



# Water Resources Strategic Master Plan 2016



Utilities Department  
Water Resources Division

FINAL – January 2017

## Acronyms and Abbreviations

AF	acre-feet
AF/yr	acre-feet per year
aka	also known as
ASR	Aquifer Storage and Recovery
AWWA	American Water Works Association
BEC	Box Elder Creek
CEC	Constituents of Emerging Concern
CIP	Capital Improvement Plan
cfs	cubic feet per second
CO	Colorado
COS	Cost-of-service
Corps	United States Army Corps of Engineers
CPMD	Castle Pines Metropolitan District
CPNMD	Castle Pines North Metropolitan District
CWCB	Colorado Water Conservation Board
DOC	Dissolved Organic Carbon
Dominion	Dominion Water & Sanitation District
DWSD	Dominion Water & Sanitation District
ECCV	East Cherry Creek Valley
EPA	United States Environmental Protection Agency
°F	degrees Fahrenheit
FMP	Financial Management Plan
gpcd	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
HAA5s	Haloacetic Acids
HID	Henrylyn Irrigation District
HOA	Homeowner's Association
LIRFs	Lawn Irrigation Return Flows
MG	million gallons
MGD	million gallons per day
MS4	Municipal Separate Storm Sewer System
NEPA	National Environmental Protection Act
O&M	Operations & Maintenance
PCWPF	Plum Creek Water Purification Facility
PCWRA	Plum Creek Water Reclamation Authority
Plan	Water Efficiency Master Plan
PWP	Aurora's Prairie Water Project
PWSD	Parker Water and Sanitation District
RHR	Rueter-Hess Reservoir
RHWPF	Rueter-Hess Water Purification Facility
RO	Reverse Osmosis

SDF	System Development Fee
SEO	State Engineer's Office
sf	square feet
SFE	Single Family Equivalent
SMWSA	South Metro Water Supply Authority
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
Town	Town of Castle Rock
TTHMs	Trihalomethanes
UCMR	Unregulated Contaminant Monitoring Rule
UDFCD	Urban Drainage and Flood Control District
UV	Ultraviolet
w/	with
w/o	without
WEMP	Water Efficiency Master Plan
WISE	Water Infrastructure and Supply Efficiency
WQCD	Water Quality Control Division
WRIP	Water Resources Implementation Plan
WRMP	Water Resources Master Plan
WROS	Water Resources Optimization Plan
WRSMP	Water Resources Strategic Master Plan
WTP	Water Treatment Plant
Yr/YR	Year

## Table of Contents

Chapter 1 – Introduction & Discussion of Previous Plans .....	1-1
1.1 2006 Water Resources Strategic Master Plan .....	1-1
1.2 2008 Water Resources Implementation Plan.....	1-3
1.3 2010 Water Resources Master Plan Update.....	1-5
1.4 Notable Accomplishments from Previous Plans.....	1-5
Chapter 2 - Plan Purpose and Need .....	2-1
Chapter 3 - Water Demand Forecast .....	3-1
Chapter 4 - Water Supply.....	4-1
4.1 Current Sources.....	4-1
4.2 Local and Regional Infrastructure .....	4-14
4.3 Future Water Sources .....	4-18
4.4 Conservation Efforts.....	4-22
4.5 Water Quality .....	4-23
4.6 Environmental and Permitting Considerations .....	4-25
4.7 Legal Considerations .....	4-25
4.8 Implementation Plan .....	4-26
Chapter 5 – Watershed Management and Groundwater Protection.....	5-1
5.1 Overview .....	5-1
5.2 Specific Watersheds and Our Water Resources .....	5-3
Chapter 6 – Economic Analysis and Program Financing .....	6-1
Chapter 7 – Monitoring Risks Associated with Climate Change.....	7-1
Chapter 8 – Relationship to the State Water Plan.....	8-1
8.1 How Castle Rock Compares .....	8-2
Chapter 9 - References.....	9-1

## Appendices

Appendix A - Castle Rock’s Surface and Storage Water Rights and Augmentation and Changes of Water Rights.....	A-1
Appendix B – Castle Rock Water’s Denver Basin Groundwater Rights.....	B-1

Appendix C – Source Water Protection.....C-1  
Appendix D – 2016 Survey Results.....D-1  
Appendix E – Informational Brochure.....E-1  
Appendix F – Approved Resolution.....F-1

## List of Figures

Figure ES-1: Combined Monthly Water & Water Resources Rate Projection ..... viii  
Figure ES-2: Water Resources System Development Fee Projection.....ix  
Figure ES-3: Total Winter Bill Comparisons for Front Range Region for 2017..... x  
Figure ES-4: Total Summer Bill Comparisons for Front Range Region for 2017 ..... x  
Figure ES-5: Total Fixed Charges for Front Range Region for 2017 .....xi  
Figure 1-1: Timing of Water Sources..... 1-3  
Figure 3-1: Historic Monthly Water Demand ..... 3-2  
Figure 3-2: Town’s Population Growth versus Water Demand Projections at Varying  
Growth Rates and Consumption Rates ..... 3-3  
Figure 4-1: Denver Basin Geologic Formation ..... 4-1  
Figure 4-2: Diagram Indicating Current Planned Source Water and Storage Locations 4-  
4  
Figure 4-3: Existing and Future Regional WISE and Box Elder Infrastructure ..... 4-9  
Figure 4-4: Existing and Future Regional Box Elder Infrastructure ..... 4-11  
Figure 4-5: Aquifer Storage and Recovery Schematic ..... 4-13  
Figure 4-6: Logan County Farms and Fort Morgan Project Infrastructure Location .. 4-17  
Figure 4-7: Schedule of Water Supply Usage ..... 4-27  
Figure 6-1: Financial Analysis of Long-Term Renewable Water Plan as Compared to  
2013 Projections of Plan ..... 6-3  
Figure 6-2: Water Resources Population Sensitivity Analysis ..... 6-4  
Figure 7-1: 5-year Monthly Average Water Consumption by Category, 2010-2015 .... 7-2  
Figure 7-2: 5-year Monthly Average Water Consumption by Category at Average  
Temperature Versus 5 Degree Temperature Increase, 2010-2015..... 7-3

## List of Tables

Table 1-1: Comparison of Preferred Alternative Distribution of Water Supply Sources to 2005 Sources .....	1-2
Table 1-2: Distribution of Water Supply Sources.....	1-5
Table 4-1: Castle Rock’s Projected Future Water Supply for Year 2055.....	4-3
Table 6-1: Water Resources Fund User Charge Revenue Requirements.....	6-1
Table 6-2: Proposed Water Resources SDF Implementation Schedule based on the 2015 Rates and Fees Study .....	6-2
Table 6-3: Current (2016) Monthly Water Resources Charge based on the 2015 Rates and Fees Study .....	6-2
Table 6-4: Investments of Major Water Resources Projects .....	6-4

## Acknowledgments

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

- Mark Marlowe, PE, Utilities Director
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- Carolyn Richards, Administrative Assistant
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East Plum Creek as it flows through Castle Rock.

## Executive Summary

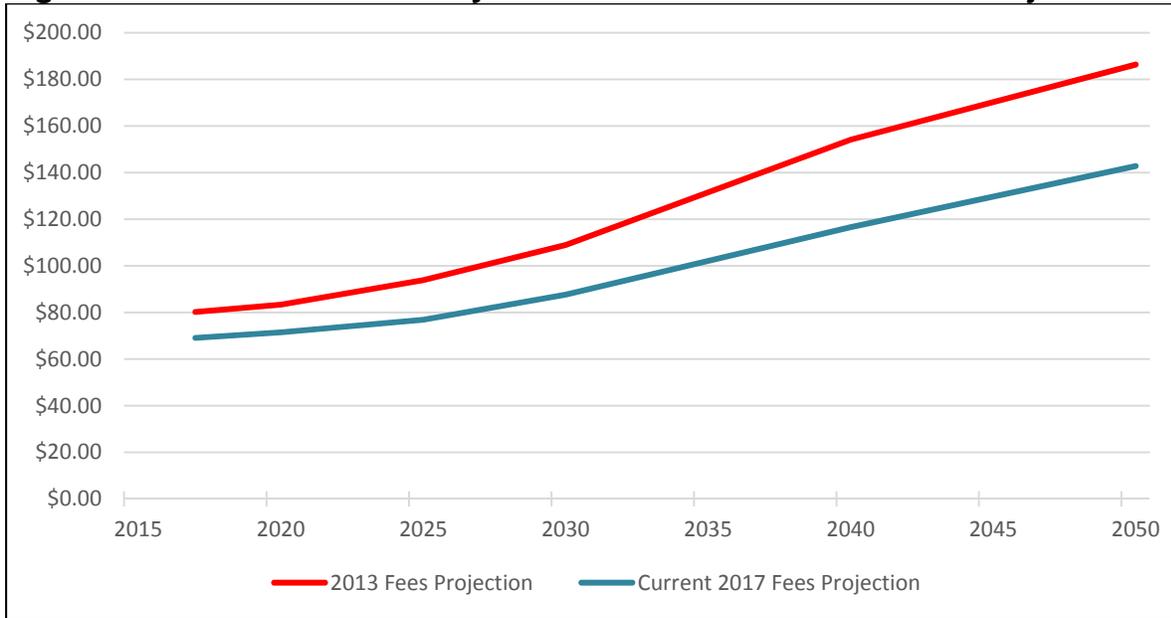
Castle Rock Water's goal is to provide a sustainable, reliable and renewable water supply, now and into the future, for all of Castle Rock's citizens and businesses, when and where they want it, and at prices that remain reasonable, viable and competitive with surrounding communities. Securing adequate water supplies for the Town's current population base and our projected future demands is critical for our residents. Water is the life-blood of any community and it is incumbent upon Castle Rock Water to meet the mission of having affordable water available when customers turn on the tap. To this end, we have updated our "Water Resources Strategic Master Plan" that lays out how we are going to meet that goal over the next 20-30 years.

This document builds on the ideas that were put forth in the 2010 Water Resources Master Plan (WRMP) update and the 2006 Water Resources Strategic Master Plan. The plan has been reviewed with the community through an extensive outreach program, which included presentations to the Castle Rock Economic Development Committee Board, Your Town Academy participants, Parks & Recreation Commission, Utilities Commission, Planning Commission, Public Works Commission, Developer's Roundtable, Community Leadership Group, Rotary Club, ROMEO's, and Chamber of Commerce Board, as well as social media notifications, Town Talk articles, water statement notifications, H2O Access statement, a brochure, and an online community survey.

In addition to laying out the projects and programs to achieve our renewable water goals, and perhaps more important, this Water Resources Master Plan identifies the investments needed from the community to meet the community's long-term water goals. Castle Rock Water is an enterprise of the Town and Castle Rock Water customers pay rates and fees to cover utility services including renewable water. The money to pay for renewable water comes from existing customers and new developments. The current plan estimates long-term investments of \$300 million to \$317 million will be needed from existing and future customers through 2050.

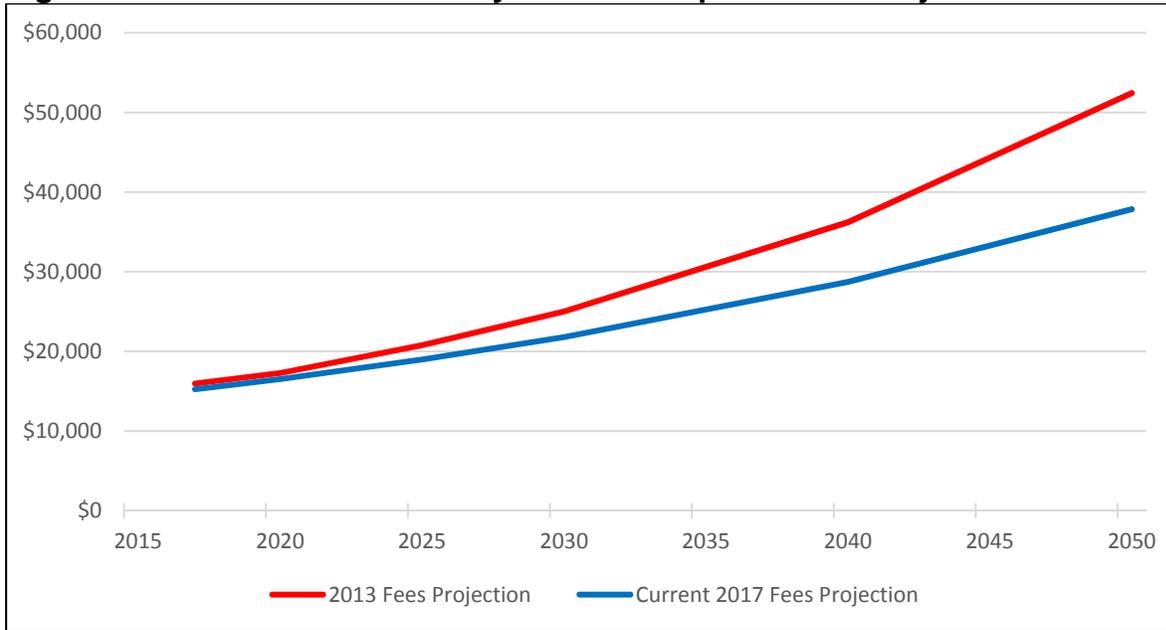
What does this mean to you? Castle Rock Water customers pay a fixed renewable water fee on their bills each month of \$26.15. In order to fully fund our renewable water plan, these fixed fees are projected to increase slowly over time. The current projections for increases in this fixed fee as well as the standard water rates are shown in **Figure ES-1**.

**Figure ES-1: Combined Monthly Water & Water Resources Rate Projection**



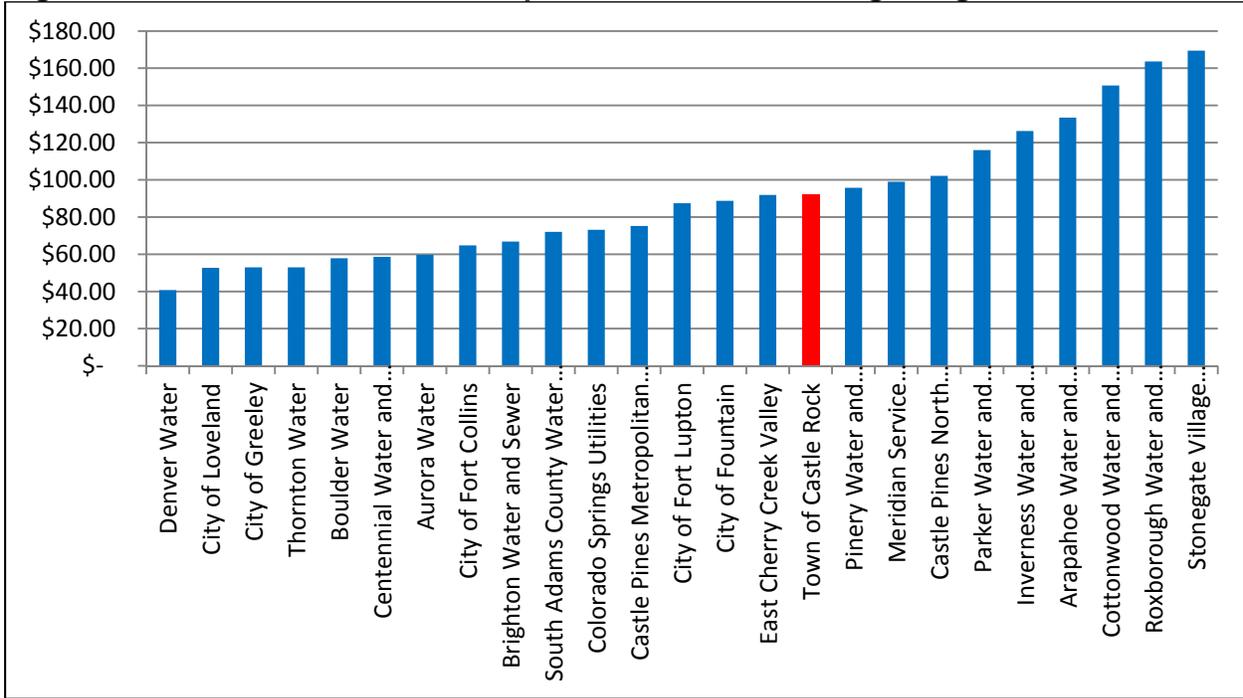
While there was no increase in the fixed monthly fees for water and water resources from 2016 to 2017, a small increase in variable water rates was approved by Town Council. Revenue from this increase in variable water rates will be dedicated to the renewable water program. New development contributes in a big way to our renewable water program even before a new customer moves in. Each new house built in Castle Rock has to pay a renewable water resource fee of \$15,248. These fees are also projected to increase overtime as shown in **Figure ES-2**.

**Figure ES-2: Water Resources System Development Fee Projection**

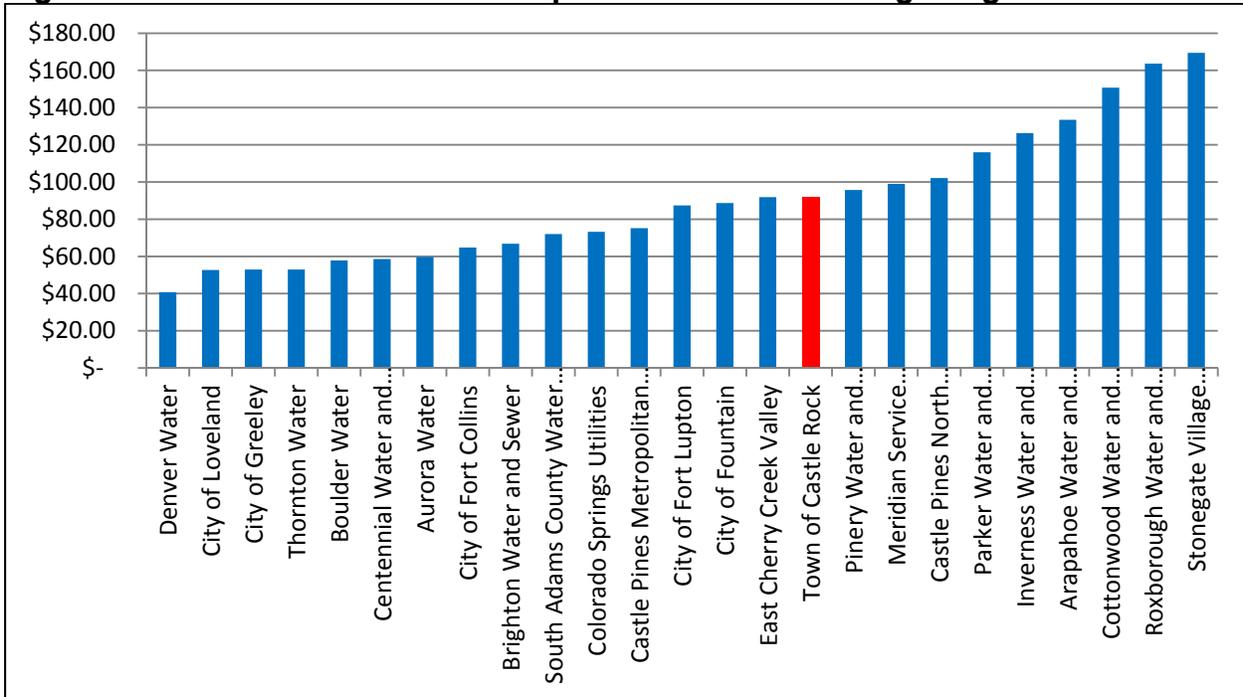


Again, implementation of this plan does mean that renewable water rates and fees will increase over time for the community. For this reason, Castle Rock Water conducts annual rates and fees studies which are presented to Town Council. The primary goal of these annual studies is to minimize rate and fee increases to the maximum extent possible. We also compare our rates and fees annually to those of similar water providers in the South Metro and Front Range region. Comparisons using 2017 rates are shown in **Figures ES-3 to ES-5**. The good news is the projected rates and fees in 2013 were greater than what our current plan projects. Castle Rock Water is constantly looking at ways to reduce costs, save money on projects, and reduce rates for customers.

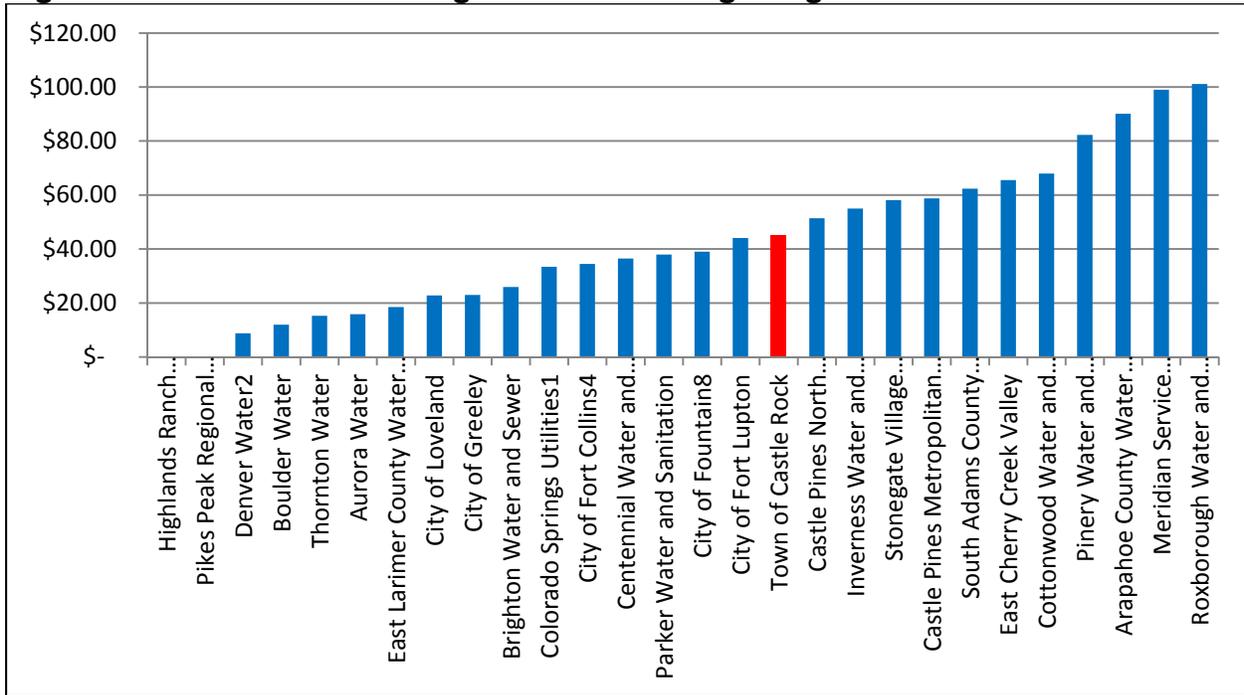
**Figure ES-3: Total Winter Bill Comparisons for Front Range Region for 2017**



**Figure ES-4: Total Summer Bill Comparisons for Front Range Region for 2017**



**Figure ES-5: Total Fixed Charges for Front Range Region for 2017**



It is important to understand a significant portion of the renewable water infrastructure is paid for by renewable water fees paid by new developments. The renewable water fees paid for by new developments reduces the long-term impact to our existing customers because the Town must construct the base renewable water infrastructure whether or not the Town continues to grow.

The Town's preferred water supply strategy is similar to that which was delineated in the 2010 WRMP, and is as follows:

- Continue to develop a water supply portfolio that consists of 75% renewable water sources and 25% non-renewable sources by 2050. After 2050, continue development of renewable sources working towards a 100% renewable supply to complement the existing non-renewable supply.

- Implement the ideas that were delineated in the 2015 Water Efficiency Master Plan: If this plan is embraced by our customers, the Town may eventually see a per capita demand of approximately 100 gallons per person per day by 2050. This would account for an additional 18% savings in water use and would essentially act as a new source of supply, representing approximately 2,700 acre-feet of water annually at a population of approximately 100,000. If the Town's existing customers (approximately 60,000 people) are able to reduce water consumption from 118 gallons per person per day to 100 gallons per person per day, the water use savings would represent approximately 1,460 acre-feet.
- Fully develop and utilize the Town's current renewable water rights which include senior and junior native surface water rights, lawn irrigation return flows (LIRF), and water reuse in both the Cherry Creek basin and Plum Creek basin. The Town currently has 8,700 acre-feet of firm yield from the existing Denver Basin well system, 834 acre-feet of firm yield from the alluvial well system along East Plum Creek which utilizes native rights and reuse water, 8,355 acre-feet of additional junior or highly variable water, and an additional 4,300 acre-feet of reliable supplies (LIRFs and reuse supplies) that the Town could utilize if infrastructure was in place. We have various alluvial wells in place with additional wells planned for the future as well as two planned surface diversions (with the ability to exchange water rights to both) which give us the ability to maximize the use of these water rights.
- Fully utilize our reusable water: Water that the Town pumps and uses from the Denver Basin aquifer, WISE supplies and future imported supplies can be reused to extinction. The Town is planning to permit and construct surface diversions on East Plum Creek that will give us the ability to re-capture these supplies. Usage of these supplies represents approximately 35% of our future projected water supply.
- Work in partnership with other entities to import additional supplies and to reduce the cost impact to our customers: The Town has been a member of the South Metro Water Supply Authority since 2004 and has worked in partnership with them to develop the WISE Authority and project. Castle Rock is also a key member in the Chatfield Reservoir Mitigation Company, which has eight participants. We have also formed partnerships with Dominion Water and Sanitation District (DWSD); Parker Water and Sanitation District (PWSD); Douglas County; and others to develop key pieces of infrastructure and to cost-share in projects. We are continuing to explore other options and opportunities with these partners and other potential partners that will provide us the water we need for the future in cost effective ways.

- Manage our reservoir storage program to optimize the placement of supplies during periods when they are not needed by our customers. Current storage space includes Rueter-Hess Reservoir (8,000 AF), Chatfield Reservoir (287 AF, expandable to 2,000 AF under an option agreement with the State) and aquifer storage (235 AF/yr) within the Denver Basin.
- Continue to maintain, develop and protect the Town's Denver Basin groundwater supply. This supply will help meet the demands of our customers in the short term and provide reliability and drought protection in the long term.
- Work within a sustainable financial plan that generates the capital funds required for the transition to a sustainable, renewable supply and maintains our existing supplies and supply infrastructure. This financial plan was updated in 2015.



As previously mentioned, this water supply strategy will likely, and in fact is predicted to require a steady increase in customer rates and fees. To ensure increases are minimal to the extent possible, a rates and fees study is conducted annually to ensure that the rates and fees collected to cover these costs are adjusted accordingly each year to avoid rate shock in any given year.

This water supply strategy will take time and significant capital expenditures. Our long-term water resources program currently predicts that the Town will spend \$300 million to \$317 million through 2055 to meet our goals. This prediction changes as projects come to fruition and costs are re-evaluated each year. Again, a rates and fees study is conducted annually to ensure that the money collected to cover these costs is adjusted accordingly each year and to minimize and smooth the cost increase impact to our customers.

## **Chapter 1 – Introduction & Discussion of Previous Plans**

Planning and preparing for a secure water future is paramount for a public water provider. A successful water supply strategy emerges from a process that:

1. Evaluates multiple alternative water sources and supply combinations;
2. Efficiently uses the Town’s existing water supplies and rights;
3. Considers viewpoints of multiple stakeholders as well as input from our customers;
4. Places realistic financial demands upon the customers as they build their investment in a sustainable water future;
5. Evaluates a host of possible future scenarios to ensure the options considered are flexible enough to allow for adjustment over time; and
6. Considers the possible risks and provides a portfolio of solutions to mitigate as many of these risks as possible.

The Town has recognized the importance of strategic water supply planning since the early 2000s. The following subsections describe the supply planning efforts prior to this 2016 Plan update.

### **1.1 2006 Water Resources Strategic Master Plan**

This document was prepared to address the future water needs for the Town of Castle Rock to achieve a sustainable long-term water supply. Prior to the implementation of this plan, the Town was overly reliant on supplies from the Denver Basin Aquifer providing the water needs of the Town for the future. When realizing the impact that over-pumping was having on the aquifer levels, and the fact that this source of water would be unsustainable for the future, the Town developed the following vision:

“A community-endorsed strategic plan establishing feasible water resource development opportunities to assure a long-term sustainable water supply for the Town of Castle Rock.”

From this vision, a preferred water supply strategy was developed which included:

- Implementation of a Water Conservation Plan.

- Full development and use of the Town’s current water rights.
- Full use of the water rights from reusable water the Town is entitled to use.
- Development of partnerships with other South Metro providers to import surface water to reach an overall water supply mix of renewable and reusable water that is 75% sustainable.
- Development of reservoir storage to maximize efficient management of water supply.
- Continue to maintain and develop the Town’s Denver Basin groundwater supply to meet the demands of continuing growth in the short term, and to provide reliability and a smaller supply role in the long term; and
- Development of a financing plan to generate the capital funds required for transitioning to a sustainable supply.

This plan also included a breakdown of where these sources of water would come from in the future.

**Table 1-1: Comparison of Preferred Alternative Distribution of Water Supply Sources to 2005 Sources**

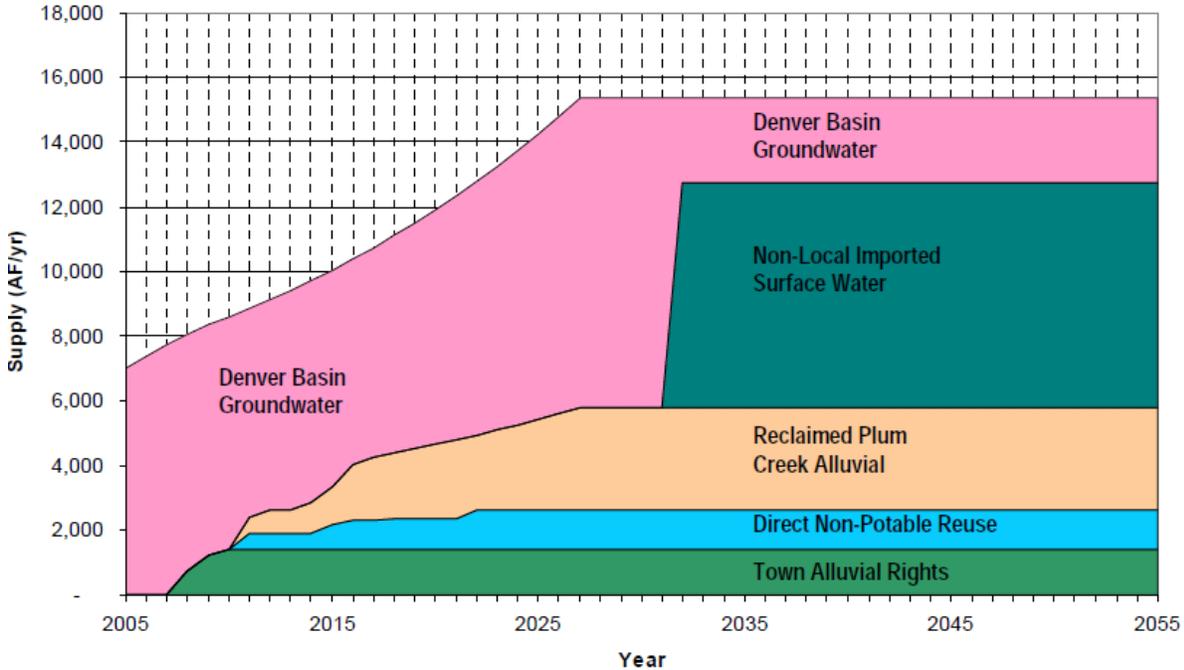
Water Source	Water Supply Amount (acre-feet per year)			
	2005		2055	
Denver Basin Groundwater	7,030	100%	2,650	17%
Town’s Plum Creek Alluvial Rights *	-	-	1,400	9%
Water Reuse Program which includes:	-	-	4411	29%
• Reclaimable – Plum Creek Alluvial (Potable) 3,166 acre-feet per year (21%)**				
• Reclaimable – Direct Non-potable (Irrigation) 1,245 acre-feet per year (8%)**				
Imported Surface Water *	-	-	6,940	45%
<b>TOTAL</b>	<b>7,030</b>	<b>100%</b>	<b>15,400</b>	<b>100%</b>

\* Renewable source of water supply

\*\* Portion attributed to Imported Surface Water is considered a renewable source

Figure 1-1 shows the planned vision as it was imagined in 2006 of when the various water sources would be brought on-line.

**Figure 1-1: Timing of Water Sources**



One notable item that is mentioned in this plan indicates that some reusable water would be used for non-potable irrigation. Due to the expense of developing a separate non-potable distribution system in Town, this option is no longer being considered.

The 2006 plan indicated that the Town’s projected build-out population would be 100,000 residents by 2030, with a demand of 18,750 acre-feet per year (AF/yr), without conservation measures implemented. With an assumed 18% reduction using conservation measures, the future demand decreased to 15,400 AF/yr.

**1.2 2008 Water Resources Implementation Plan**

The 2008 Water Resources Implementation Plan (WRIP) document delineated the plan for development and use of local renewable supplies, drawing on detailed analyses of alternative infrastructure systems that would capture, store, convey, treat, and distribute the renewable water from various points of diversion. This plan was a cooperative effort between the Town, Castle Pines Metropolitan District (CPMD) and Castle Pines North Metropolitan District (CPNMD) and discussed a regional approach to management of the local renewable supplies. These supplies included:

- East and West Plum Creek alluvial and surface water rights;
- Reusable return flows from the Plum Creek Water Reclamation Authority (PCWRA);
- Lawn irrigation return flows (LIRFs); and
- Future imported renewable water supplies.

The plan recommended a phased approach to implementing renewable water projects. The specific projects identified in the WRIP included:

- Construction of an interconnection between Centennial Water & Sanitation District's potable water system to divert, treat and deliver a portion of the local renewable supplies via Centennial's South Platte River diversions and treatment/distribution infrastructure.
- Acquisition of capacity in the East Cherry Creek Valley (ECCV) Northern Water Supply system to treat and deliver additional local renewable supplies plus future imported water supplies.
- Construction of new pipelines to deliver water from the ECCV northern pipeline's terminus to the participant's service area.
- Acquisition of storage in RHR to store off-peak deliveries of water through the ECCV's northern system for subsequent periods of peak demand.
- Construction of a new regional WTP to treat water withdrawn from storage in RHR.
- Development and implementation of an aquifer storage and recovery (ASR) pilot testing program to convert groundwater wells to ASR and evaluate the technical feasibility of ASR for seasonal storage.
- Possible future development of a reclaimed water distribution system to serve certain non-potable water demands (primarily irrigation) in the Castle Rock service area.
- Possible future local diversion of Plum Creek water rights and reusable water through a surface diversion, a new Plum Creek Reservoir, and a series of Lower Plum Creek alluvial wells, with conveyance to an expanded Regional WTP for treatment and subsequent distribution to the participants.

A number of these items have been implemented, see Section 1.4.

### 1.3 2010 Water Resources Master Plan Update

The 2010 WRMP Update provides a summary of the Town’s regional involvement, a review of the major plan assumptions, an update on the progress of the implementation actions outlined by previous plans, a list of current capital improvement projects, and the means by which the Town planned to fund improvements.

This plan reiterated the preferred water supply strategy from the 2006 plan, and provided a breakdown of our water supply source percentages through the planning period (2055). This breakdown is shown in **Table 1-2**.

**Table 1-2: Distribution of Water Supply Sources**

Water Source	Water Supply Amount (acre-feet per year)			
	2010		2055	
Denver Basin Groundwater	6,140	100%	3,850	25%
Town's Plum Creek Alluvial Rights			1,440	**
Water Reuse Program			5,700	37%
Imported Surface Water				38%
<b>TOTAL</b>	<b>6,140</b>	<b>100%</b>	<b>15,400 ***</b>	<b>100%</b>

\*\* Due to the uncertainty associated with some of the Town’s junior water rights, they are not considered as a firm supply.

\*\*\* Included conservation of around 16% from 2006 usage patterns.

### 1.4 Notable Accomplishments from Previous Plans

The following activities have either been initiated or completed since the 2006 WRSMP was put into effect. Each of these accomplishments helps Castle Rock Water achieve its goal of becoming a sustainable water provider.

1. Ownership of 8,000 AF of storage space in Rueter-Hess Reservoir. Additionally, in 2015, the Town finalized an agreement with PWSD to capture reusable water in the Cherry Creek basin (treated at the Pinery wastewater treatment facility) and store it in RHR. As of the date of this Plan, the Town has approximately 75 AF of water in RHR, with additional reusable supplies coming in each month (4-5 AF/mo when PWSDs diversion is in priority).
2. Purchase of 1.4 million-gallons-per-day (MGD) capacity in ECCV’s northern pipeline.
3. Construction of the first phase of the Plum Creek Water Purification Facility (PCWPF) with 4 MGD of capacity, giving the Town the ability to effectively treat surface water. The Town is currently engaged in the conceptual design of an

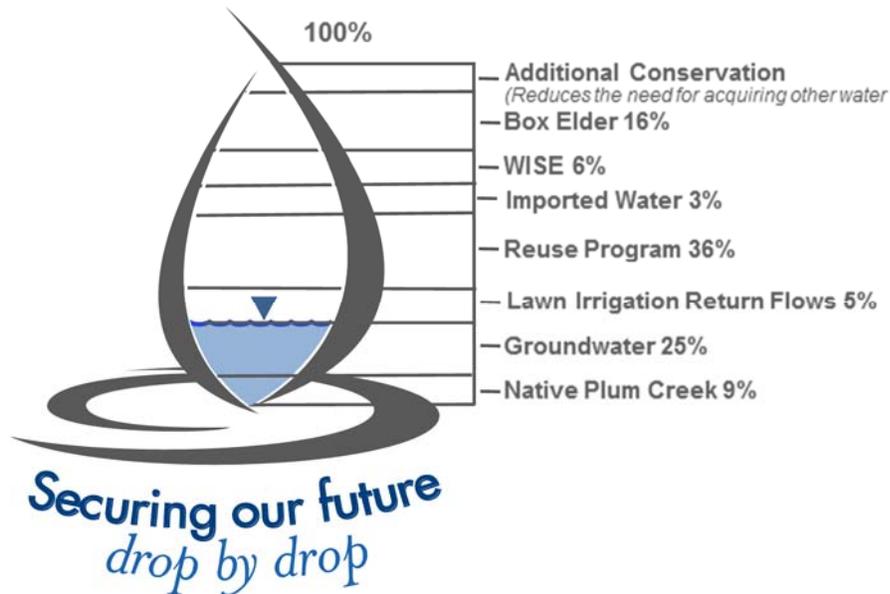
expansion to 6 MGD with the addition of other advanced water treatment processes to treat new sources of supply.

4. Fostering regional partnerships
  - a. Membership in South Metro Water Supply Authority (SMWSA);
  - b. Membership in the WISE Authority implementing the WISE Project.
  - c. Membership in the Chatfield Reservoir Mitigation Company (CRMC) implementing the Chatfield Reallocation Project.
  - d. Intergovernmental Agreements related to water infrastructure with Parker Water and Sanitation District (PWSD); Dominion Water and Sanitation District (DWSD); Castle Pines Metropolitan District (CPMD), the Pinery, and other SMWSA and WISE Authority members.
5. Participation in the WISE Project (1,000 AF subscription) – part of the Town's 'Hybrid' Solution<sup>1</sup> for renewable water. WISE water will be available for the Town in 2017. This water is a fully reusable supply.
6. Design and construction of local infrastructure to deliver WISE water to the Town:
  - a. The Town is participating with PWSD in the interconnect and 'Ridgegate' pipeline that connects to the WISE Western Pipeline.
  - b. The Town is working with a professional engineering consulting firm to design a 5.3 mile, 36-inch section of pipeline that will connect the WISE system to our distribution system.
  - c. The Town is partnered with PWSD to construct a 4-mile, 36-inch section of pipeline connecting PWSD's system to the WISE local infrastructure, as described in 6.b.
  - d. Castle Rock Water is negotiating the purchase of transmission capacity in the PWSD system.
7. Conducting due diligence activities on the Box Elder well field in Weld County. The Town is examining this project to provide approximately 2,500 AF/yr of renewable water in the future.
8. Purchased the Rothe Property and associated water rights in Weld County that will be able to provide augmentation water for the Box Elder project or other projects in the future, up to 770 AF/yr.

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<sup>1</sup> Hybrid Solution – This is an imported water plan approved by Council in 2013 that included 3,500 acre-feet of imported renewable water from the WISE project and the Box Elder Project that is also known as the Alternate Source of Supply Project.

9. PWSD completed the first phase of construction on the Rueter-Hess Water Purification Facility (RHWPF) that has the ability to treat the surface waters stored in RHR. This treatment facility is currently rated at 10 MGD with the capability to expand to 40 MGD. Castle Rock Water is discussing the option to purchase capacity in this facility.
10. Ownership of 287 AF of storage space in Chatfield Reservoir with an option agreement with CWCB to purchase an additional 1,213 AF over the next 14 to 19 years<sup>2</sup>.
11. Constructed and began pilot testing of two converted Denver Basin wells for aquifer storage and recovery (ASR).
12. Started the permitting and preliminary design for a surface diversion along East Plum Creek located downstream of the Plum Creek Water Reclamation Authority (PCWRA) outfall.
13. Completed the implementation of a temporary surface diversion upstream of PCWPF and started design on a permanent facility.
14. Completed permitting and construction of three alluvial wells with lateral arms and modifications of three existing alluvial wells with lateral arms to increase alluvial supply production and maximize our existing water rights.



Graphical depiction of our long-term water supplies as a percentage of the total

<sup>2</sup> The Town's agreement with CWCB allows up to five years of deferment, thus, the uncertainty of when the final storage amount will be purchased.

## Chapter 2 - Plan Purpose and Need

The purpose of the 2016 update to the Water Resources Strategic Master Plan is to build upon the work and ideas that have been put forth in the Town's previous plans as Castle Rock continues to grow. It is the responsibility of a water utility to ensure that adequate water is available for our customers now and into the future. In developing this document, we understand the following facts which help us craft our preferred water supply plan:

- Availability of deep groundwater, which the Town has been reliant upon for decades, will continue to decrease in the future and ultimately not meet the Town's long-term water needs.
- Availability of sustainable water supplies in the region and State are limited and will continue to decrease.
- Regional efforts to construct infrastructure such as reservoirs, pipelines, and treatment facilities are occurring. This infrastructure helps bring water to the area and through economies of scale by partnering with other entities, reduces the cost impact to our customers for long-term renewable water supply.

The 2016 WRSMP will cover the following information:

- A discussion of our predictive model for the amount of water that will be required for our community as we continue to grow over the next 50 years, and potentially serve adjacent areas that are not part of the Town presently.
- An overview of our current sources of supply and storage, and the future water supply sources that we are examining.
- An account of the regional partnerships and projects that we are involved in and a discussion of others that may be viable in the future.
- A review of the Town's water conservation efforts and how increased water efficiency can reduce the need to obtain additional future supplies.
- A section of how we manage our local watershed and protect our groundwater resources.
- How unpredictability in climate might impact our future water supplies.
- How our plan relates to the recently adopted State Water Plan.

- What impact a reliable and secure water portfolio will have on the cost to our residents.

With, or without growth, the existing deep groundwater supply that the Town has been so reliant upon is a non-renewing resource that is not by itself sustainable for the Town in the long-term. Thus, it is imperative that the Town develop a plan for a secure water future within the limits that are economically feasible for our community.

The plan has been endorsed by the community through an extensive outreach program, which included meetings and discussions with the Castle Rock Economic Development Committee Board, Your Town Academy participants, Parks & Recreation Commission, Utilities Commission, Public Works Commission, Developer's Roundtable, and Chamber of Commerce Board, social media notifications, Town Talk articles, water statement notifications, H2O Access statement, a brochure, and a community survey.

The results from the survey showed the respondents tended to support all of the efforts outlined in the plan. The respondents were generally aware of the water issues facing Castle Rock. Respondents felt moderate conservation efforts were valid. There was strong support for reuse both in terms of acceptance and that is it the best option for supply. The attitude of the respondents regarding how Castle Rock Water is managing water was positive, but not strong. An open-ended comment section was provided and many respondents expressed concern about growth and offered suggestions on how to better manage water supply, all of which are currently in place. The survey results are provided in **Appendix D**.

The educational brochure developed is included in **Appendix E**.

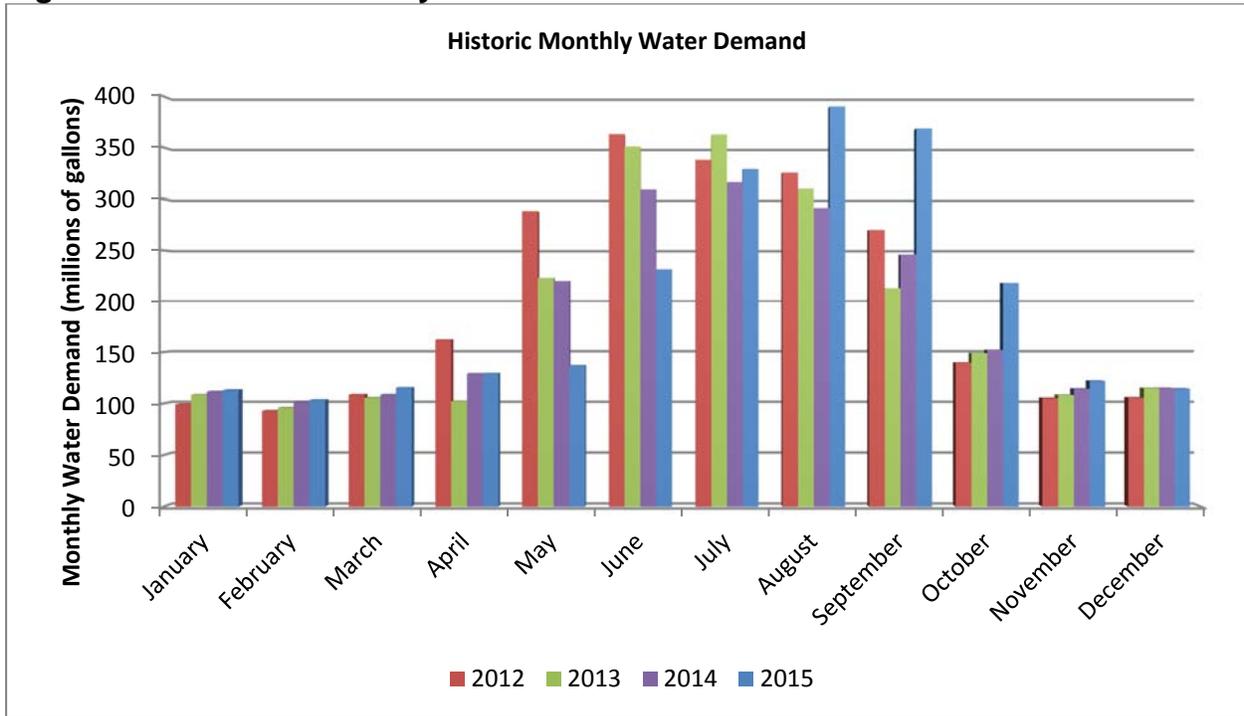
## Chapter 3 - Water Demand Forecast

Castle Rock utilizes a water supply and demand forecasting model that was developed with the assistance of a water resources consultant to model water supplies, storage capacities, and demands out to 2055. The model allows the user to account for supplies in drought years, wet years, and average precipitation years in regards to renewable supplies. At the present time, the model does not include advanced algorithms predicting climate change impacts, however, it can model some renewable water supplies based on minimum, average, median, and maximum historic yield estimates.

The Statewide Water Supply Initiative 2010 and Colorado's Water Plan have a 2050 (adopted in 2015) water conservation goal of 129 gallons per capita per day (gpcd) for the Metro Basin, which Castle Rock is a part of. However, the Town's current 5-year potable water consumption average is 122 gallons per capita per day to serve the community. Therefore, the Town is already below the future 2050 water conservation goal set by the Colorado Water Conservation Board. As part of the Town of Castle Rock 2015 Water Efficiency Master Plan, the Town has a goal to reach 100 gpcd. As part of this master planning effort, staff has developed our water demand forecast models using both a 100 gpcd demand and 135 gpcd demand to evaluate both possibilities.

The Town's model also takes into account available storage capacities for excess water supplies that may occur during wet years. Castle Rock owns capacity in Rueter-Hess Reservoir, has space reserved in the Chatfield Reservoir Reallocation Project, and is pilot testing aquifer storage and recovery (ASR) in two Denver Basin aquifer wells for feasibility. During years when excess supplies are available, the Town will store unused supplies to smooth out demands across multiple years and during peak usage seasons. Evaluations of historic monthly water demands for the past four years are provided in **Figure 3-1**. Additionally, the Town is planning to complete feasibility studies for transporting excess renewable water for storage in Rueter-Hess Reservoir.

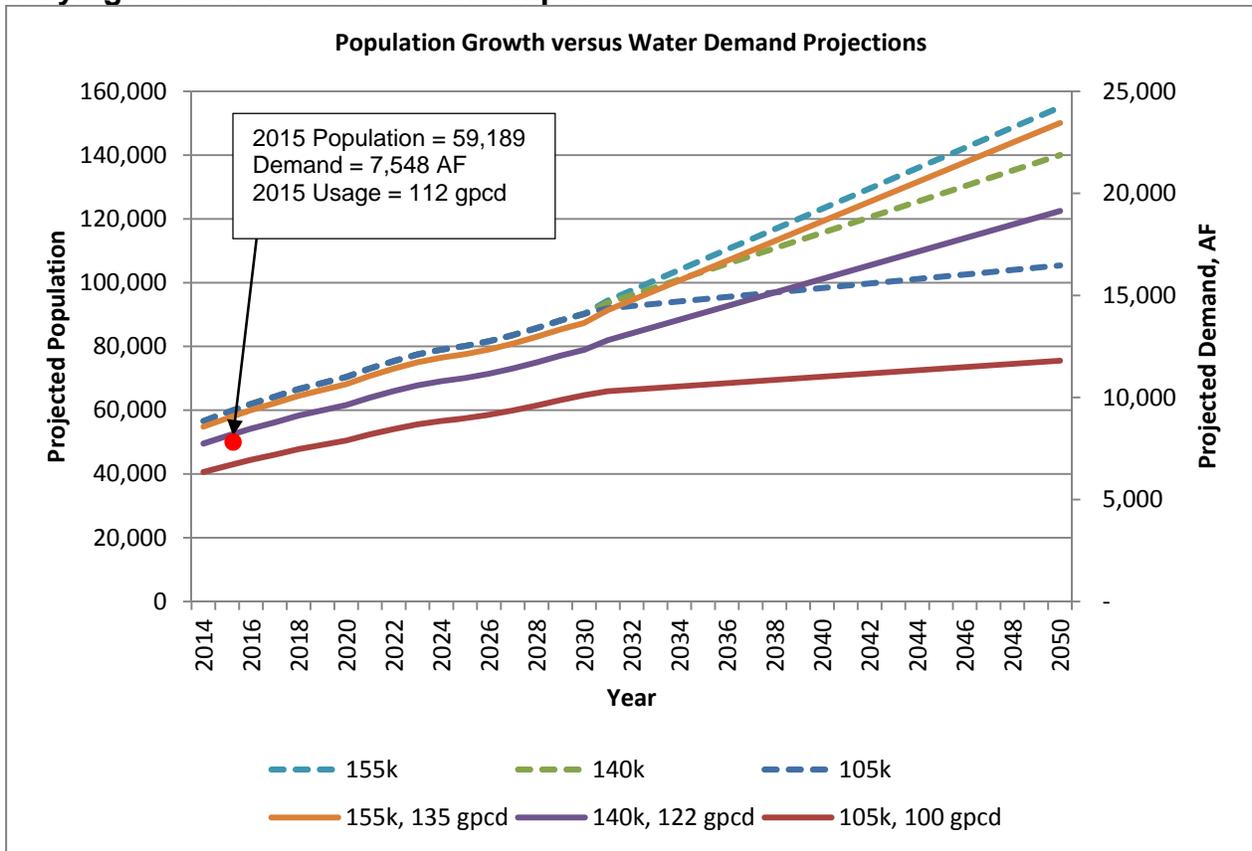
**Figure 3-1: Historic Monthly Water Demand**



Projecting future growth values can be difficult. This plan utilizes scenario planning to consider a range of possible long-term outcomes related to population. To help in the population projection, planners typically monitor existing planning areas for percent build-out and project those average percentages over all new and future planning areas. In the past, the Town assumed the Town’s projected population was based on 75% build-out of these planning areas on average, which equated to a future population of 105,200. Based on recent development activity, the Town planners have noticed that planning areas are growing to nearly the amount of homes that were planned. To adequately project water supplies that could be needed, Castle Rock Water has assumed that the Town could build-out to 100% of all its existing property entitlements. Additionally, there are several properties that are interested in annexing (e.g. Pine Canyon, Pioneer Ranch, Canyons South) into the Town of Castle Rock. The total future population from the existing entitlements could be as high as 140,000 with future annexations adding an additional 15,000 to the population by around 2050.

**Figure 3-2** shows Castle Rock Water’s varying projected population growth rates at various conservation scenarios. The base scenario that closely matches the previous water demand projections in the 2010 Water Resource Strategic Master Plan (WRSMP) is 105,200 people at a usage rate of 135 gpcd. The projected demand was set at 15,400 AF in 2050. For planning purposes, we estimate high-case and low-case scenarios to encompass a range of possibilities. In order to plan for varying scenarios, Castle Rock Water has identified that projected demands could be as low as 11,800 AF under the low-case water conservation scenario of 100 gpcd, and 105,200 people versus 23,500 AF under a high-case water conservation scenario of 135 gpcd with 155,000 people.

**Figure 3-2: Town’s Population Growth versus Water Demand Projections at Varying Growth Rates and Consumption Rates**



Demands will continue to be impacted by weather, conservation, costs, and population. Some key water conservation initiatives which could impact demand include advanced metering initiatives, formal metering testing programs, water budget rate structure changes, landscape and irrigation retrofits to Town parks and right-of-ways, indoor conservation incentive programs, hot water recirculation systems, and irrigation audits.

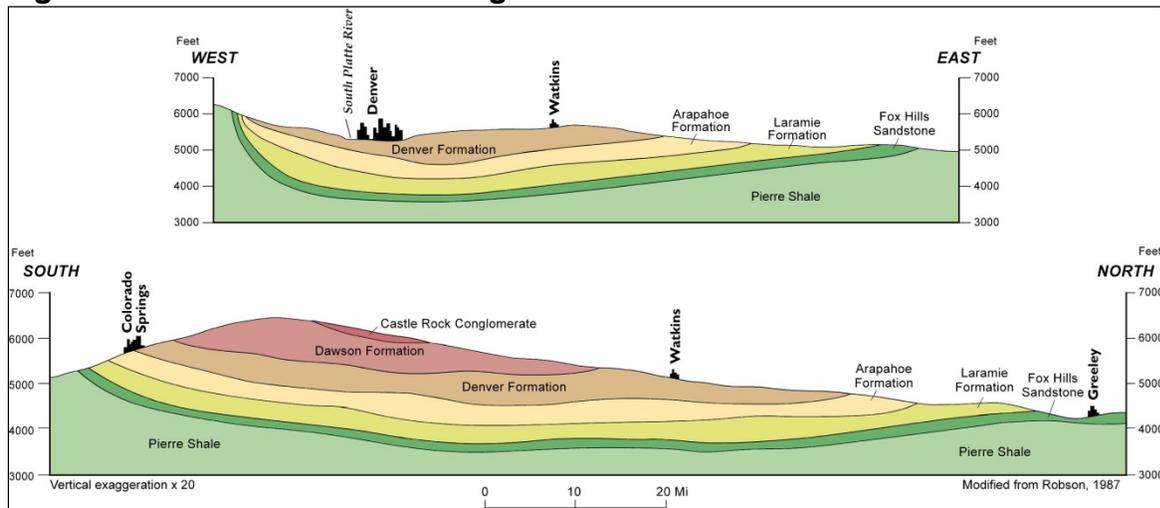
In 2014, the Town created minimum water efficiency design criteria, which can be used by new developments. These criteria include indoor and outdoor water conservation efforts as well as specific water budgets for properties included within a water efficiency plan. The effectiveness of the plans will be evaluated as new communities are developed. To date, one development, The Lanterns, has utilized these guidelines to develop their approved development specific water efficiency plan. There is a possibility that some of the future annexation properties would utilize the same minimum water efficiency design criteria, thus decreasing the total amount of renewable supplies the Town would need to purchase in the future.

## Chapter 4 - Water Supply

### 4.1 Current Sources

Castle Rock overlies the Denver Basin, a geologic formation with four principal aquifers: the Dawson, Denver, Arapahoe, and the deepest of the four, the Laramie-Fox Hills as shown in **Figure 4-1**. These aquifers are a non-renewable water source that recharge extremely slowly and the recharge rate is a tiny fraction of the rate of withdrawal. Currently, approximately 89 percent of the Town's water is pumped from the Town's fifty-four deep groundwater wells located in the Denver Basin Aquifer. Approximately 11 percent of the water supply comes from renewable water resources which include twelve active shallow alluvial wells along East Plum Creek. In the future, Castle Rock plans to construct a surface diversion along East Plum Creek to fully capture the Town's renewable surface water rights on East Plum Creek.

**Figure 4-1: Denver Basin Geologic Formation**



The Town of Castle Rock currently owns all of the Denver Basin groundwater underneath the Town as well as some renewable water rights. The Town has more than 57,000 acre-feet of water rights between surface water, Denver Basin groundwater, and reuse rights but the Town does not have the necessary infrastructure in place to access all of these water rights. Groundwater is a non-renewable resource, and therefore, it is imperative that we continue transitioning to the Town's ultimate water portfolio goal of 75% renewable and 25% non-renewable by 2050. As a comparison, a typical family uses approximately a half an acre-foot of water per year which would look like a basketball court filled with 50 inches of water or about the size of the lap pool at the Town's Recreation Center. Each year, the entire Town uses about 2.2 billion gallons of water which is enough water to fill a football field-sized swimming pool one mile deep.

Castle Rock has long recognized the need to diversify its water portfolio and extend the life of its aquifers. The Town recognizes its limited Denver Basin ground water supply source will ultimately not meet water needs. Water Resource programs and projects are currently being implemented that speak to the feasible life of groundwater aquifers and support the Town's goal of obtaining sustainable long-term renewable water supplies. In 2006, the Town adopted its Water Resource Strategic Master Plan to address the future water needs for the Town to achieve a sustainable long-term water supply. In 2011, the Town adopted the 2010 Water Resources Master Plan Update which is updated by this document. The plans consist of implementing the following activities:

- Implementation of a water conservation plan;
- Fully develop and use the Town's current water rights;
- Make full use of the water rights from reusable water the Town is entitled to use; and
- Work in partnership to import surface water to reach an overall water supply mix of renewable and reusable water that is 75% sustainable.

The goal of the Water Resource Strategic Master Plan is to evaluate the major water supply options potentially available to the Town in a manner that will result in an optimal mix of conservation, reuse, groundwater and renewable water sources in order to provide the Town with a long-term, sustainable water supply for the Town's future water needs. Transitioning to renewable water supplies for 75% of the Town's future water needs by 2050 will lessen the reliance on the Denver Basin groundwater aquifers which are experiencing declining water levels each year. The Plan presents options in a manner that will allow the Town to map out a program that best fits its goals and financial capabilities.

The potential water resources available to the Town fall within four primary categories as shown in **Table 4-1**: existing Town-owned groundwater, Town-owned local surface water, imported surface water, and reusable supplies in both the Plum Creek and Cherry Creek basins.

**Table 4-1: Castle Rock’s Projected Future Water Supply for Year 2055**

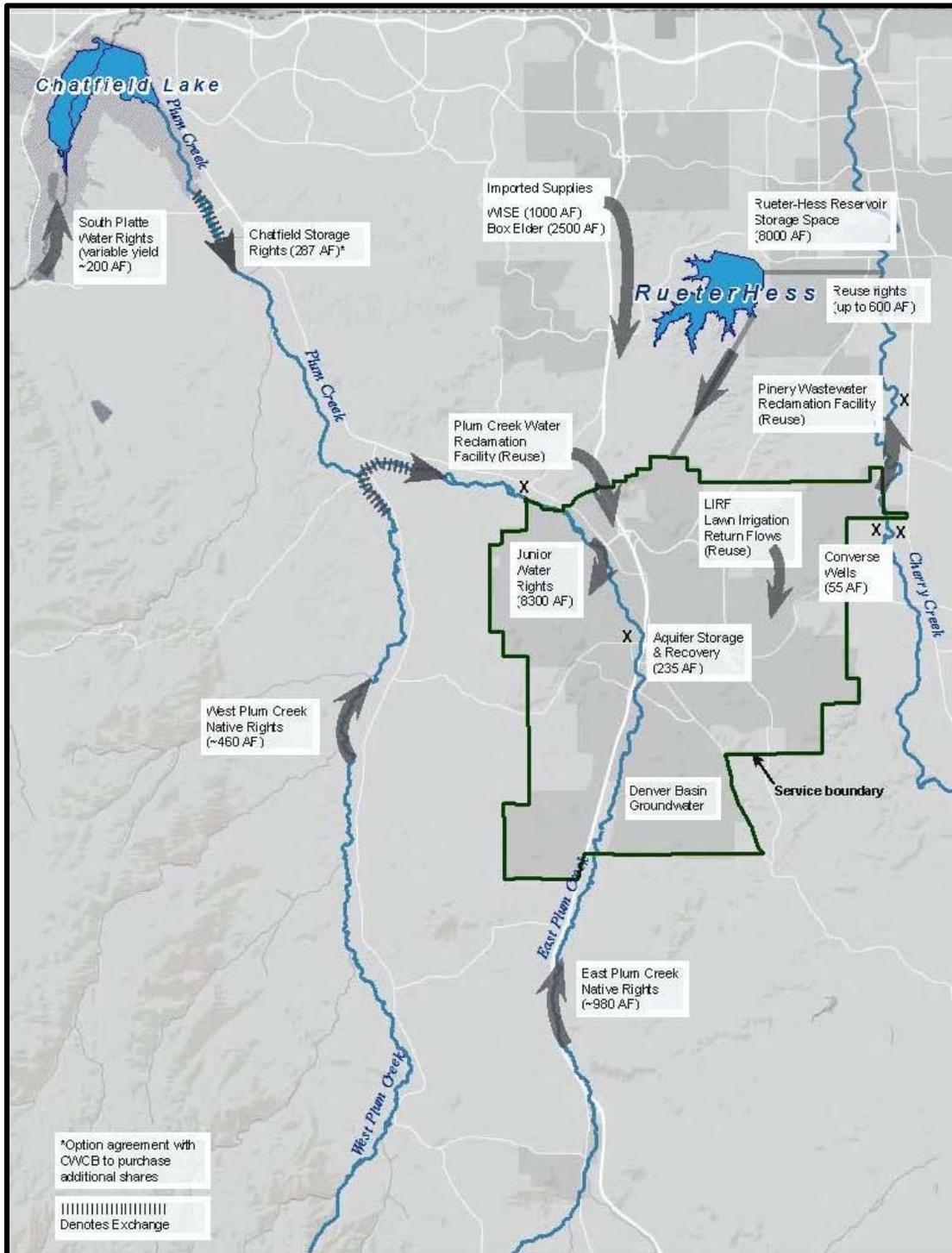
Water Source	Minimum Raw Water Supply		Maximum Raw Water Supply	
	Volume (Acre-Feet/Year)	% of Annual Supply	Volume (Acre-Feet/Year)	% of Annual Supply
<b>Denver Basin Groundwater</b>	2,835	25%	3,980	21%
<b>Local Renewable Surface Water</b>				
Junior Local Plum Creek Alluvial Rights <sup>1</sup>	8,300		8,300	
Senior Plum Creek Native Water Rights	1,440	13%	1,440	7%
Cherry Creek Alluvial Rights <sup>1</sup>	55		55	
South Platte Water Right <sup>2</sup>	200		200	
Spot Water Purchases at Chatfield	Variable		Variable	
<b>Reusable Water</b>				
Plum Creek LIRFs	365	3%	655	3%
Cherry Creek LIRFs	200	2%	300	2%
Water Reuse Program <sup>3</sup>	4,090	36%	7,630	40%
<b>Imported Surface Water<sup>4</sup></b>	2,450	22%	5,170	27%
<b>Total</b>	11,380	100%	19,135	100%

Notes:

1. Junior water rights that are not reliable and require augmentation during a call. Not included in total supplies available.
2. This is a junior water right at the Chatfield Reservoir. Chatfield Reservoir storage will firm up the yield during a dry year. Location is also an alternate location for capturing and accessing the Town's reuse rights and junior Plum Creek rights. Not included in the total water supplies available.
3. Includes reuse supplies in both the Plum Creek basin and Cherry Creek basin.
4. Includes WISE, Box Elder, and other future supplies that may come in partnership with SMWSA and PWSD.

**Figure 4-2** shows the Town of Castle Rock’s current planned sources of water supplies and storage locations.

**Figure 4-2: Diagram Indicating Current Planned Source Water and Storage Locations**



**Appendix A** shows the Town of Castle Rock's Surface and Storage Water Rights and the Town's Tributary Plans for Augmentation and Changes of Water Rights associated with tributary structure as of October 2015.

**Appendix B** shows the Town's current Denver Basin groundwater rights as of November 2015, which is approximately 41,000 acre-feet on paper. While the Town owns nearly all of the water rights within its service boundary, access to this water on an annual basis is limited to the amount of infrastructure constructed, the location of that infrastructure and water levels in the aquifer. As water levels in the aquifer decline, the pumping capacities of the wells also decline. If the Town wanted to retrieve the same annual volume of water each year, additional wells would need to be constructed as water levels decline. Over the past five years, the maximum day demand of the customers was 15.4 mgd. The maximum annual amount of Denver Basin groundwater supplies that Castle Rock Water has produced over the past five years is 7,372 acre-feet. Castle Rock Water estimates that the current infrastructure allows for the pumping of approximately 8,400 acre-feet per year of these water rights.

### **Groundwater**

The primary water resources available to the Town at this time are our groundwater rights within the Denver Basin aquifers and alluvial ground water rights from the Plum Creek alluvium. In 2014, 13% of the Town's annual demands were met using renewable alluvial groundwater rights and in 2015, 11% of the annual demand was met using alluvial groundwater rights. To ensure responsible use of this resource, the Town has retained several consultants to develop groundwater and water rights planning models that help Town staff evaluate these resources. The models better define the Town's aquifers characteristics, allowing the Town not only to evaluate the conditions of the aquifers today, but also evaluate the impacts of other water supply projects to the life of the aquifers.

With the majority of the Town's water produced from deep groundwater aquifers, it is essential to use this resource responsibly and efficiently. By applying groundwater and planning models, Town staff has a tool to not only evaluate our preferred water supply option, but also to help guide our decisions as factors change over time. The models provide a framework for assessing the impacts on the groundwater resource over the next 50 years and they also provide a basis on which to evaluate the optimal mix of conservation, reuse, groundwater and renewable water and its impacts to the Town's aquifers.

The initial results of the models indicate the Town has time to address its long-term water supply issues. However, the cost to continue down the current path of relying on non-renewable groundwater is high and the time to continue to implement and refine a strategic plan to diversify the Town's water portfolio is now. Many of the renewable water projects required to reduce the Town's dependence on non-renewable groundwater have taken and will continue to take decades to develop.

## **Surface Water**

Work continues on evaluating the options of bringing renewable water to the Town. The Town has four primary areas where renewable water can be obtained in adequate quantities, which include using the Town's existing senior water rights along East and West Plum Creek and junior water rights in Cherry Creek, importing water through the South Metro Water Infrastructure and Supply Efficiency (WISE) Project, importing water from the middle and lower South Platte River (through one or more projects including the Box Elder Project, and junior water rights in the upper South Platte through the Chatfield Reallocation Project). The scope of the renewable projects is so expansive; Castle Rock alone cannot develop the financial or political capabilities to implement them. The Town's involvement in local and regional efforts is crucial to the Town's success in the renewable water arena. The Town is currently participating in several regional programs as part of our Alternative Source of Supply Project which includes the WISE Project, the Box Elder Project, and other potential projects identified since the 2011 RFP process, as well as developing conjunctive use plans with other water providers, increasing existing reservoir storage capacities and participating in new storage projects.

The Town's senior water rights on East and West Plum Creek are a key renewable water source currently tapped by alluvial wells. Alluvial water makes up the balance of the Town's current renewable water portfolio. The Town owns rights on East Plum Creek with an average annual yield of 980 acre-feet and rights on West Plum Creek with an average annual yield of 460 acre-feet. Historically, the Town did not have an adequate way to treat the alluvial water. In 2013, the Town began operating a newly constructed surface water treatment facility (Plum Creek Water Purification Facility) to treat renewable water supplies from nine alluvial wells. The nine existing alluvial wells produce about 11% of the Town's annual supply. In early 2016, the Town constructed three more alluvial wells along East Plum Creek. The impact of these wells will be evaluated in 2016. The Town is considering at least two surface water diversions along East Plum Creek to maximize its use of senior water rights in the basin. The Town anticipates at least one of the surface water diversion structures to be available in 2017 and thereby delivering additional renewable water to the Plum Creek Water Purification Facility.

The Town owns 62% of the rights in the Converse Wells along Cherry Creek which amounts to 55 acre-feet of water per year. Currently the Town does not have infrastructure in place to put this water to beneficial use. These have been changed for municipal use in water court. Options for use include storage in Rueter-Hess Reservoir, irrigation of a future local park, or treatment at a nearby facility for potable water supply. The Town could also use this location as an exchange point for its reusable effluent and lawn irrigation return flows.

The Town owns 287 acre-feet of storage space in the Chatfield Reservoir Reallocation Project with an option agreement with the Colorado Water Conservation Board to

purchase an additional 1,213 acre-feet of available storage shares. The Town is also discussing revising the option agreement to purchase an additional 500 acre-feet of available storage shares. Based on historic call information on the South Platte River, the anticipated yield for our junior water storage right is approximately 200 acre-feet per year. Any water that the Town can keep in storage will help firm up supplies during dry times. Over the past 20 years, this water right was out of priority for nine consecutive years. The Town speculates that once the reallocation project is complete, the historic operations may not be representative of how the calls will operate in the future. Therefore, the Town is not including the capture of these rights as a firm water supply source at this time and the fact that this junior water right is so variable and highly unpredictable. On the other hand, the location of the Chatfield Reservoir gives the Town an alternate location to capture and access the Town's reuse rights and junior Plum Creek rights.

Each month, Castle Rock Water tracks the renewable water rate as one of our key performance indicators. This compares the total volume of renewable water produced to the total volume of water produced. The Town is striving to reach a 75% renewable water rate by 2050. Beyond that time, the Town may consider adding additional renewable water resources.

### **Reusable Water**

Some of the water used by the Town that is collected and conveyed to the Plum Creek Water Reclamation Authority (PCWRA) treatment plant for treatment and discharge to East Plum Creek can, by law, be treated and reused by the Town. Similarly, a portion of the water used for lawn, park, and golf course irrigation that returns to East Plum Creek can also be reused by following the proper procedures.

The Town plans to maximize the use of this water by capturing the reusable effluent that is discharged directly to Plum Creek after the water undergoes some natural treatment processes within the stream and mixing with native flows. The reusable water would be delivered back to the Town for further treatment at Plum Creek Water Purification Facility (PCWPF) to meet drinking water quality standards and then be sent into the water distribution system. Additionally, Castle Rock Water is exploring options for storing excess reuse water from the Plum Creek Basin in RHR or Chatfield Reservoir and direct pumping of reuse water to PCWPF for blending and potable treatment. For further information regarding reuse water, visit the WateReuse website at [www.watereuse.org](http://www.watereuse.org).

A small portion of the Town's reusable effluent is treated by the Pinery Wastewater Treatment Plant and discharged to the Cherry Creek Basin. The Town has full rights to reuse this water. The Town is capturing these water rights at Parker Water & Sanitation District's Cherry Creek Diversion Structure for storage in Rueter-Hess Reservoir. At the present time (2016), the Town has about 60 acre-feet per year of water that can be delivered to Rueter-Hess Reservoir. In the future, Castle Rock Water anticipates the

reusable flows will increase to approximately 600 acre-feet from additional growth of already zoned properties and future annexations/development of land. However, water deliveries to the reservoir are dependent on the operation of the Cherry Creek Pump Station which turns off during river calls or for maintenance, so the Town may not always be able to divert all water that is available. Ultimately, Castle Rock Water plans to treat the reusable water that is in storage and return it to Town through the WISE infrastructure.

The Town can also claim lawn irrigation return flows (LIRFs)<sup>3</sup> that accrue to Plum Creek and Cherry Creek. These flows will amount to approximately 700 acre-feet at 2050 assuming that 10% of the irrigation water applied is returned to the respective stream channel.

### **Imported Water**

In 2011, staff was directed by Town Council to evaluate other potential water supply projects (Alternative Source of Water Supply Projects) to ensure that Castle Rock fully understood the options available in addition to Water Infrastructure Supply Efficiency (WISE) Project. The Town developed a Request for Proposals (RFP) process that could accomplish that in a public, transparent process.

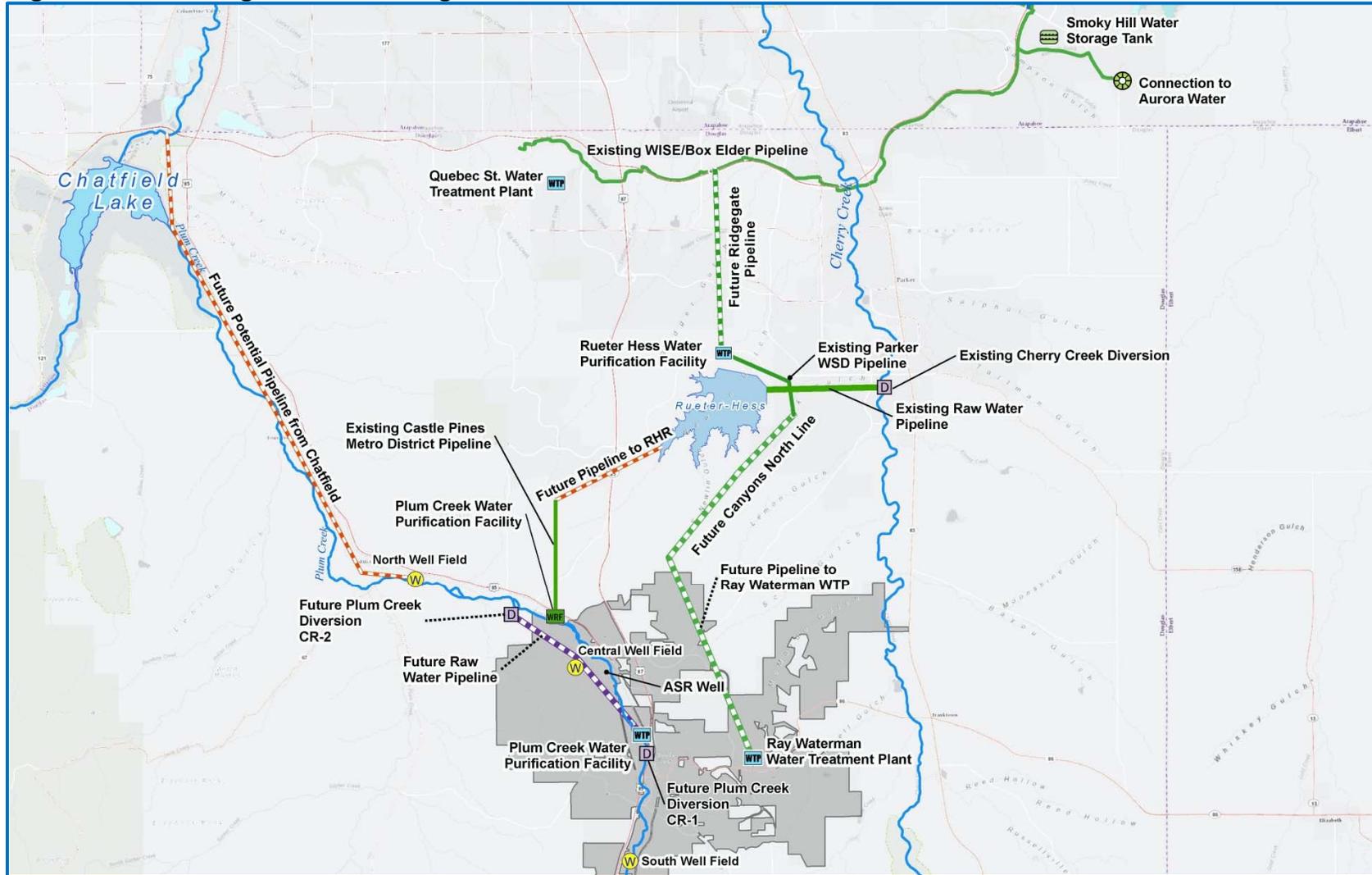
Through various public meetings in 2012, Town Council considered the risks, benefits, and costs of all of the proposals submitted including a hybrid option that couples the WISE project with one of the other proposals. As a result of these meetings, Town Council directed staff to focus efforts on a scaled back (hybrid) renewable water project (2,000 - 4,000 acre-foot solution) and to explore it in more detail, the hybrid option which includes 1,000 acre-feet of WISE water and 2,500 acre-feet of northern supplies along the South Platte River.

The Town currently is a member of the South Metro WISE Authority for 1,000 acre-feet of WISE water to be delivered in 2017 through a partnership with ten South Metro WISE members, East Cherry Creek Valley Water & Sanitation, Denver Water, and Aurora Water. The WISE water is anticipated to be variable dependent on the weather but the longest period of time without deliveries can only be 24 months per the Water Delivery Agreement between the South Metro WISE Authority, Aurora Water, and Denver Water. The WISE water is a renewable source from the South Platte River and can be reused to extinction. The “core infrastructure” is being modified to meet the functionality needs of the members. Through additional partnerships with local area water providers such as PWSD, Pinery Water & Sanitation District, Dominion, and Stonegate, the remaining local infrastructure is in various stages of design or construction. **Figure 4-3** shows the location of this regional infrastructure.

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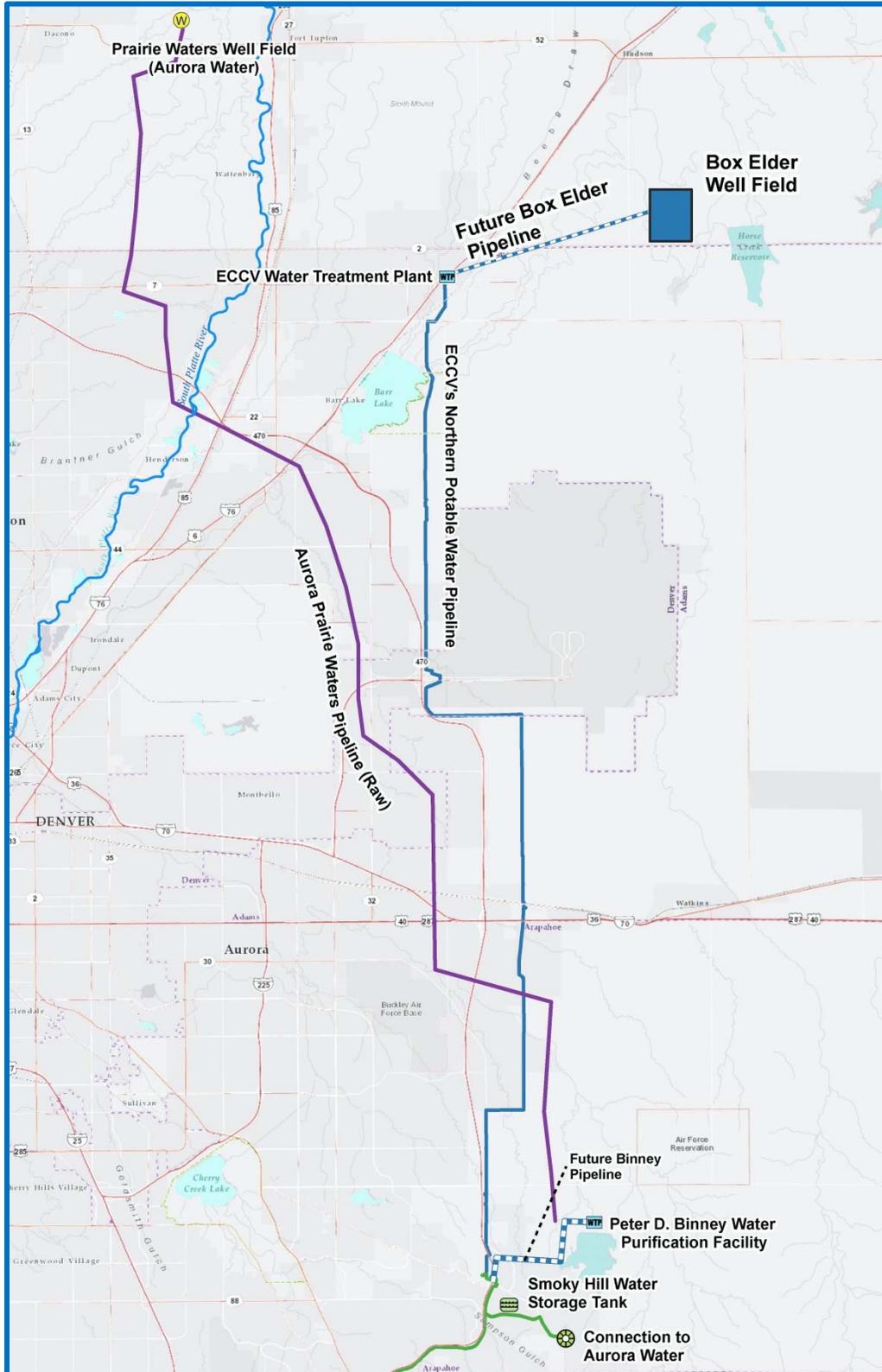
<sup>3</sup> Lawn Irrigation Return Flow (LIRF) – Irrigation water that is applied to lawns and not consumed by vegetation which percolates through the soil and travels to the nearest streambed.

Figure 4-3: Existing and Future Regional WISE and Box Elder Infrastructure



The northern supply project (also known as the Box Elder Project) includes the following three components: (1) the Box Elder well field, (2) water rights acquisition, and (3) treatment and transmission infrastructure. Items 1 and 2 were designed to progress in tandem. Item 3 is part of the longer term renewable water program, and infrastructure is planned as water rights come online. The purpose of the Box Elder well field is to serve as a point of diversion (the place where we get our wet water) for acquired water rights. This well field is located approximately six miles east of Lochbuie, CO in southern Weld County as shown on **Figure 4-4**. The well field contains eleven existing permitted alluvial wells, 850 acres of property, approximately 300 acre-feet of consumptive use HID water rights, and 300 acre-feet per year of Ground Water Management Subdistrict of the Central Colorado Water Conservancy District (Central GMS) irrigation water rights. The Town entered into a 5-1/2 year option agreement with the owners of the Box Elder well field in 2014 and closed on the property in November 2016. This project will provide renewable water to the Town from along the South Platte River.

Figure 4-4: Existing and Future Regional Box Elder Infrastructure



To date, the Town has secured 770 acre-feet of augmentation water from the purchase of the Rothe Recharge Project which diverts water from the South Platte River at the Riverside Canal which is located east of Greeley under a water right with an effective 1988 priority date. This water is delivered from the Riverside Canal into several recharge ponds which then makes its way through the alluvial sands as groundwater return flow to the South Platte River approximately 16 miles downstream of the point where Box Elder Creek theoretically enters the South Platte River. The hydrogeologic transport of this water through the alluvium takes a number of years. The Town is currently performing due diligence efforts on 1,000 acre-feet of renewable water rights in the Lost Creek Basin. Additional water rights will be evaluated for acquisition in the near term.

### **Water Storage**

The Town of Castle Rock secured 8,000 acre-feet of raw water storage in Rueter-Hess Reservoir in 2008. To date, the Town has approximately 75 acre-feet of treated effluent flows from the Cherry Creek Basin stored in Rueter-Hess Reservoir. Beginning in 2017, unused WISE water deliveries can also be stored in Rueter-Hess Reservoir.

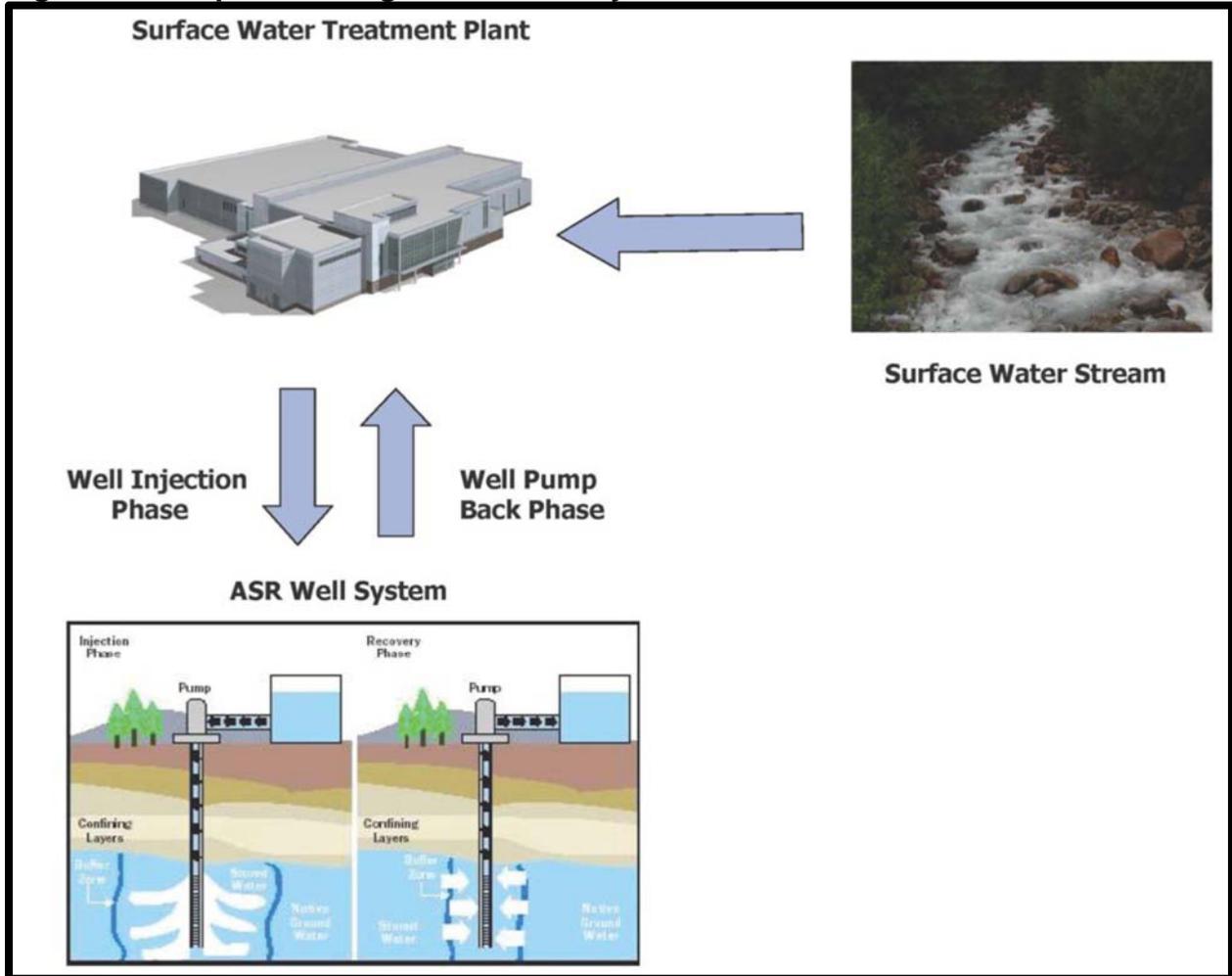
In 2015, the Town purchased 287 acre-feet of storage space in the Chatfield Reservoir Reallocation Project. The Town has an option agreement with the State to purchase an additional 1,126 acre-feet over the next 13-18 years, to bring the total project participation level to 1,500 acre-feet. To date, the Town's current storage capacity in the project is 374 acre-feet. The Town is working with the State to revise the option agreement to purchase an additional 500 acre-feet of available storage shares, bringing the total project participation level from 1,500 to 2,000 acre-feet. Beginning in 2018, the Town will be able to begin storing raw water from the Plum Creek Basin in the Chatfield Reservoir provided all deadlines are achieved in accordance with the Water Storage Agreement signed by the State of Colorado and the US Army Corps of Engineers (Corps).

Additionally, the Town has modified two existing deep groundwater wells for use as underground reservoirs (aquifer storage and recovery [ASR]). This project is in the pilot phase and will be evaluated in 2017 for effectiveness. ASR capabilities not only provide storage space and eliminate losses that would otherwise occur due to evaporation (approximately 18% annually for this location) but also help bolster the hydrostatic pressure in the aquifer. Ideally, the increased hydrostatic pressure will increase the pumping capacities in the surrounding deep groundwater wells. In the future, when we have excess renewable water, the renewable water can be treated and stored underground in these wells. When we need additional water during times of high demand, typically summer months, the water can be pumped out of these wells and sent to the water treatment facilities for treatment and distribution.

**Figure 4-5** shows a basic schematic of how ASR systems operate. Staff estimates that storage of renewable water in these wells will occur during the months of November through April. Typical ASR wells have a maximum injection rate of 80% of the average pumping rate. Based on the information available, staff believes that up to a total of 235

AF of renewable water could be stored in the two existing ASR wells in a year. Castle Rock Water is planning four additional ASR wells within the next five years.

**Figure 4-5: Aquifer Storage and Recovery Schematic**



## 4.2 Local and Regional Infrastructure

### Current Opportunities

Area water providers are a major asset to each other in that they have the ability to share their existing and future infrastructure regionally with other water providers. Regional infrastructure helps offset capital costs and future operation and maintenance costs that would be incurred by a single entity. For example, as part of the WISE project through South Metro WISE Authority, the ten partners in conjunction with Denver Water, purchased the Western Pipeline from East Cherry Creek Valley Water & Sanitation District. This purchase regionalized existing infrastructure and provided a way for the WISE Authority members to obtain water from the South Platte River. The Western Pipeline is located along C-470 and E-470 as shown on **Figure 4-3** (referred to as the *Existing WISE/Box Elder Pipeline* on the map).

Castle Rock has developed partnerships with Parker Water & Sanitation District, Dominion Water & Sanitation District, Pinery Water & Sanitation District, and Stonegate Water & Sanitation District for design and construction of infrastructure necessary to deliver local WISE water deliveries between the Western Pipeline and the Town of Castle Rock.

Additionally, Castle Rock Water owns 1.4 million gallons per day capacity in the East Cherry Creek Valley (ECCV) Northern Pipeline through South Metro Water Supply Authority as shown on **Figure 4-4**. The pipeline will be used to deliver treated water from the Box Elder Project to the Town of Castle Rock. Additional pipeline and treatment capacity would need to be purchased or leased in the future to deliver the full quantity of renewable water from the Box Elder Project.

The Town is a participant in the Chatfield Reservoir Reallocation Project. In 2015, the participants formed the Chatfield Reservoir Mitigation Company (CRMC) which is the managing entity for the reallocation project. The CRMC hired CDM-Smith in November 2015 as the program manager to coordinate the design of the mitigation items. Castle Rock Water currently does not have a seat on the Board due to the small amount of storage shares held but plans to have a seat on the governing board once additional shares are bought in the future. The Town is participating in the Technical Advisory Committee (TAC) to provide assistance and advisement on various mitigation, design, and construction issues. As part of the Chatfield Reservoir Reallocation Project, the Town owns 374 acre-feet of storage space in the Chatfield Reservoir Reallocation Project with an option agreement with the Colorado Water Conservation Board to purchase an additional 1,126 acre-feet of available storage shares. The Town is discussing revising the option agreement to purchase an additional 500 acre-feet of available storage shares, bringing the total option to 1,626 acre-feet. The Town plans to utilize the storage space in the Chatfield Reservoir to capture excess surface water flows on the South Platte using a

junior water right, and provide an alternate location for the Town to capture and access the Town's reuse rights and junior Plum Creek rights.

The Town has emergency interconnects with both the Pinery Water & Sanitation District (constructed in 2013) and Castle Pines Metropolitan District (constructed in 2015). None of the parties have had to use the emergency interconnects but connecting neighboring systems and infrastructure helps provide resilience during potential emergencies.

### **Potential Future Opportunities**

Future opportunities exist to move water around in the area. Such partnerships may include obtaining our stored Chatfield Reservoir supplies through future infrastructure Denver Water and Castle Rock are considering, future infrastructure between the Town of Castle Rock and Dominion Water & Sanitation District, or partnerships with Centennial Water & Sanitation District and Castle Pines North Metropolitan District.

- Pipeline from Plum Creek Water Reclamation Authority to Rueter-Hess Reservoir

Castle Rock Water is interested in storing unused reusable treated effluent in Rueter-Hess Reservoir for use during high demand periods. Storage of water is critical for dry years. The stored water will be used when the Town's renewable supplies are called out of priority or are not available. Castle Rock Water has completed a preliminary evaluation for a pipeline alignment from Plum Creek Water Reclamation Authority, through Castle Pines Metro District (CPMND) utilizing their existing treated effluent infrastructure, and building new infrastructure from CPMD to Rueter-Hess Reservoir. CPMD utilizes their treated effluent infrastructure for golf course irrigation. The Town would be able to make deliveries through this infrastructure when CPMD is not providing irrigation water to the golf course. CPMD understands the criticality of water storage and may be interested in partnering on the project to be able to store their unusable supplies in Rueter-Hess also. The Town of Castle Rock plans to continue negotiations with CPMD and has budgeted to start the project in 2017. The project will also include improvements to the Plum Creek Water Reclamation Authority to meet the water quality standards of the water that is delivered to the Rueter-Hess Reservoir.

- Pump Station & Pipeline from Chatfield

Castle Rock Water is interested in partnering in a pump station and pipeline from Chatfield Reservoir to the Town of Castle Rock. The likely partners would be Denver Water and Dominion Water & Sanitation District. The Town has plans to evaluate pipeline alignment options to Town. Ultimately, the Town and other regional water providers would benefit significantly from a connection from Chatfield Reservoir to Rueter-Hess Reservoir. During times of high flow on the South Platte, water could be diverted and stored in Rueter-Hess Reservoir.

- Converse Wells

The Town owns 62% of the rights in the Converse Wells along Cherry Creek which amounts to 55 acre-feet of water per year. Currently the Town does not have infrastructure in place to put this water to beneficial use nor can these wells be used as an exchange point for its reusable effluent and lawn irrigation return flows at the present time. However, once the Town has approval to use this water for municipal use, the Town could capture this water in Cherry Creek at PWSD's diversion structure for storage in Rueter-Hess Reservoir. The Town has an existing agreement with PWSD to wheel reusable effluent to storage in Rueter-Hess Reservoir. Wheeling this water would be an extension of that existing agreement with PWSD.

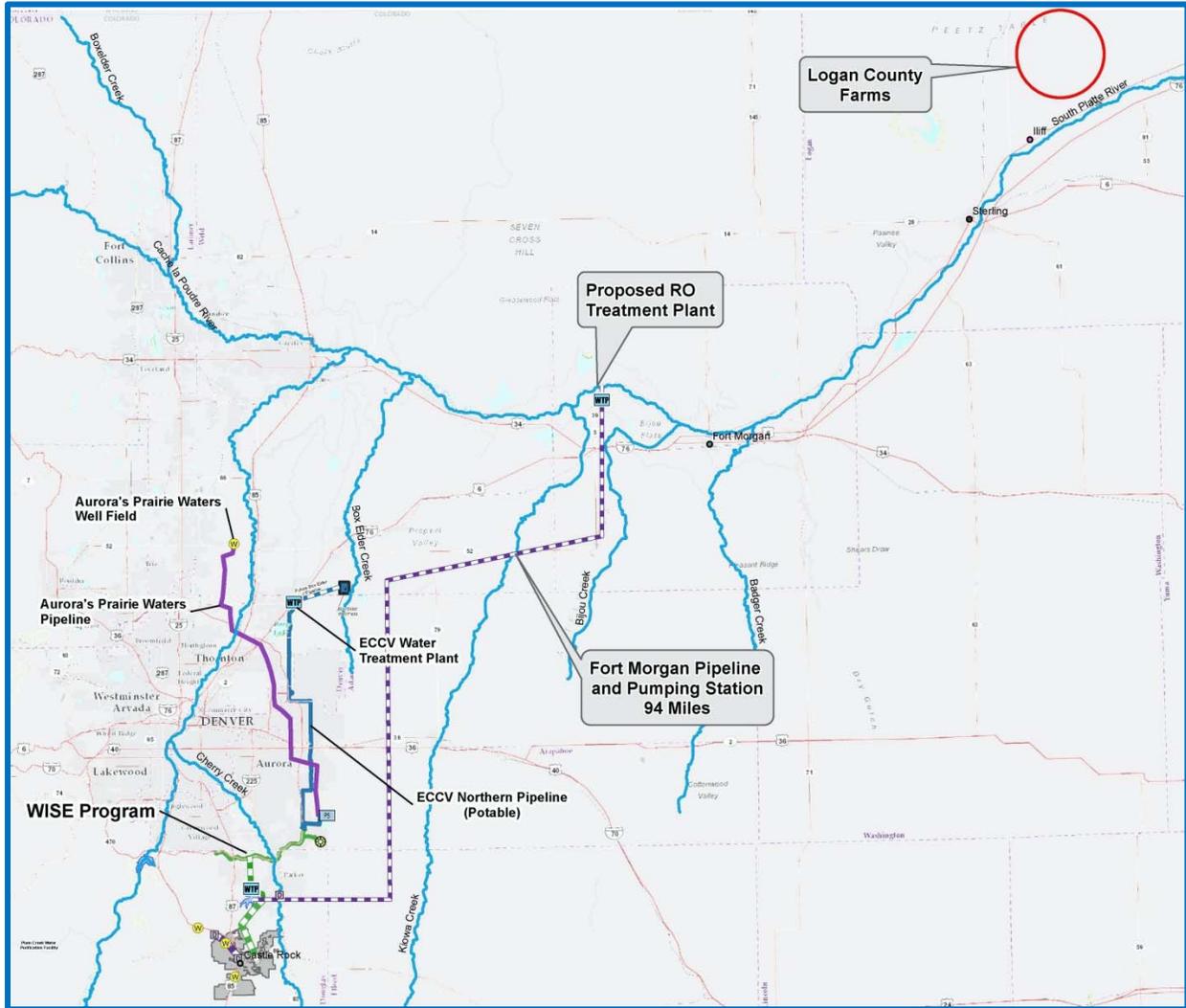
- Fort Morgan Project

There is a potential to partner with Parker Water & Sanitation District (PWSD) on water rights near Fort Morgan. Castle Rock may have interest in participation at the 3,000 acre-feet level in the project. The Town plans to evaluate this project and start incorporating financial impacts into our long-term cost model.

PWSD owns numerous farms and their associated senior water rights along the South Platte near Iliff, Colorado in Logan County. PWSD refers to these farms as the Logan County Farms. This project would involve a partnership with PWSD who will lead the project and has begun preliminary engineering. The project involves the exchange of water rights from the Logan County Farms along the South Platte, upstream to Fort Morgan and about 94 miles of pipeline and pumping systems from Fort Morgan to Rueter-Hess Reservoir. This project is in the conceptual phases and will likely require a reverse osmosis (RO) treatment facility to improve the water quality.

**Figure 4-6** shows the approximate location of the farms, the RO water treatment facility, the pipeline and pumping system, and Rueter-Hess Reservoir.

Figure 4-6: Logan County Farms and Fort Morgan Project Infrastructure Location



- South Metro Water Supply Authority Master Plan Update

South Metro Water Supply Authority is studying other regional renewable water opportunities for members as part of their master plan update efforts. Projects from all over the State are being evaluated as a means to provide for the region's anticipated water shortfall described in the Colorado Water Plan. The Authority's Plan is available at [southmetrowater.org](http://southmetrowater.org).

### 4.3 Future Water Sources

#### Current Capital Improvement Projects

Castle Rock Water has budgeted for the following water resources capital improvement projects over the next fifteen years. These projects will further increase our renewable water quantities.

- Plum Creek Diversion Project

The Town is working on a design for two diversion structures along East Plum Creek that will allow the Town to capture all of its available water rights. These available water rights include a 30 cubic foot per second (cfs) junior water right on East Plum Creek, which has an approximate average year yield of 2,265 acre-feet. senior and junior tributary (renewable) water rights on East and West Plum Creek, lawn irrigation return flows (LIRF) that accrue to East Plum Creek, reusable non-tributary groundwater that is discharged from PCWRA, and reusable WISE and future Northern Supply Project flows. These source water supplies will be treated at the Plum Creek Water Purification Facility (PCWPF). One major element that has changed since the last update of the Plan is the idea of also implementing a direct potable reuse system to capture all reusable water rights. Direct potable reuse provides a raw water supply very similar to indirect potable reuse but avoids the need for a permit from the US Army Corps of Engineers. The Town is currently evaluating the advanced treatment processes that would be necessary to treat both direct and indirect potable reuse water at the PCWPF in order to maintain flexibility in the ultimate water reuse solution best for Castle Rock.

- WISE Partnership Water Delivery Agreement

The Town of Castle Rock is a member of the South Metro WISE Authority formed in 2013 and has a 1,000 AF subscription. The Town participated in the WISE project feasibility and agreement negotiations, which started in 2009. The WISE project is a component of the Town's hybrid project concept that spreads out the costs over several generations but secures a renewable water supply in the near term for existing customers and development in the future. This project is based largely on the utilization of available Denver Water and Aurora Water reusable return flows available in the South Platte River downstream of Denver and excess capacity in Aurora's Prairie Waters Project (PWP) Phase I. The PWP project includes a water diversion, "the north campus" located along the South Platte River close to Brighton, three pump stations, and over 30 miles of pipeline to convey the water from the north campus to the Peter Binney Water Purification Facility located adjacent to the Aurora Reservoir (See **Figure 4-5**). Initial planning work indicates that Aurora Water would only need the full capacity of the PWP system in the peak summer demand periods two of every ten years (drought years). In drought years, Denver could benefit from an ability to recapture its reusable return flows through

existing regional infrastructure rather than independently constructing Denver Water infrastructure to infrequently or intermittently access those resources.

The project is beneficial in multiple ways:

- Adds to the Town's conversion from nonrenewable groundwater to renewable surface water supplies;
- Partners the Town with two of the state's largest water providers (Aurora Water and Denver Water);
- Shares the cost of key infrastructure with nine other South Metro partners, Denver, and ECCV;
- Provides access to renewable water with less upfront capital investment and further delays much of the needed investment than other options;
- Ensures a renewable and reusable water supply already approved through Water Court;
- Allows the Town to only pay for water it uses; and
- Spreads the cost of the renewable water more evenly across current and future customers.

Infrastructure will be installed by 2017 to take WISE water deliveries. Deliveries will be scheduled in advance with the group through South Metro WISE. The Town plans to fully utilize these deliveries when they are available and minimize the use of the deep groundwater wells. If additional WISE supplies are available that the Town cannot put to beneficial use, the plan is to first store those excess supplies through ASR and then store in Rueter-Hess Reservoir. Ideally, since this is treated water, the Town prefers to utilize the water rather than send it to storage. Additional WISE water is available if Castle Rock Water determines additional WISE supplies would be beneficial. These additional supplies total 2,275 AF through an option reserved by Douglas County.

- **Box Elder Well Field**

In 2011, staff began evaluating the Alternative Source of Water Supply Project to develop a hybrid solution with the WISE project to import 2,500 acre-feet (AF) of additional renewable water to the Town. The first piece of the puzzle for the northern water supply is the diversion system for future water supply rights that the Town may obtain in the South Platte River basin. The Box Elder Well Field was put forward as just such a diversion. This well field is located approximately six miles east of Lochbuie, CO in southern Weld County as shown on **Figure 4-4**. The well field contains eleven existing permitted alluvial wells, 850 acres of property, approximately 300 acre-feet of consumptive use Henrylyn Irrigation District (HID) water rights, and 300 acre-feet per year of Ground Water Management Subdistrict of the Central Colorado Water Conservancy District (Central GMS) irrigation water rights. The Town entered into a 5-1/2 year option agreement with the owners of the Box Elder well field in 2014 and closed on the property in November 2016.

In 2014, the Town purchased a 640-acre parcel in southeastern Weld County known as the Rothe property. The Rothe Recharge water rights (through the Sublette Augmentation Plan) could potentially account for 770 acre-feet of augmentation water which is approximately 30% of the total water that is to be acquired for the project. The Town is currently performing due diligence efforts on 1,000 acre-feet of renewable water rights in the Lost Creek Basin. Additional water rights will be evaluated for acquisition in the near term with a total project goal of obtaining 2,500 acre-feet.

In June 2016, Weld County Commissioners approved a Use by Special Review process to review future projects that transport water to locations outside the County. Pipelines smaller than 16-inches in diameter are exempt which means the Town's infrastructure needed for the project would likely be exempt.

- **Chatfield Reallocation Supply**

The Town owns 374 AF of storage space in the Chatfield Reservoir Reallocation Project with an option to purchase an additional 1,126 AF of storage shares from Colorado Water Conservation Board (CWCB) over the next 13-18 years. Castle Rock Water has also discussed the opportunity to purchase an additional 500 AF of orphan shares from CWCB, further increasing our ability to store and access renewable water. Ultimately, the Town will have between 1,500 and 2,000 AF of water stored in the reservoir to be used as a downstream release or an exchange upstream to the Town. Castle Rock Water owns a junior 2,000 acre foot water right in the South Platte River, which can be used to access additional renewable water through this project. Denver Water typically has significant spot water available for sale in Chatfield. The Town has filed for a refill water right and another free river water right at Chatfield. Ideally, the Town would like to construct infrastructure to deliver the stored raw water from Chatfield Reservoir to the Town

for treatment. Several other regional water providers have expressed similar interests, and there are partnering possibilities available.

### **Regional Partnerships**

- South Metro Water Supply Authority

South Metro Water Supply Authority (SMWSA), formed in 2004, is an organization comprised of thirteen (13) individual water providers in Douglas and Arapahoe counties that works collaboratively to foster and secure long-term water supplies through water acquisition and infrastructure development. By taking a unified approach to regional water rights, South Metro garnishes increased negotiating power and has positioned itself to cooperate with the state's largest water providers such as Denver Water and Aurora Water most recently.

Through SMWSA, the Town is a member of the South Metro WISE Authority as previously discussed. The Town also worked through SMWSA to obtain a portion of the Town's water storage shares in the Chatfield Reservoir Reallocation Project. Castle Rock Water is now also a member of the CRMC.

Town staff also participates in a South Metro subgroup called the SMWSA Groundwater Group, which meets periodically for the purpose of jointly managing the pumping of the deep groundwater aquifers in the south-central region of the Denver Basin. Some of the accomplishments of the group include:

- Developing a GIS database with well information such as well locations, aquifer properties, pump test data, cost data, and other information from all the participants;
- Sharing well operational strategies and an inventory of well pumping data, and aquifer water level data among participating members;
- Conducting a Regional Aquifer Supply Assessment utilizing funds from a Colorado Water Conservation Board (CWCB) Water Supply Reserve Grant; and
- Initiating an Aquifer Storage and Recovery (ASR) Feasibility Study to evaluate whether the aquifers in the South Metro region are a viable water storage option. This project is also being funded through a grant from the CWCB.

The SMSWA Groundwater Group continues to be a useful forum for member engineers and hydrologists to share knowledge, and discuss issues regarding the Denver Basin Aquifers as well as coordinating aquifer storage and recovery efforts among the participants.

- Plum Creek Water Reclamation Authority

The majority of the Town's wastewater is treated at Plum Creek Water Reclamation Authority (PCWRA). A small portion of the Town's wastewater on the very east side of Town is treated by Pinery Water and Sanitation District. The Town plans to assist PCWRA with upgrades to the reclamation facility that will improve the water quality of the effluent. The Town plans to reuse all available effluent to which it has rights. Some of this effluent will be stored in Rueter-Hess Reservoir and the remainder will be captured at a diversion structure along East Plum Creek downstream of PCWRA. The water captured at the diversion structure will be treated at Plum Creek Water Purification Facility that will be upgraded to treat this new water source.

#### **4.4 Conservation Efforts**

In 2015, the Town developed the 2015 Water Efficiency Master Plan (WEMP). The WEMP meets or exceeds the requirements of the CWCB Municipal Water Efficiency Plan Guidance Document and provides a brief summary of the Town, the water demand forecast, water use, system improvements, implementation and monitoring of programs, and updated efficiency goals and programs.

Efficient water use is a key element of living in the semi-arid Colorado environment and is a critical part of the Town's water resource strategy. Additionally, the State of Colorado requires that water providers who provide 2,000 AF/yr of water or more annually have a State approved water efficiency plan. As part of the Town's water resource planning approach, managing water demand is key. Effective management of the community's resources is good environmental and financial stewardship. This WEMP outlines a goal-oriented, performance based, and cost-effective strategy that delineates our current conservation programs and identifies the Town's plans for other conservation programs that will result in water savings to our community. The WEMP and conservation in general, is a key puzzle piece of Castle Rock's long-term water plan. Continuing to be a leader in conservation and efficiency has the potential to save the customers and community tens of millions of dollars in renewable water investments over the next thirty years.

Water use efficiency has short and long-term positive social and economic impacts. The Town involved the community in the development, review and implementation of this efficiency plan through focus groups and surveys. Efficient water use helps to optimize existing and future water supplies.

The Town has a future water conservation goal of an additional 18% by maturity, which is estimated to be around 2055. Soon after implementation of the 2006 Water Conservation Master Plan, the Town decreased its water consumption from 165 gpcd to 135 gpcd. The current 5-year average consumption rate is 122 gpcd. An additional 18% would reduce consumption to 100 gpcd and save the community approximately \$97 million in present

dollars, which equates to about \$130 per year for the average customer. Staff estimates that this additional reduction is achievable by the community. Colorado's State Water Plan has set a 2050 goal for our region of 129 gpcd. We have already surpassed that value but plan to continue conservation programs as outlined in this plan.

As part of the new WEMP, multiple new activities, incentive programs, ordinances/regulation changes, as well as education activities will be considered over the next several years. These items are as follows:

- Advanced Metering Infrastructure
- Formal Meter Testing Program
- Water Budget Rate Structure Changes
- Public Right-of-Way & Town Park Landscape & Irrigation Retrofits
- Indoor Conservation Incentive Program
- Irrigation Audit/Sprinkler Inspection Fee
- Hot Water Recirculation Units
- Evaluate Additional Water Saving Options
- Potential Changes to Local Building Code
- Water Wiser Certification Expiration & Renewal
- Water Wiser Online Course
- Water Wiser Course Fee
- Conservation Contests

#### **4.5 Water Quality**

As part of this Water Resources Strategic Master Plan, Castle Rock Water is seeking a host of new water supplies with varying raw and treated water quality. It is important for Castle Rock Water to evaluate the quality of each source, whether it is already treated (i.e. WISE water) or whether it is a raw water source that Castle Rock Water will treat. Castle Rock Water currently enjoys excellent water quality, as evidenced by some recent awards received. Castle Rock Water won the regional water taste test at the 2015 Rocky Mountain American Water Works Association (AWWA) annual conference and was able to represent the Rocky Mountain Region at AWWA's annual conference and exposition (ACE 2016) in Chicago, Illinois in June 2016. Not only is it important to review and understand the water quality of each proposed source, it is critical for Castle Rock Water to review and understand the blended water quality and how each source interacts in our system. The following sections provide general information on water quality. More specifically, a summary of expected water quality for each proposed source is also provided.

To supply drinking water to our customers, the Town is required by federal and state regulations to maintain a chlorine residual of 0.2 mg/L (effective April 1, 2016) in our distribution system. In May 2013, the Town converted our drinking water disinfection system from free chlorine to chloramines. Chloramines have proven to have a longer-

lasting residual in the distribution system, and they develop less disinfection by-products (TTHMs and HAA5s) as compared to free chlorine.

To maintain fresh water in the potable water distribution system, the Town's staff completes the following:

- Cycle water storage tanks to keep fresh water flowing in and out of the tanks.
- Maintain a flushing program on dead-end lines throughout the distribution system.
- Identify areas of limited water use and conduct routine checks on those areas. If necessary, crews flush these areas to provide fresh water for customers.

#### Total Organic Carbon and Disinfection By-Products

- Currently, the Town samples dissolved organic carbons (DOC), total organic carbons (TOC), and light transmittance (at a wavelength of 254 nanometers) to determine if any disinfection by-product precursors exist in the water supply. These values will likely increase as the water sources transition to include more surface water supplies such as WISE and reusable water. The Town will need to monitor these values in the future to determine if additional treatment processes are necessary.

#### Total Dissolved Solids (TDS)

- We are currently conducting TDS studies to evaluate the reusable water supply. The data we are collecting will be used to design the advanced treatment processes at PCWPF. The Town will need to monitor these values in the future to determine if additional blending water is needed to decrease TDS concentrations.

#### Constituents of Emerging Concern and Indirect Potable Reuse

- The Town is currently sampling for Constituents of Emerging Concern<sup>4</sup> (CEC) to evaluate the reusable water available. The data collected will be used to design the advanced treatment processes at PCWPF to remove CECs.

#### Regulatory Considerations

- The Town continues to participate in upcoming rule makings and water quality regulatory discussions to stay informed. The Town participated in the United States Environmental Protection Agency (EPA) Third Unregulated Contaminant Monitoring Rule (UCMR 3) in 2014 and 2015, which provides the EPA with scientific data on the occurrence of contaminants in drinking water. The data will serve as a source for developing regulatory decisions regarding constituents of emerging concern, which are currently not regulated in drinking water. Additionally, the Town is preparing for the upcoming Unregulated Contaminant Monitoring Rule (UCMR4) that will begin in 2018 and will require sampling of the Town's drinking water. For the annual water quality report see <http://www.crgov.com/1700/Water-Quality>.

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<sup>4</sup> Constituents of Emerging Concern (CEC) - chemicals that are being detected in surface waters that may have impacts to aquatic life such as pharmaceuticals and personal care products (PPCP).

- Certain federally-permitted activities and capital improvement projects require that Section 401 Water Quality Certification is required from the Colorado Department of Public Health and Environment (CDPHE), Water Quality Control Division (WQCD). The purpose of 401 Certification is for the State to ensure that federally-authorized projects are fully compliant with state water quality standards and regulations.

#### Treatment Methods

- The Town is continuing to collect water quality data to plan for the correct treatment methods necessary to treat the available water supplies. As stated before, it is essential that adequate information on the source water quality is gathered so that effective treatment options are provided.

### **4.6 Environmental and Permitting Considerations**

Each proposed capital improvement project will need permits of various types and will also need to be evaluated for compliance with various environmental regulations including the National Environmental Protection Act (NEPA), Threatened and Endangered Species Act, Clean Water Act, Clean Air Act, and Floodplain Development. Some projects may require cultural assessments, investigation, inventorying, mapping, and reporting of cultural features as well as coordination with the US Army Corps of Engineers (Corps) regarding tribal coordination and communication. Federal coordination on any project requires additional time, effort, and money. When possible, the Town will explore economically feasible alternatives that require fewer permitting complications, as this will reduce the time and cost for the project.

### **4.7 Legal Considerations**

The State of Colorado follows the “Colorado Doctrine” for water rights which was started in the 1860s. The prior appropriation system is a legal procedure by which water users can obtain a court decree for their water right. The court decrees are assigned a priority date. The decree also includes conditions that prevent injury to other water users. When senior water users call for water in the South Platte Basin, for example, the Town must cease pumping all water that is junior in appropriation dates to the senior water user. For example, in dry times, the Town may not be able to pump any of the alluvial wells if a more senior water user is calling for the water downstream. (Citizen’s Guide to Colorado Water Law, pgs. 5-7).

The Town monitors potential future legislation for impacts to our water rights and supplies. For example, Town staff has representation at the annual State Engineer’s Office (SEO) Forum, Colorado Water Congress conferences, and Weld County Commissioner meetings. The Town also uses outside water counsel services to stay informed of new water rights cases that could potentially injure the Town’s water rights.

## 4.8 Implementation Plan

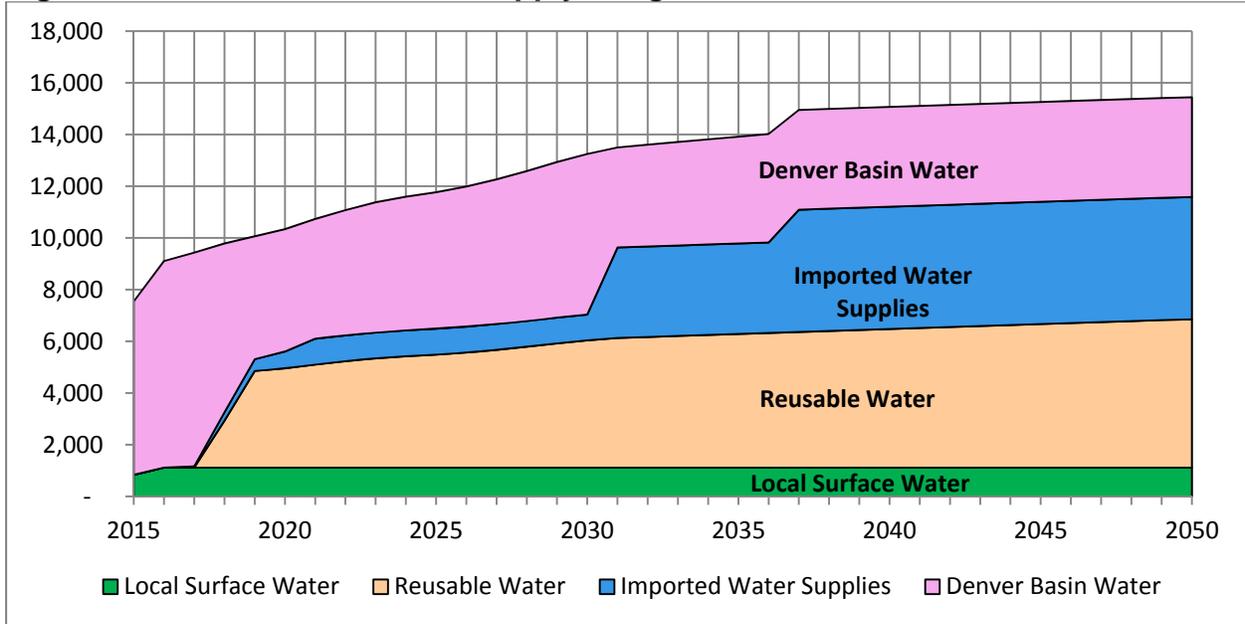
As part of the implementation plan, the Town plans to optimize the use of our existing water rights that we cannot currently capture or store. The Town will carefully monitor the optimization through daily water rights accounting efforts that will ultimately be brought in-house.

Likely additional staffing, such as a Water Resources Program Analyst, will be needed to support the long-term water planning efforts and the non-renewable well program needs. Additional staffing needs will be evaluated in the future to determine if appropriate coverage is being provided to the overall water resources program as the Town continues to grow and brings on additional water supplies that will require daily managing to ensure the Town is maximizing its water resources and properly recording usage.

The Town plans to finish construction the WISE local infrastructure in 2017 to take water deliveries in Fall 2017. The Town also plans to finish design and construct the Plum Creek Diversion Project and expand the Plum Creek Purification Facility to include advanced water treatment by 2018. This project will help Castle Rock Water capture the majority of its reusable water and native Plum Creek water rights. Castle Rock Water plans to continue to move forward on securing renewable water supplies as part of the Box Elder Project which will provide water to the Town by 2030. Additionally, the Town plans to purchase 1,713 additional water storage shares in the Chatfield Reallocation Project over the next 19 years. The five-year CIP budget worksheets can be found online at <http://www.crgov.com/1666/Annual-Budget> and provide a detailed cost breakdown and description of our major water resource projects.

**Figure 4-7** shows when the various water sources need to be brought on-line to meet demands of a community of approximately 100,000 people.

**Figure 4-7: Schedule of Water Supply Usage**



## Chapter 5 – Watershed Management and Groundwater Protection

### 5.1 Overview

Our water resources come from or will come from a variety of different watersheds. The water quality and the benefits of various water resources being used and being considered has a strong dependency on how the watershed is being managed and by who.

A watershed is a geographical area through which water flows across the land and drains into a common body of water, whether a stream, river, lake, or ocean. The watershed boundary generally follows the highest ridgeline around the stream channels and meets at the bottom or lowest elevation of the land where the water flows out of the watershed. For example, the confluence of East Plum Creek and the South Platte River is the lowest point of the East Plum Creek Watershed. The Town of Castle Rock is currently divided into two alluvial watersheds, the Plum Creek Basin and the Cherry Creek Basin. The dividing line generally follows Founders Parkway. The Town also owns assets in the Box Elder Creek drainage basin in Weld County, Colorado.

Management of watersheds is important because the surface water features and stormwater runoff within a watershed ultimately enter the aquifers or other bodies of water and management can impact water quality. Currently, the Town operates nine wells that are located in the alluvium of East Plum Creek. In addition, there are three new wells being constructed (early 2016) in the Central Well Field located in the East Plum Creek watershed alluvium. Two surface water diversions on East Plum Creek are planned for installation in the next year or two. The Town also owns alluvial wells in the Cherry Creek basin (the Converse Wells). Watershed management is important to protect water quality for all of these water sources. Further, watershed management and groundwater protection are closely related to measures that have been developed by Castle Rock Water's Stormwater Division.

The following are general examples of goals for a watershed management and groundwater protection program:

1. Avoid the conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;
2. Preserve areas that provide important water quality benefits (e.g. wetlands) and/or are necessary to maintain riparian and aquatic biota;

3. Protect, to the extent practicable, the natural integrity of water bodies and natural drainage systems (e.g. seeps and springs) associated with site development; and
4. Identify the priority local watershed pollutant reduction opportunities (e.g. improve existing urban and runoff control structures).

Each of the above management measures is to encourage land use and development planning on a watershed scale that takes into consideration sensitive areas that, by being protected, will maintain and improve water quality.

Some practices include:

1. Protect areas that provide water quality benefits, including wetlands, riparian vegetation and wildlife. This can be accomplished through buffers, easements, deed restrictions and covenants. Developers could be encouraged to protect the water resources as a selling point (aesthetic and ecological amenity).
2. Protect the integrity of water resources from the effects of site development and infrastructure. This can be accomplished by establishing setbacks from natural drainage areas including seeps, springs, and groundwater recharge zones. Protect or promote vegetated buffers around natural drainage areas to provide additional protection<sup>5</sup>.

One example of this practice in action is the East Plum Creek Stream and Well Field Improvement Project. In 2015, the Stormwater, Engineering, and Water Resources Divisions began working together on a multi-disciplinary project that will improve the stream through control structures, restoration, stream bank stabilization and the modifications to the existing wells that will improve the quality of the stream and increase the production in the alluvial wells.

As part of protecting the Town's groundwater, Castle Rock Water identified eleven potential risks and the measures that are used for protection. The risks are identified as construction, development, landscaping, natural disasters, pet waste, roads / deicing practices, soil erosion, solid waste, storage tanks, stormwater runoff, and wastewater treatment plants. **Appendix C** identifies the risks and the measures that are in place to help protect the Town's local renewable source water. As Castle Rock Water considers new renewable long-term water resources, the risks associated with these resources from a watershed standpoint are considered.

In addition to using the measures described in **Appendix C** to protect the watershed and the Town's source water, when constructing new wells, staff contracts with licensed well drillers and pump installers. In the contracting documents and permits, wells are required

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<sup>5</sup>([http://www.waterboards.ca.gov/water\\_issues/programs/nps/encyclopedia/3\\_1a\\_plandes\\_wtrsdgrdwr\\_protect.shtml](http://www.waterboards.ca.gov/water_issues/programs/nps/encyclopedia/3_1a_plandes_wtrsdgrdwr_protect.shtml))

to follow the Colorado Water Well Construction Rules that are designed to “protect public health and preserve groundwater resources by ensuring proper construction and/or abandonment of wells and the proper installation of pumping equipment”. The Colorado Water Well Construction Rules are located at the following website:

<http://water.state.co.us/groundwater/BOE/Pages/BOERules.aspx>.

## **5.2 Specific Watersheds and Our Water Resources**

### **Plum Creek Watershed**

The Plum Creek Basin is managed by the Chatfield Watershed Authority (CWA). The Authority is charged with protecting beneficial uses through the control of phosphorus and chlorophyll-a in the reservoirs. Phosphorus is a nutrient found naturally in sediment and also in manmade products such as fertilizers and detergents and has the potential to contribute to algae blooms in the reservoirs. Chlorophyll-a is the measurable substance in algae and is an indicator of water quality in the reservoirs. Their regulatory authority is established through the Water Quality Control Regulations No. 72 and 73 through the State.

The CWA traditionally has been governed by a board made up of 22 paying membership entities, counties, municipalities, water and sanitation districts and other public and private entities that have material impact on the watershed or a vested interest in the Authority. A new governing agreement was adopted in 2016 that establishes a five member board of local elected officials including Douglas County, Jefferson County, Castle Rock and two at-large board seats for water and wastewater districts and other paying members. The CWA developed a Chatfield Watershed Plan in 2015 that is a living document to guide watershed efforts and decision-making to promote water quality protection in Chatfield Watershed. This document will be revised from time to time as the watershed develops and new management techniques become necessary.

The mission of the CWA is to promote protection of water quality in the Chatfield Watershed for recreation, fisheries, drinking water supplies and other beneficial uses. To protect these beneficial uses, the Colorado Department of Public Health and Environment, Water Quality Control Commission, adopted Control Regulation No. 73 which includes water quality standards for phosphorus and chlorophyll-a (CWA Website, 2013). The Town has been involved with the Authority for over 25 years and plans to continue participation as a means to help protect the Town’s drinking water supply.

### **Cherry Creek Watershed**

The Cherry Creek Basin is managed by the Cherry Creek Basin Water Quality Authority (CCBWQA). The Authority is charged with protecting beneficial uses through the control of phosphorus and chlorophyll-a in the reservoirs. Phosphorus is a nutrient found naturally in sediment and also in manmade products such as fertilizers and detergents

and has the potential to contribute to algae blooms in the reservoirs. Chlorophyll-a is the measurable substance in algae and is an indicator of water quality in the reservoirs. Their regulatory authority is established through the Water Quality Control Regulations No. 72 and 73 through the State.

The CCBWQA's focus is protecting, preserving, and enhancing beneficial uses and water quality needed to support the beneficial uses in Cherry Creek Reservoir and Cherry Creek watershed (CCBWQA Annual Report, 2015, pg. ES-1). The CCBWQA was created in 1988. Currently there are 15 members of the CCBWQA. Castle Rock is one of the members and is represented on the Board and Technical Advisory Committee. The CCBWQA develops water quality strategies to (1) minimize point, nonpoint, and regulated stormwater pollutant source nutrient contributions; (2) implement pollutant reduction programs; and (3) monitor water quality to evaluate progress. Together, these strategies create an effective water quality management approach" (CCBWQA Annual Report, pg. 1-1).

### **Box Elder Creek Watershed**

The Box Elder Creek well field project is located in the Box Elder Creek drainage basin of Weld County, Colorado. The property may be in a future growth area of the revised MS4 permit but the growth areas for the Box Elder drainage basin have not been created. The watershed is long (100 miles) and narrow (3-5 miles) and extends from El Paso County to the South Platte River in Weld County. The watershed is located in El Paso County, Adams County, City of Aurora, Arapahoe County, Elbert County, and very small portions of Douglas County. It passes through areas also controlled by the Urban Drainage & Flood Control District (UDFCD) and the Southeast Metro Stormwater Authority.

The water quality in the Box Elder Creek basin is consistent with water quality on the South Platte River with high total dissolved solids (TDS) and high nitrate levels. Water supplies from the Box Elder Creek watershed will require advanced water treatment to remove the high levels of TDS and nitrates.

## Chapter 6 – Economic Analysis and Program Financing

Castle Rock Water uses a cost-of-service (COS) model to determine rates and fees for water, wastewater, stormwater, and water resources. User charge revenue requirements are also calculated independently for all four enterprise funds. The basic philosophy behind a COS methodology is that utilities should be self-sustaining enterprises that are adequately financed with rates and fees that are based on sound engineering and economic principles. The guidelines of water ratemaking are established by the AWWA in the Manual M1 – *Principles of Water Rates, Fees and Charges*. As a result of the most recent COS study for the Town, our consultant developed projected revenue requirements from 2016-2020 that will recover the Town’s revenue requirements for operating expenses and capital improvements associated with our plan for meeting renewable water requirements.

Table 6-1 presents the water resources fund user charge revenue requirements for the period from 2016 through 2020 based on the 2015 Rates and Fees Study.

**Table 6-1: Water Resources Fund User Charge Revenue Requirements**

Item	FY2016	FY2017	FY2018	FY2019	FY2020
Operating and Maintenance	\$4,014,521	\$6,466,323	\$7,022,409	\$7,488,393	\$8,029,459
Debt Service	4,624,212	4,627,577	4,625,258	4,650,189	4,672,699
Transfers Out	859,838	325,445	293,508	227,541	286,965
Minor Capital Outlay	47,639	45,405	45,521	46,639	46,749
Cash Funded Capital	36,491,066	15,395,999	13,937,421	10,503,291	4,895,477
<b>Total Expenditures</b>	<b>\$46,037,276</b>	<b>\$26,860,749</b>	<b>\$25,924,117</b>	<b>\$22,916,053</b>	<b>\$17,931,349</b>
Non-Rate Revenues	(445,542)	(388,586)	(373,064)	(290,238)	(302,718)
PCWPF Reimbursement	(1,492,462)	(1,498,849)	(1,626,142)	(1,760,128)	(1,837,004)
Capital Adjustment	(36,314,520)	(16,691,250)	(15,120,260)	(11,546,422)	(5,896,898)
<b>Revenues Required from Rates</b>	<b>\$7,784,752</b>	<b>\$8,282,064</b>	<b>\$8,804,651</b>	<b>\$9,319,265</b>	<b>\$9,894,729</b>

In order to maintain system development fee (SDF) revenues to match increases in capital costs over time, our consultant recommends that the SDFs for water resources continue to be evaluated annually and escalated appropriately to cover the long term capital needs of the enterprise.

**Table 6-2: Proposed Water Resources SDF Implementation Schedule based on the 2015 Rates and Fees Study**

Meter Size	SFE	Meter Capacity (GPM)	2016	2017	2018	2019	2020 and thereafter
5/8" x 3/4"	0.67	20	\$10,196	\$10,498	\$10,808	\$11,129	\$11,458
3/4" x 3/4"	1	30	\$15,218	\$15,668	\$16,132	\$16,610	\$17,102
1"	1.67	50	\$25,414	\$26,166	\$26,940	\$27,739	\$28,560
1.5"	3.33	100	\$50,676	\$52,174	\$53,720	\$55,311	\$56,950
2" C2	6.67	200	\$101,504	\$104,506	\$107,600	\$110,789	\$114,070
2" T2	8.33	250	\$126,766	\$130,514	\$134,380	\$138,361	\$142,460
3" C2	16.67	500	\$253,684	\$261,186	\$268,920	\$276,889	\$285,090
3" T2	21.67	650	\$329,774	\$339,526	\$349,580	\$359,939	\$370,600
4" C2	33.33	1,000	\$507,216	\$522,214	\$537,680	\$553,611	\$570,010
4" T2	41.67	1,250	\$634,134	\$652,886	\$672,220	\$692,139	\$712,640
6" C2	66.67	2,000	\$1,014,584	\$1,044,586	\$1,075,520	\$1,107,389	\$1,140,190
6" T2	83.33	2,500	\$1,268,116	\$1,305,614	\$1,344,280	\$1,384,111	\$1,425,110

The Town currently assesses all water resources customers a monthly service charge per SFE. The water resources charge calculated per SFE for each of the larger meter sizes is presented below in **Table 6-3**.

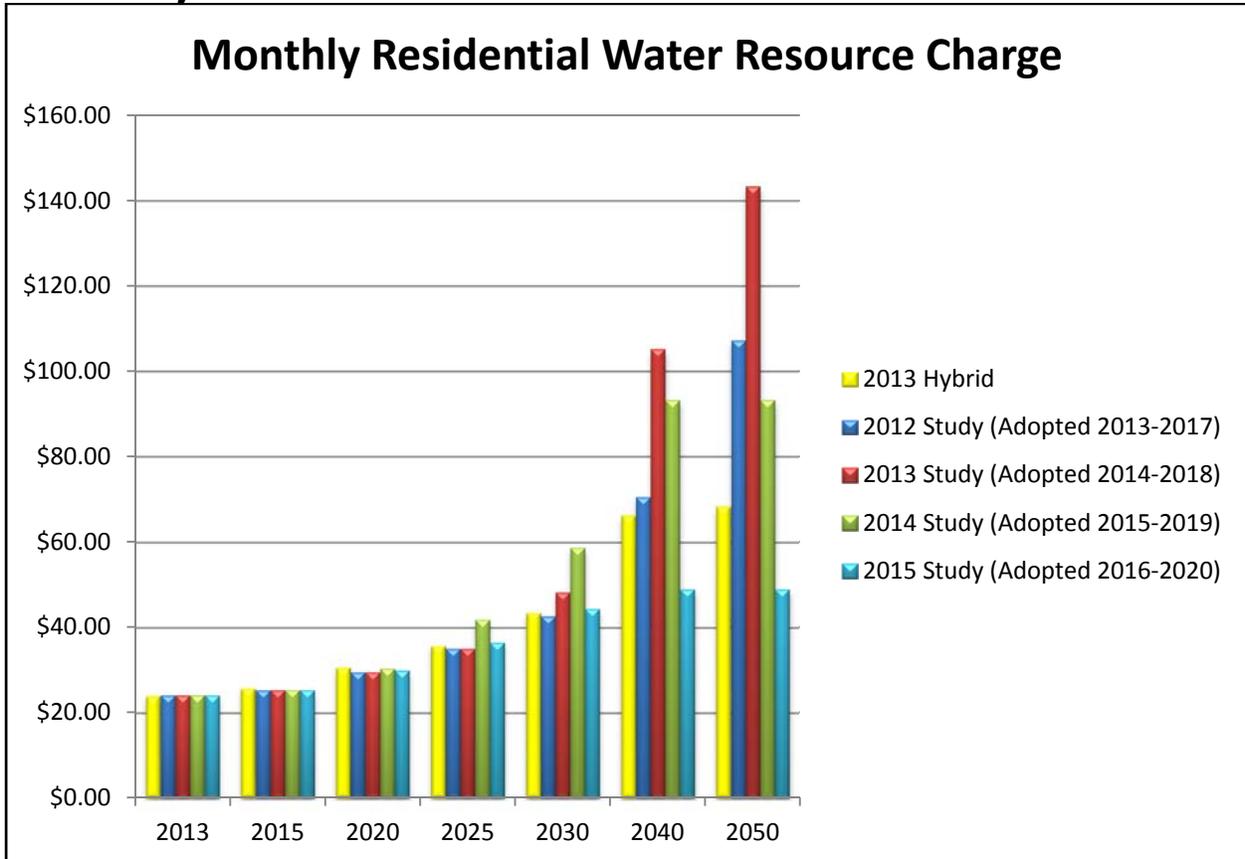
**Table 6-3: Current (2016) Monthly Water Resources Charge based on the 2015 Rates and Fees Study**

Meter Size	Monthly Charge
5/8" x 3/4"	\$17.52
3/4"	\$26.15
1"	\$99.11
1.5"	\$187.50
2"	\$313.54
3"	\$588.90
4"	\$1,502.32
6"	\$2,429.34

Our long-term water resources program predicts that the Town will spend \$317 million (in 2016 dollars) thru 2055 to meet our goals of a sustainable, renewable water supply. To achieve this, a rates and fees study is conducted annually to ensure that the rates and fees collected to cover these costs are adjusted accordingly to be the minimum required to meet the long-term renewable water needs of the community.

One of our key performance indicators for the Water Resources Strategic Master Plan is how we are doing on minimizing the needed increases to rates and fees. **Figure 6-1** shows progress to date relative to the financial analysis of the long-term renewable water plan done in 2013.

**Figure 6-1: Financial Analysis of Long-Term Renewable Water Plan as Compared to 2013 Projections of Plan**



**Table 6-4** shows the investments to date on the major water resource capital improvement projects (CIP) that Castle Rock Water has completed or started since the last update of the master plan was done in 2010.

**Table 6-4: Investments of Major Water Resources Projects**

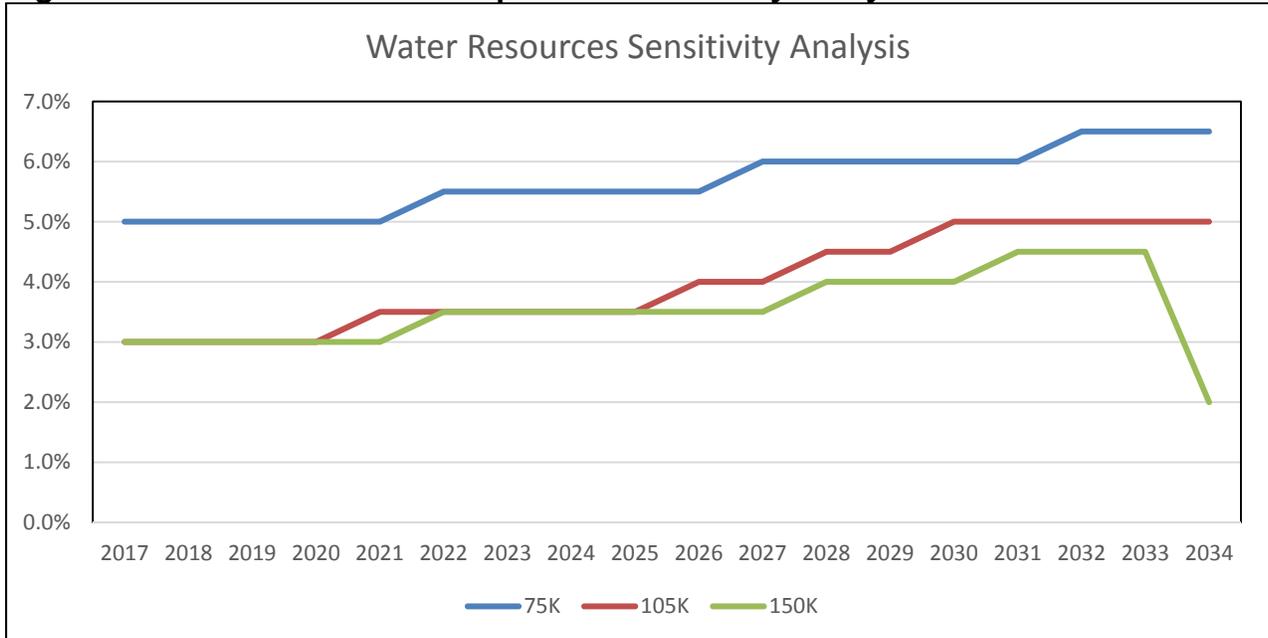
Project	Investments to Date <sup>1</sup>
East Cherry Creek Valley North-South Pipeline Capacity	\$1.45 million
Rueter-Hess Reservoir	\$44.60 million
Plum Creek Water Purification Facility (PCWPF)	\$17.75 million
Alluvial Wells and Raw Water Pipelines	\$8.47 million
PCWPF Expansion	\$1.41 million
Chatfield	\$2.78 million
WISE	\$24.98 million <sup>2</sup>
Box Elder Project and Purchase of Water Rights	\$15.05 million <sup>3</sup>
Plum Creek Diversion Structure	\$0.47 million
Aquifer Storage & Recovery	\$0.52 million
Pipeline to Newlin Gulch	\$0.06 million
Alluvial Well Field Rehabilitation	\$0.16 million
<b>Total</b>	<b>\$117.72 million</b>

**Notes:**

1. Costs through October 26, 2016.
2. Includes Lease-Purchase Agreement with Dominion Water & Sanitation District and revenues.
3. Includes purchase of Rothe Recharge water rights. Excludes potential Lost Creek Basin deal.

The Town conducted a water resources sensitivity analysis in 2016 to determine how the population growth affects the water resources fees. **Figure 6-2** shows the fee increases at various populations: 75,000, 105,000, and 150,000 people.

**Figure 6-2: Water Resources Population Sensitivity Analysis**



**Figure 6-2** shows that if the population of the Town stops at 75,000 people, rates will need to increase in the near-term by 5% to obtain a 75% renewable water portfolio for the Town. Additionally, if the population increases to 150,000 people, the future rates will be less than a growth less than 150,000.

The Town has developed a Financial Management Plan (FMP) which outlines the Utilities main financial policies, procedures and outlays for the future. The plan also establishes the goals and the principles to guide Castle Rock Water staff, Finance Department, Town Manager and Council members to make consistent and informed future financial decisions. Key performance indicators are used to help measure performance and develop conclusions and recommendations to drive continuous improvement.

The goals were derived based on the Castle Rock Water's main vision to become a national leader in the water industry and our mission to provide our community exceptional service. Each of the goals has been set in place to help Castle Rock Water achieve this. The FMP has been created to help guide Castle Rock Water with making the best possible financial decisions to help achieve and maintain the goals. The FMP goals are:

- To minimize future rates at or below the 2013 Hybrid Model levels
- To minimize debt carrying costs at or below industry standards
- To minimize risk by balancing fixed versus variable revenues and expenses equal or matching as appropriate
- To keep costs at or under budget for capital and operational budgets each year by fund and to continuously strive towards more efficient operations
- To keep our rates and fees competitive with surrounding communities
- To keep adequate reserves and maintain fund balances between minimums and maximums
- To keep rates and fees affordable within various national affordability indices
- To develop regional partnerships to provide economies of scale to reduce total costs of infrastructure to our customers
- To be an industry leader in the application of financial management benchmarking ourselves against others locally and nationally

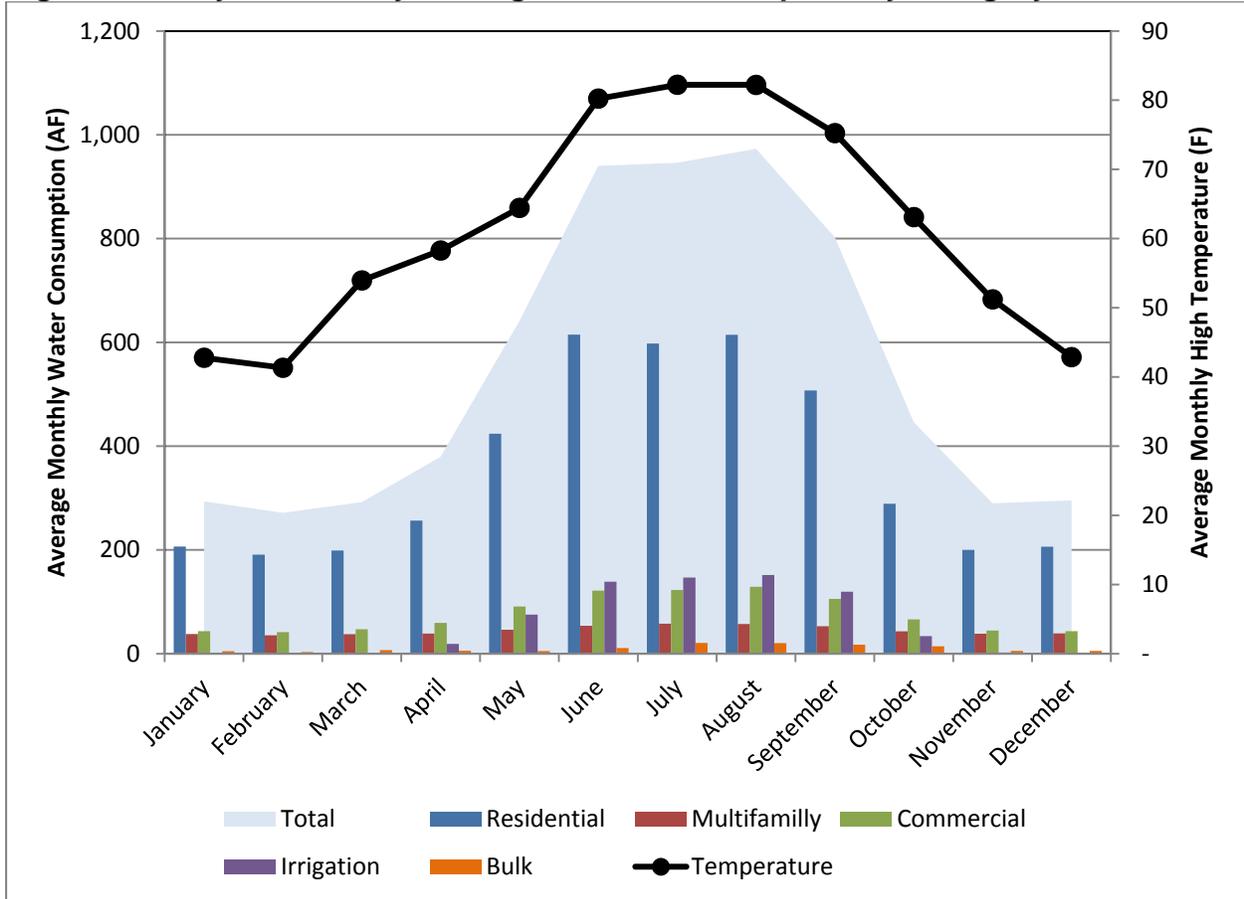
The goals are compared to key performance indicators to determine if Castle Rock Water is meeting the goals of the FMP. Each year, the Town does a Cost of Service model using updated CIP cost estimates and CIP schedules as previously mentioned to ensure that the rates and fees increases are smooth and affordable for the customers.

## Chapter 7 – Monitoring Risks Associated with Climate Change

Colorado has warmed 2 °F in the last 30 years and 2.5 °F in the last 50 years. This warming has resulted in an increasing trend in heat waves and, along with other factors, has led to a shift in the timing of peak runoff by 1 to 4 weeks, drier soils, and more frequent and severe wildfire. Future estimates project temperatures rising an additional 2.5 °F to 5 °F by 2050, meaning the warmest summers from our past may become the average summers in our future. With increasing temperatures come increasing water demands, shifts in snowmelt runoff, water quality concerns, stressed ecosystems and transportation infrastructure, impacts to energy demand; and extreme weather events.

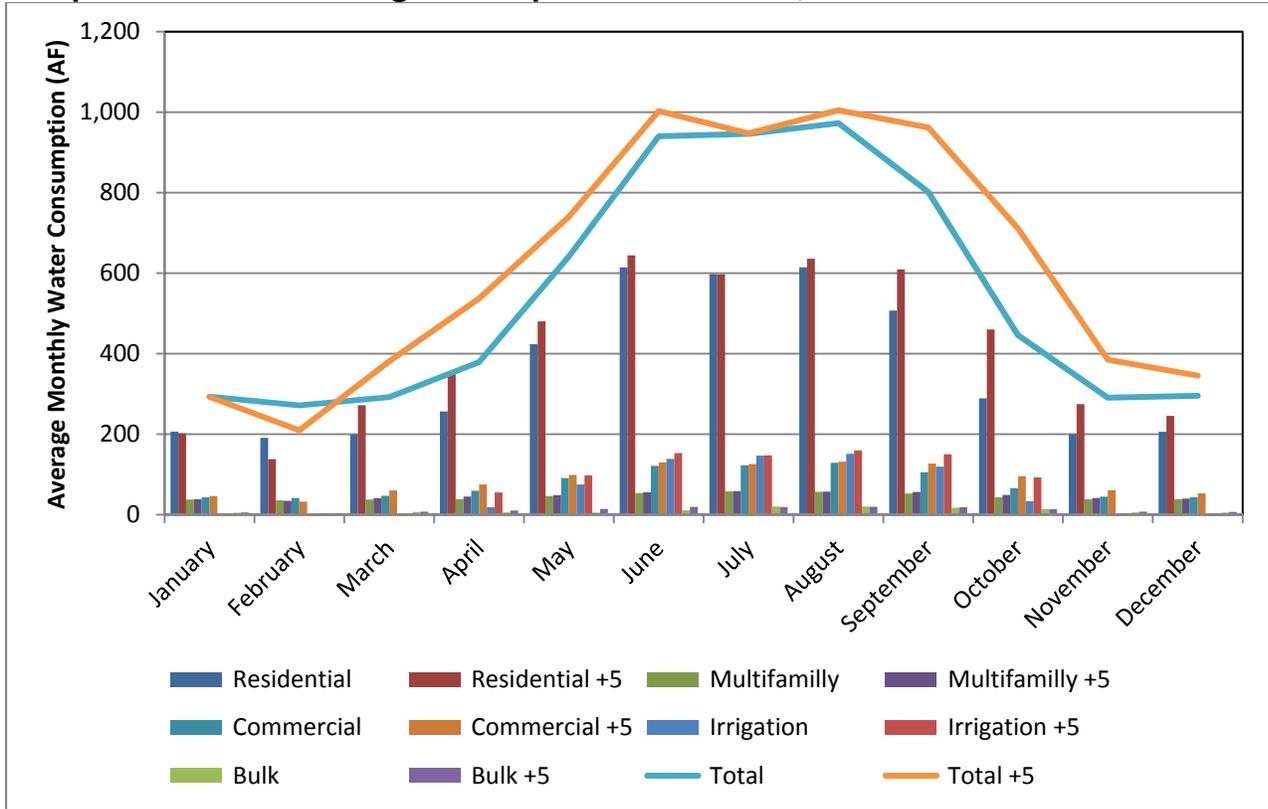
**Figure 7-1** represents the 5-year (2010-2015) monthly average water consumption by customer category in relation to average monthly temperature during that same time period. As expected, cooler temperatures relate to reduced water consumption and warmer temperatures relate to increased water consumption. The demands calculated in this plan are based on average year conditions. During times of increased temperatures, the Town will rely on groundwater supplies, stored water supplies, and additional conservation efforts to meet the peak demands.

**Figure 7-1: 5-year Monthly Average Water Consumption by Category, 2010-2015**



**Figure 7-2** represents the 5-year (2010-2015) monthly average water consumption by customer category in relation to average monthly temperature versus a 5 degree temperature increase. As expected, warmer temperatures increased water consumption.

**Figure 7-2: 5-year Monthly Average Water Consumption by Category at Average Temperature Versus 5 Degree Temperature Increase, 2010-2015**



Streams that flow from our mountains to our reservoirs will warm, allowing for higher nutrient and bacteria content in the water; and wildfire in watersheds may result in sediment loading from recent burns. With warmer temperatures overall runoff will likely decrease while crops (grass and landscaping) will simultaneously need more water to grow as evapotranspiration rates increase<sup>6</sup>. This may affect water-rights holders who traditionally divert surface water during the crop growing season or those with limited access and rights to water storage facilities. Increasing temperatures will also likely result in decreased late summer streamflow because of the earlier season snowmelt and the projection that precipitation is likely to increase in winter months but decrease in summer months. Concurrently, increased population, higher irrigation requirements, and a longer growing season will put additional pressure on a limited water supply.

The Colorado Climate Plan indicates that the effects of climate change on annual municipal water demands are projected to increase from 0-8 percent with 4 percent (which equates to 616 acre-feet when the annual demand is 15,400 acre-feet) being the median increase<sup>7</sup>. The Town plans to take this potential increase of demand into account with our future water supply modeling and conservation program activities.

<sup>6</sup> Colorado Climate Plan – State Level Policies and Strategies to Mitigate and Adapt.

<sup>7</sup> Colorado Climate Plan – State Level Policies and Strategies to Mitigate and Adapt, pg. 10.

A warming climate has the potential to impact the Town's water supplies in several ways including the following:

- Increasing water demand for irrigation. This increases the importance of moving customers away from high water use plant material and towards more drought resistant plants.
- Additional evaporative losses from our supplies stored in surface reservoirs (Rueter-Hess and Chatfield). The Town can offset some of these evaporative losses with an expansion of our Aquifer Storage and Recovery (ASR) program that experiences zero evaporation losses.
- Added demand on our deep aquifer, non-renewable supplies. While the deep groundwater does not diminish due to climate change, its use could increase with a warmer climate since renewable supplies can become scarcer during these times.
- Increased treatment costs for surface water supplies due to warmer source-water temperatures, increased organic loading and decreased water quality.
- Increased evapotranspiration (ET) will impact the water budget rate structure, as well as our stored water.
- Renewable supplies in East and West Plum Creek could be impacted with less water available during the late summer months. This may increase the Town's need to store more water and/or build or purchase more storage infrastructure.
- South Platte and WISE supplies could shift regular availability which would require the Town to store supplies during times when supplies are available.
- Water rights could be impacted with increased calls on the rivers and creeks.

The Colorado Climate Plan lists a number of strategies and recommendations for water providers, which the Town of Castle Rock has been embracing for several years.

- Promote water efficiency and conservation
  - The Town's Water Efficiency Master Plan and various conservation programs

- Conduct comprehensive integrated water resource planning
  - The Utilities Department updates its Water Resources Strategic Master Plan, as well as its other water-related plans (water, wastewater, stormwater) every five years as part of an integrated water resource planning process.
  
- Examine water sharing agreements with other entities
  - The Town has multiple IGAs with other providers including Parker Water & Sanitation District, the Pinery, Dominion Water and Sanitation District and Castle Pines Metro District to name a few.
  
- Optimize the use of our fully consumable water
  - The Town is in the process of designing a diversion along East Plum Creek that will give us the ability to capture fully consumable return flows and transmit those supplies back to our Plum Creek Water Purification Facility for retreatment and reuse.
  
- Encourage, and participate in, reservoir enlargement projects that have multiple uses including municipal, agricultural, recreational and environmental
  - The Town is a participant in the Chatfield Reservoir Reallocation Project which benefits many types of users and Rueter-Hess Reservoir for which recreational and environmental uses are currently being developed.
  
- Incorporate climate variability and change into long-term water planning efforts.
  - Both our Water Efficiency Master Plan and our Water Resources Strategic Master Plan have recognized the fact that climate variability will most likely put additional pressures on our water supplies. Additionally, we are incentivizing new developers in the Town to include Town-approved Water Efficiency Plans as part of their development agreements.

The Town will continue to monitor the long-range projections for climate variability and collaborate with other water utilities in the region to incorporate the best information available into our future water planning efforts.

## Chapter 8 – Relationship to the State Water Plan

In May 2013, Governor John Hickenlooper issued an Executive Order directing the Colorado Water Conservation Board (CWCB) to develop Colorado’s Water Plan, and on November 19, 2015, this landmark \$20 billion dollar plan was adopted. Creation of this plan was a grassroots effort drawing upon eight years of work, dialogue and consensus building that water leaders from across the state engaged in through Interbasin Compact Committees and Basin Roundtables. The water plan aligns with the state’s water values: vibrant and sustainable cities, visible and productive agriculture, a robust recreation industry, and a thriving environment that includes healthy watersheds, rivers and wildlife. The main purpose of the plan is to address an estimated water-supply gap of 560,000 acre-feet of water by 2050 due to a population expansion from the current 5.3 million to over 10 million. While Castle Rock is seeing population growth, this planned growth has been incorporated into our long-term plan and will provide economies of scale that will help spread the costs of our long-term plan amongst more customers and minimize rate impacts to existing customers.

The main goals of the Colorado State Plan are as follows:

- Continue to apply and strengthen the doctrine of prior appropriation. Colorado’s water law is respected because it works. First, it stipulates that water rights are property rights that can be bought and sold by willing parties and that can be transferred to new users. Second, it provides certainty among competing water uses by telling us which rights have priority. Third, it has accommodated Colorado values as they developed over time, from mining and agricultural to municipal and energy development. This is important for the Town because it provides certainty on the yield of the water rights we own.
- Emphasize water conservation with a goal of increasing municipal and industrial conservation by 400,000 acre-feet per year. Every acre-foot of conserved water used to meet new demands is an acre-foot of water that does not need to come from other existing uses. At 10 million people, this is a reduction of approximately 35 gpcd. As we have proven here in Castle Rock, conservation is achievable if it is made a priority and structured properly.
- Ensure that financing options are available for water projects. In order to support this objective, the State will investigate options to raise additional revenue in the amount of \$100 million annually (\$3 billion by 2050) starting in 2020.

- Encourage projects that enhance the environment, provide recreation, increase supplies and meet compact compliance. Two great examples are the Chatfield Reservoir Reallocation Project and the proposed recreation enhancements at the Rueter-Hess Reservoir.
- Increase efficiency and effectiveness in water project permitting while properly mitigating negative environmental impacts.
- Continue to strengthen water outreach, education, and public engagement to equip our residents with the necessary information to make informed water choices.
- Boosting the amount of water involved in voluntary alternative transfer projects up to 50,000 acre-feet annually from 3,000 acre-feet annually now. This strategy aims to slow the loss of irrigated agricultural land.
- Linking county land use planning with water supply planning so that by 2025, 75 percent of residents live in communities where new development is tied to water availability.

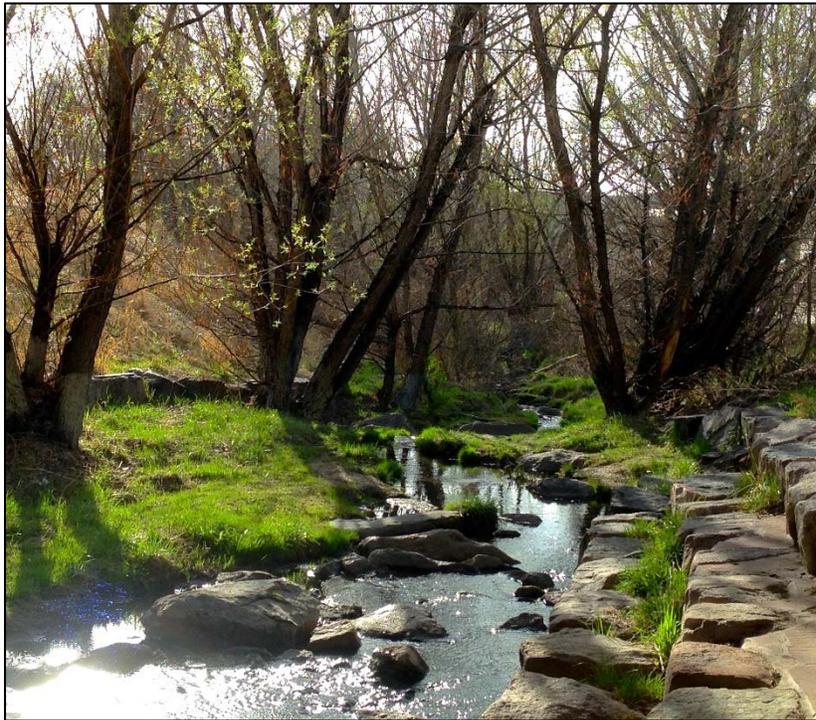
### **8.1 How Castle Rock Compares**

The Town is not only well-aligned but a leader in implementing the goals of the State Water Plan on many fronts:

- **Water Conservation** – In 2015, the Water Efficiency Master Plan was approved by Town Council. A key point of this plan was to save an additional 18% in water consumption by our customers by 2055. Soon after adopting the 2006 plan, our residents decreased their consumption from 165 gallons per capita per day (gpcd) to 135 gpcd. The current 5 year average consumption rate is 122 gpcd. An additional 18% reduction would put our consumption rate at 100 gpcd. In comparison, the State Water Plan has set a goal of 129 gpcd for our region by 2050. Castle Rock will be adding storage in the future to contribute to this goal through more ASR wells.
- **Financing** – Every year, Castle Rock Water conducts a rates and fees study that looks closely at the projects we must do to meet the demands of our existing and growing population to maintain a high level of customer service. With that, we adjust the amounts that our customers pay for water availability, water service, usage and tap fees. This system has allowed us to be self-sustaining and requires that new growth pays its share for water.
- **Education and Outreach** – Castle Rock Water has been reaching out to its customers for over a decade with information that helps them make better decisions about water. Examples of this include historical consumption information on water bills, Water Wiser educational sessions, Xeric design

workshops, water treatment facility tours and classroom visits.

- **Water Storage** – The Town is a key participant in two regional water storage projects, Rueter-Hess Reservoir and Chatfield Reservoir. The Town owns 8,000 acre-feet of storage space in RHR and nearly 300 acre-feet in Chatfield, with an option to purchase up to a total of 2,000 acre-feet in the future. Both of these projects incorporate water storage, recreation and environmental enhancement and help the State meet the goal of developing an additional 400,000 acre-feet of water storage projects by 2050. Castle Rock will be adding storage in the future to contribute to this goal through more ASR wells.
- **Land Use/Water Supply Linkage** – In 2015, Town Council adopted changes to the municipal code that allow new developments to submit voluntary water efficiency plans, to be approved by Castle Rock Water, that provide more flexibility on density, reduced system development fees, and ensure that existing supplies will go further. Because land use and water both fall under the Town, 100% of our residents live in a community where new development is tied to water availability.



Springtime along East Plum Creek.

## Chapter 9 - References

- 2010 Water Resources Master Plan Update.* Prepared by Castle Rock Water Engineering, March 2011.
- 2015 Annual Report on Activities Cherry Basin Water Quality Authority.* Prepared by Cherry Creek Basin Water Quality Authority, 2015.
- 2015 Town of Castle Rock Water Efficiency Master Plan.* Prepared by Town of Castle Rock Water Resources Division – Water Conservation Group.
- American Water Works Association, Manual of Water Supply Practices M50: Water Resources Planning.* Denver, CO: 2001, 1<sup>st</sup> ed.
- Citizen's Guide to Colorado Water Law, 4<sup>th</sup> ed.* Prepared by Colorado Foundation for Water Education. 2015
- Colorado Climate Plan – State Level Policies and Strategies to Mitigate and Adapt.* Colorado Department of Natural Resources - Water Conservation Board. 2015.
- Colorado's Water Plan: Collaborating on Colorado's Water Future.* Colorado Department of Natural Resources - Water Conservation Board. November 2015.
- Hydrology Report for Lower Box Elder Creek Watershed Outfall Systems Planning and Flood Hazard Area Delineation.* Prepared by Wright Water Engineers, Inc. March 2000.
- Parker Water & Sanitation District 2015 Long-Term Water Supply Plan.* Providence Infrastructure Consultants. July 24, 2015.
- Town of Castle Rock Ordinance 2015-46: An Ordinance Amending Titles 3, 4 and 13 of the Castle Rock Municipal Code by Changing the Water, Wastewater and Storm Water Monthly Service Charges and Fees, the Renewable Water Resource Fee, the Water and Wastewater Development fees and the Storm Water Development Impact Fee, and Authorizing the Administrative Adoption of the Utility Administrative Fee Schedule.* Prepared by Town of Castle Rock. 2015.
- Town of Castle Rock Proposed Diversion to Rueter-Hess Reservoir - DRAFT.* W.W. Wheeler. January 2014.
- Water Quality in the South Platte River Basin Colorado, Nebraska, and Wyoming, 1992-95, Circular 1167.* U.S. Department of the Interior and U.S. Geological Survey. 1998.

## **Appendix A- Castle Rock's Surface and Storage Water Rights and Augmentation and Changes of Water Rights**

# CASTLE ROCK'S SURFACE AND STORAGE WATER RIGHTS (Revised July 2016)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Amount Owned (cfs)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Terms and Conditions of Decrees and Other Comments
<b>OLD TOWN WATER RIGHTS</b>									
Castle Rock Ditch and Reservoir	Decree dated 12/10/1883; 79CW281; 90CW143	East Plum Creek	4/1/1880	2.0 absolute	2.0	380	Municipal	Wells CR 2, CR 8, CR 3, CR 4, CR 9, CR 11, CR 12, CR 13, CR 81	<p><b>79CW281</b></p> <ul style="list-style-type: none"> <li>Authorized alternate points of diversion at the following wells CR 2, CR 8, CR 3, CR 4, CR 9, CR 11, CR 12, CR 13</li> <li>Limited consumption to 50% of diversions</li> <li>Limited diversions at alternate points to ≤ 267 af from 10/1 to 4/1</li> <li>Created cumulative volumetric limit of 700 af for Castle Rock Ditch and Reservoir, Eureka Ditch and Water Works System</li> </ul> <p><b>90CW143</b></p> <ul style="list-style-type: none"> <li>Authorized alternate point of diversion at CR 81</li> </ul>
Eureka Ditch	Decree dated 03/03/1890; 79CW281; 90CW143	East Plum Creek	3/31/1883	7.0 absolute	2.0	280	Municipal	Wells CR 2, CR 8, CR 3, CR 4, CR 9, CR 11, CR 12, CR 13, CR 81	SAME AS ABOVE - OLD TOWN WATER RIGHTS
Water Works System	Decree dated 11/28/1908; 79CW281; 90CW143	East Plum Creek	9/20/1891	1.0 absolute	1.0	40	Municipal	Wells CR 2, CR 8, CR 3, CR 4, CR 9, CR 11, CR 12, CR 13, CR 81	SAME AS ABOVE- OLD TOWN WATER RIGHTS
<b>NOE RANCH WATER RIGHTS</b>									
Cook Creek Ditch	Decree dated 12/10/1883; 87CW240; 90CW143; 09CW166; 12CW296 (pending)	East Plum Creek	6/30/1870	3.8 absolute	3.8	77	Irrigation, municipal, industrial, storage, augmentation, exchange	CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	<p><b>87CW240</b></p> <ul style="list-style-type: none"> <li>Authorized alternate points of diversion at the following wells CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87</li> <li>Changed water rights from irrigation to irrigation, municipal, industrial, storage, augmentation and exchange</li> <li>Established a cumulative volumetric limitation of 249 af for Cook Creek and Hillside Ditches</li> <li>Designated as augmentation source for certain wells in the East Plum Creek Well Field</li> </ul> <p><b>90CW143</b></p> <ul style="list-style-type: none"> <li>Authorized alternate point of diversion at CR 81</li> <li>Designated as augmentation source for CR 81</li> </ul> <p><b>09CW166</b></p>

## CASTLE ROCK'S SURFACE AND STORAGE WATER RIGHTS (Revised July 2016)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Amount Owned (cfs)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Terms and Conditions of Decrees and Other Comments
									<ul style="list-style-type: none"> <li>Authorized storage of consumptive use credits associated with water right in Chatfield Reservoir</li> </ul> <p><b>12CW296</b></p> <ul style="list-style-type: none"> <li>Authorized use of consumptive use credits in various exchanges</li> </ul>
Hillside Ditch	Decree dated 12/10/1883; 87CW240; 90CW143; 09CW166; 12CW296 (pending)	East Plum Creek	7/1/1881	3.65 absolute	3.65	172	Irrigation, municipal, industrial, storage, augmentation, exchange	CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	SAME AS ABOVE - NOE RANCH WATER RIGHTS
<b>DOUGLAS PARK WATER RIGHTS</b>									
Benjamin Quick Ditch	Decree dated 12/10/1883; 87CW309; 09CW166; 12CW296 (pending)	West Plum Creek	6/15/1866	3.8 absolute	3.8	103	Irrigation, municipal, industrial, storage, augmentation, exchange	None	<p><b>87CW309</b></p> <ul style="list-style-type: none"> <li>Changed water rights from irrigation to irrigation, municipal, industrial, storage, augmentation and exchange</li> <li>Established cumulative volumetric limitation of 2,900 in any consecutive 10 year period for Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch</li> <li>Designated as augmentation source for wells in the East Plum Creek, West Plum Creek and Meadows Well Fields</li> </ul> <p><b>09CW166</b></p> <ul style="list-style-type: none"> <li>Authorized storage of consumptive use credits associated with water right in Chatfield Reservoir</li> </ul> <p><b>12CW296</b></p> <ul style="list-style-type: none"> <li>Authorized use of consumptive use credits in various exchanges</li> </ul>
John Kinner Ditch	Decree dated 12/10/1883; 87CW309; 09CW166; 12CW296 (pending)	West Plum Creek	3/1/1868	3.52 absolute	3.52	21	Irrigation, municipal, industrial, storage, augmentation, exchange	None	SAME AS ABOVE - DOUGLAS PARK WATER RIGHTS
Huntsville Ditch	Decree dated 12/10/1883; 87CW309;	West Plum Creek	3/1/1880	9.12 absolute	4.0	208	Irrigation, municipal, industrial,	None	SAME AS ABOVE - DOUGLAS PARK WATER RIGHTS

# CASTLE ROCK'S SURFACE AND STORAGE WATER RIGHTS (Revised July 2016)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Amount Owned (cfs)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Terms and Conditions of Decrees and Other Comments
	09CW166; 12CW296 (pending)						storage, augmentation, exchange		
John Kinner Ditch No. 2	Decree dated 12/10/1883; 87CW309; 09CW166; 12CW296 (pending)	West Plum Creek	4/1/1885	3.52 absolute	3.52	120	Irrigation, municipal, industrial, storage, augmentation, exchange	None	SAME AS ABOVE - DOUGLAS PARK WATER RIGHTS
<b>HIGH LINE WATER RIGHTS</b>									
High Line Ditch, Priority No. 57	Decree dated 12/10/1883; 81CW049; 00CW78; 09CW166	East Plum Creek	9/1/1871	3.52 absolute	0.585	40 with other priorities	Irrigation, municipal, industrial, storage, augmentation, exchange	None	<p><b>81CW049</b></p> <ul style="list-style-type: none"> <li>Limited diversions to 60 af for High Line Ditch priorities from 4/1 to 7/31</li> <li>Limited depletions to 40 af for High Line Ditch priorities from 4/1 to 7/31</li> <li>Limited cumulative maximum diversions for High Line Ditch priorities to 1.665 cfs</li> <li>Castle Rock owns 29 AF of 40 AF</li> </ul> <p><b>95CW240</b></p> <ul style="list-style-type: none"> <li>Changed water rights from irrigation to irrigation, storage and augmentation</li> <li>Designated as augmentation source for Well Nos. CR 15, CR 17 and EDI Well Den-1 (5.0 cfs of priorities not owned by Castle Rock)</li> </ul> <p><b>00CW78</b></p> <ul style="list-style-type: none"> <li>Designated as augmentation source for Well No. 205 (NNT)</li> </ul> <p><b>09CW166</b></p> <ul style="list-style-type: none"> <li>Changed water rights to add municipal, industrial and exchange uses</li> <li>Authorized storage of consumptive use credits associated with Ball Ditch water rights in Chatfield Reservoir</li> </ul> <p><b>12CW296</b></p> <ul style="list-style-type: none"> <li>Authorized use of consumptive use credits in various exchanges</li> </ul>
High Line Ditch, Priority No. 73	Decree dated 12/10/1883; 81CW049; 00CW78; 09CW166	East Plum Creek	6/30/1873	1.4 absolute	0.233	40 with other priorities	Irrigation, municipal, industrial, storage, augmentation, exchange	None	SAME AS ABOVE - HIGH LINE WATER RIGHTS

# CASTLE ROCK'S SURFACE AND STORAGE WATER RIGHTS (Revised July 2016)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Amount Owned (cfs)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Terms and Conditions of Decrees and Other Comments
High Line Ditch, Priority No. 102	Decree dated 12/10/1883; 81CW049; 00CW78; 09CW166	East Plum Creek	6/30/1878	15.08 absolute	0.848	40 with other priorities	Irrigation, municipal, industrial, storage, augmentation, exchange	None	SAME AS ABOVE – HIGH LINE WATER RIGHTS
<b>BALL DITCH WATER RIGHTS</b>									
Ball Ditch	Decree dated 12/10/1883; W-7604-74; 09CW166; 12CW296 (pending)	West Plum Creek	4/19/1872	3.0 absolute	0.1429	49	Irrigation, municipal, storage, augmentation, exchange	NA	<p><b>W-7604-74</b></p> <ul style="list-style-type: none"> <li>Established a volumetric limit of 182 af over 10 years</li> </ul> <p><b>09CW166</b></p> <ul style="list-style-type: none"> <li>Changed water rights from irrigation to irrigation, municipal, storage, augmentation and exchange uses</li> <li>Authorized storage of consumptive use credits associated with Ball Ditch water rights in Chatfield Reservoir</li> </ul> <p><b>12CW296</b></p> <ul style="list-style-type: none"> <li>Authorized use of consumptive use credits in various exchanges</li> </ul>
<b>CASTLE ROCK SURFACE DIVERSION WATER RIGHTS</b>									
Castle Rock Surface Diversion No. 1	12CW296 (pending)	East Plum Creek	8/31/2015	30.0 conditional	30.0	NA	Irrigation, municipal, storage, augmentation, exchange	NA	<p><b>12CW296</b> Approved conditional water right</p> <ul style="list-style-type: none"> <li>Authorized use as upstream terminus of various exchanges</li> </ul> <p><b>DUE DILIGENCE DEADLINE: 4/30/2022</b></p>
Castle Rock Surface Diversion No. 2	12CW296 (pending)	East Plum Creek	8/31/2015	30.0 conditional	30.0	NA	Irrigation, municipal, storage, augmentation, exchange	NA	<p><b>12CW296</b></p> <ul style="list-style-type: none"> <li>Authorized conditional water right</li> <li>Authorized alternate points of diversion at Castle Rock Surface Diversion No. 3, Castle Pines Diversion Point S-1 and Castle Pines Diversion Point S-2</li> <li>Authorized use as upstream terminus of various exchanges</li> </ul> <p><b>DUE DILIGENCE DEADLINE: 4/30/2022</b></p>
<b>STORAGE WATER RIGHTS</b>									

## CASTLE ROCK'S SURFACE AND STORAGE WATER RIGHTS (Revised July 2016)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Amount Owned (cfs)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Terms and Conditions of Decrees and Other Comments
Chatfield Reservoir	89CW169; 09CW166; 12CW296 (pending)	South Platte River	4/6/1989	-	-	2000 conditional	Municipal	NA	<p><b>09CW166</b></p> <ul style="list-style-type: none"> <li>Authorized storage of consumptive use credits associated with Noe Ranch, Douglas Park, High Line and Ball Ditch water rights in storage</li> </ul> <p><b>12CW296</b></p> <ul style="list-style-type: none"> <li>Authorized as a downstream terminus in various exchanges</li> </ul> <p><b>DUE DILIGENCE DEADLINE: 8/31/2016</b></p>
<b>ABANDONED WATER RIGHTS</b>									
Douglas Lane Pipeline	84CW656; Cons. 86CW378/379 ; 87CW240; 90CW143; 94CW289; 02CW026; 09CW167	East Plum Creek	4/12/1984	-	-	-	-	-	This water right was <b>abandoned</b> in 09CW167.
Sellers Gulch Reservoir No. 1	84CW656; 90CW143; 94CW289; 02CW026; 09CW167;	East Plum Creek	4/12/1984	-	-	-	-	-	This water right was <b>abandoned</b> in 09CW167.
Sellers Gulch Reservoir No. 2	84CW656; 90CW143; 94CW289; 02CW026; 09CW167;	East Plum Creek	4/12/1984	-	-	-	-	-	This water right was <b>abandoned</b> in 09CW167.

# CASTLE ROCK'S TRIBUTARY PLANS FOR AUGMENTATION AND CHANGES OF WATER RIGHTS ASSOCIATED WITH TRIBUTARY STRUCTURES (Revised October 2015)

Case Nos.	Augmented Structures and/or Alternate Points of Diversion	Augmentation Sources	Credit for Sewered Return Flows?	Credit for Lawn Irrigation Return Flows?	Terms and Conditions of Decrees or Other Comments
79CW281	Wells CR 2, CR 8, CR 3, CR 4, CR 9, CR11, thru CR 16 (as alternate points ONLY)	Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System (Old Town Water Rights)	No	No	<ul style="list-style-type: none"> <li>As amended by 84CW656, requires 50% of diversions be returned to East Plum Creek</li> <li>Requires contemporaneous diversions and returns</li> <li>Prohibits credit for 50% of diversions</li> <li>Retained jurisdiction has expired as to all issues</li> </ul>
84CW656	Wells CR 2, CR 8, CR 3, CR 4, CR 9, CR11, thru CR 16	573 af NT Dawson; 310 af NT Denver; 657 af Arapahoe (Wells CR 1, CR 5, CR 6, CR 7, CR 10)  Discharge of effluent, lawn irrigation return flows, direct discharge from well head, seepage	Yes - available immediately - must meter effluent discharged to Plum Creek	Yes - after 1 year for Zone 1 - after 2 years for Zone 2 - after studies for Zone 3	<ul style="list-style-type: none"> <li>Quantifies consumption for indoor use as 5% of diversions and irrigation and evaporation consumption by formula</li> <li>Establishes dominion and control over nontributary return flows</li> <li>Requires Castle Rock to conduct "nitial measurements for Zones 1 and 2 to utilize LIRFs</li> <li>Requires Castle Rock to collect 7 years of data to determine lagged return flows from Zone 3 under retained jurisdiction</li> <li>Operates by exchange. See exchange table.</li> <li>Retained jurisdiction expired as to all issues, except LIRFs from Zones 2 and 3</li> </ul>
89CW212	Wells CR 2, CR 8, CR 3, CR 4, CR 9, CR11, thru CR 16	SAME AS 84CW656 ABOVE	Yes SAME AS 84CW656 ABOVE	Yes SAME AS 84CW656 ABOVE	<ul style="list-style-type: none"> <li>Amends 84CW656 so that discharges can come from PCWRA</li> <li>Operates by exchange from PCWRA outfall to former Castle Rock WWTP outfall. See exchange table.</li> </ul>
85CW480	- Meadows Wells (CR 184 thru CR 203) (formerly AL-1 through AL-20)	80CW377 – 1966 af NT Arapahoe 80CW375 – 946 af NT LFH 79CW270 – 93 af NT Dawson 80CW376 – 2990 af NNT Denver 84CW197 – 1477 af NNT Lower Dawson 80 af NT Lower Dawson 79CW271 – 96 af NT LFH 79CW272 – 51 af NT Arapahoe 85CW470 – 48 af NT Arapahoe  Discharge of effluent, lawn irrigation return flows, direct discharge from well head, seepage	Yes - To determine in-house return flows, measured discharges reduced by 3%	Yes - after 1 year for Zone 1 - after 2 years for Zone 2 - after studies for Zone 3	<ul style="list-style-type: none"> <li>Requires compliance with decrees for nontributary and not non-tributary groundwater; nontributary ground water utilized for augmentation subject to 2% relinquishment; not nontributary groundwater must be fully augmented</li> <li>Establishes estimated annual diversion requirement of 8300 af/year</li> <li>Requires returns flows to occur between east boundary of Meadows and confluence East and West Plum Creeks</li> <li>Requires replacement of delayed pumping depletions per tables</li> <li>Requires daily measurements during irrigation season, weekly non-irrigation season</li> <li>Operates by exchange. See exchange table.</li> <li>Retained jurisdiction on injury extends to 10 years after notice of 60 % build out</li> <li>Retained jurisdiction as to well depletions not expired</li> <li>Retained jurisdiction on LIRFs has expired</li> </ul>

# CASTLE ROCK'S TRIBUTARY PLANS FOR AUGMENTATION AND CHANGES OF WATER RIGHTS ASSOCIATED WITH TRIBUTARY STRUCTURES (Revised October 2015)

Case Nos.	Augmented Structures and/or Alternate Points of Diversion	Augmentation Sources	Credit for Sewered Return Flows?	Credit for Lawn Irrigation Return Flows?	Terms and Conditions of Decrees or Other Comments
Cons. 86CW378/37 9	<ul style="list-style-type: none"> <li>- West Plum Creek Well Field (CR 176 - CR 181)</li> <li>- East Plum Creek Well Field (CR 2, CR 3, CR 4, CR 8, CR 9, CR 11, CR 12, CR 13, CR 78 thru CR 87)</li> <li>- Meadows Wells (CR 184 thru CR 203) (formerly AL-1 through AL-20)</li> </ul>	<p>Various decrees yielding:</p> <ul style="list-style-type: none"> <li>- 1936 af Dawson NNT</li> <li>- 3548 af Dawson</li> <li>- 4522 af Denver NNT</li> <li>- 5117 af Denver</li> <li>- 9183 af Arapahoe</li> <li>- 4252 af Laramie-Fox Hills</li> </ul> <p>Discharge of effluent, lawn irrigation return flows, direct discharge from well head, seepage, storage releases</p>	<p>Yes</p> <ul style="list-style-type: none"> <li>- available immediately</li> <li>- must meter effluent discharged to Plum Creek</li> </ul>	<p>Yes</p> <ul style="list-style-type: none"> <li>- after 1 year for Zone 1</li> <li>- after 5 years for Zone 2</li> <li>- after studies for Zone 3</li> </ul>	<ul style="list-style-type: none"> <li>• Requires nontributary groundwater utilized for augmentation subject to 2% relinquishment</li> <li>• Requires not nontributary groundwater to be fully augmented</li> <li>• Prohibits claim for LIRFs unless there is a surface flow at Titan Road gage</li> <li>• Requires Castle Rock to conduct initial measurements for Zones 1 and 2 to utilize LIRFs</li> <li>• Limits diversions at West Plum Creek Well Field when Craig Ditch is calling to Benjamin Quick Ditch only</li> <li>• Requires studies every 4 years of water table at Larson Wells; if unable to get sustained yield, Castle Rock must provide water</li> <li>• Conditions on diversions upstream of Titan Road gage</li> <li>• Operates by exchange. See exchange table.</li> <li>• Requires 3 year study on lagged depletions of East Plum Creek well field</li> <li>• Establishes dominion and control over nontributary return flows</li> <li>• Retained jurisdiction has not expired as to any issues, including LIRFs from Zones 2 and 3 and injury to Castle Pines</li> </ul>
87CW240	<ul style="list-style-type: none"> <li>- CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 82 thru CR 87</li> </ul>	<p>Cook Creek Ditch and Hillside Ditch (Noe Ranch Water Rights) by discharge of effluent, lawn irrigation return flows, exchange, seepage, storage releases</p>	<p>Yes</p> <ul style="list-style-type: none"> <li>- available immediately</li> <li>- must meter effluent discharged to Plum Creek</li> </ul>	<p>Yes</p> <ul style="list-style-type: none"> <li>- after 1 year for Zone 1</li> <li>- after 2 years for Zone 2</li> <li>- after studies for Zone 3</li> </ul>	<ul style="list-style-type: none"> <li>• Operates between 4/1 and 9/30 annually</li> <li>• Allows Castle Rock to fully consume consumptive use component of Cook Creek Ditch and Hillside Ditch</li> <li>• Prohibits operation plan without live stream between Noe Road and Douglas Lane</li> <li>• Need to conduct initial measurements for Zones 1 and 2 to utilize LIRFs; every 5 years must conduct new measurements</li> <li>• Operates by exchange. See exchange table.</li> <li>• Retained jurisdiction has expired as to all issues, except LIRFs from Zones 2 and 3 and injury to Castle Pines</li> </ul>
90CW143	CR 81	<ul style="list-style-type: none"> <li>- Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System (Old Town Water Rights)</li> <li>- Cook Creek Ditch and Hillside Ditch (Noe Ranch Water Rights)</li> </ul>	<p>Yes</p> <ul style="list-style-type: none"> <li>- available immediately</li> <li>- must meter effluent discharged to Plum Creek</li> </ul>	<p>Yes</p> <ul style="list-style-type: none"> <li>- after 1 year for Zone 1</li> <li>- after 2 years for Zone 2</li> <li>- after studies for Zone 3</li> </ul>	<ul style="list-style-type: none"> <li>• Amended augmentation plans decreed to 84CW656 and 87CW240</li> </ul>

# CASTLE ROCK'S TRIBUTARY PLANS FOR AUGMENTATION AND CHANGES OF WATER RIGHTS ASSOCIATED WITH TRIBUTARY STRUCTURES (Revised October 2015)

Case Nos.	Augmented Structures and/or Alternate Points of Diversion	Augmentation Sources	Credit for Sewered Return Flows?	Credit for Lawn Irrigation Return Flows?	Terms and Conditions of Decrees or Other Comments
87CW309	<ul style="list-style-type: none"> <li>- East Plum Creek Well Field (CR 2, CR 3, CR 4, CR 8, CR 9, CR 11, CR 12, CR 13, CR 78 thru CR 87)</li> <li>- West Plum Creek Well Field (CR 176 – CR 181)</li> <li>- Meadows Wells (CR 184 thru CR 203)</li> <li>- Douglas Lane Pipeline</li> </ul>	Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch (Douglas Park Water Rights) by discharge of effluent, lawn irrigation return flows, direct discharge	Yes - available immediately - must meter effluent discharged to Plum Creek	Yes - after 1 year for Zone 1 - after 5 years for Zone 2 - after studies for Zone 3	<ul style="list-style-type: none"> <li>• Prohibits claims for LIRFs unless there is a surface flow at Titan Road gage</li> <li>• Operates between 4/1 and 9/30 annually</li> <li>• Limits diversions at West Plum Creek Well Field when Craig Ditch is calling to Benjamin Quick Ditch only</li> <li>• Requires studies every 4 years of water table at Larson Wells; if Larson Wells are unable to get sustained yield, Castle Rock must provide water</li> <li>• Conditions on diversions upstream of Titan Road gage for Castle Pines Metro District</li> <li>• Operates by exchange. See exchange table.</li> <li>• Retained jurisdiction has not expired as to any issues, including LIRFs from Zones 2 and 3 and injury to Castle Pines</li> </ul>
09CW166	Chatfield Reservoir	NA	No	No	<ul style="list-style-type: none"> <li>• Authorized storage of consumptive use credits from the following water rights               <ul style="list-style-type: none"> <li>○ Cook Creek Ditch and Hillside Ditch (Noe Ranch Water Rights)</li> <li>○ Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch (Douglas Park Water Rights)</li> <li>○ High Line Ditch Water Rights</li> <li>○ Ball Ditch Water Rights</li> </ul> </li> </ul>

# CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
<b>EAST PLUM CREEK WELL FIELD (AKA SOUTH WELL FIELD)</b>										
Second Fairgrounds Well (CR 2)	79CW280 ; 79CW281; Cons. 86CW378/379; 87CW240; 87CW309; 90CW143	East Plum Creek	9/30/1950	0.44 cfs, absolute (198 gpm)	NA	Municipal	Cook Creek Ditch, Hillside Ditch, Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	No	<b>79CW280</b> - Limited cumulative annual diversions under junior priorities equal 800 af with CR 2, CR 3, CR 4 and CR 8  <b>79CW281</b> <ul style="list-style-type: none"> <li>Made an alternate point of diversion for Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System</li> <li>Limited diversions at alternate points from 10/1 to 4/1 to ≤ 267af</li> </ul> <b>84CW656</b> <ul style="list-style-type: none"> <li>Designated as an augmented structure</li> <li>Made an alternate point for CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81, CR 82 thru CR 87)</li> </ul> <b>Cons. 86CW378/379</b> - Designated as an augmented structure  <b>87CW240</b> <ul style="list-style-type: none"> <li>Designated as an augmented structure</li> <li>Made an alternate point of diversion for Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81, CR 82 thru CR 87</li> </ul> <b>87CW309</b> - Designated as an augmented structure  <b>90CW143</b> - Made an alternate point of diversion for CR 81
Extra Well (CR 3)	79CW280 ; 79CW281; Cons. 86CW378/379; 87CW240; 87CW309; 90CW143	East Plum Creek	12/31/1954	0.27 cfs, absolute (121 gpm)	200 af	Municipal	Cook Creek Ditch, Hillside Ditch, Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	No	SAME AS ABOVE – CR 2
Anderson Well (CR 4)	79CW280 ;	East Plum Creek	12/31/1954	0.27 cfs, absolute (121 gpm)	200 af	Municipal	Cook Creek Ditch, Hillside Ditch, Castle Rock Ditch and	Yes	No	SAME AS ABOVE – CR 2

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
	79CW281; Cons. 86CW378/379; 87CW240; 87CW309; 90CW143						Reservoir, Eureka Ditch, Water Works System  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87			
First Park Well (CR 8)	79CW280 ; 79CW281; Cons. 86CW378/379; 87CW240; 87CW309; 90CW143	East Plum Creek	6/30/1951	0.27 cfs, absolute (121 gpm)	200 af	Municipal	Cook Creek Ditch, Hillside Ditch, Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	No	SAME AS ABOVE - CR 2
Rock Street Well (CR 9)	79CW281; 84CW656; Cons. 86CW378/379; 87CW240; 87CW309; 90CW143	East Plum Creek	NA	NA	NA	NA	Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System, Cook Creek Ditch and Hillside Ditch  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	No	<b>79CW281</b> - Made an alternate point of diversion for Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System  <b>84CW656</b> <ul style="list-style-type: none"> <li>• Designated as an augmented structure</li> <li>• Made an alternate point for CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81, CR 82 thru CR 87)</li> </ul> <b>Cons. 86CW378/379</b> - Designated as an augmented structure  <b>87CW240</b> <ul style="list-style-type: none"> <li>• Designated as an augmented structure</li> <li>• Made an alternate point of diversion for Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81, CR 82 thru CR 87</li> </ul> <b>87CW309</b> - Designated as an augmented structure  <b>90CW143</b> - Made an alternate point of diversion for CR 81

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
First Miller Well (CR 11)	79CW281; 84CW656; Cons. 86CW378/379; 87CW240; 87CW309; 90CW143	East Plum Creek	NA	NA	NA	NA	Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System, Cook Creek Ditch and Hillside Ditch  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	Yes	SAME AS ABOVE - CR 9
Second Miller Well (CR 12)	79CW281; 84CW656; Cons. 86CW378/379; 87CW240; 87CW309; 90CW143	East Plum Creek	NA	NA	NA	NA	Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System, Cook Creek Ditch and Hillside Ditch  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	Yes	SAME AS ABOVE - CR 9
Third Miller Well (CR 13)	79CW281; 84CW656; Cons. 86CW378/379; 87CW240; 87CW309; 90CW143	East Plum Creek	NA	NA	NA	NA	Castle Rock Ditch and Reservoir, Eureka Ditch, Water Works System, Cook Creek Ditch and Hillside Ditch  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	Yes	SAME AS ABOVE - CR 9
Heckendorf Well No. 1 (CR 78)  (formerly CR14)	84CW656;Cons. 86CW378/379; 87CW309; 90CW143	East Plum Creek	4/12/1984	120 gpm absolute  130 gpm conditional	NA	All municipal, augmentation	Cook Creek Ditch and Hillside Ditch  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru	Yes	No	<b>84CW656</b> <ul style="list-style-type: none"> <li>• Designated as an augmented structure</li> <li>• Made an alternate point for CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81, CR 82 thru CR 87</li> </ul>

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
	Last diligence: 09CW167						CR 16, CR 81 thru CR 87			Cons. 86CW378/379 - Designated as an augmented structure 87CW309 - Designated as an augmented structure 90CW143 - Made an alternate point of diversion for CR 81 <b>Due diligence deadline: 10/31/2017</b>
Heckendorf Well No. 2 (CR 79)  (formerly CR15)	84CW656;Cons. 86CW378/379; 87CW309; 90CW143  Last diligence: 09CW167	East Plum Creek	4/12/1984	56 gpm absolute  194 gpm conditional	NA	All municipal, augmentation	Cook Creek Ditch and Hillside Ditch  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	Yes	SAME AS ABOVE - CR 78
Heckendorf Well No. 3 (CR 80)  (formerly CR16)	84CW656;Cons. 86CW378/379; 87CW309; 90CW143  Last diligence: 09CW167	East Plum Creek	4/12/1984	186 gpm absolute  64 gpm  conditional	NA	All municipal, augmentation	Cook Creek Ditch and Hillside Ditch  CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	Yes	Yes	SAME AS ABOVE - CR 78
CR Well 2-8-67-T1 (aka Cemetery Well) (CR 81)	Cons. 86CW378/379; 87CW309; 90CW143	East Plum Creek	NA	100 gpm	121	NA	Cook Creek Ditch, Hillside Ditch, Castle Rock Ditch, Eureka Ditch, Water Works System, Heckendorf Well Nos. 1 thru 3, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 13	No	No	Cons. 86CW378/379 - Designated as an augmented structure <b>90CW143</b> <ul style="list-style-type: none"> <li>• Changed point of diversion and name of well</li> <li>• Designated as an augmented structure</li> <li>• Made an alternate point of diversion for Cook Creek Ditch, Hillside Ditch, Castle Rock Ditch, Eureka Ditch, Water Works System, Douglas Lane Pipeline, Sellers Gulch Reservoir No. 1</li> <li>• Made an alternate point of diversion to CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 13, CR 78-80</li> <li>• Limited diversions to ≤ 100 gpm and ≤ 161 af annually</li> </ul> <b>87CW309</b> - Designated as an augmented structure

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
CR Well 11-8-67-T1 (CR 82)	Cons. 86CW378/379; 87CW309; 90CW143	East Plum Creek	NA	100 gpm	NA	NA	Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	No	No	Cons. 86CW378/379 - Designated as an augmented structure  <b>87CW240</b> <ul style="list-style-type: none"> <li>• Designated as an augmented structure</li> <li>• Made an alternate point of diversion for Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81, CR 82 thru CR 87, Douglas Lane Pipeline</li> </ul> <b>87CW309</b> - Designated as an augmented structure
CR Well 11-8-67-T2 (CR 83)	87CW240; Cons. 86CW378/379; 87CW309; 90CW143	East Plum Creek	NA	100 gpm	NA	NA	Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	No	No	SAME AS ABOVE - CR 82
CR Well 11-8-67-T3 (CR 84)	87CW240; Cons. 86CW378/379; 87CW309; 90CW143	East Plum Creek	NA	100 gpm	NA	NA	Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	No	No	SAME AS ABOVE - CR 82
CR Well 11-8-67-T4 (CR 85)	87CW240; Cons. 86CW378/379; 87CW309; 90CW143	East Plum Creek	NA	100 gpm	NA	NA	Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	No	No	SAME AS ABOVE - CR 82
CR Well 11-8-67-T5 (CR 86)	87CW240; Cons. 86CW378/379; 87CW309; 90CW143	East Plum Creek	NA	100 gpm	NA	NA	Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81, CR 82 thru CR 87, Douglas Lane Pipeline Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	No	No	SAME AS ABOVE - CR 82

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
CR Well 14-8-67-T1 (CR 87)	87CW240; Cons. 86CW378/379; 87CW309; 90CW143	East Plum Creek	NA	100 gpm	NA	NA	Cook Creek Ditch and Hillside Ditch, CR 2, CR 3, CR 4, CR 8, CR 9, CR 11 thru CR 16, CR 81 thru CR 87	No	No	SAME AS ABOVE – CR 82
<b>WEST PLUM CREEK WELL FIELD</b>										
CR 176	Cons. 86CW378/379; 87CW309  Last diligence: 10CW245	West Plum Creek	3/3/1992	350 gpm conditional	NA	NA	NA	No	No	Cons. 86CW378/379 - Designated as an augmented structure  87CW309 - Designated as an augmented structure  <b>Due diligence deadline: 3/31/2019</b>
CR 177	Cons. 86CW378/379; 87CW309  Last diligence: 10CW245	West Plum Creek	3/3/1992	350 gpm conditional	NA	NA	NA	No	No	SAME AS ABOVE – WEST PLUM CREEK WELL FIELD
CR 178	Cons. 86CW378/379; 87CW309  Last diligence: 10CW245	West Plum Creek	3/3/1992	350 gpm conditional	NA	NA	NA	No	No	SAME AS ABOVE – WEST PLUM CREEK WELL FIELD
CR 179	Cons. 86CW378/379; 87CW309  Last diligence: 10CW245	West Plum Creek	3/3/1992	350 gpm conditional	NA	NA	NA	No	No	SAME AS ABOVE – WEST PLUM CREEK WELL FIELD

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
CR 180	Cons. 86CW378/379; 87CW309  Last diligence: 10CW245	West Plum Creek	3/3/1992	350 gpm conditional	NA	NA	NA	No	No	SAME AS ABOVE – WEST PLUM CREEK WELL FIELD
CR 181	Cons. 86CW378/379; 87CW309  Last diligence: 10CW245	West Plum Creek	3/3/1992	350 gpm conditional	NA	NA	NA	No	No	SAME AS ABOVE – WEST PLUM CREEK WELL FIELD
<b>MEADOWS WELL FIELD (AKA CENTRAL WELL FIELD)</b>										
AL-1 (CR 184)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	Yes	Yes	<b>85CW480</b> <ul style="list-style-type: none"> <li>• Designated as an augmented structure</li> <li>• Constrained use of water to 4140 acres (Meadows Development)</li> <li>• Established maximum cumulative diversion AL-1 to AL-20 of 5000 gpm</li> </ul> <b>Cons. 86CW378/379</b> - Designated as an augmented structure <b>87CW309</b> - Designated as an augmented structure  <span style="color: red;">Due diligence deadline: 4/30/2019</span>
AL-2 (CR 185)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	Yes	Yes	SAME AS ABOVE – MEADOWS WELL FIELD
AL-3 (CR 186)	85CW480; Cons. 86CW378/379;	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE – MEADOWS WELL FIELD

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
	87CW309  Last diligence: 12CW232									
AL-4 (CR 187)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-5 (CR 188)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-6 (CR 189)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-7 (CR 190)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-8 (CR 191)	85CW480; Cons. 86CW378/379; 87CW309	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	Yes	Yes	SAME AS ABOVE - MEADOWS WELL FIELD

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
	Last diligence: 12CW232									
AL-9 (CR 192)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	Yes	Yes	SAME AS ABOVE - MEADOWS WELL FIELD
AL-10 (CR 193)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-11 (CR 194)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-12 (CR 195)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-13 (CR 196)	85CW480; Cons. 86CW378/379; 87CW309	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
	Last diligence: 12CW232									
AL-14 (CR 197)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-15 (CR 198)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-16 (CR 199)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-17 (CR 200)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD
AL-18 (CR 201)	85CW480; Cons. 86CW378/379; 87CW309	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE - MEADOWS WELL FIELD

## CASTLE ROCK'S TRIBUTARY GROUNDWATER RIGHTS AND STRUCTURES (Revised October 2015)

Water Rights	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs, gpm)	Max Annual Yield (af)	Decreed Uses	Decreed Alternate Points Relevant to Castle Rock	Drilled	Producing	Terms and Conditions of Decrees and Other Comments
	Last diligence: 12CW232									
AL-19 (CR 202)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE – MEADOWS WELL FIELD
AL-20 (CR 203)	85CW480; Cons. 86CW378/379; 87CW309  Last diligence: 12CW232	East Plum Creek	11/14/1985	250 gpm	NA	NA	NA	No	No	SAME AS ABOVE – MEADOWS WELL FIELD

## CASTLE ROCK'S EXCHANGES (Revised July 2016)

Exchange From Point (Downstream Terminus)	Exchange to Point (Upstream Terminus)	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Substitute Supplies	Terms and Conditions and Comments
<b>AUGMENTATION PLAN 84CW656</b>							
Castle Rock Wastewater Treatment Plant Discharge	Douglas Lane Pipeline	84CW656 Last Diligence: 09CW167	East Plum Creek	4/12/1984	5.7 conditional	573 af NT Dawson 310 af NT Denver 657 af Arapahoe (Wells CR 1, CR 5, CR 6, CR 7, CR 10)	<b>Due diligence deadline: 3/31/2019</b>
<b>AUGMENTATION PLAN 86CW378/379</b>							
Chatfield Reservoir	CR 181	Cons. 86CW378/379 Last Diligence: 10CW245	Plum Creek, West Plum Creek	3/3/1992	4.7 conditional	1936 af Dawson NNT 3548 af Dawson 4522 af Denver NNT 5117 af Denver 9183 af Arapahoe 4252 af Laramie-Fox Hills	<b>Due diligence deadline: 2/28/2019</b>
Chatfield Reservoir	Douglas Lane Pipeline	Cons. 86CW378/379 Last Diligence: 10CW245	Plum Creek, East Plum Creek	12/31/1986	50 conditional	SAME AS ABOVE	SAME AS ABOVE FOR 86CW378/279
Confluence East and West Plum Creek	CR 181	Cons. 86CW378/379 Last Diligence: 10CW245	West Plum Creek	3/3/1992	4.7 conditional	SAME AS ABOVE	SAME AS ABOVE FOR 86CW378/279
Plum Creek Water Reclamation Authority Treatment Plant Discharge	Douglas Lane Pipeline	Cons. 86CW378/379 Last Diligence: 10CW245	East Plum Creek	12/31/1986	23.5 conditional	SAME AS ABOVE	SAME AS ABOVE FOR 86CW378/279

## CASTLE ROCK'S EXCHANGES (Revised July 2016)

Exchange From Point (Downstream Terminus)	Exchange to Point (Upstream Terminus)	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Substitute Supplies	Terms and Conditions and Comments
<b>AUGMENTATION PLAN 87CW240</b>							
Castle Rock Wastewater Treatment Plant Discharge	CR 81	87CW240 Last Diligence: 10CW244	East Plum Creek	11/27/1987	0.8 conditional 0.8 absolute	Cook Creek Ditch Hillside Ditch (Noe Ranch)	<b>Due diligence deadline: 3/31/2019</b>  Established a continuous call for 0.8 cfs on East Plum Creek, which will be increased to 1.6 cfs if becomes absolute  A portion of exchange to Douglas Lane Pipeline was abandoned in 10CW244.
<b>AUGMENTATION PLAN 87CW309</b>							
Confluence East and West Plum Creek	East Plum Creek Well Field and Meadows Well Field	87CW309 Last Diligence: 10CW243	East Plum Creek	3/25/1992	2.0 conditional	Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch	<b>Due diligence deadline: 3/31/2019</b>
<b>AUGMENTATION PLAN 89CW212</b>							
Plum Creek Wastewater Authority Treatment Plant Discharge	Castle Rock Wastewater Treatment Plant	89CW212 Last Diligence: 13CW3028	East Plum Creek	12/23/1989	5.7 conditional 0.5 absolute	573 af NT Dawson 310 af NT Denver 657 af Arapahoe (Wells CR 1, CR 5, CR 6, CR 7, CR 10)	<b>Due diligence deadline: 12/30/2019</b>
<b>AUGMENTATION PLAN 85CW480</b>							
AL-4 (CR187)	NW ¼ § 11, T8S, R67W	85CW480 Last Diligence: 12CW232	East Plum Creek	11/14/1985	11.14 conditional	1966 af NT Arapahoe 946 af NT LFH 93 af NT Dawson 2990 af NNT Denver 1477 af NNT Lower Dawson 80 af NT Lower Dawson 96 af NT LFH 51 af NT Arapahoe 48 af NT Arapahoe	<b>Due diligence deadline: 4/30/2019</b>  Exchanges only to wells within 100 feet of alluvium

## CASTLE ROCK'S EXCHANGES (Revised July 2016)

Exchange From Point (Downstream Terminus)	Exchange to Point (Upstream Terminus)	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Substitute Supplies	Terms and Conditions and Comments
AL-20 (CR203)	Plum Creek Wastewater Authority Treatment Plant Discharge	85CW480 Last Diligence: 12CW232	East Plum Creek	11/14/1985	11.14 conditional	SAME AS ABOVE	SAME AS ABOVE FOR 85CW480
NW ¼ § 1, T8S, R68W	Confluence of East and West Plum Creek  Up East Plum Creek to Meadows Well Field	85CW480 Last Diligence: 12CW232	East and West Plum Creeks	11/14/1985	11.14 conditional	SAME AS ABOVE	SAME AS ABOVE FOR 85CW480
<b>12CW296</b>							
Chatfield Reservoir	Castle Rock Surface Diversion No. 1	12CW296 Last Diligence: NA	Plum Creek and East Plum Creek	12/18/2012	15.0 conditional	Effluent from all sources Chatfield Reservoir storage right Consumptive use credits from - High Line Ditch, - Cook Creek Ditch, Hillside Ditch (Noe Ranch) - Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch (Douglas Park) - Ball Ditch water rights	<b>Due diligence deadline: 4/30/2022</b>
Confluence East and West Plum Creek	Castle Pines Diversion Point S-1	12CW296 Last Diligence: NA	East Plum Creek	12/18/2012	2.09 conditional	Consumptive use credits from - Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch (Douglas Park) - Ball Ditch water rights	SAME AS ABOVE FOR 12CW296
Plum Creek Water Reclamation Authority Treatment Plant Discharge	Castle Pines Diversion Point S-1	12CW296 Last Diligence: NA	East Plum Creek	12/18/2012	10.8 conditional	Effluent from all sources	SAME AS ABOVE FOR 12CW296

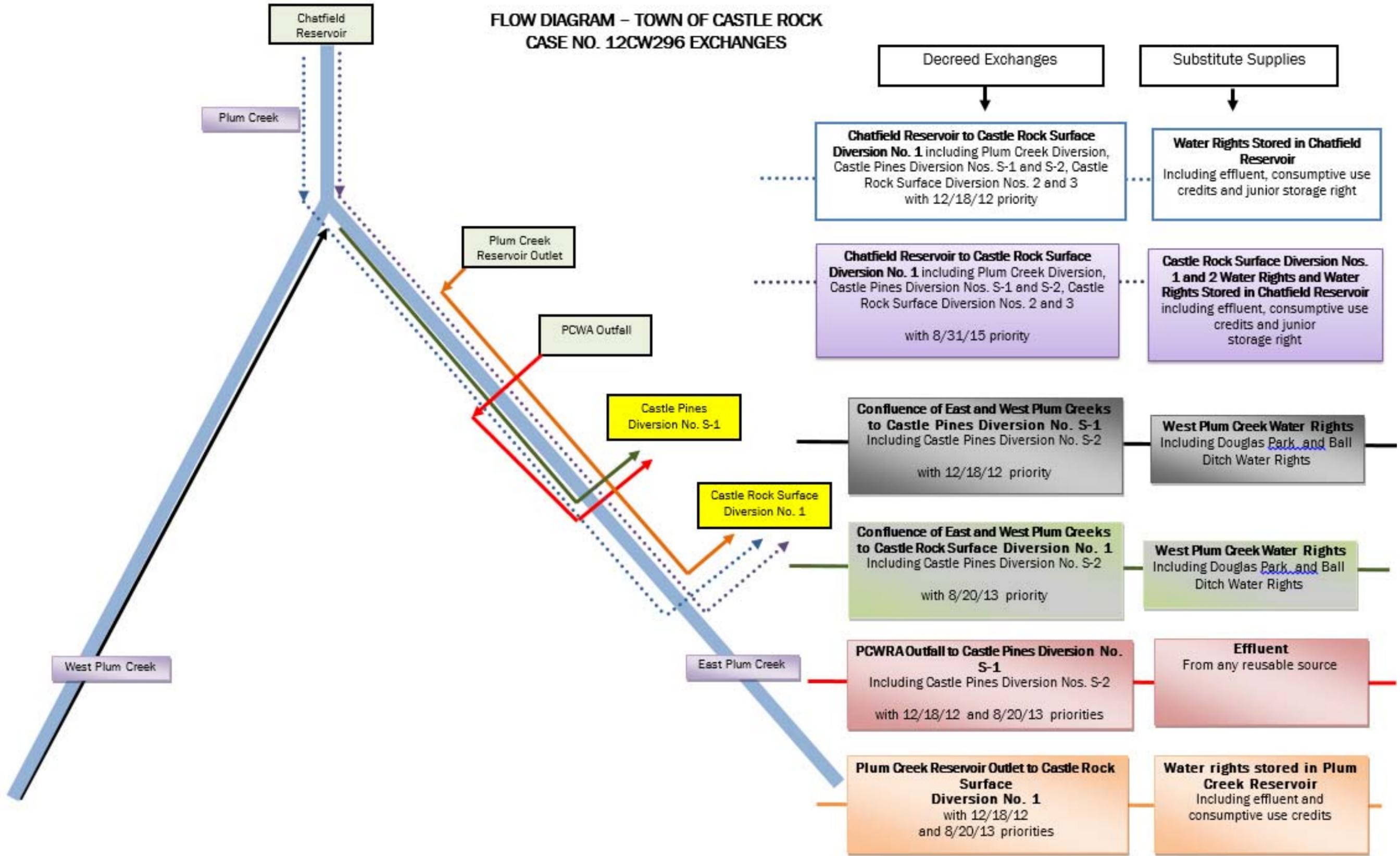
## CASTLE ROCK'S EXCHANGES (Revised July 2016)

Exchange From Point (Downstream Terminus)	Exchange to Point (Upstream Terminus)	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Substitute Supplies	Terms and Conditions and Comments
Plum Creek Reservoir Outlet	Castle Pines Diversion Point S-1	12CW296  Last Diligence: NA	East Plum Creek	12/18/2012	15.0 conditional	Effluent from all sources Consumptive use credits from - High Line Ditch, - Cook Creek Ditch, Hillside Ditch (Noe Ranch) - Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch (Douglas Park) - Ball Ditch water rights	SAME AS ABOVE FOR 12CW296
Confluence East and West Plum Creek	Castle Rock Diversion Point No. 1	12CW296  Last Diligence: NA	East Plum Creek	8/20/2013	2.09 conditional	Consumptive use credits from - Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch (Douglas Park) - Ball Ditch water rights	SAME AS ABOVE FOR 12CW296
Plum Creek Water Reclamation Authority Treatment Plant Discharge	Castle Rock Diversion Point No. 1	12CW296  Last Diligence: NA	East Plum Creek	8/20/2013	10.8 conditional	Effluent from all sources	SAME AS ABOVE FOR 12CW296
Plum Creek Reservoir Outlet	Castle Rock Diversion Point No. 1	12CW296  Last Diligence: NA	East Plum Creek	8/20/2013	15.0 conditional	Effluent from all sources Consumptive use credits from - High Line Ditch, - Cook Creek Ditch, Hillside Ditch (Noe Ranch) - Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch (Douglas Park) - Ball Ditch water rights	SAME AS ABOVE FOR 12CW296

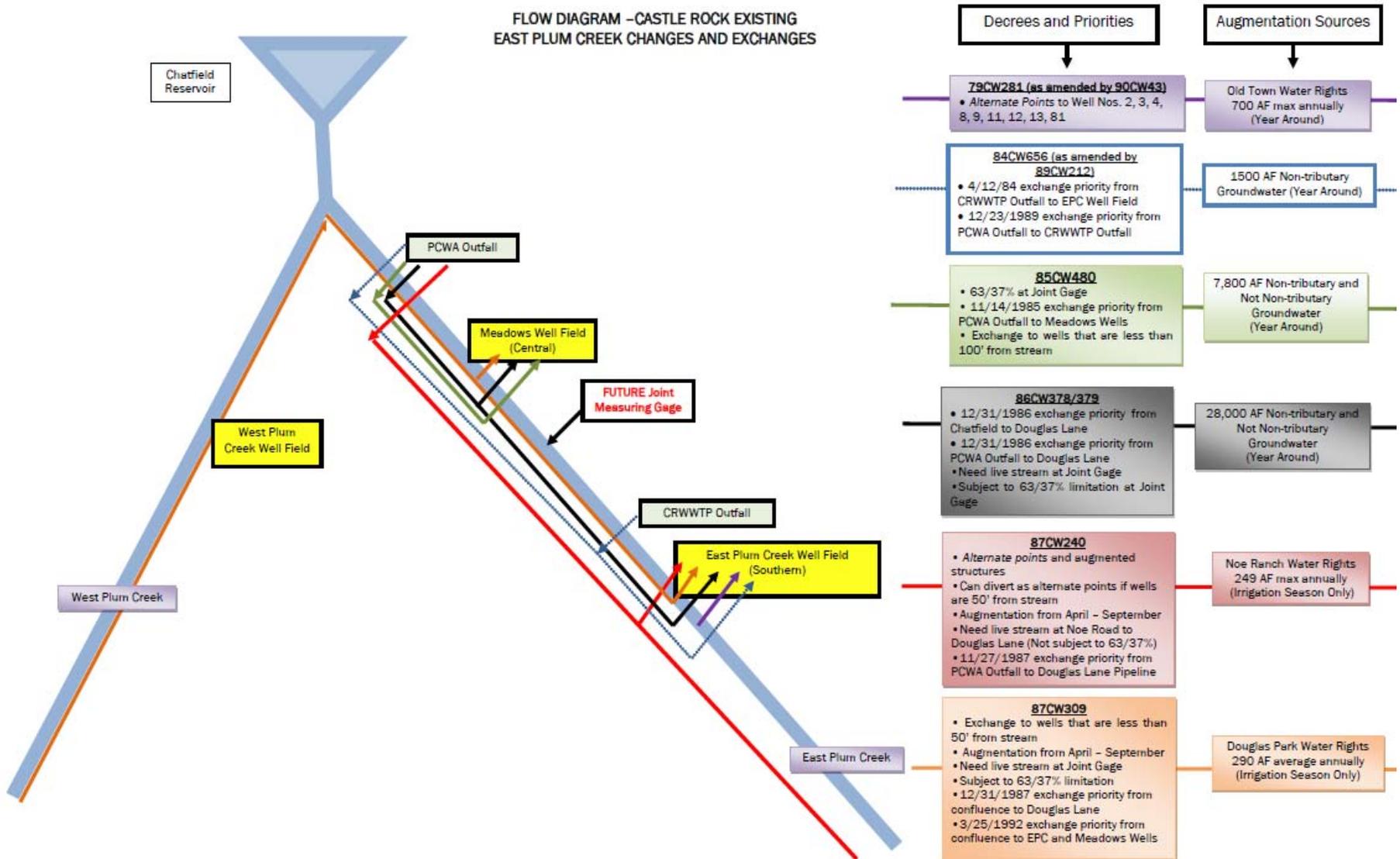
## CASTLE ROCK'S EXCHANGES (Revised July 2016)

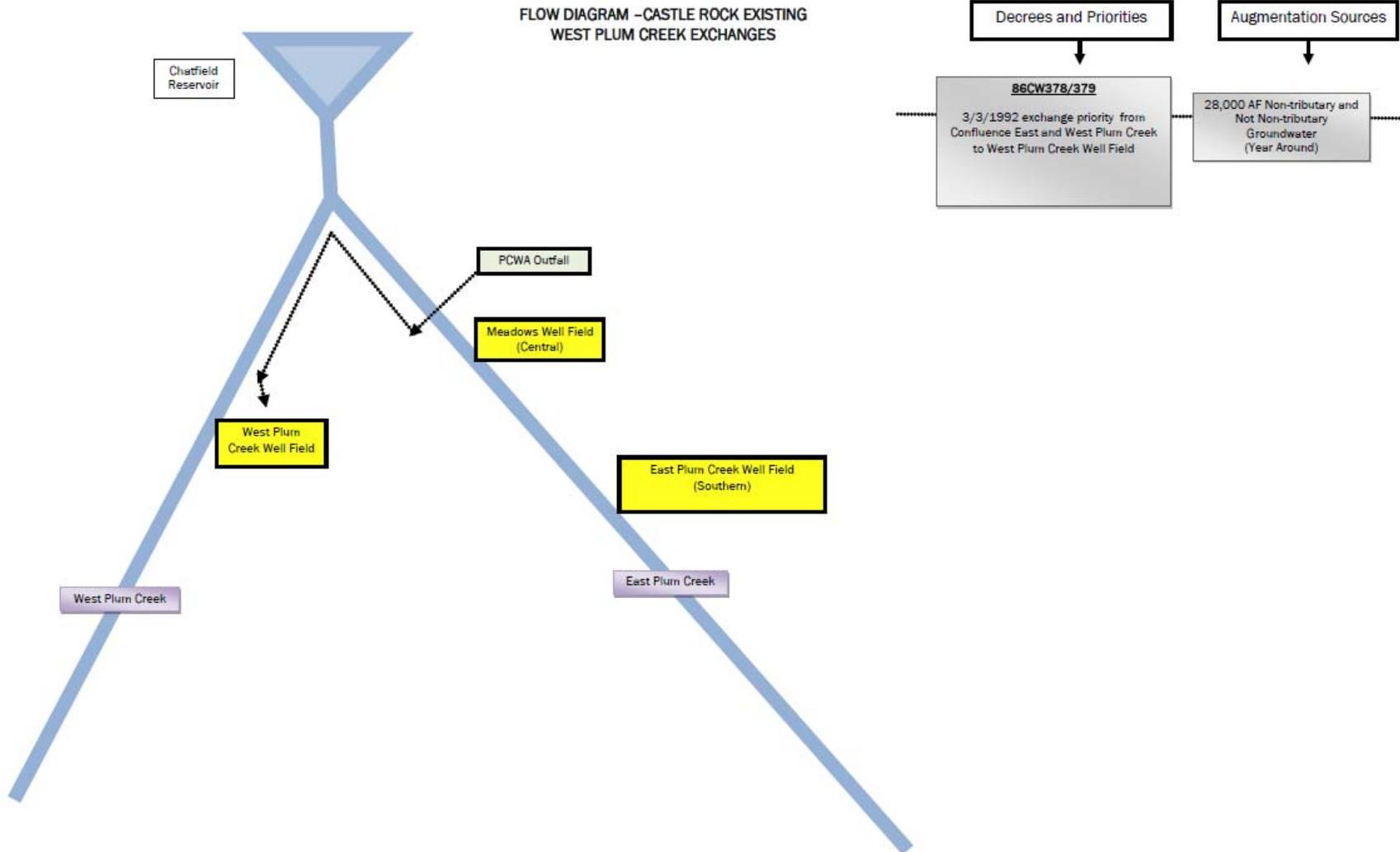
Exchange From Point (Downstream Terminus)	Exchange to Point (Upstream Terminus)	Case Nos.	Source	Appropriation Date	Decreed Amount (cfs)	Substitute Supplies	Terms and Conditions and Comments
Chatfield Reservoir	Castle Rock Surface Diversion No. 1	12CW296  Last Diligence: NA	Plum Creek and East Plum Creek	8/31/2015	15.0 conditional	Effluent from all sources Chatfield Reservoir storage right Consumptive use credits from - High Line Ditch, - Cook Creek Ditch, Hillside Ditch (Noe Ranch) - Benjamin Quick Ditch, John Kinner No. 1 Ditch, John Kinner No. 2 Ditch, Huntsville Ditch (Douglas Park) - Ball Ditch water rights Castle Rock Surface Diversion No. 1 Castle Rock Surface Diversion No. 2	SAME AS ABOVE FOR 12CW296
<b>AUGMENTATION PLAN 87CW309 (ABANDONED)</b>							
Confluence East and West Plum Creek	Douglas Lane Pipeline	87CW309  Last Diligence: 10CW243	East Plum Creek	12/31/1987	2.0 conditional	Benjamin Quick Ditch John Kinner No. 1 Ditch John Kinner No. 2 Ditch Huntsville Ditch (Douglas Park)	This exchange was abandoned in 10CW243.

**FLOW DIAGRAM – TOWN OF CASTLE ROCK  
CASE NO. 12CW296 EXCHANGES**



FLOW DIAGRAM –CASTLE ROCK EXISTING  
 EAST PLUM CREEK CHANGES AND EXCHANGES





## **Appendix B – Castle Rock Water’s Denver Basin Groundwater Rights**

<b>Average Annual Yield in Acre-Feet</b>								
<b>WATER RIGHT OR SUBDIVISION NAME</b>	<b>CASE NUMBER(S)</b>	<b>LOWER DAWSON NON-TRIB</b>	<b>LOWER DAWSON NOT NON-TRIB</b>	<b>UPPER DAWSON NOT NON-TRIB</b>	<b>DENVER NON-TRIB</b>	<b>DENVER NOT NON-TRIB</b>	<b>ARAPAHOE NON-TRIB</b>	<b>LARAMIE FOX HILLS NON-TRIB</b>
Brookwood	96CW123	3.2	0	3.5	39.3	0	34.5	18.9
Burt	2001CW152	9.1	0	0	0	18.3	17.9	8.4
Cambridge Heights	03CW021	0.7	0	0.6	2.6	0	2.6	1.3
Canyons South	81CW417 & 84CW386	1224	0	0	1189	0	2960	1580
Castle Oaks (Douglas County)	94CW011	0	0	0	61	0	54	31
Castle Oaks & Tanager Investments	79CW365	1,002	0	0	1,251	0	1,105	691.5
Castle Pines (Town portion)	79CW270, 85CW468 thru 85CW471	0	78	0	0	103	241	82
Castle Pines Commercial	85CW473 thru 85CW476	0	32	0	0	124	130	63
Castle Ridge	96CW198	9	0	0	35	0	36	16
Castle Rock Downtown Area	79CW279	573	0	0	310	0	657	0
Castle Rock Marine	85CW475	0	0	0	0	0	130	0
Cedar Hill Cemetery (Douglas County)	99CW010	0	0	0	0	12	10	5
Church of the Rock	95CW287	0	0	0	0	41.8	31.7	13.4
Colorado Department of Transportation	95CW34	22	0	0	114	0	88	44
Covenant	06CW210	8.3	1.3	0	33.5	0	22.7	10.6
Demis	2006CW094	0	0	0	1	0	0.8	0.3
<b>WATER RIGHT OR SUBDIVISION NAME</b>	<b>CASE NUMBER(S)</b>	<b>LOWER DAWSON NON-TRIB</b>	<b>LOWER DAWSON NOT</b>	<b>UPPER DAWSON NOT</b>	<b>DENVER NON-TRIB</b>	<b>DENVER NOT NON-TRIB</b>	<b>ARAPAHOE NON-TRIB</b>	<b>LARAMIE FOX HILLS</b>

			NON-TRIB	NON-TRIB				NON-TRIB
Ditmars (Crystal Valley)	83CW252(A) & (B)	146	0	0	615	115	879	349
EDI (Plum Creek)	85CW197, 85CW367 & 85CW388	103	0	0	61	281	345	154
Enderud (Founders Village)	79CW364	159	0	0	155	0	196	96
Epiphany	2007CW027	0	0	0	4.2	0	2.9	1.2
Fletcher-Birney (Oaks)	82CW304, 82CW306 & 84CW281	77	0	0	71	0	119	33
Glen Scott (Woodlands)	85CW260 & 261, 86CW29	207	0	0	167	0	202	115
Graham	96CW162	0	0	0	0	3	2	1
Heckendorf (Crystal Crossing)	84CW173	96	0	0	0	101	102	22
Home Depot (Cooper Hook)	01CW072	0	3	0	0	22	33	11
Implied Consent Area	97CW168	61	0	0	945	176	317	473
Lanterns	84CW252	149	0	0	225	0	292	95
Lenz (pt. Crystal Valley/pt. County)	99CW111	0	0	0	20	0	24	9
Lincoln Meadows & Wolfensberger	84CW194 thru 84CW197	71	1,486	0	0	2,990	1,966	915
Maher Ranch	99CW146	5	0	0	15	0	13	7
Maher Ranch	99CW195	0	18	0	0	23	25	12
Maher Ranch (incl. pt. Diamond Ridge)	84CW109, 110, 112, 113 & 114	116	22	0	178	38	220	114
Maher Ranch/Diamond Ridge	99CW039	0	144	0	0	187	208	101
Main Place	01CW058	0	0	0	0	6	6	2
Memmen-Young (Homestead Village)	85CW266 & 267	88	0	0	83	0	109	50
<b>WATER RIGHT OR SUBDIVISION NAME</b>	<b>CASE NUMBER(S)</b>	<b>LOWER DAWSON NON-TRIB</b>	<b>LOWER DAWSON NOT</b>	<b>UPPER DAWSON NOT</b>	<b>DENVER NON-TRIB</b>	<b>DENVER NOT NON-TRIB</b>	<b>ARAPAHOE NON-TRIB</b>	<b>LARAMIE FOX HILLS</b>

TOWN OF CASTLE ROCK  
WATER RESOURCES STRATEGIC MASTER PLAN  
JANUARY 2017

			NON-TRIB	NON-TRIB				NON-TRIB
Metzler Ranch (incl. Milestone/DCJC)	85CW274 & 275, 86CW28	80	272	0	79	268	372	206
Mikelson (Founders Village)	80CW284	514	0	0	545	0	701	265
Mikelson (Founders Village)	95CW182	3	0	0	11	0	11	5
MSP (Westfield Trade Center)	86CW072	70	0	0	0	143	134	70
Plum Creek Ridge	04CW042	0	0	0	0	0	1.9	6.1
Rampart Ventures (Castle Highlands)	86CW047	22	11	0	0	79	56	25
Rangeview Ranch (Heritage Farm)	86CW377	332	0	0	196	0	303	209
Rice	96CW147	0	1.7	0	0	3.6	2.4	1.2
Schaap	2010CW113	4.2	0	0	0	11.1	9.5	4.7
Scott	98CW375	120	28	0	222	47	204	117
Sellers Creek	98CW298	53.1	0	64	423.9	0	383.7	158.2
Sir Thomas (Hazen Moore)	98CW370	0	18	0	0	28	22	12
Steyn	2010CW114	1.2	0	0	0	3	0	1.4
Techtrack (Dawson Ridge) <sup>1</sup>	W-9496-78, 80CW365 & 83CW356	0	0	0	570	0	1,200	300
U.S. Homes (Red Hawk)	94CW275 & 95CW16	0	178	0	0	356	253	123
Weaver (Founders/Castle Oaks)	85CW262 & 263	236	0	0	250	0	390	202
Zemp/Clingman	2001CW021	12.6	25.6	0	21.1	42.9	48.7	25.4
<b>TOTALS</b>		<b>5,577.5</b>	<b>2,318.6</b>	<b>68.1</b>	<b>7,893.3</b>	<b>5,222.7</b>	<b>14,674.5</b>	<b>6,856.6</b>
<b>GRAND TOTAL</b>							<b>42,611.3<sup>1</sup></b>	

<sup>1</sup>Deed does not itemize which water rights were transferred to the Town. Town only owns 127.97 AF of Denver Basin groundwater under this development.

## Appendix C – Source Water Protection

Identified Risk	Protection Measures/Best Management Practices
Construction	Contractors must acquire a permit, submit construction plans for approval, and comply with periodic inspection and testing regulations in an effort to protect valuable land and water resources. Specific regulations are outlined in municipal code regarding source water protection measures ( <i>4.02 Watershed Protection District, 4.03 Illicit Discharge and Connection, Chapter 13 General Provisions</i> ) as well as <i>Landscape and Irrigation Performance Standards and Criteria Manual</i> and DESC/GESC Manual (Drainage and Grading, Erosion Sediment Control requirements). These regulations apply to public and private construction and also take into consideration state and federal mandates.
Development	Developers must acquire a permit, submit construction plans for approval, and comply with periodic inspection and testing regulations in an effort to protect valuable land and water resources. Specific regulations are outlined in municipal code regarding source water protection measures ( <i>4.02 Watershed Protection District, 4.03 Illicit Discharge and Connection</i> ) as well as <i>Landscape and Irrigation Performance Standards and Criteria Manual</i> and <i>DESC/GESC Manual</i> (Drainage and Grading, Erosion Sediment Control requirements). These regulations take into consideration state and federal mandates.
Landscaping	Industry professionals, including designers, installers and maintenance contractors performing commercial landscape and/or irrigation work are required to gain certification through the Town and adhere to the <i>Landscape and Irrigation Performance Standards and Criteria Manual</i> and <i>DESC/GESC Manual</i> (Drainage and Grading, Erosion Sediment Control requirements). Residents must follow municipal code ( <i>Chapter 13, General Provisions</i> ) and landscaping code which addresses erosion and permeable area, as well as strict water efficiency requirements.
Natural Disasters (Flood, Fire, Drought)	Natural disaster are addressed through an Emergency Response Plan and through coordination with local emergency response agencies. In addition, Castle Rock Water is a member agency of CoWARN. Exercises are conducted periodically and include table-top activities, walk-through's and practice drills. Coordination with outside agencies such as local law enforcement and fire department are included with the exercises. Additionally, security measure in place include emergency backup power for all water treatment plants and pump stations, remote operated isolation valves on

Identified Risk	Protection Measures/Best Management Practices
	select water storage tanks and remote SCADA monitoring and control.
Pet Waste	In Municipal code <i>4.03.020 Definitions</i> , animal waste is defined as a pollutant and <i>4.03.090 Discharge prohibitions</i> states that no person shall throw, drain or otherwise discharge, cause or allow others under his or her control to throw, drain or otherwise discharge into the Municipal Separate Storm Sewer System any pollutants or waters containing pollutants, other than stormwater.
Roads/Deicing Practices	Public Works maintains the roads for snow and ice removal with assistance from the Utilities Department. A granular magnesium chloride product is mixed with other salts to minimize hazardous chemicals put into the waterways. A liquid magnesium chloride product is used for extreme roadway conditions. Town's Municipal Code under <i>10.10 Snow Routes</i> outlines street priorities, snow plow routes and resident regulations regarding parking in streets and clearing sidewalks. Snow plow routes are mapped online. Through outreach, residents are encouraged to place shoveled snow on lawn or permeable areas.
Soil Erosion	The Town of Castle Rock has two permitting programs for erosion and sediment control on public and private construction projects within the limits of the Town that have been adopted to promote environmentally-sound construction practices. The <i>Drainage, Erosion and Sediment Control (DESC)</i> program covers residential construction on individual lots. The <i>Grading, Erosion and Sediment Control (GESC)</i> program covers all other development and construction projects. A Stormwater Hotline (720-733-2235) is available for residents to report erosion issues.
Solid Wastes	Solid wastes are specifically identified in municipal code ( <i>4.03 Illicit Discharge and Connection</i> ) that all activities including construction must reduce the discharge of pollutants directly or indirectly to stormwater and additionally, ( <i>4.03.100 - Industrial or construction activity discharges</i> ) construction shall apply for and comply with all provisions of code and permits in the disposal of solid wastes.
Storage Tanks	The Town of Castle Rock has 14 active finished water storage tanks that are constructed of reinforced concrete and sealed for water quality protection. These tanks are spread throughout the distribution system and serve different pressure zones. Each tank is inspected by a certified operator at least monthly. Operators inspect each tank's security devices, the outside/appearance of the tank, the water quality in the tank and also all water quality protection devices. Data is recorded in Cartegraph asset management program. Additionally, tanks are drained and cleaned with a

Identified Risk	Protection Measures/Best Management Practices
	structural inspection by a qualified engineer every three years. Certain tanks are taken offline each winter due to low water demand allowing for increased turnover in tanks that remain in service, improved water quality and tank maintenance activities.
Stormwater Runoff	Castle Rock Utilities manages stormwater runoff, drainage-ways and detention ponds including the operation, upgrades, maintenance and improvements of the Town’s storm drainage facilities. A stormwater hotline is provided for residents to report problems and illicit discharge. Per the Town’s <i>Stormwater Management Facility Operation and Maintenance (O&amp;M) Standard Guidelines</i> , property owners are responsible for the maintenance of stormwater management facilities on their property incorporating all drainage facilities, including inlets, pipes, culverts, channels, ditches, hydraulic structures and detention basins located unless modified by specific agreement. The utility maintains runoff control plans for all of its water and wastewater facilities. Castle Rock Water also participates in the county household chemical roundup event by hosting the event at the Utilities Headquarters and through outreach, educates customers on potential contaminants, thus helping to reduce the potential for contaminants to enter either storm sewers or sanitary sewers.
Wastewater Treatment Plants	To treat the Town’s wastewater, the Town of Castle Rock is a member of the Plum Creek Water Reclamation Authority (PCWRA) and contracts with the Pinery Water and Wastewater District (Pinery). The Town owns 71% of the capacity at PCWRA and actively participates in its management through the board of directors. The Town contracts wastewater services through an intergovernmental agreement with the Pinery for the portion of the Town in Cobblestone Ranch that flows to the Pinery. These facilities operate under permits issued by the Colorado Department of Public Health and Environment, and maintain compliance with water quality standards.

## Appendix D – 2016 Survey Results

### EXECUTIVE SUMMARY

The Water Resources Strategic Master Plan, originally developed in 2006, was updated again in late 2016 and an opportunity for community input was provided. Over a dozen presentations to civic and community organizations were conducted as well as a press release, web page with link to the plan and brochures available for additional information. Residents were requested to fill out a survey with their opinions on the plan. The survey was available from mid-September through November 30, 2016. There were 69 respondents to the survey. **Castle Rock Water greatly appreciates the time taken and opinions from the residents regarding securing water for the future.**

The respondents tended to support all of the efforts outlined in the plan. The respondents were generally aware of the water issues facing Castle Rock. Respondents felt moderate conservation efforts were valid. There was strong support for reuse both in terms of acceptance and that is it the best option for supply. The attitude of the respondents regarding how Castle Rock Water is managing water was positive, but not strong. An open-ended comment section was provided and many respondents expressed concern about growth and offered suggestions on how to better manage water supply, all of which are currently in place.

### SUMMARY OF SURVEY RESULTS

1. Awareness: 75.3 percent are somewhat or very aware of water issues facing the future of Castle Rock and the surrounding areas.
2. Conservation: 45 percent feel moderate conservation efforts should be taken, with 16 percent believing minimal efforts and 16 percent requesting more extensive efforts should be taken.
3. Import: 79 percent support purchasing and importing renewable water to supplement the Town's water resources.
4. Reuse: 65.2 percent somewhat or strongly support reuse with only 3 percent strongly opposing.
5. Partnerships: 52.1 percent are familiar with Castle Rock Water partnerships.
6. Storage: 72.5 percent somewhat or strongly support acquiring additional storage.
7. Financial plan: 40.5 percent are somewhat or strongly confident in the financial plan with 22 percent neutral and 31.9 percent not very or not at all confident.
8. Best option: Water reuse/recycling was identified as the best option for future water with 36.2 percent of the responses. Storing water was the second preferred option at 30.4 percent.
9. Long-term water: 53.5 percent of respondents are somewhat or very concerned about water supply but felt Castle Rock Water is on the right path.
10. Water Resources plan: 50.7 percent were somewhat or very confident in the plan that Castle Rock Water has developed.

11. Residency: 44.9 percent of the respondents have lived in Castle Rock greater than 10 years and 34.8 percent have lived less than four years.

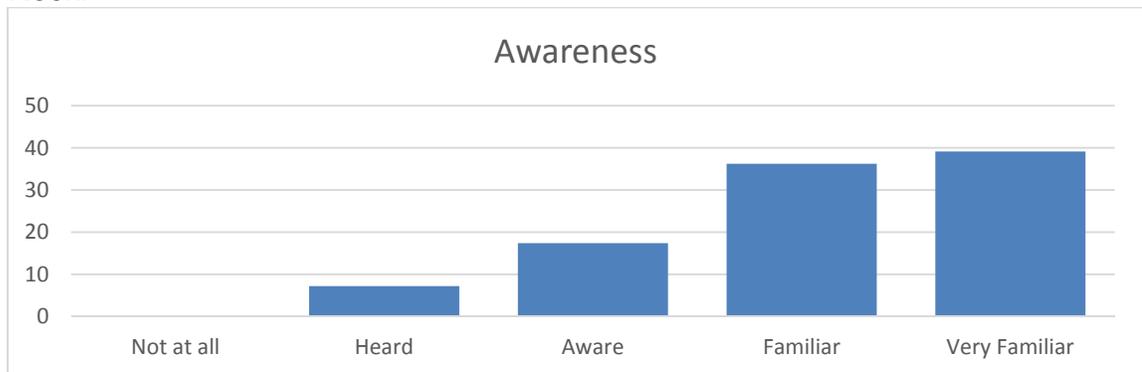
### **FEEDBACK ON RESPONDENTS' COMMENTS**

- Analysis of and adjustments for commercial properties, HOA-managed medians and Town parks and open spaces are currently being put in place to minimize excessive irrigation and time violations. (The water department cringes at irrigation water flowing down the street too!)
- While population growth does require additional supply, acquiring new sources of supply and building infrastructure are needed regardless of growth. The addition of new developments help spread the costs between current and future residents, keeping rates from rising excessively.
- Water rates in Castle Rock will continue to slowly rise, as will those in surrounding communities, due to the shared need for securing renewable supplies and building infrastructure.
- Castle Rock water rates are mid-range compared to regional water providers. A regional rate comparison is available online at [CRgov.com/waterrates](http://CRgov.com/waterrates).
- Castle Rock Water has partnered with other South Metro communities to leverage resources and costs to import water, build transport pipelines and develop storage.
- Castle Rock Water plans to institute reused water for potable use in the near future, accounting for a third of water the Town's supply by 2050. Treatment for reuse water is managed at a higher water quality standard.
- To increase conservation measures, Castle Rock Water is working with home builders to incorporate indoor water efficiency fixtures and low-water use landscaping options. Smaller lots is one of those measures.
- Developers do pay a substantial system development fee (tap fee, approx. \$23,000) for infrastructure and future supply.
- An annual rates and fees study is conducted to analyze future growth and costs and adjust rates for residential, commercial and development, accordingly.
- Castle Rock Water is entirely rate based and does not acquire additional funds through taxes and mill levies as some other South Metro communities do.
- A tiered budget for water consumption and regulations for watering every third day and at cooler parts of the day has been in place more than a decade, resulting in conservation in excess of 20 percent. Castle Rock Water has been acknowledged in the State Water Plan for the success of these aggressive efforts.
- Currently, imported water is coming from northern sources such as Denver, Aurora and Weld County—not the Western Slope. Treatment of these supplies is part of the imported water parameters.
- The scope of Chatfield Reservoir has been expanded for storage capacity, but its primary purpose for flood mitigation is still in place.

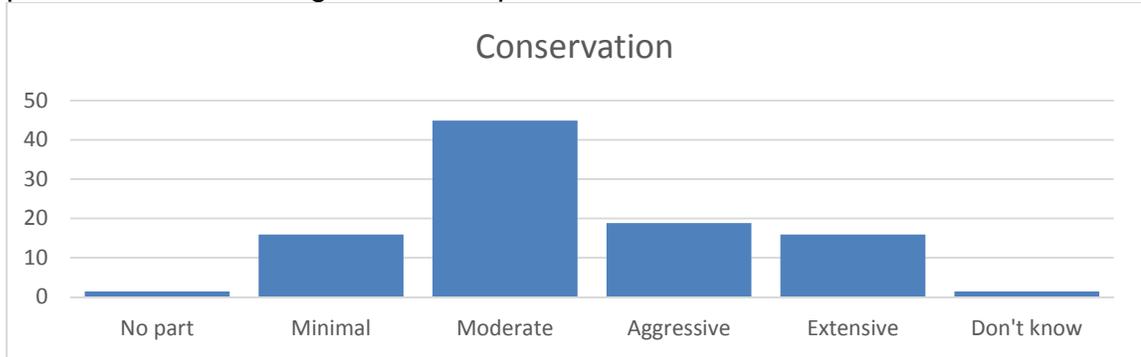
- Small town atmosphere is part of the Town's plan. Having vegetated open space adds to aesthetics and is also a necessity in stormwater management.
- Financial analysis is conducted annually to account for the current 20,000 customers, growth at various rates, management of fixed costs with variable customer rates, etc.
- Ninety percent of Castle Rock Water's costs are fixed, yet we have a variable rate for customers.
- Several programs are in place to assist customers with landscaping water efficiency including rebates for turf removal, irrigation workshops and a recommended plant list for low-water use landscaping.
- Castle Rock Water continues to go beyond water quality regulations with mandatory and voluntary testing and reporting conducted daily. Our annual water quality report is available online at [CRgov.com/waterquality](http://CRgov.com/waterquality).
- As we are depleting our aquifer at 5 feet per day (down from 30 feet/day in the 1990s), we are looking at alternative sources of supply. Drilling deeper (in excess of 2000 feet) and pumping it out (electricity is our highest cost center) is more expensive than some alternative options. We are beginning to pump imported treated water back into the aquifer for storage.
- Castle Rock Water does have water monitors patrolling for irrigation violations, but their intent is to educate and not necessarily fine customers. It remains the residents' responsibility to adhere to regulations.

## GRAPHICAL RESULTS

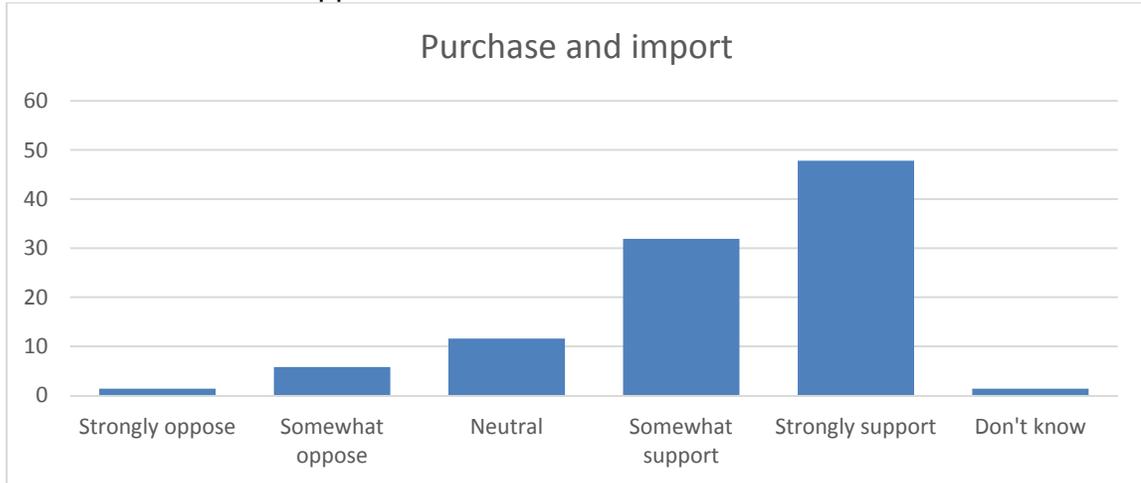
1. Rate your awareness level regarding the water issues facing the future of Castle Rock.



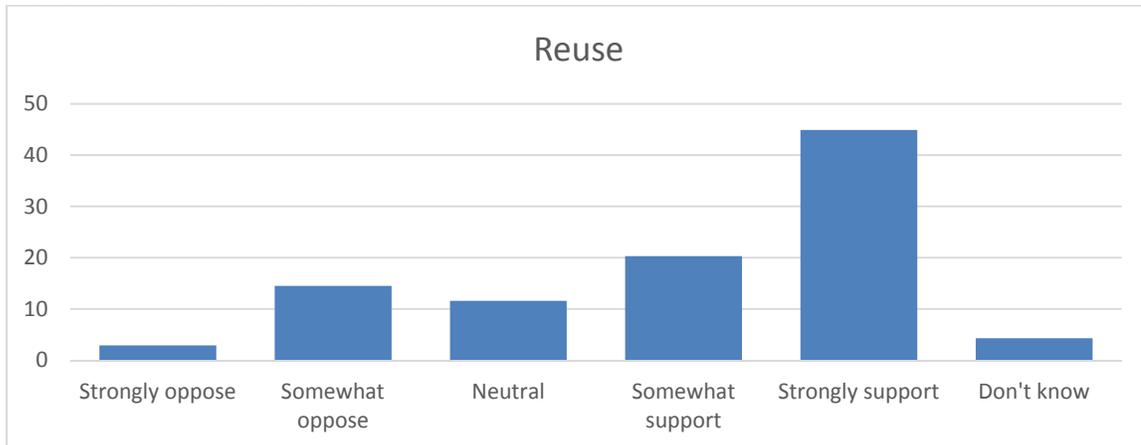
2. To what extent do you believe these additional conservation efforts should be a part of the Town's long-term water plan?



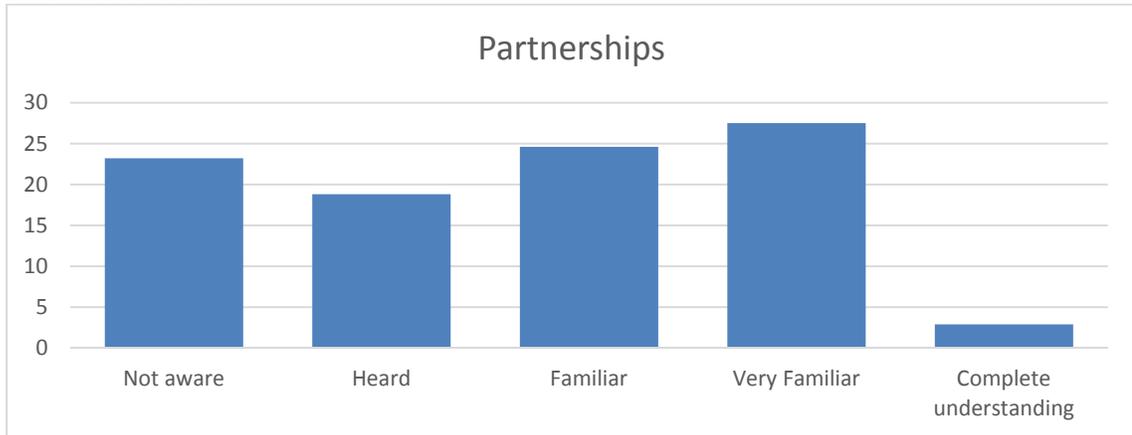
3. To what extent do you support or oppose the Town purchasing and importing renewable water to supplement the Town's water resources?



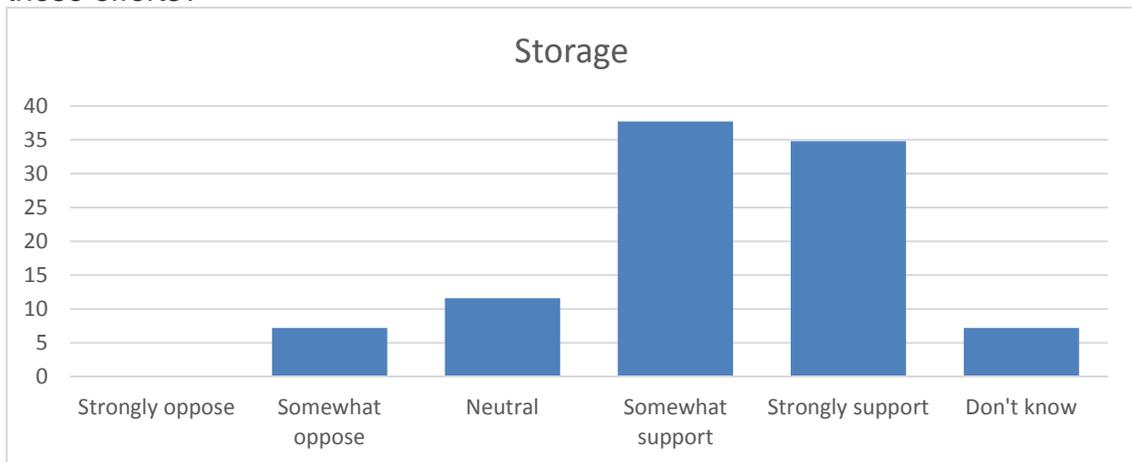
4. To what extent do you support or oppose the practice of reusing/recycling purified water for residential use?



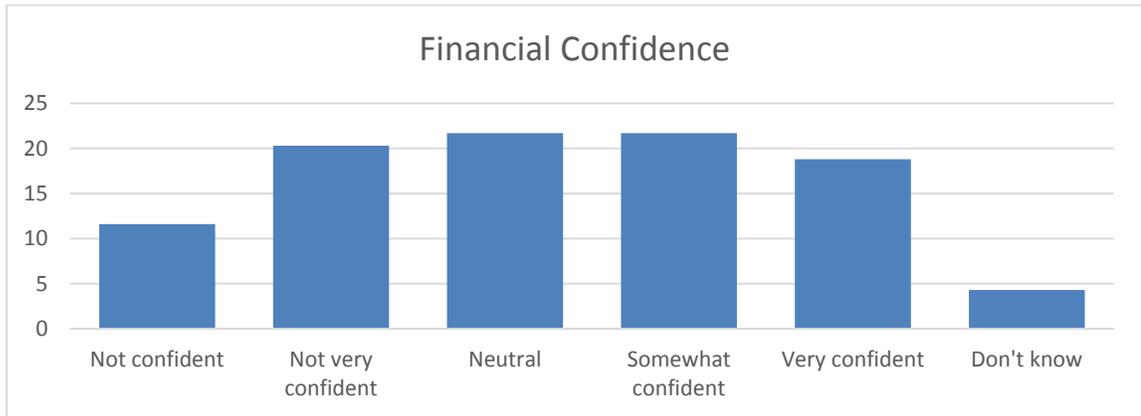
5. How familiar are you with the work Castle Rock Water is doing with various partners, such as others towns and regional associations in an effort to share costs and resources?



6. The plan is to acquire additional storage. How strongly do you support or oppose these efforts?



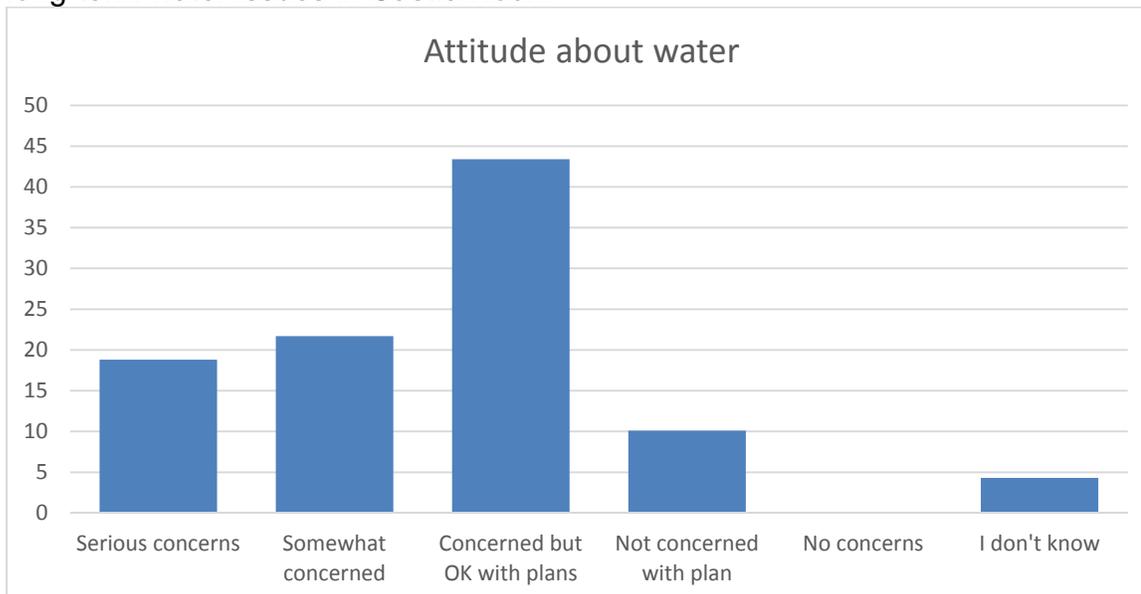
7. How confident are you that Castle Rock Water is looking at the best financially feasible water supply options?



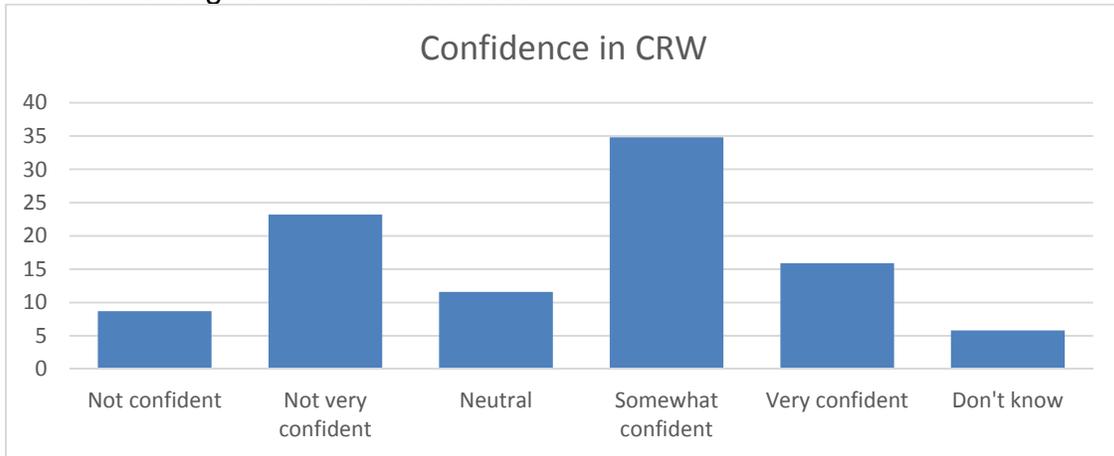
8. Which ONE of the following you believe is the BEST option to ensure water for the future.



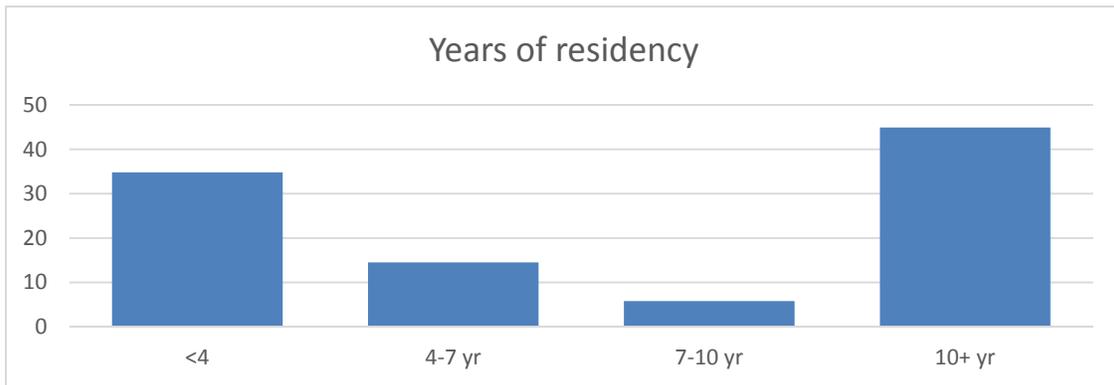
9. Which one of the following statements best describes your current feelings about long-term water issues in Castle Rock?



10. How confident are you in the plan that Castle Rock Water has to secure the Town's long-term water resources?



11. How long have you lived in Castle Rock?



## **Appendix E – Informational Brochure**

# Your opinion matters!

Take the survey at  
[CRgov.com/WaterMasterPlan](http://CRgov.com/WaterMasterPlan)

It is important to us for our customers to:

- understand**
- endorse**
- invest**

The 2016 Water Resources Strategic Master Plan applied extensive financial modeling to explore several future scenarios.

A rates and fees study is conducted annually, of which this long-term plan affects. With the expected growth providing economies of scale, Castle Rock Water is working to ensure rates and fees are balanced among current and future customers.



Give us your opinion at  
[CRgov.com/WaterMasterPlan](http://CRgov.com/WaterMasterPlan)

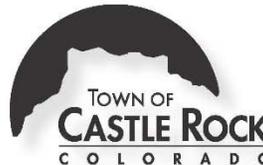
**CASTLE ROCK**  
*Water*  
Securing our future drop by drop

**Castle Rock Water**  
175 Kellogg Court  
Castle Rock, CO 80109

**Contact us:**  
720-733-6000  
[water@CRgov.com](mailto:water@CRgov.com)

**Visit us online:**  
[CRgov.com/Water](http://CRgov.com/Water)

**Mission:**  
We provide our community with exceptional service that protects public health and balances social, environmental and fiscal responsibilities in a sustainable manner.



# It's your water

## Tell us what you think



Your opinion is important!  
[CRgov.com/WaterMasterPlan](http://CRgov.com/WaterMasterPlan)

# Securing water for the future

## How is Castle Rock Water planning the Town's water future?

The Water Resources Strategic Master Plan outlines how Castle Rock Water is ensuring the community's water future.

Right now, a large portion of the Town's water is nonrenewable groundwater that comes from 1,000 or more feet below ground.

In the future, groundwater will become more difficult and expensive to extract. For the past 10 years, Castle Rock Water has been working on a plan to secure a long-term renewable water supply.

The draft 2016 Water Resources Strategic Master Plan updates and outlines the huge strides Castle Rock Water has made toward ensuring the Town's water future and details ongoing program plans.



Here's a sneak peek at what the plan entails:

### Pump

Sources including the water in East Plum Creek can be reused or recycled. The creek contains treated water discharged from the wastewater treatment plant. Castle Rock Water plans to recapture water from the creek, purify it at the Plum Creek Water Purification Facility, and then redistribute to homes.

Reusing water could meet approximately 35 percent of projected future demands.



### Store

The plan outlines storage programs for reservoirs and aquifers. Current storage space includes both the Rueter-Hess and Chatfield reservoirs.

Additional storage would entail pumping water back into the underground aquifers within the Denver Basin.



### Partner

Continue to develop partnerships with regional entities to share costs and resources thus reducing the cost impact to customers.

The Town has been a member of the South Metro Water Supply Authority since 2004 which established the WISE water project.

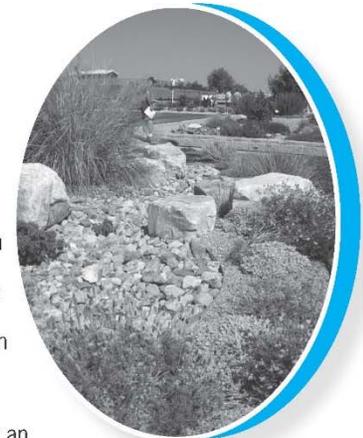
The group works together to develop key pieces of infrastructure, purchase and import water from northern sources and cost-share in projects.

### Conserve

Castle Rock residents have embraced conservation.

The plan details additional conservation measures that could help the Town realize a per capita demand of 100 gallons per person per day.

This would account for an additional savings of 18 percent in water use and would essentially act as a new water source. Additional conservation measures would require less water to be purchased in the future.



## **Appendix F – Resolution**

RESOLUTION NO. 2017-012

A RESOLUTION ADOPTING THE  
2016 WATER RESOURCES STRATEGIC MASTER PLAN

WHEREAS, the Town of Castle Rock (Town) adopted the 2006 Water Resources Strategic Master Plan in 2006, and subsequently updated in 2010; and

WHEREAS, Castle Rock Water's goal is to provide a sustainable, reliable and renewable water supply, now and into the future, for all of Castle Rock's citizens and businesses, when and where they want it, and at prices that remain reasonable, viable and competitive with surrounding communities; and

WHEREAS, Castle Rock Water has updated the Water Resources Strategic Master Plan that lays out how the Town is going to meet that goal over the next 20-30 years; and

WHEREAS, an extensive outreach program was conducted which included an online community survey, of which various comments voiced by the community are incorporated in this final Plan; and

WHEREAS, the Utilities Commission, recommended support of the Plan; and

WHEREAS, maintaining an updated Strategic Master Plan is a key puzzle piece of Castle Rock's long-term renewable water plan; and

WHEREAS, Castle Rock desires to continue to be a leader in conservation, promote the efficient use of water and reduce long-term water needs; and

WHEREAS, Town Council has reviewed the 2016 Water Resources Strategic Master Plan, and wishes to adopt said Plan by Resolution.

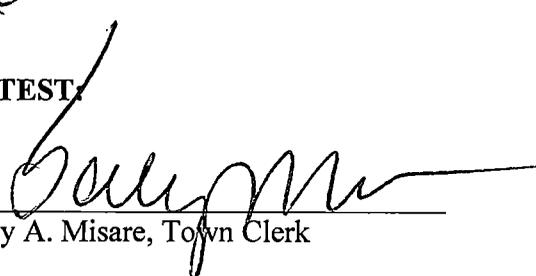
NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COUNCIL OF THE TOWN OF CASTLE ROCK AS FOLLOWS:

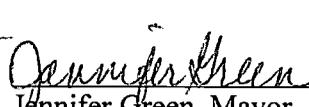
Section 1. Approval. The 2016 Water Resources Strategic Master Plan in the form attached as *Exhibit 1* is hereby approved.

PASSED, APPROVED AND ADOPTED this 17<sup>th</sup> day of January, 2017, by the Town Council of the Town of Castle Rock, Colorado, on first and final reading by a vote of 7 for and 0 against.

ATTEST:

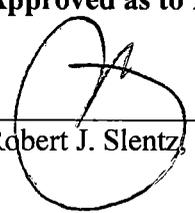
TOWN OF CASTLE ROCK

  
Sally A. Misare, Town Clerk

  
Jennifer Green, Mayor

Approved as to form:

Approved as to content:

  
Robert J. Slentz, Town Attorney

  
Mark Marlowe; Director of Castle Rock Water