than the previous two. The drought response is to primarily focus on mandatory restriction measures with the objective of reaching a water use reduction target of 40%.

7.3.1. Supply-Side Response Measures

Supply-side response actions triggered in the Advisory and Watch drought stages will continue into the Warning drought stage. In addition, Castle Rock Water will consider the following:

- Direct Potable Reuse on a temporary basis – work with the Colorado Department of Public Health and Environment to create a temporary permit authorization to utilize direct potable reuse to limit losses of reusable water supplies during drought and construct emergency infrastructure (pipe connections, etc.). Direct potable reuse can limit losses from evaporation and loss of water into dry stream beds.

7.3.2. Demand-Side Response Measures

Demand-side response actions triggered in the Advisory and Watch drought stages will continue into the Warning drought stage. In addition, the following measures will be considered:

Castle Rock Water

- Implement a drought surcharge design as follows: Reduce ET Factors from by half which will reduce the outdoor water budget for all customers putting them into Tier 3 rates for water usage over half their normal outdoor budget. Reduce conservation threshold to 30,000 gallons and increase Tier 3 rate by 10%.

- Restrict or eliminate turf irrigation on Town parks and open spaces. Sports fields, trees, and shrubs may be irrigated on a pre-determined limited basis. Preferred "green spaces" may be specified in advance by a public outreach survey conducted at any time.

- Conduct indoor water audits on public buildings and on privately-owned buildings that have applied for an audit.

- Use of all water for fire training and of water from the hydrant will be prohibited unless essential for public safety.

- Utilize catastrophic failure reserves to ColoradoScape parks and open spaces where high water using turf is in place or allow that turf to go without water and replace the turf once the drought is over using those same failure reserves.

Residential Restrictions and General Use

- Outdoor mandatory watering restrictions – Lawn and other irrigation will be limited to once a week, with the same watering schedule outlined in Table 16 for the summer months, and will extend from May 1 to September 30.
- Residents will be prohibited from irrigating turf from October 31 to April 30.
- Residents will be prohibited from installing new sod, seeding, and landscaping until the drought has ceased.
- All washing of personal vehicles will be prohibited except at commercial car washes.
- The filling of private swimming pools and hot tubs will be prohibited.

Commercial and Institutional Restrictions

- Businesses/institutions will be prohibited from installing new sod, seeding, and landscaping until the drought has ceased.
- Outdoor watering and irrigation will be limited to once a week, and will take place from May 1 to September 30.
- Customers will be prohibited from irrigating turf from October 1 to April 30.
- The filling of commercial swimming pools and hot tubs will be highly discouraged.
- All commercial car washes will be required to implement best management practices and limit water use to 20 gallons per vehicle.[22]
- All washing of vehicles on car dealership property will be prohibited.
- Work in partnership with commercial customers to offer large rebates using catastrophic failure reserves to ColoradoScape large irrigated turf spaces where high water using turf is in place or allow that turf to go without water and replace the turf once the drought is over using those same failure reserves.

[22] The Southwest Car Wash Association (comprised of many Colorado car washes), states that a full serve conveyor car washing facility will spend an average of 30-40 gallons per car. For more information, please visit their website at https://swcarwash.org

7.4. Emergency Drought Stage

Drought Trigger Points: Water Supply Index score ranging from 0.94 to 0.90, with all available supplies producing at their maximum capacity.

Drought Stage and Trigger Summary: The Emergency drought stage is the second most rigorous stage. The drought responses focus on reaching a water use reduction target of about 50%, as well as tapping into reserve resources, increasing water pumping and surface water use, and working with partners to utilize more regional water.

7.4.1. Supply-Side Response Measures

Supply-side response actions triggered in the Advisory, Watch, and Warning drought stages will continue into the Emergency drought stage. In addition, the following measures will be considered:

- Draw from drought reserves.
- Increase groundwater pumping – extract from the Denver Basin up to the full capacity of the Town's water rights, to the extent which water supplies can't be made up with renewable supply.
- Drill additional Denver Basin wells if necessary, and re-drill out-of-service wells to the extent possible.
- Work with water partners (e.g., WISE) to increase water use allocation for the Town (if excess supply is available)
- Look to purchase or lease water supplies from agricultural interests.

7.4.2. Demand-Side Response Measures

Demand-side response actions triggered in the Advisory, Watch, and Warning drought stages will continue into the Emergency drought stage. In addition, the following measures will be considered:

Castle Rock Water

- Implement a drought surcharge design as follows: Eliminate outdoor water budgets for all customers putting them into Tier 3 rates for water usage for any outdoor water use. Reduce conservation surcharge to 15,000 gallons, increase Tier 3 rate by 10%, and increase surcharge by 10%.

- Eliminate all turf irrigation on Town parks and open spaces unless necessary for emergency response or operations. Limited irrigation of trees with a hand-held hose or non-spray device may be allowed to help ensure survival.

- Washing of Town-owned vehicles will be prohibited.

- Hydrant washing and flushing will be prohibited unless necessary for public safety reasons.

Residential Restrictions and General Use

- All outdoor water use and irrigation will be prohibited until drought conditions have eased.

Commercial and Institutional Restrictions

- Use of all construction water will be prohibited unless necessary for public safety. Construction water use must be negotiated beforehand with Castle Rock Water.

- The filling of commercial swimming pools and hot tubs will be prohibited.

- Commercial car washes – all car washing is prohibited unless required for emergency operations or public safety reasons.

7.5. Critical/Crisis Drought Stage

Drought Trigger Points: Water Supply Index score falling below 0.90, with all available supplies producing at their maximum capacity.

Drought Stage and Trigger Summary: The Critical/Crisis drought stage is the most severe of all five stages. The drought response involves heavily focusing on strict water savings measures (outdoors and indoors) with the objective of reaching a water use reduction target of more than 60%, while engaging in collaborative efforts with water partners to bring in water sources. Maximizing water reuse (e.g., from wastewater) is also a key measure in this stage.

7.5.1. Supply-Side Response Measures

Supply-side response actions triggered in the Advisory, Watch, Warning, and Emergency drought stages will continue into the Critical/Crisis drought stage. In addition, the following measures will be considered:

- Work with WISE partners and other local, regional, and even national sources to allocate and bring in water for necessary activities and critical use (e.g., drinking water, bathing,

cooking), as well as to supplement available water for emergency response, operations, and public safety.

- Consider other radical options (for example bringing water supplies to Town via rail car or working with the National Guard or FEMA for temporary drinking water stations).

7.5.2. Demand-Side Response Measures

Demand-side response actions triggered in the Advisory, Watch, Warning, and Emergency drought stages will continue into the Critical/Crisis drought stage. In addition, the following measures will be considered:

All Town Departments, Residential, and Commercial and Institutional

- Implement a drought surcharge as follows: Eliminate outdoor water budgets for all customers putting them into Tier 3 rates for water usage for any outdoor water use. Reduce conservation threshold to indoor use so that all use in excess of the indoor allowance would be charged at the surcharge rates, increase Tier 3 rate by 10%, and increase surcharge by 10% as well as periodic water shutoffs as needed.

- Eliminate all outdoor water use and irrigation unless required for emergency operations and response.

- Indoor water use is restricted to critical activities such as cooking, drinking water, or bathing. Limitations on gallons used per household will be implemented according to the specific drought conditions, and complete water shutoffs may be periodically necessary.

8. PLAN IMPLEMENTATION AND MONITORING

8.1. Mitigation Action Plan

Many of the mitigation measures are either a component of this Drought Management Plan, are specified in Castle Rock's other water related plans (e.g., 2023 Water Efficiency Master Plan, 2021 Water Resources Strategic Master Plan, 2024 Water Use Management Plan), or are standard practices conducted by Town staff. These measures are generally conducted and/or tested on a routine annual basis. The majority of mitigation measures related to the development of new water supplies and operation/maintenance changes are to occur when new supplies are anticipated to come online. Table 23 to Table 26 summarize the water efficiency activities currently in place, in progress, or presently being considered for implementation, along with the relevant periods of implementation and the customer class they may affect.

Table 23. Mitigation Action Plan - Foundational Activities

Water Efficiency Activities	Period of Implementation	Customer Class
Water budget rate structure (Nonresidential)	2008 – present	Non-residential
Water budget rate structure (Residential)	2009 – present	Residential
Historical Consumption Information on Bills	2009 – present	Residential, Non-residential
Advanced Metering Infrastructure	Implementing – completion expected by 2027	Residential, Non-residential
Formal Meter Testing Program	In Progress	Residential, Non-residential
Leak Detection / Non-revenue Water Program	2008 – present	Municipal
Public Right-of-Way & Town Park Landscape & Irrigation Retrofits	Ongoing – performed as determined to be cost effective	Municipal

Table 24. Mitigation Action Plan - Targeted Technical Assistance and Incentives

Water Efficiency Activities	Period of Implementation	Customer Class
Rotary nozzle retrofit	2009 - Present	Residential, Non-residential
ColoradoScape landscape retrofit	2009 - Present	Residential
Rain sensor	2009 - Present	Residential
Smart controller	2009 - Present	Residential, Non-residential
Irrigation Audit/Sprinkler Inspection	2008 - Present	Residential, Non-residential
High Efficiency Toilet retrofit	2020 - Present	Residential, Non-residential
Indoor Conservation Incentive Program	Considering	Could apply to residential and non-residential

Table 25. Mitigation Action Plan – Ordinances and Regulations

Water Efficiency Activities	Period of Implementation	Customer Class
Water Use Management Plan	Early 2000 - present	Residential, Non-residential
Watering Restrictions	1985 - present	Residential, Non-residential
Water Monitoring Program	Early 2000 - present	Residential, Non-residential
Soil Amendment and Inspection Requirements	Early 2000 - present	Primarily for non-residential, and mandatory on residential new builds
Irrigation Exemptions	1985 – present	All Residential and non-residential irrigation customers
Landscape Regulations for New Developments	1999 – present	Requirements for non-residential, recommended for residential (with the exception of Kentucky Blue Grass, which is prohibited. In addition, moderate and low water use turf alternatives are required for single-family and two-family residential areas)
Water Efficiency Plan Guidelines	2014 - present	Residential, Non-residential
Emergency Regulation of Water	2018 - present	Residential, Non-residential

Water Efficiency Activities	Period of Implementation	Customer Class
No Turf Ordinance	2023 - present	Residential, Non-residential
Ordinance prohibiting enforcement of restrictive convenants conflicting with drought compliance	2026 – present	Residential, Non-residential (common interest community governed properties)
Revised supply side and drain side plumbing codes compatible with water efficient fixtures	Considering	Could apply to residential and non-residential
Hot Water Recirculation Units	Considering	Could apply to residential and non-residential

Table 26. Mitigation Action Plan – Education Activities

Water Efficiency Activities	Period of Implementation	Customer Class
Historical Consumption Info on Bills	2009 - present	Residential, Non-residential
Water Wiser	2004 - present	Available for all sectors but geared toward residential
Public Information and Education (including classroom visits)	Early 2000 - present	Residential, Non-residential
ColoradoScape Demonstration Gardens	2005 - present	Residential, Non-residential
Registration for Landscape Professionals	2004 - present	Landscape & Irrigation design, installation, and maintenance contractors
Water Ambassador Program	2009 - present	Residential customers through school education
Water Conservation Website	2010 - present	Residential, Non-residential
Drought Management webpage with live Drought Indicator	2022 - present	Residential, Non-residential
ColoradoScape Guidelines	2022 - present	Residential, Non-residential
ColoradoScape Classes	2007 - present	Residential, Non-residential
ColoradoScape Contest	2019 - present	Residential
Conservation Contests	Considering	All

8.2. Drought Declarations

Castle Rock Water's approach to drought declarations is specified in Municipal Code section 13.12.070[23], Emergency Regulation of Water which provides the Director of Castle Rock Water the power to make a drought declaration which would be authorized by Council in general accordance with this plan or as deemed necessary immediately for any other reason in consultation with the Town Manager and subsequent confirmation by Council within 21 days of such declaration. The drought triggers shown in Table 17 serve as a general guideline for action. However, the proposed drought monitoring data, in addition to the experience and skill of Castle Rock Water and other relevant departments' staff, also play a large role in determining the severity and corresponding action or declaration of a drought. As such, Castle Rock Water staff

[23] Source: https://library.municode.com/co/castle_rock/codes/municipal_code?nodeId=TIT13PUSE_CH13.12UTSECH_13.12.070EMREWA

reserve the right to make modifications, based on their experience and resources, to the drought trigger guidelines, drought stages, drought response strategies, or any other appropriate factors associated with drought.

As previously mentioned in Section 6.1, it is important for the Town to officially declare a drought and adjust correspondingly to drought stages, in a timely manner. If a drought is declared too late or actions are not taken early enough to reduce water use, supplies can be severely depleted and strict water restrictions may be required, leading to economic impacts that could have been avoided. Conversely, premature drought declarations can result in unnecessary mandatory water restrictions and associated impacts while customers can lose confidence in the declaration. The Castle Rock Water Director is ultimately responsible for providing final recommendations on the timing of drought declaration and corresponding stage of a drought to Town Council.

The following protocol will be followed to officially declare a drought:

- Castle Rock Water staff will discuss the drought monitoring data with the Director providing recommendations on the timing of the drought declaration and the appropriate drought stage (severity).

- The Director of Castle Rock Water will provide recommendations to the Town Council.

- Town Council members will have an opportunity to ask questions and comment on recommendations in an official public Town Council meeting that is either regularly scheduled or scheduled as an emergency specifically to discuss drought conditions.

- The Town Council will decide whether to declare a drought (and corresponding drought stage) based on the Castle Rock Water Director's recommendations and comments from Castle Rock Water staff members. Greatest credence should be given to the Castle Rock Water Director's recommendations, however. This decision will be made at the Town Council meeting, whether it be a regular meeting or a special meeting.

- If the Town Council decides to declare a drought, direction will be given to the Communications Manager to convey the drought declaration to Town and County Emergency Management, CWCB, Colorado Division of Homeland Security and Emergency Management, and to the public. Public notification will include a summary of applicable restrictions and enforcement provisions, including limitations on common interest communities enforcement of restrictive covenants regarding drought-related landscape conditions.

The same drought declaration protocol will be followed, per the Castle Rock Water staff's discretion, to change a drought stage (e.g., water shortages are increased from a warning to an emergency drought stage or reduced from an emergency to a warning level) and to end a drought, returning to normal operating conditions. If, for emergency reasons, the declaration or adjustment of a drought stage is necessary within a shorter timeframe than specified above, Chapter 13.12.070 of the Municipal Code allows the Town Council to regulate water usage during times of drought or emergency. This is limited to circumstances when the safety and health of the community are at risk due to stressed (e.g., drought-related) water supply conditions. A thorough review of supply conditions and implementation of the drought response program shall be conducted by Castle Rock Water following such declaration.

8.3. Implementation of the Staged Drought Response Program

The staged drought response program requires actions to be taken by Castle Rock Water, Parks, Communications and Finance Departments. In addition, Town staff are expected to follow water use restrictions imposed by the staged drought response program. The roles and responsibilities are provided below.

- Castle Rock Water – administer, implement, and enforce the staged drought response program. The Castle Rock Water Director will ultimately be responsible for facilitating necessary communication and coordination with other departments.
- Parks and Recreation – coordinate outdoor irrigation efforts on Town-owned property closely with Castle Rock Water.
- Communications and Castle Rock Water – communicate with appropriate state and federal agencies regarding drought conditions and responses, convey the drought declaration and key messages to the public, and aid in implementing the public drought campaign.
- Communications, Castle Rock Water and Development Services – communicate with appropriate developers, home builders and others involved in construction within the community.
- Finance Department – closely monitor revenue and coordinate with Castle Rock Water to determine if operating reserves, revenue stabilization reserves or catastrophic failure reserves are needed for operations.
- All Town Departments – follow water use restrictions imposed by the staged drought response program, and enforce water use guidelines and all other imposed regulations and ordinances.

Weekly staff meetings will be initiated by the Castle Rock Water Director among key departments and Town staff at the onset of a drought, to ensure that the program is properly carried out. The initial staff meetings will focus on implementation of the staged drought response program and public drought campaign(s), and will include:

- Review of Town budget and funds available for implementation of the Plan.

- Actions necessary to initiate the designated staged drought response measures to achieve the appropriate response target.
- Specific drought messages to convey to the public and methods used for education using the framework provided in this Plan (See Section 5.4).
- Actions necessary for enforcement (See Section 8.4).
- Review of roles and responsibilities of each staff member.

8.4. Enforcement of the Staged Drought Response Program

The purpose of enforcement is to maintain the integrity of the water system during peak periods to ensure positive pressure exists and fire flow demands are met. This code enforcement is conducted to protect the interests of the public, the Town, and protect public health and safety. The focus of the program is encouragement of compliance, as well as education. As such, standard first violations are issued as warnings with no surcharges applied (although, per the Castle Rock Water staff's discretion and based on the specific drought circumstances and type of violation, first-time violators may be imposed more stringent penalties). Subsequent violations are on a graduating scale. Water monitors can include all other Town of Castle Rock staff when needed. Town staff are trained and authorized to issue violations and shut off meters if necessary. The Town can also allow overtime pay to Town staff for water monitoring, when necessary. Members of the public can submit an affidavit of out-of-compliance irrigation or other water usage, upon which the Town may issue a violation.

Castle Rock's level of enforcement will be customized to the severity of the drought (drought stage) as well as to how responsive the public is to mandatory drought response measures. During the Advisory drought stage, enforcement may not be necessary given that the majority of drought response is voluntary. However, for the remaining drought stages, enforcement will consist of several strategies, such as: a call-in service where customers have an opportunity to report infractions, patrolling of neighborhood and business districts to identify owners/residents that are in violation of mandatory restrictions/requirements, the implementation of a neighborhood watch program, issuance of citations and appropriate penalties based on the drought stage and number of violations, and at times even resorting to temporary or permanent water shutoffs as necessary. Each staff member responsible for patrol will be trained to ensure that a consistent drought message is conveyed, and that conflicts are handled and conducted in a responsible, orderly fashion.

Table 27 provides the pre-defined penalty structure associated with each drought stage, and outlines the standard number of infractions per resident/business owner per calendar year. This will be posted on Castle Rock Water's website and conveyed to the public through the public drought campaign. Citations and monetary fines will be primarily issued through the mail and/or email (with occasional citations potentially being issued in person, depending on the drought stage and/or infraction severity). If inclined, residents/occupants will have an opportunity to

appeal citations. Written appeals may be mailed/emailed to Castle Rock Water providing justification for why the citation should be appealed. Reasons for appeal may include:

- The citation mistakenly included the wrong address.
- Irrigation is necessary for extraordinary circumstances.
- A new resident has moved into a house that had received multiple previous citations through no fault of the new resident.

Castle Rock Water will review each citation and determine whether sufficient justification has been provided to forfeit the citation and penalty. Isolated exemptions to water restrictions may also be made in certain cases upon review and approval of Castle Rock Water staff.

Table 27. General Guidelines for Enforcement of the Staged Drought Response Program [24]

	Advisory	Watch	Warning	Emergency or Critical/Crisis[25]
First Violation	n/a	Warning citation stating that next violation will result in monetary fine. Educational information on drought will be provided.	Warning citation stating that next violation will result in monetary fine. Educational information on drought will be provided.	Warning citation stating that next violation will result in monetary fine. Educational information on drought will be provided.
Second Violation	n/a	Monetary fine (to be determined) added to water bill.	Monetary fine (to be determined) added to water bill.	Monetary fine (to be determined) added to water bill. Phone call to educate and inform the violator of the impending penalty if another infraction occurs.
Third Violation	n/a	Monetary fine (to be determined) added to water bill. Phone call to violator to educate and inform him/her of the impending penalty if another infraction occurs.	Monetary fine (to be determined) added to water bill. Phone call to violator to educate and inform him/her of the impending penalty if another infraction occurs.	Monetary fine (to be determined) added to water bill and possible installation of a flow restrictor or temporary termination of water service until cause of violation is corrected and fines are paid.
Fourth Violation	n/a	Monetary fine (to be determined) added to water bill and possible installation of a flow restrictor or temporary termination of water service until cause of violation is corrected and fines are paid.	Monetary fine (to be determined) added to water bill and possible installation of a flow restrictor or temporary termination of water service until cause of violation is corrected and fines are paid.	Water service terminated indefinitely.

[24] Monetary fines will, at a minimum, be administered in accordance with the current Town Council approved Water Use Management Plan (WUMP).

[25] Note that, based on the Castle Rock Water staff's discretion and the specific drought circumstances and/or type of violation, these guidelines may be updated to reflect more stringent penalties. As such, violations could be handled on a case-by-case basis.

The Castle Rock Water Director and Castle Rock Water staff will be responsible for administering the enforcement of the staged drought response program and ensuring that appropriate messages concerning enforcement are conveyed to the public via the Communications Department. This will require close coordination with Castle Rock Water and Communications Departments. Roles and responsibilities of each department are as follows:

- Castle Rock Water – facilitation of call-in service for reports on infractions and follow up, patrol of service area, issuing written citations and fines, sending bills, recording and tracking of violations and fines, facilitating the appeals process, and installing flow restrictors to cut off service until violation is corrected.

- Communications Department – conveying accurate, consistent information on enforcement to the public through the public drought campaign.

8.4.1 Common Interest Communities Enforcement During Drought Conditions

During any officially declared drought stage, enforcement of water use restrictions shall be coordinated across all applicable governing entities to ensure consistency with Town regulations. Pursuant to Municipal Code §13.15.080(D), common interest communities (such as HOAs or metro districts) are prohibited from issuing violations, fines, or enforcement actions related to brown or dormant turf, reduced irrigation, or other landscape conditions that result from compliance with Town-imposed drought restrictions.

Any existing common interest community enforcement actions related to such conditions shall be suspended for the duration of the drought declaration. This provision is intended to eliminate conflicts between Town-directed water conservation measures and private covenant enforcement, and to ensure that customers are not penalized for complying with drought response requirements. Common interest community general governance and authority over other activities or maintenance not related to drought impacts to landscaping remains unchanged.

8.5. Revenue Implications and a Financial Budgeting Plan

A reduction in customer water use during periods of drought reduces water sales and consequently could result in a revenue shortfall for Castle Rock. Increased costs associated with implementation of the staged drought response program, public drought campaign, and enforcement could further intensify the shortfall. During the 2002 and later 2012/2013 droughts, several neighboring water providers had to increase customer water rates in order to compensate for such a shortfall. These increases were not anticipated and the general public's perception was that they were penalized for conserving water during the drought.

- Castle Rock Water currently has access to water emergency reserve accounts (rate revenue stabilization reserve and catastrophic failure reserve), which could be utilized during the staged drought response program to alleviate surcharges to customers, for example. These funds may also be applied to implement the public drought campaign and other aspects tied to this drought management plan. In addition to Castle Rock Water's emergency reserve account, the Town plans to seek financial drought-related assistance (public drought-related loans, grants, etc.) where needed and available.

The staged drought response program also calls for temporary drought surcharges that increase in severity as the drought stage increases. These drought surcharges were reviewed and approved by Town Council on 2/4/2025 at a public meeting. Outreach was provided to the public ahead of adoption of the surcharges in the following ways:

- Social Media
- Town Council Agendas
- Emails
- Stakeholder Meetings

The main objectives of these surcharges are to provide additional financial incentives to conserve water; however, as a secondary benefit, the drought surcharge will also be used to help compensate for reduced water sales and increased drought response costs. If drought conditions and corresponding water sale reductions are severe enough to warrant implementation of the drought surcharges, an intensive public outreach campaign will be implemented to convey the reasoning behind why the water rates are being raised, and inform about the status of the Town's financial condition.

8.6. Monitoring of Plan Effectiveness

Monitoring provides the information and data necessary to improve the effectiveness of updates to Castle Rock's Plan. This process will be key to improving Castle Rock's ability to prepare and respond to drought. Monitoring will be both an ongoing and post-drought evaluation process. Ongoing monitoring should include testing components of the drought management plan when a drought is not occurring as well as tracking and following through with the drought mitigation measures.

By the second quarter of each year, Castle Rock Water will organize an annual drought monitoring meeting. The meeting will entail the latest status of potential drought conditions in the upcoming irrigation year based on the current drought monitoring data, the status of the drought mitigation measures specified in this Plan, an overview of the public drought campaign efforts, and a review of individual staff member's roles and responsibilities if a drought does occur. The meeting will also provide a forum for educating new staff members on their drought-related responsibilities as well as "testing" the implementation of the Plan by enabling staff members to question and discuss potential challenges and solutions that could arise via implementation of the Plan.

Castle Rock Water staff will also present or publicize the results from monitoring data collected to assess the effectiveness of the drought mitigation, response measures and enforcement (if applicable), and the public drought campaign. The following monitoring data will be collected and made available publicly by Castle Rock Water staff, on an annual basis (note that some of these data may not be applicable if a drought has not occurred):

- Demands – Comparison of the demands during historical droughts relative to the current year's annual demands. These demand data will include monthly water usage by high water users, customer types, total per capita water usage, residential per capita water usage, and the Parks and Recreation Department's monthly irrigation use, on Town parks and open spaces. Also, records on new development that can influence water demands (e.g., new housing developments, parks, commercial buildings) will be maintained on an annual basis. If a drought occurred, information will also be presented on how effectively the water savings target response was achieved.

- Lessons learned – Key issues, challenges, and concerns arising during the implementation of the staged drought response program (if applicable), drought monitoring, mitigation activities, and public drought campaign. Castle Rock Water staff will interview Town staff members from other departments also involved with the Plan implementation to get a full inter-departmental spectrum of lessons learned.

- Conditions of the water supply system – This will include the drought indicator data such as tank levels, treatment and well production, data about infrastructure conditions, water obtained from direct flow rights, storage rights, etc.

- Drought mitigation measures – Status of the mitigation related activities to date and other relevant factors (e.g., budget).

- Public perceptions and response to the drought – This will include documenting comments provided at public meetings, Town council/board meetings, and electronic emails/letters sent to the Castle Rock public regarding the drought response. Formal public surveys may also be used to gather public input depending on the magnitude of the drought and Town budget available for the survey. These surveys will be developed in advance of a drought to ensure that there is sufficient time to develop a well thought out survey.

- Administrative staged drought response program data – This will include administrative summaries such as the number of citations delivered to customers, number of incentives distributed, number of hotline calls received, etc. Records will also be maintained on the level of effort the staff put into facilitating the staged drought response measures and public education campaign, to help make predictions and budget allotments for the future.

The monitoring data will help assess the effectiveness of the Plan, provide a means to make adjustments to mitigation and response measures if necessary, and ultimately develop recommendations for updating and improving the Plan.

9. FORMAL PLAN APPROVAL AND UPDATES

9.1. Public Review Process

Prior to finalization of the Plan in December 2024, the Town facilitated a public review process educating and providing the public an opportunity to review and provide feedback on the Plan. This process was important in developing an effective Plan that is reflective of the community's values and could mitigate potential conflict during a future drought event. The Town sent out emails to homeowner's associations, used social media, and posted on its website that a draft Drought Management Plan was available for the pubic to review and comment. This included notices in the "Your Town Talk" publication that is included with water bills, and a notice on the message block on the water bills. The public was provided more than 60 days to review and comment on the Plan, per the CWCB guidelines.

Castle Rock Water hosted an Open House on Sept. 18, 2024 during the 60-day comment period to allow the public to ask questions on the drought management plan. Input was also sought during Town Council open houses during the summer and fall of 2024. Approximately 500 people were reached. Some comments of appreciation of the Town's efforts to develop a drought management plan were received during the open houses. Two stakeholder meetings were held with non-residential customers including primary homeowner's associations. There were no other public comments received during the comment period.

9.2. Ordinances and Official Agreements

The following drought-related ordinances are currently in place, and relate to the implementation and enforcement of the water restrictions outlined in this Plan. However, the Town reserves the right to create, modify, or remove any specific ordinances to suit the needs of the community.

9.2.1. Ordinances

- Chapter 13.12.070[26] of the Municipal Code discusses the emergency regulation of water. This chapter enables the Town Council to hold power over the regulations of water usage during time of drought, shortage, fire, or other emergency, and provides authority to the Director of Castle Rock Water and the Town Manager. This chapter was amended by ordinance (2018-011) on April 17, 2018 to specifically reference the Drought Management Plan and to provide power to the Town Manager and Director of Castle Rock Water to declare a water emergency.

[26] Town of Castle Rock Municipal Code Chapter 13.12.070 website

- Chapter 4.03.140[27] of the Municipal Code regards water related violations, enforcement, and penalties. This section outlines a series of measures for handling infractions to Castle Rock Water's regulations, which may be related to compliance of water saving guidelines, limitations on water use, and other such requirements stated in any of the Town's Master Plans or ordinances. Castle Rock Water reserves the right to pursue action as necessary, including emergency action or any other enforcement action.

- Chapter 13.12[28] and Chapter 13.15[29] of the Municipal Code have been amended to address the implementation of drought surcharges. This section has updated definitions relates to the emergency regulation of water and drought surcharges. Additionally, a new Section was added to Chapter 13.15 which details conditions which would require the billing of drought surcharges. These chapters were amended by ordinance (2025-003) on February 4, 2025 and will go into effect March 6, 2025.

- Chapter 13.15 of the Municipal Code has been amended to prohibit common interest communities from enforcing restrictive covenants that conflict with drought declaration requirements during declared drought stages. This chapter was amended by ordinance (2026-XXX) and applies during the period of any officially declared drought stage.

9.3. Drought Management Plan Approval

Castle Rock's Drought Management Plan was approved by Town Council at the February 4, 2025 Town Council meeting. Each member had the opportunity to review the Plan and comment prior to finalization and formal approval of the Plan.

9.4. Periodic Review and Update

Drought management planning is most effective when viewed as an ongoing process rather than a discrete process that results in a shelved document reviewed only at the onset of a drought. Castle Rock Water's Drought Management Plan will be updated every five years (or more frequently if the Town deems appropriate). The next general update is scheduled for December 2029. The Director of Castle Rock Water will be responsible for initiating the update with Castle Rock Water staff in charge of the majority of the facilitation. The update will consist of a similar stakeholder process outlined in Section 2, where the stakeholder group will be responsible for reviewing the Plan objectives and operating principles in light of the Plan monitoring data and conclusions presented in the annual monitoring reports. This group will be charged with providing recommended changes to the goals and operating principles as well as identifying key changes necessary to improve the overall effectiveness of the revised Plan; important changes to future Plan updates may include holding additional Town meetings or requesting feedback from

[27] Town of Castle Rock Municipal Code Chapter 4.03.140 website
[28] Town of Castle Rock Municipal Code Chapter 13.12 website
[29] Town of Castle Rock Municipal Code Chapter 13.15 website

community members. This plan should be updated to reflect the Town's diversification in water supply, as well as other demographic, cultural, or transitional changes. As the Town continues to shift to more surface water supplies, the monitoring indicators and response measures will need to be modified accordingly.