EXECUTIVE SUMMARY | ONE

BACKGROUND

The Town of Castle Rock and its residents have recognized the need to develop a sustainable water supply for more than a century. During the Town's 125-year anniversary celebration, documents were uncovered showing that in the 1890s, the Town Council was considering purchasing renewable water rights on the South Platte River. Many of the Town's water policies developed in the decades since have helped to extend the life of the aquifers which is the source of our groundwater. The community has always recognized that we live in a high mountain desert that only receives around 15 inches of moisture per year. As a result, we have become conservation-minded, and Castle Rock has one of the lowest per capita uses of water in Colorado (130 gallons per person per day).

Castle Rock is nearly 100 percent dependent on deep well water from the Denver Basin Aquifers. We are fortunate to be located over the bulls-eye of these aquifers, which produce a very high-quality supply of drinking water. However, our aquifers are nonrenewable, meaning they are not replenished from sources such as snow melt or rain water. In order to develop a sustainable water supply to meet the community's future needs, the Town completed a community-endorsed Water Resources Strategic Master Plan in 2006. The plan better defined actual programs, timelines and costs for developing Castle Rock's renewable water supply. Its overarching goals were to (1) work with our regional partners to establish a renewable and sustainable water supply that accounts for 75 percent of the Town's annual water demand, (2) continue to maintain and develop the Town's groundwater supply to meet the demands of the continuing growth in the short term and to provide reliability in the long term, and (3) develop a financing plan to generate the capital funds required for transitioning to a sustainable water supply. The 75 percent renewable water goal was determined to be achievable, and it provided enough renewable water to meet the Town's needs and extend the life of the Town's aquifers for decades. In addition, it takes advantage of the investment in the Town's current groundwater system, to continue to develop groundwater resources, as well as provide some level of drought protection.

Over the last few years, certain components of the master plan have been achieved. The most notable is the Town's purchase of 8,000 acre-feet of water storage space in Ruerter-Hess Reservoir, which was completed March 2012. (A typical family uses one-half an acre-foot of water per year.) This is one of our Legacy Water Projects because of its role in securing long-term water solutions for future generations. Ruerter-Hess gives the Town capability to capture
and store water when it is available in spring and then use it in the summer, when demand peaks.

The Plum Creek Water Purification Facility, under construction in Castle Rock, is another Legacy project. It will allow the Town to capture and treat all its water rights in the Plum Creek Basin, including surface water rights, lawn irrigation return flows and treated return flows. In 2013, when the facility begins operation, these water rights will account for approximately 48 percent of the Town’s water supply (19 percent renewable Plum Creek Surface Rights and 29 percent return flows). At build-out, it is estimated that the facility will account for approximately 42 percent of the Town’s water supply.

Some residents are of the opinion that Castle Rock is "running out of water" because of community growth and, therefore, Castle Rock's water problem can be addressed by stopping growth. This view, while understandable, is not accurate. The problem is not that Castle Rock is "running out of water;" it is that our water comes from nonrenewable groundwater. Eventually, over time, we will deplete that source to the extent that it is unsustainable and uneconomical. Increased demand for water through community growth contributes to that issue, but it does not cause it. The problem remains whether Castle Rock is a community of 50,000 residents or a community of 100,000 residents -- we still will need renewable sources of water for our community. In the 1990s, the Town implemented a policy that requires developers to provide two times the amount of groundwater rights than most other communities in the Front Range. In addition, community growth helps to pay for long-term water solutions in two ways: (1) new development pays fees to cover additional capital costs for renewable water resulting from growth, and (2) community growth creates a larger customer base to pay for ongoing renewable water costs. Because of high fixed costs associated with obtaining and utilizing renewable water sources, there are economies of scale created by planning to serve 100,000 residents rather than 50,000 residents. Castle Rock water rates would end up even higher if all of the costs for securing renewable water sources were borne by only today's 50,000 residents. This is the same reason why it is advantageous for Castle Rock to partner with other south metro area water providers on securing renewable water. The combination of economies of scale and spreading costs among a greater number of participants over an extended period of time results in lower costs for all.

A common question that comes up during public presentations on the Town’s long-term water program is, “What if we just continued to use groundwater?” This was discussed with the community and Council in 2006, during the development of the Water Resources Strategic Master Plan. Staff modeled this scenario and found that after developing every well field within the Town’s 35 square miles (80 additional wells and 150 replacement wells), the Town would not be able to meet its peak demands in the summer starting in 2055. Because groundwater nonrenewable, aquifer declines would continue over time and the gap to meet the Town’s water demands would grow. The conclusion was, after investing $250 million in nonrenewable groundwater; the Town would not be able to meet its demands and would have to invest in a renewable water supply.

In 2009, the Town was presented with an opportunity through the South Metro Water Supply Authority to participate in a regional project with South Metro, Aurora Water and Denver Water.
The concept was for Aurora and Denver to make unused return flows and excess mountain water available to South Metro members. The concept evolved into a project known as the Water Infrastructure and Supply Efficiency Partnership. As a WISE agreement neared, the Town decided to initiate an open, competitive process to ensure it was pursuing the best possible solution for its renewable water needs.

Alternative Source of Supply Procurement

In order to compare alternative water projects to WISE, the Town issued a Request for Qualifications to solicit potential providers of alternative sources of water supply. The Town received seven responses, which was eventually short-listed to four to participate in the Request for Proposals phase. The short-listed proposals are (1) Renew Strategies, (2) Stillwater Resources, (3) United Water and Sanitation District and (4) WISE Partnership. The Town has assembled an evaluation team, including consultants with expertise in water law (Lyons Gaddis Kahn & Hall), water resources engineering (W.W. Wheeler and Associates ), project delivery (SAIC Energy, Environment & Infrastructure), environmental compliance (States West Water Resources Corp.) and rate and fee analyses (Red Oak Consulting).

The original RFP requested proposals to provide up to 6,000 acre-feet of renewable water. That is the estimated amount of renewable water needed to meet the Town’s goal of providing 75 percent renewable water once we reach our build-out population of 104,000 residents.

Renew and United provided proposals to deliver 6,000 acre-feet of renewable water. Stillwater’s proposal is limited to 4,000 acre-feet, based on well field capacity. The draft agreement for the WISE Partnership provides a maximum of 100,000 acre-feet of water over 10 years, or an annual average of 10,000 acre-feet per year. Of the 10,000 acre-feet per year offered to the South Metro, the Town could acquire as much as 3,525 acre-feet. For the purposes of this analysis, the WISE full-scale project delivers an average of 3,525 acre-feet each year over a 10-year block. It never was the intent of the WISE proposal to be the sole water source for South Metro (and the Town). As listed in the agreement recitals, the WISE agreement is not intended to provide all of the Town’s renewable water needs. The Town would need to combine the WISE water supply with another supply to meet the Town’s future water needs.

Full Scale Options

For cost comparison purposes, it was necessary to get each proposal to a baseline delivery of 6,000 acre-feet per year. The Stillwater and WISE proposals where supplemented with groundwater in future years. It is likely that the Town would choose to develop another renewable water supply in the future instead of supplementing with additional groundwater, but the Town has the right to fully develop its groundwater in the interim. For the purposes of this analysis, the larger scale proposals identified above are referred to as the full-scaled’ projects.
The full-scaled proposals, as expressed in net present value, ranged between $424 million and $671 million. The net present value is the project costs – capital and operation and maintenance – over 38 years, expressed as the total value in 2012 dollars.

**Scaled-Back Options**

To give Council and the community more options to consider a scaled-back project (2,000 acre-feet) was developed and analyzed. The scaled-back option would meet the Town’s needs out to the year 2030, based on current growth rates. Staff analyzed the option in two ways. First, the scaled-back proposals were supplemented with groundwater after 2030 to meet the Town’s demands out to 2050. This approach assumes that the Town will develop no other renewable water. It provides total project costs and monthly rates for a program that meets the Town’s demands with a combination of renewable and nonrenewable water resources out to 2050. The second approach was to provide a total project cost for renewable water only, understanding that, after 2030, the Town would have to develop other water resources. This approach helps compare project costs for renewable water solutions only. In both approaches, the scaled-back proposals result in a total renewable supply of approximately 50 percent by build out (inclusive of the water supplied by the Plum Creek Water Purification Facility).

If a scaled-back option is pursued, the Town will have to develop additional renewable water resources in order to meet the goal of having 75 percent renewable water. The net present value for the scaled-back proposals, with supplemental groundwater, ranged from $390 million to $464 million. For the scaled-back proposals without groundwater (from 2012 to 2030), that ranged from $223 million to $290 million. The biggest advantage to a scaled-back program is that it allows the Town to take a significant step toward addressing Castle Rock’s renewable water goal without placing the entire burden to fund the program on the current generation. Another advantage is that it gives the Town an additional 18 years to purchase and develop additional renewable water supplies. The biggest concern to this approach in not securing a renewable water supply now to meet build out needs is the uncertainty of availability and cost of renewable supplies in the future.

**Hybrid Option**

Staff has identified a hybrid concept that spreads out the costs over several generations but secures a renewable water supply over the next couple of years for future development. That concept involves purchasing a reduced amount of WISE water with our regional partners and acquiring senior water rights in the South Platte River at lower agricultural prices. Those rights would need to be changed in Water Court for municipal uses before the Town would complete the transaction. The Town could leave the water “on the farm” until needed, sometime in the 2030s. The purchase of WISE water would reduce the capital outlay needed to get renewable water flowing to the Town, because that project requires less infrastructure to be constructed and does not involve the purchase of water rights. Purchasing senior water rights and securing a renewable water supply now while putting off the development costs, such as additional infrastructure, until years down the road, provides the Town a larger customer base to fund the program. Staff has developed an example for Council’s information, and it is included in the analyses. The example assumes the Town would subscribe to 1,000 acre-feet of WISE and
2,000 acre-feet of a senior South Platte River water right, to be developed and available to the Town in 2032. Staff developed a capital and operation and maintenance cost schedule for a 3,000 acre-foot hybrid option, based on cost information from the proposals. Staff modeled the Town and customer impacts from this concept in the same manner as the other projects. This conceptual project is estimated to meet Town water demands until the year 2048 and is estimated to have a net present value of $455 million. This concept results in a renewable water supply of approximately 70 percent at build-out.

Each respondent has submitted viable projects capable of meeting the Town's needs. The following section of the Executive Summary is intended to provide a high-level description of each project concept, and legal and costs analyses for each proposal. A more in-depth analysis of each proposal follows in subsequent sections of the report. All supporting reports are included in the appendices.

ASSUMPTIONS AND APPROACH

The following discussion presents common assumptions and approaches used in the comparative analysis for all proposals received.

The financial analysis for each proposal presents the cost impacts to the Town's monthly bills (residential and commercial customers) for the full-scale proposal and for the scaled-back proposal with supplemental groundwater. The monthly bills were also calculated for the hybrid proposal.

A key factor of the scaled-back options is that they address the Town’s water needs through 2030. After 2030, additional water supplies would be required to meet the Town’s demands. The supplemental water could be renewable water or groundwater. In our analysis, groundwater was assumed to meet the needs post 2030. The scaled-back options, with or without supplemental groundwater, have the same monthly charges through 2030. The cost evaluation for the scaled-back options with no supplemental groundwater ends in 2030, and we acknowledge that additional water supplies will be needed at that time. The cost evaluation for the scaled-back options with supplemental groundwater are modeled and are included in the comparison charts. The higher costs in the monthly charges after 2030 reflect these additional costs for additional water supplies.

System Development Fees were also calculated for the proposals; however, the report only contains these fees for the full-scaled option. System Development Fees are the one-time fees that new growth pays to connect to the Town’s water system. Current System Development Fees are based on conceptual descriptions of likely renewable water supply projects, which were based on staff's best engineering judgment. The current fees are based on a concept project that provides almost 6,000 acre-feet of renewable water by build-out. The Town’s RFP requested renewable water projects up to 6,000 acre-feet. United and Renew submitted proposal for 6,000 acre-feet, where Stillwater proposed 4,000 acre-feet, and WISE is assumed
to be 3,525 acre-feet. The only proposals that are comparable to the Town’s System Development Fees are United and Renew. The 2012 System Development Fees calculated for these proposals are about 15 percent higher than the Town’s current fees.

| Current 2012 System Development Fees | $14,355/single family equivalent |
| United                      | $16,391/single family equivalent |
| Renew                       | $16,820/ single family equivalent |

If the Town selects an option that supplies less than the 6,000 acre-feet of renewable water, additional renewable water projects must be included when calculating the new System Development Fees.

Red Oak modeled three debt funding options for each proposal. The funding options are revenue bonds, and general obligation bonds, with a property tax levy of 10 and 20 mills. Property taxes are based on the value of property and are not related to water usage or meter size. Figure ES-1 graphs an example net present value for average residential and commercial customers for each funding option.

The net present value represents the total cost a customer would pay for the renewable project over a 38-year period, represented in 2012 dollars. In the revenue bond option, the cost is very similar for both ¾” customers – $26,785 residential and $27,487 commercial. However, the net present value increases substantially when property tax options are modeled. For example, with the 20 mill property tax option, the residential net present value is $25,816, slightly lower
than the revenue bond option. However, for the commercial customer, the 20 mill property tax results in a net present value of $467,239. All three funding options have been applied to the three customer classes (¾-inch residential, ¾-inch commercial and 2-inch commercial) and are documented in the Financial Analysis reports (Appendix B-D). To help simplify the presentation of financial data, the comparative analysis report will only use the revenue bond option to communicate cost impacts.

The net present value includes all of the proposal costs identified by the respondents, plus the Town’s total cost to convey the water to our service area. The Town’s costs are similar for all proposals; they are included to provide Council with a complete picture of the cost impacts. The net present value is distinguished in each of the projects by three major indicators: (1) the timing and amount of program costs (i.e. how much does it cost, and when does it get paid); (2) the balance of operation and maintenance-related costs versus the capital-related costs; and (3) the amount of the costs that are assets not owned and operated by the Town. The Town maintains a policy consistent with accounting standards across governmental organizations that if an asset is not owned, it must be financed with cash. So, when analyzing the net present value, the more costs early in the project -- whether debt for capital or operation and maintenance that includes assets not owned and operated by the Town – the higher the net present value.

In 2012, the typical single family home is estimated to pay an average of $71/month for both water and water resource charges. After the adopted rates end in 2015, the charges are escalated at 3 percent annually through 2050. At that time, the $71/month would be equivalent to $220/month in 2050 dollars. To help evaluate monthly charges for each option, these escalated charges are included in the comparison charts. The financial analysis performed was for comparison purposes only and a rate study will be conducted once and alternative is selected. The $71 monthly fee for water and water resources was developed in the 2011 Rate and Fee Study and includes the cost for the Town’s renewable concept project that provides almost 6,000 acre-feet at build-out.

It is important to note that the financial analysis was based on the information submitted in the proposals, and it is likely to change in the negotiations leading up to a final agreement with any of the potential providers. Once the costs are finalized in an agreement, an actual rate and fee study will be conducted. The Town will also evaluate additional financing options than those modeled in the report. For example, there may be the ability to secure longer term revenue bonds beyond the 30-year term assumed in the analysis to reduce the cost impact on the current generation.

Rueter-Hess Reservoir is a critical component of the Town’s water resource plan. The existing U.S. Army Corps of Engineers permit limits the type of water to be stored in Rueter-Hess to groundwater and return flows. The Corps must evaluate any other water source, including the water identified in the proposals, for any potential environmental impacts before it could be stored in Rueter-Hess. The WISE Partnership has been working with the Corps to amend the
current permit to allow for the storage of WISE water. The outcome of this process is unknown, but it is likely that the request will be approved, with some requirements for mitigation.

**PROPOSAL SUMMARIES**

The following discussion presents the overview of each of the four proposals and the analysis performed to compare each to the others.

**Renew Strategies**

**Project Concept**

Renew's proposal is to convey to the Town the right to pump groundwater from the Lost Creek Designated Ground Water Basin north of Denver. Included in the purchase price would be all of the wells necessary to produce the amount of water purchased and all easements needed to convey the water to the nearest public right of way. Renew would also provide the land for a water treatment plant and brine disposal site. The Town would be responsible for the design, construction and operation of the system to convey the water to an area regional water system (East Cherry Creek Valley Water and Sanitation District or Aurora Prairie Waters facilities).

**Legal Analysis**

There are a lot of positive aspects to the Renew proposal. The project is relatively simple and well defined. Renew has already obtained authorization to utilize 3,886 acre-feet per year for municipal purposes outside the Basin. In fact, South Adams County Water and Sanitation District purchased the right to utilize 1,267 acre-feet per year in 2006. There is a low risk that existing orders of the Ground Water Commission and the Lost Creek Ground Water Management District, which allow municipal export of water pumped by the wells, can be successfully legally challenged. The wells in the Basin can operate free of the South Platte River's priority system, and an augmentation plan is not required. There is a low risk that senior water rights tributary to the South Platte River could place a call within the Basin. In addition, each well in the Basin has been assigned a maximum "banking" reserve. This allows each well to make use of the natural storage capacity of the Basin aquifer, providing the Town with significant flexibility to deliver water to meet operational requirements.

The evaluation team’s biggest concern with Renew's proposal is the long-term reliability for the Basin to be recharged. The Basin has a relatively small drainage area, limiting the ability for natural recharge from rain and snow melt. Henrylyn Irrigation District diverts tributary water from the South Platte River to irrigate lands within Henrylyn’s boundaries, which includes land within the Basin. There is currently a high dependence on irrigation and irrigation system return flows for recharge of the aquifer. Of the total inflows to the Basin, approximately 61.5 percent are related to or dependent on the operation of the Henrylyn system. This makes the water levels in the Basin vulnerable to Henrylyn's operational changes. The consequences to the Town, if the water levels in the Basin decline, would be a loss of production capacity in the existing wells. We believe this to be a material risk.
Financial Analysis

The net present value of the full-scale option is $572 million. Those values for the scaled back options are $253 million and $433 million. Figure ES2 shows the net present value for all three options and breaks out the capital and operation and maintenance costs. The net present value for the scaled-back option with supplemental groundwater is relatively high compared to the full-scale option, considering that it represents only one-third of the water of the full-scale option. There is a $118 million reduction in capital costs from the full-scale model to the scaled-back one because of the two-thirds decrease in the cost of water rights and a slight reduction in infrastructure. However, there is only a slight reduction on the operations and maintenance cost, as it reflects the high cost of electricity needed for the groundwater wells in the years past 2030. The scaled-back option without supplemental groundwater is considerably less and reflects a renewable project one-third the size of the full-scale option.

![Figure ES-2](image)

*Groundwater means “supplemental groundwater”*

The full-scale option actually exceeds the Town’s 75 percent renewable water goal at build out. As expected, the scaled-back options (with or without supplemental groundwater) do not meet the goal, and additional renewable water would have to be developed. Figure ES-3 presents the percent of renewable water each option provides through build out.
Figure ES-3
Renew – Percent renewable water – Full-scale and scaled-back projects

Figure ES-4 shows the combined monthly bill for the Water and Water Resource components for an average residential customer. Included in the chart are the adopted 2012-2015 charges, escalated 3 percent annually from 2016-2050.

The current combined Water and Water Resource monthly charge is $71.52 for a typical residential customer. The 2015 charge would be $77.90. If the Town were to implement the full-scale project, the monthly charge in 2015 would be $148.20. The scaled-back option would require a monthly charge of $91.02.
An affordability analysis was calculated for the total utility bill (including Water, Water Resources, Wastewater, and Stormwater), based on the Environmental Protection Agency’s guideline of affordability. Our financial consultants researched guidelines across various water and wastewater industry organizations, and the threshold for affordability for water, wastewater, and water resources ranges between 2 and 4 percent of the median household income. Two percent was selected as the threshold for the Town’s analysis, as recommended by the EPA. Figure ES-5 shows affordability information for the full scale option (and includes all three funding options). Figure ES-6 provides the same information for the scaled-back option with supplemental groundwater.

**Figure ES-5**

**Renew – Residential affordability – full scale**

**Figure ES-6**

**Renew – residential affordability – scaled back w/ supplemental groundwater**
Stillwater Resources

Project Concept

Stillwater proposes that the Town acquire an option to purchase 11 existing irrigation wells on the Box Elder Creek Farm north of Denver. The wells are capable of producing 3,400 to 4,000 acre-feet per year from the Box Elder Creek alluvium, depending on delivery schedules the Town prefers. The cost for the wells includes the existing wells, easement for well sites and pipelines to the nearest public right of way. The bulk of the payment would be after Water Court approval of an augmentation plan, allowing the well field to operate as proposed. The proposal identifies several water rights options. Town could acquire an option to purchase approximately 600 acre-feet of water rights historically used on the Farm. Stillwater proposes three different alternatives for additional water rights: (1) a trade of irrigation water rights for municipal effluent discharged to the South Platte; (2) purchase of senior irrigation water rights; and (3) a combination of (1) and (2).

The Town would be responsible for the design, construction and operation of a system to convey the water to an area regional water system (East Cherry Creek Valley or Aurora).

Legal Analysis

There is a high probability that Stillwater can acquire enough reliable senior water rights to yield the proposed 3,400 to 4,000 acre-feet of water each year. In addition, the modeling estimates of the aquifer yields seem reasonable. By acquiring options to purchase the well field and water rights, rather than purchasing those assets outright, the Town can minimize its initial financial risk. The bulk of the Town’s payments would occur after the Water Court’s approval of the changes of water rights and plan for augmentation.

The evaluation team identified several concerns over Stillwater’s proposal. Similar to Renew, Stillwater assumes that 40 percent of the groundwater supply comes from irrigation and irrigation system return flows attributable to the Henrylyn’s and Farmers Reservoir Irrigation Company’s systems. As a result, the physical water supply for the well field may be vulnerable to operational changes to the irrigation systems. A recent Colorado Supreme Court decision may further reduce inflows to the Box Elder Creek Basin by as much as 25 percent.

Stillwater also proposes that the Town purchase water rights that have been historically used as an irrigation water supply on the Farm. The water rights include Henrylyn “acre rights” and junior water rights associated with the 11 existing wells and augmentation contracts. It is unlikely the Town will get authorization from the controlling entities to change these water rights for municipal and/or augmentation purposes and use them in Douglas County. If the Town proceeds with Stillwater’s project, our consultant team is recommending that the Town acquire additional effluent or senior irrigation water rights instead of relying on the Henrylyn acre rights, the junior water rights or the augmentation contracts.

If the Town cannot contract with wastewater treatment plant operators for effluent that can be delivered year-round, additional storage or recharge facilities would need to be constructed to meet augmentation requirements. This storage volume would be dependent on the estimated
The net present value of the full-scale option is $424 million. The values for the scaled-back options are $223 million (no supplemental groundwater) and $389 million (with supplemental groundwater). Figure ES7 shows the net present value for all three options and breaks out the capital and operation and maintenance costs. The net present value for the Stillwater fullscale project shows a relatively low capital cost, due to the low unit price of the target water rights. The scaled-back option without groundwater shows a significant decrease in operation and maintenance due to the shortened time period (2012-2030). There is a slight reduction in the capital costs for the scaled-back project, due to the decrease in the amount of water rights. The net present value of the scaled-back project with groundwater reflects the added costs to develop a groundwater source to meet demands beyond the 2,000 acre-feet of renewable water.
Neither the full-scale option nor the scaled-back option meets the Town’s 75 percent renewable water goal at build out. Additional renewable water would have to be developed. Figure ES-8 presents the percent of renewable water each option provides through build out.

Figure ES-9 shows the combined monthly bill for the Water and Water Resource components for an average residential customer. Included in the chart are the adopted 2012-2015 charges, escalated 3 percent annually from 2016-2050.
The current combined Water and Water Resource monthly charge is $71.52 for a typical residential customer. The 2015 charge would be $77.90. If the Town were to implement the full-scale project, the monthly charge in 2015 would be $104.06. The scaled-back option (with groundwater) would require a monthly charge of $86.42.

Figure ES-10 shows affordability information for the full scale option (and includes all three funding options). Figure ES-11 provides the same information for the scaled-back option with supplemental groundwater.
United Water

Project Concept

United Water proposes to set up a separate governmental entity to own water rights. United would purchase senior irrigation water rights from the South Platte River Basin. The water rights would be spread across a wide geographic area to minimize localized impacts and Water Court risks. The Town would have the right to reject proposed acquisitions based on predetermined criteria and will be responsible for its own review costs.

The water rights would target a dry-year yield of 60 percent of the average annual yield. The Town would pay a price per acre-feet based on the average annual amount of fully consumable water the Water Court approves. The price includes all infrastructure and easements necessary to divert and deliver water to the East Cherry Creek Water and Sanitation District's water treatment plant north of Denver, near Barr Lake.

United would deliver this water to the treatment plant on whatever schedule the Town requires, limited to 12 million gallons per day. United Water would operate the facilities upstream of the plant, and the Town would be responsible for all costs for operation, maintenance and scheduled replacement of its proportional share in all United Water facilities. The Town would be responsible for all costs of water delivery downstream of the plant.

Legal Analysis

There is a good probability that United's proposed project can yield a long-term reliable water supply for the Town. United has a record of building infrastructure and providing water on a wholesale basis. They have constructed a portion of the facilities required to deliver water to the Town. United has stated it would commit to constructing and/or upsizing infrastructure
needed to serve the Town upstream of the East Cherry Creek Valley Plant. The new construction includes the 70 Ranch and St. Vrain pipelines.

The review team has identified several concerns with the Untied Water proposal.

The project is extremely complex, and a lot of issues will have to be carefully negotiated in the agreement. United’s plan relies, in part, on exchanges on the South Platte River and St. Vrain Creek. The exchanges have not been adjudicated and would be less reliable than, and junior to, all other decreed exchanges. In order for the Town to obtain the water quality and cost-saving benefits from such exchanges, the Town would need to participate in storage projects near Gilcrest and United’s existing water-diversion structure on the South Platte River, at an additional cost estimated to be $16 million. This cost is not in the proposal and is not part of the financial analysis.

The 70 Ranch pipeline significantly reduces the risk associated with exchanging water on the South Platte under United’s proposal. Without the pipeline, the Town’s water supply would not be reliable. This pipeline has not been constructed.

In order to firm up the dry year yield shortfall, the Town would need to obtain additional water rights, store water in wet years, and hold that water for use in dry years. United Water’s plan does not include any multiyear storage. They have indicated multiyear storage is available at an additional cost of approximately $30 million. This cost was not in the original proposal but was included after discussion with United. The structures were considered but they are not required for the project to be successful and are not part of the financial analysis.

Similar to Stillwater proposal, the Water Court application will most likely draw opposition from northern Colorado water users, which could drive up the cost of adjudication.

There are risks associated with purchasing senior irrigation water on the South Platte Reservoir because of the uncertainty of the Water Court process. To help mitigate the risk, United Water proposes to purchase, at their expense, an additional 10 percent of the approved senior irrigation water rights to act as an insurance policy.

The risks identified can be mitigated with the purchase of additional facilities and the negotiation of a detailed agreement with clearly defined performance measures.

Financial Analysis

The NPV net present value of the full-scale option is $671 million. The values for the scaled-back options are $290 million (no supplemental groundwater) and $464 million (with supplemental groundwater). Figure ES7 shows the net present value for all three options and breaks out the capital and operation and maintenance costs. The net present value for the full-scale option is relatively large due to the high unit cost of the water rights. The scaled-back project without groundwater shows a significant savings due to the reduced amount of water rights and a slight reduction on the necessary infrastructure. The scaled-back project backed
by groundwater shows a slight increase in capital costs for groundwater wells and shows an increase in operation and maintenance because of the longer study period (2012-2050).

The full-scale option actually exceeds the Town’s goal of 75 percent renewable water at build out. As expected, the scaled-back options do not meet the goal, and additional renewable water would have to be developed. Figure ES-13 presents the percent of renewable water each option provides through build out.

Figure ES-14 shows the combined monthly bill for the Water and Water Resource components for an average residential customer. Included in the chart are the adopted 2012-2015 charges, escalated 3 percent annually from 2016-2050.
The current combined Water and Water Resource monthly charge is $71.52 for a typical residential customer. The 2015 charge would be $77.90. If the Town were to implement the full-scale project, the monthly charge in 2015 would be $127.75. The scaled-back option (with groundwater) would require a monthly charge of $119.47.

Figure ES-15 shows affordability information for the full scale option (and includes all three funding options). Figure ES-16 provides the same information for the scaled-back option with supplemental groundwater.
WISE

Project Concept

In August 2009, Town Council unanimously approved participation in the Denver Water – Aurora – South Metro Water Supply Authority Intergovernmental Agreement to identify and evaluate opportunities to address long-term water supply needs for all Denver-metro communities in the most efficient and cost-effective manner possible. The Water Infrastructure and Supply Efficiency water delivery project was developed. The WISE proposal is a permanent, but variable, water supply contract between Denver, Aurora and South Metro. Castle Rock is one of 15 members of South Metro. In general, the WISE project would supply South Metro members with water by blending excess, and currently unused, South Platte return flows with mountain water. Included in the project is the use of major regional infrastructure and assets, including Denver Water’s water rights and return flows and Auror’s water rights, return flows and Prairie Water Project components (wells, pipelines and Peter Binney Water Treatment Facility). The agreement requires Denver and Aurora to deliver 100,000 acre-feet of water to South Metro over each 10-year period, which is an annual average of 10,000 acre-feet per year. However, because of the variable nature of the WISE project, the amount of water can range from no water to a maximum of 25,000 acre-feet in a single year. The contract has a permanent delivery schedule to define the minimum and maximum water delivery limitations, which provides certainty in Denver and Aurora’s obligations.
Legal Analysis

It is highly likely Denver and Aurora will be able to meet the required deliveries under all future hydraulic conditions. In addition, water sources to be delivered to South Metro are fully consumable and available for delivery without additional Water Court approval. Water from WISE would be available for deliveries as soon as 2013. WISE is also a regional project, intended to serve other water providers in Douglas County (currently, 10 have made tentative commitments). Castle Rock would partner with other South Metro members to construct, operate and maintain all infrastructures necessary to deliver water from Chambers and E-470 to the south metro area. As compared to the other proposals, the Town would not be required to outlay large sums of money initially to purchase water rights and construct infrastructure. The Town would only pay for water actually delivered, and for the Town’s share of necessary local infrastructure to take deliveries.

The review team has identified several concerns with the WISE proposal.

The WISE proposal requires agreements between the South Metro partners. There is the possibility of 11 separate governmental agencies within South Metro contracting jointly with Denver and Aurora to purchase water. The agreements between the South Metro partners have to address issues, such as liability for each other’s commitments to Denver and Aurora. For example, if Castle Rock did not fund its annual commitment to Denver and Aurora under the terms of the WISE agreement, who would be responsible for our share? This issue is under discussion among the South Metro participants, as well as Aurora and Denver Water.

Another major concern is the potential variable water-delivery schedule. During the initial phase of WISE (ending May 31, 2020), Denver and Aurora would deliver a minimum of 5,000 acre-feet per year to South Metro. However, after 2020, it is possible, per the terms of the agreement, for the delivery schedule to be highly variable. Under the worst-case scenario, the permanent delivery schedule in the agreement allows for no deliveries for 24 consecutive months and limited deliveries for 35 consecutive months. The agreement also allows for significant variation in the volume of water delivered. Water can be delivered at high-volume rates for a period of years, followed by minimal deliveries for long periods of time. The variable delivery schedule is understandable, given the nature of the WISE Partnership, which involves multiple agencies sharing infrastructure and water rights. This creates operational challenges.

The existing Corps of Engineers permit limits the type of water to be stored in Rüeter-Hess Reservoir to groundwater and return flows. The WISE Partnership has been working with the Corps to amend the current permit to allow for the storage of WISE water. The outcome of this process is unknown, but it is likely the request will be approved, with some requirements for mitigation. For the WISE proposal, the current draft agreement has an “off ramp” if the amendment is denied or mitigating is too expensive. The “off ramp” gives Castle Rock the ability to get out of all contract obligations. Staff expects a Corps decision by the end of 2012. The risks identified can be mitigated through storage and the use of other water resources. The agreement risks identified can be mitigated through negotiations.
Financial Analysis

The net present value of the full-scale option is $603 million. The values for the scaled-back options are $253 million (no supplemental groundwater) and $444 million (with supplemental groundwater). Figure ES7 shows the net present value for all three options and breaks out the capital and operation and maintenance costs. As illustrated in the chart below, the full-scale project has little capital costs; however, it has significant operation and maintenance costs. There is a slight increase in the capital costs for the scaled-back project with groundwater, due to the costs of the groundwater facilities. The operation and maintenance costs for the scaled-back option with groundwater is less than the full-scale option, because having only 2,000 acre-feet of WISE water mitigates the unit cost and the costs associated with the high variability of the delivery schedule.

![Figure ES-17](attachment:image)

WISE – Total long-term water program costs (net present value)

*Groundwater means “supplemental groundwater”*

The full-scale and scaled-back options hover around 60 percent renewable water by 2030 and at build out. As expected, the scaled-back options do not meet the goal of 75 percent renewable water; additional renewable water would have to be developed. Figure ES-18 presents the percent of renewable water each option provides through build out.
Figure ES-18

WISE – Percent renewable water – Full-scale and scaled-back projects

Figure ES-19 shows the combined monthly bill for the Water and Water Resource components for an average residential customer. Included in the chart are the adopted 2012-2015 charges, escalated 3 percent annually from 2016-2050.

The current combined Water and Water Resource monthly charge is $71.52 for a typical residential customer. The 2015 charge would be $77.90. If the Town were to implement the full-
scale project, the monthly charge in 2015 would be $110.11. The scaled-back option (with groundwater) would require a monthly charge of $93.

Figure ES-20
WISE – Residential affordability – Full scale

Figure ES-21
WISE – Residential affordability – Scaled back
**Hybrid Option**

The hybrid option was developed to maximize the value of the renewable water supply while reducing early bill impacts early for the Town’s customers. This option combines the WISE project at a 1,000 acre-feet subscription level with 2,000 acre-feet of South Platte water rights.

The WISE project has low up-front capital costs, because the Town would not purchase the water rights and could use non-Town infrastructure. It also has relatively high operating costs in the middle to late years. By subscribing at 1,000 acre-feet, the variability and operating costs in the out years could be reduced. The WISE project requires a large amount of storage. That storage could either be accomplished in Rueter-Hess (if the permit is amended) or in the aquifers underlying the WISE participants. The WISE project could start delivering renewable water to the Town as soon as the necessary infrastructure is acquired or constructed. There is little risk that Denver and Aurora would not meet the terms of the draft water delivery agreement.

The second component of the hybrid option is the purchase of alluvial wells near the South Platte, or in a tributary drainage, and secure 2,000 acre-feet of senior irrigation water rights on the South Platte River now. Securing the water rights early in the project while deferring the infrastructure cost, rather than attempting both supply and infrastructure projects in a similar timeframe, will reduce the bill impacts to each customer.

**Legal Analysis**

The hybrid project has similar risk considerations as described in the analysis of the four proposals above.

**Financial Analysis**

As with all the other projects, staff compiled a Long Term Capital Improvements Plan for the hybrid option (See Appendix D). These cost tables provided the cornerstone to evaluating the impacts to the Town and its customers. The tables and figures in this section illustrate the key observations and findings.

The hybrid option was analyzed using only revenue bond debt.

The net present value of this option, plus operating costs for 2012 through 2050, totals approximately $455 million, supplemented with groundwater in starting in 2045. The value for a hybrid with no groundwater is $443 million. The chart below shows a break out of the capital and operation and maintenance costs.
Figure ES-23 compares the water supply portfolio over time, including the hybrid option, to the goal of 75 percent renewable water.

In 2015, the water supply from WISE would ramp up to the full 1,000 acre-feet subscription level. By 2030, the Town’s water supply would have 56 percent renewable water. By 2050, the water supply would be close to the ultimate goal, at 70 percent renewable water. The hybrid options meet demands out until approximately 2048. At that point, the Town may develop another renewable water supply or supplement the supply by further developing deep groundwater. For the purpose of this analysis, two options were considered: (1) with supplemental groundwater developed in 2045 and (2) with no groundwater. The option with no groundwater can meet the Town’s needs out to the year 2048.
Figure ES-24 shows the impact on customers’ combined Water and Water Resources monthly bill for the Hybrid project. For reference, the adopted 2012-2015 combined monthly water and water resources payments are shown on each chart. These charges are based on a water resources program that will import close to 6,000 acre-feet of renewable water evenly over time by the year 2050. Where the adopted charges end in 2015, the charges are escalated at 3 percent annually.
Figure ES-25 shows the affordability of the water resources program for the residential customer for only the revenue bond financing scenario. The hybrid option remains in the affordable range the entire study period. Out-year affordability approaches two percent as more debt is issued, and as operating costs increase.
FINANCIAL ANALYSIS SUMMARY

The following section is intended to provide a summary of the key financial findings for the various options.

Figure ES-26 presents side-by-side the net present value for full-scale and scaled-back options (with and without supplemental groundwater) for each proposal. The hybrid options were also included.

*GW means "supplemental groundwater".

Figure ES-27 presents side-by-side the percent of renewable water for full-scale and scaled-back options for each proposal. For the individual proposals, the scaled-back options had the same renewable percentage, regardless of whether they were supplemented with groundwater. The hybrid option was also included.
Figures ES-28 and ES-29 graph the typical residential customer’s monthly charges for both the full- scale and scaled-back options (with supplemental groundwater). The hybrid option is also included.
Figure ES-28  
Residential combined monthly Water/Water Resources payment – Full scale

Figure ES-29  
Residential combined monthly Water/Water Resources payment – Scaled-back
GENERAL DISCUSSION

The Town has identified in the Water Resources Strategic Master Plan the need for a sustainable long-term water supply. One of the major goals of that plan is to establish a renewable, sustainable water supply that accounts for 75 percent of the annual demand for water in Castle Rock at build out. That equates to approximately 11,550 acre-feet per year of renewable water supply. Renewable water sources include junior and senior tributary water rights on East and West Plum Creek, reclaimable water discharged to East Plum Creek, reclaimable water discharged to Cherry Creek via the Pinery Water and Wastewater District (including lawn irrigation return flows), and future imported surface water.

<table>
<thead>
<tr>
<th>Water supply</th>
<th>Percent of demand</th>
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</thead>
<tbody>
<tr>
<td>Denver Basin Groundwater</td>
<td>25 percent</td>
</tr>
<tr>
<td>Renewable Water</td>
<td>75 percent</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100 percent</td>
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</tbody>
</table>

Town Council directed staff to evaluate potential water supply projects that would advance the Town toward its goal of a sustainable water supply. A Request for Proposals was issued to four organizations: Renew Strategies, Stillwater Resources and Investments Inc., United Water and Wastewater District and the WISE Partnership (consisting of Denver Water, Aurora Water and South Metro). The RFP solicited a detailed technical and cost proposal regarding strategies to provide the Town a supplemental renewable and reusable water supply. The objectives in the RFP were to find a renewable and reusable source of water supply that meets the following minimum criteria:

1. The water is delivered based on the following schedule
   a. 2,500 acre-feet/year by 2017;
   b. an additional 2,500 acre-feet/year by 2025; and
   c. an additional 1,000 acre-feet/year at build out.
2. The water is delivered either to a potential Master Meter at Chambers Road and E-470 or directly to Rueter-Hess Reservoir
3. Water quality is sufficient to allow storage in Rueter-Hess.
The proposals were evaluated based on the following criteria:

- The project concept's technical viability, including the ownership nature of the subject water rights and long-term reliability, and potential risk to the Town.
- The overall cost of the project to the Town and the impact to its customers.
- The respondent organization's prior experience delivering a similar water supply project.
- The anticipated complexity and timeline of acquiring necessary permits from any governmental, regulatory or other entity in order to deliver the proposed water supply.

Understanding that securing the community's long-term water supply is one of the Town's top priorities, staff compiled a team to analyze the proposals. The team stretches across the entire organization and is supplemented by expert consultants in the water industry. The internal analysis team includes staff from the Legal, Utilities, Finance and Community Relations departments. The experts brought on to assist in this process and their respective roles are presented below.

**Lyons Gaddis Kahn & Hall – Special counsel for water law**

Based in Longmont, this firm has a water law practice group with five attorneys who specialize in water-related litigation and transactions. These lawyers have more than 50 years of experience representing municipalities, water districts, landowners, ditch and reservoir owners and developers in protecting their Colorado water rights and developing new water resources. The firm has been the Town’s special water counsel for the past six years and is currently representing the Town in several active Water Court cases.

The role Lyons Gaddis Kahn & Hall has served on this team was to analyze each of the proposed water rights or targeted water rights in terms of risk to the Town and risk of legal attack from opposition. The firm also brought into the analysis a perspective on how best to bring the target water rights through the Water Court process, and ways that the water rights would best incorporate into the Town’s current water rights portfolio. This section of the report contains a summary of their analysis. The final memorandum of their analysis can be found in Appendix A.

**W.W. Wheeler and Associates – Water resources consulting engineers**

Based in Englewood, this firm specializes in water supply planning, water rights investigations, groundwater and hydrologic modeling and dam and reservoir engineering. Gary Thompson, the president and a principal of the firm, has been the Town's water engineer for almost three decades and knows Castle Rock's water supply issues inside and out. He is frequently called to serve as an expert witness in water rights cases throughout Colorado and is a recognized expert in the evaluation of water rights.

Mr. Thompson worked in concert with Lyons Gaddis Kahn & Hall on analyzing the water rights in each proposal. He confirmed yield and modeling assumptions made in the proposals and
performed a general appraisal of the targeted water rights. Mr. Thompson’s findings have been summarized in this section and his final joint memorandum with Lyons Gaddis Kahn & Hall can be found in Appendix A.

Red Oak Consulting – Rates and fees consultant

Red Oak Consulting is a division of ARCADIS, one of the country’s leading environmental engineering and consulting firms and focuses on utility planning, management and financing and alternative service delivery options. Red Oak has helped the Utilities Department in preparing the Utilities Rates and Fees Study for the past six years and will model the 2012 update. Red Oak has extensive knowledge of all financial aspects of the department’s enterprise funds, including its capstone programs: water budget rate structure and long-term renewable water. Red Oak’s role on this team has been to prepare a financial analysis on each of the proposals that includes indicators of the project’s financial feasibility such as:

- Net present value of capital and operation and maintenance costs
- Analysis of the Water Resources Fund System Development Fee
- Total impacts to the overall utility bill for 2013 and future years
- Affordability of the project based on the total utility bill as a percentage of the median household income
- Financial health of the Water Resources Fund

Appendices B, C and D contain the Financial Analysis Report prepared by Red Oak for the full-scale, scaled-back and hybrid options. Key findings and observations from those reports have been summarized in the section below.

SAIC Energy, Environment & Infrastructure – Procurement process consultants

SAIC provides program management services to Utilities for the development of critical infrastructure. With about 3,500 employees in 50 offices across the United States and Canada, and more than 100 in the Denver area, SAIC has the local resources and experience to fully support the Town in its endeavor to secure an alternative long-term source of water supply. SAIC has extensive experience in assisting clients to get the best-value professional services, utilizing many different procurement strategies.

SAIC was contracted in May 2011 to help Town staff administer the procurement process. In the RFQ step, SAIC helped evaluate each of the proposals and provided a recommendation of the potential water providers that the Town should consider short-listing. During the RFP step, SAIC helped staff administer the procurement process and provided quality assurance reviews of the 38-year Capital Improvements Plan and annual operations and maintenance costs tables. The 38-year plan and operation and maintenance tables are the foundation of the financial analysis of each of the water delivery projects.

Camp Dresser, McKee and Smith– Water resources engineering

Camp Dresser, McKee and Smith is a consulting, engineering, construction and operations firm that offers full services across the project life cycle in water, environment, transportation,
energy, and facilities. The firm has helped the Town plan, understand, and manage its water resources for several years. It has completed several planning documents for the Town, including the Water Resources Implementation Plan that outlined water supply and infrastructure through build out. Camp Dresser, McKee and Smith has completed investigations for the Plum Creek North, Central and South Well Fields related to the new Plum Creek Water Purification Facility. The firm also has been contracted to complete the final design for the alluvial wells that will supply water to the Purification Facility. Most recently, the team helped staff develop a water supply forecasting model that analyzes how feasible each proposed water supply project is, considering the quantity of water delivered and the timing of the delivery, as compared to Town growth.

Financial Analysis

The basis for the financial analyses is a Water Resource Program Capital Improvements Plan, which incorporates all of the capital improvements necessary to meet Town water demands until build out. The plan allocates costs for infrastructure improvements and operations and maintenance, by year, in 2012 dollars. These cost tables were compiled from information submitted in the proposals and through direct collaboration with each respondent.

A key factor of the scaled-back options are that they address the Town’s water needs through 2030. After 2030, additional water supplies would be required to meet the Town’s demands. The supplemental water could be renewable water or groundwater. In our analysis, groundwater was assumed to meet the needs post 2030. The scaled-back options, with or without supplemental groundwater, have the same monthly charges through 2030. The cost evaluation for the scaled-back options with no supplemental groundwater ends in 2030, and we acknowledge that additional water supplies will be needed at that time. The cost evaluation for the scaled-back options with supplemental groundwater are modeled and are included in the comparison charts. The higher costs in the monthly charges after 2030 reflect these additional costs for additional water supplies.

Red Oak modeled three debt funding options for each proposal. The funding options are revenue bonds and general obligation bonds supported by a property tax levy of 10 and 20 mills. This monthly payment incorporates the projected monthly water resources charges, water charges and any applicable property taxes. For example, Figure ES1 graphs an example net present value for average residential and commercial customers for each funding option.
The net present value represents the total cost a customer would pay for the renewable project over a 38 year period, represented in 2012 dollars. In the revenue bond option, the value is very similar for both 3/4" customers – $26,785 residential and $27,487 commercial. However, there is a substantial increase to the net present value when the property tax options are modeled. For the 20 mill property tax option, the residential value is $25,816, slightly lower than the revenue bond option. However, for the 2" commercial customer, the 20 mill property tax results in a net present value of $467,239. All three debt-funding options have been applied to the following customers – ¾-inch residential, ¾-inch commercial and 2-inch commercial – and are documented in the Financial Analysis (Appendix B-D). To help simplify the presentation of financial data, the comparative analysis report will only use the revenue bond option to communicate cost impacts.

To give Council and the community more options to consider a scaled-back project (2,000 acre-feet) was developed and analyzed. The scaled-back option would meet the Town’s needs out to the year 2030, based on current growth rates. Staff analyzed the option in two ways. First, the scaled-back proposals were supplemented with groundwater after 2030 to meet the Town’s demands out to 2050. This approach assumes that the Town will develop no other renewable water. It provides total project costs and monthly rates for a program that meets the Town’s demands with a combination of renewable and nonrenewable water resources out to 2050. The second approach was to provide a total project cost for renewable water only, understanding that, after 2030, the Town would have to develop other water resources. This approach helps compare project costs for renewable water solutions only. In both approaches, the scaled-back proposals result in a total renewable supply of approximately 50 percent by build out (inclusive of the water supplied by the Plum Creek Water Purification Facility).
An advantage to a scaled-back project is that the Town would secure renewable supplies in increments rather than all at once, which would put the burden of funding the program on the current generation. Another advantage is that it gives the Town another 18 years to purchase and develop additional renewable water supplies. One concern of the scaled-back projects is the uncertainty of future opportunities to secure renewable water supplies.

Along the lines of providing more options to Town Council, a hybrid concept has been identified by staff, which spreads out costs over several generations but secures a renewable water supply over the next couple of years, for future development. The concept involves purchasing a reduced amount of WISE water with our regional partners and acquiring senior water rights in the South Platte River at lower agricultural prices. Those rights would need to be changed in Water Court for municipal uses, but they could be left "on the farm" until the Town needs them, estimated to be some time in the 2030s. The purchase of WISE water for the early years reduces the capital outlay needed to get renewable water flowing to the Town, because that project requires fewer infrastructures to be constructed, and it does not involve purchasing water rights. Purchasing senior water rights at the lower agricultural prices secures a renewable water supply now but puts off the development costs, such as additional infrastructure, until years down the road, when the Town has a larger customer base to fund the program. Staff has developed an example for Council's information, which is included in the analyses. The example assumes that the Town would subscribe to 1,000 acre-feet of WISE and 2,000 acre-feet of a senior South Platte River water right, to be developed and available to the Town in 2032. Staff developed a capital and operation and maintenance schedule for a 3,000 acre-foot hybrid, based on cost information from the proposals. The team modeled the Town and customer impacts resulting from this concept in the same way as the other projects. This concept is estimated to meet Town water demands until the year 2048.

Rueter-Hess Reservoir

Rueter-Hess is a critical component of the Town’s water resources plan. When the Town reaches build out, it is estimated that summer water demand will reach 42 million gallons per day. The current South Platte River proposals can deliver between 8 and 12 million gallons per day. The limitation is due to the available capacity in the East Cherry Creek Valley North South Pipeline. (United Water was able to negotiate 12 million gallons per day from the East Cherry Creek Valley Water Authority). Assuming 12 million gallons per day is coming from renewable water sources from the South Platte River, the Town requires an additional 30 million gallons per day of water to meet demands. Another 10 million gallons per day will be developed from the Plum Creek Purification Facility, which is currently under construction. The Town would still be short 20 MGD to meet its summer demands. This shortfall will be met through the use of groundwater and water stored in Rueter-Hess. Without Rueter-Hess, the Town would be required to develop additional nonrenewable groundwater wells and/or construct new conveyance structures to the renewable water supplies on the South Platte River.
Parker completed construction of Rueter-Hess earlier this year. The Town owns 8,000 acre-feet of storage capacity in the reservoir and can begin to store water as soon as the necessary infrastructure is completed. Currently, the only water sources Castle Rock has permitted to be stored in Rueter-Hess are Plum Creek return flows and Denver Basin Aquifer groundwater. The existing Corps of Engineers permit for Rueter-Hess has a requirement that “prior to the Participants storing any renewable sources of water in the expanded Rueter-Hess Reservoir, the Corps must evaluate the environmental impacts, in accordance with 33 CFR Part 325.7(a), associated with the transfer, storage and/or use of such water.” Any renewable source of water, including all of the water supplies included in all four project proposals, will need to be evaluated prior to being stored in Rueter-Hess.

The Town, in cooperation with the WISE Partnership and as a member of South Metro, has been working with the Corps since 2010 to amend the current permit to allow WISE participants to store water supplied through WISE in Rueter-Hess. It is anticipated that the WISE Partnership can address all remaining issues without needing to prepare an Environmental Assessment; however, the Corps will make this final determination.
Renew Strategies

Renew Strategies is a Colorado Limited Liability company that provides management, development and sale of water assets owned by an affiliated company, Front Range Resources. The team assembled for this potential project has successfully worked together for more than five years and has helped other similar communities secure Lost Creek Basin water rights. In 2006, South Adams County Water and Sanitation District purchased 12 wells in the Lost Creek Basin (for a similar price per acre-foot), with an annual yield of 1,267 acre-feet.

Project Concept

Renew has proposed to Castle Rock the sale and development of up to 6,000 acre-feet of groundwater in the Lost Creek Basin, approximately 25 miles northeast of Denver (See Figure below).

Each well in the basin has been assigned a maximum banking reserve that will allow the Town to make use of the natural storage capacity of the basin’s aquifer. In wet years, when a water supply is easier to obtain close to Town, the Town may opt to leave this water in storage. To the extent that actual pumping in prior years has been less than the allowed annual appropriation of 3,886 acre-feet, the maximum amount of water stored could be as much as 8,266 acre-feet per year, for three years in succession. This would decrease the need for additional firming storage. Because the water is from an aquifer, the yield from year to year is expected to be steady. The wells can be pumped at high peaking flow rates, or on any flexible schedule that the Town may desire.

Renew’s proposal is to provide all of the existing wells and necessary easements from the wells to the nearest county road. The Town would construct the new infrastructure required to convey the water to Castle Rock and operate the necessary facilities.

Legal Considerations of the Project Concept

The water rights associated with Renew’s project are not risky from a legal perspective. There is low risk that senior water
rights tributary to the South Platte River could place a call within the Lost Creek Basin, or that
the existing orders of the Ground Water Commission and the Lost Creek Ground Water
Management District could be challenged. All of Renew’s 3,886 acre-feet of the water has
already been authorized for municipal purposes outside of the basin. There is no risk of losing
any expected yield of the water rights, because no change application or augmentation plan
through the Water Court is for this project.

There is a risk that the water from the basin could not be reliable as a long-term solution.
Approximately 38.5 percent of the inflows into the basin are from precipitation or groundwater
inflow from small tributary valleys. The basin is heavily dependent on the operation of the
Henrylyn Irrigation District system. Henrylyn’s ditch flows through most of the southern reaches
of the basin (See Figure X), and 61.5 percent of the inflows into the basin are related to
Henrylyn’s operation. This water right is vulnerable to any operational changes of the Henrylyn
system. Water counsel for Renew believes that basin would be protected from the effects of
decreased return flows from the Henrylyn to the basin, because the Water Court would require
Henrylyn to replace any depletions. Also, because the basin has a relatively small drainage
area, water that could naturally recharge the basin is limited.

To deliver this water supply to the Town, a combination of existing and newly constructed
infrastructure is anticipated. Detailed below is a description of the infrastructure components
necessary for developing the Lost Creek Basin water supply for the full-scale and scaled-back
projects.
Water Rights and Alluvial Well Field - Renew currently owns 35 wells of varying age and condition located throughout the Lost Creek Basin that are capable of delivering 3,886 acre-feet per year. The unit cost for 3,886 acre-feet of water is $23,000 per acre-foot. To provide the full 6,000 acre-feet per year as requested in the full-scale project, Renew would purchase additional water rights and wells that would then be conveyed to the Town for $24,000 per acre-foot. Renew would change the water rights for municipal use in Douglas County at no additional cost. Conveyance of the wells would also include easements for the well site and to the nearest public road. The project proposal assumes rehabilitating or redrilling all of the wells.

Well Collection System – The well collection system would be a simple network of pipelines, ranging from 6 to 20 inches in diameter, and would gather water produced at each of the wells for delivery to a central treatment location. Total length of pipeline is estimated to be approximately 20 miles.

Water Treatment Plant – The Renew proposal anticipates an advanced water treatment plant to treat basin water to Rueter-Hess Reservoir water quality standards. The project proposal includes approximately 90 acres of land to locate the treatment plant and evaporation pond for the brine.

Lost Creek Pipeline and Conveyance System – A combination of existing and newly constructed infrastructure would be used to convey water from the basin to E-470 and Chambers. First, the project would require the construction of a new pipeline from the water treatment plant (described above) to the East Cherry Creek Valley Northern Pipeline. The newly constructed pipeline would be approximately 6.7 miles. Renew's project proposal has the ability to connect into either the Prairie Waters Pipeline or the East Cherry Creek Valley...
Pipeline. While evaluating this proposal, staff assumed delivery to the East Cherry Creek Valley pipe. Castle Rock currently owns 1.4 million gallons per day of capacity in that pipe, so the Town would only need to purchase an additional 4 million gallons per day in capacity to have the ability to deliver the full 6,000 acre-feet per year on a constant flow basis. 5.4 million gallons per day of capacity in East Cherry Creek Valley’s north and south pump stations would need to be negotiated as part of the conveyance system. Staff contacted East Cherry Creek Valley management and confirmed that Castle Rock could enter into negotiations to purchase additional infrastructure. The last piece of the conveyance system is a pipeline from East Cherry Creek Valley’s Smoky Hill Road Tank Farm down to E-470 and Chambers Road. East Cherry Creek Valley owns an existing pipeline (east/west pipe) along E-470 (shown in green on above map). South Metro, Denver and Aurora are currently in negotiations with East Cherry Creek Valley to purchase the pipeline. Castle Rock could either participate in the purchase of the pipe with other partners or could opt to construct a new pipeline to make the connection. The cost (approximately $7 million) for a new 7.7-mile pipeline is assumed in this project.

Denver Basin Aquifer Well Facilities
Two thousand acre-feet of an imported renewable supply will only meet the Town’s needs until around 2030. The scaled-back option with a groundwater supplement assumes that the Town will complete Denver Basin groundwater wells in the Cherry Creek Basin to be stored in Rueter-Hess for use during peak demands. The Town may also choose to develop another renewable water project instead of deep basin groundwater.

Financial Analysis
Staff compiled a Long-Term Capital Improvements Plan for the Renew proposal for both a full-scale project and scaled-back project (See Appendix B-C). These cost tables provided the cornerstone for evaluating the impacts to the Town and its customers by including the Renew proposal as part of the Town’s water resources program. The tables and figures in this section illustrate the key observations and findings. The results are summarized for 2012; in five-year, cumulative increments from 2015 through 2030; and then in 10-year cumulative increments thereafter through 2050.

The net present value of the full-scale option is $572 million. The values for the scaled-back options are $253 million and $433 million. The chart below shows the net present value for all three options and breaks out the capital and operation and maintenance costs.
The capital costs in the scaled-back without groundwater project are almost half as much as the full-scale project. That is due to the Town only purchasing one-third of the water rights in the scaled-back project. The slight increase to the capital costs in the scaled-back project backed by groundwater is due to the groundwater wells needed to meet demands after 2030.

Figure R-2 compares the water supply portfolio over time with Renew's project included to the 75 percent renewable water and 25 percent nonrenewable water goal approved in the Water Resources Strategic Master Plan. Renew's full-scale project attains the Town's goal of 75 percent renewable water by build out. The scaled-back project never attains the Town's goal of 75 percent renewable water because, in this analysis, the scaled-back project is supplemented in future years with the Town's nonrenewable supply.
Figures R-3 through R-5 show the impact on customers’ combined Water and Water Resources monthly bill for the full-scale and scaled-back projects. For reference, the adopted 2012-2015 combined monthly water and water resources payments are shown on each chart. These charges are based on a water resources program that will import close to 6,000 acre-feet of renewable water evenly over time by 2050. Where the adopted rates end in 2015, the charges are escalated at 3 percent annually.
For the full-scale project, each customer class would see large up-front increases resulting from the initial investment. The scaled-back project climbs early on and levels out for some time. However, in 2030, the impact of high operating costs of the groundwater supply is felt, as the charges increase sharply though 2050.

Figures R-6 and R-7 show the affordability of the water resources program for the residential customer for all three financing scenarios. The affordability assessment compares the total
annual utility payment (includes Water, Wastewater, Water Resources, Stormwater, and property tax, if applicable) against the 2010 Median Household Income within a 3-mile radius of Town. The median income, as reported by the Castle Rock Economic Development Council, is $95,406; 65 percent of households report an annual income of $75,000. The total annual utility payment is considered affordable if it stays below 2 percent of the median income. In Figure R-6, for the full-scale Renew project, because of the initial investment up front in the water rights, the utility payment from 2012-2015 goes above the “affordable” threshold. For the scaled-back project (with supplemental groundwater), the utility bills remain affordable throughout the study period (2012-2050)

Figure R-6

Renew – Residential affordability – Full scale

Utility Payment as Percent of Median Household Income: Renew
The impact of financing a significant portion of the Renew solution early in the program is equally evident in the timing of debt issuance. For the full-scale project, the Renew proposal revenue bond scenario requires $60 million in debt proceeds issued in 2012, and reaches maximum debt issuance of $185 million in 2015. Between 2016 and 2050, no further debt issuance is required. This is the largest and most immediate debt issue of the four responders. For the scaled-back project, the revenue bond scenario requires $50 million in debt proceeds issued in 2015, and reaches maximum debt issuance of $63 million in 2040. Again, this is the largest and most immediate debt issue of the four responders.

Table R-1

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<th>2012</th>
<th>2015</th>
<th>2020</th>
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Environmental and Permitting Considerations

Based on the routine nature of the projects, it is reasonable to assume that any permits required for this project can be obtained. All the water rights Renew currently owns have been changed by the Colorado Ground Water Commission from agricultural to municipal and other uses of the water. At the time Renew submitted its proposal, 3,449 acre-feet of the 3,886 acre-
feet had been approved for export from the Lost Creek Ground Water Management District. The remaining 437 acre-feet have now been approved. For the full-scale project, Renew would need to acquire an additional 2,114 acre-feet. New applications for changes of existing permits and applications for export may face a higher level of scrutiny.
Stillwater Resources & Investments, Inc.

Stillwater Resources & Investments, Inc., a Colorado Corporation, is a water brokerage and development firm based in Boulder that has been developing water supplies for clients since 1987. Walraven Ketellapper owns Stillwater and serves as its president. Stillwater has two other employees. The staff has worked on a wide variety of water acquisition and development projects in Colorado, Arizona, Nevada, California and New Mexico. Most recently, Stillwater has assisted the Woodmoor Water District, near Monument, in the acquisition of 4,000 acre-feet of water and more than 6,000 acre-feet of storage to replace its reliance on Denver Basin wells.

Project Concept

Stillwater, in conjunction with Boxelder Creek Properties, LLC, is proposing a project capable of delivering up to 4,000 acre-feet annually. Water would be pumped from an alluvial well field on Boxelder’s 850-acre farm on Box Elder Creek in Weld County, 6 miles east of Lochbouie. There are currently 11 alluvial wells on the property used for irrigation. Stillwater proposes to use 600 acre-feet of the water used for irrigation, along with additional water rights in the South Platte Basin (east of Greeley), to augment the depletions from pumping 4,000 acre-feet from the farm. Stillwater is targeting municipal effluent to comprise all or a portion of the additional South Platte water rights. Formerly, the farm was used to grow trees for a nursery, with water delivered by the Henrylyn Irrigation District and alluvial wells augmented by the Central Colorado Water Conservancy District. A major hail storm destroyed the trees in 2010, and now the farm is used to grow corn, wheat and sunflowers. Stillwater’s project proposal is to provide all of the existing wells and necessary easements from the wells to the nearest county road. The Town would construct the new infrastructure required to convey this water to Castle Rock and operate the necessary facilities.

To deliver this water supply to the Town, a combination of existing and newly constructed infrastructure is anticipated. Detailed below is a description of infrastructure components
particular to developing the Box Elder Creek water supply for the full-scale and scaled-back projects.

Water Rights

The Town would acquire water rights historically used on the farm, which Stillwater estimates will yield 600 acre-feet of consumptive use credits annually. The water rights would include junior irrigation water rights for the existing 11 wells and senior rights owned by the Henrylyn Irrigation District. The Town would also acquire the augmentation contract with the Central Colorado Water Conservancy District that is currently used to augment the well field.

In addition to the farm water rights, the Town would acquire an option to purchase 3,400 acre-feet of consumptive use credits tributary to the South Platte River to use to augment the well field. Stillwater has proposed three different packages of water: (1) a trade of irrigation water rights for effluent discharged to the South Platte River; (2) purchase of senior irrigation water rights; and (3) some combination of (1) and (2). Stillwater staff proposes to identify and negotiate the acquisition of the water rights. Stillwater estimates the cost of the water rights to be between $6,000 and $9,000 per acre-foot. Town staff would have the opportunity to analyze the yield and title of the water rights prior to purchase. Upon successful acquisition, the Town would file an application for a plan for augmentation in Water Court. After the Water Court enters a decree, the Town would then close on the purchase of the well field and make final payments for the water rights.

Box Elder Creek Farm Well Field

The Town will acquire 11 existing irrigation wells on the farm, capable of producing 4,000 acre-feet per year at a constant year-round rate for the full-scale project, or 2,000 acre-feet per year at any demand curve the Town desires. The purchase of the wells would also include easements for the wells, easements for pipelines on the farm and an easement for a water treatment plant. The project proposal includes the cost for redrilling or rehabilitating the existing wells so they would be capable of municipal production.

Well Collection System – The well collection system would be a network of pipelines collecting the well water and pumping it to the on-site water treatment plant. All easements necessary for the pipelines have been included in the cost of the well field. Included in this cost is a pump station to pump the water from the farm to East Cherry Creek Valley’s northern water treatment plant.

Water Treatment Plant – The water quality in the Box Elder Creek basin is consistent with water quality on the South Platte River. The Stillwater proposal anticipates treating two-thirds of the water with reverse osmosis and blending the rest to produce water with water quality acceptable to be stored in Rueter-Hess. The cost for an easement on the farm for a water treatment plant is included in the cost of the farm.

Box Elder Creek Pipeline and Conveyance System – A combination of existing and newly constructed infrastructure would be used to convey water from Box Elder Creek to E-470 and
Chambers. First, the project would require the construction of a new pipeline from the Box Elder Creek water treatment plant (described above) to the East Cherry Creek Valley north/south pipe. Along with the 1.4 million gallons per day that Castle Rock currently owns in the pipe, Stillwater’s proposal would need an additional 2.2 million gallons per day capacity to deliver 4,000 acre-feet per year on a constant flow basis. Also, 3.6 million gallons per day of capacity in ECCV’s north and south pump stations would need to be obtained as part of the conveyance system. The last piece of the conveyance system would be a new pipeline from East Cherry Creek Valley’s Smoky Hill Road Tank Farm to E-470 and Chambers Road. Stillwater’s proposal included the cost for a new 7.7-mile pipeline.

Northern Raw Water Storage – Depending on the type of water right obtained with this project (effluent or senior irrigation water rights), the Town may need to secure storage for timing replacement supplies back to the river or to store irrigation water for delivery to Town during non-irrigating months. The cost for this storage is not included in the proposal. If Stillwater and the Town can negotiate a trade of municipal effluent, no additional storage would be needed.

Denver Basin Aquifer Well Facilities
This project has a maximum yield of 4,000 acre-feet. In order to meet water demands in the long term, the Town would need to invest in new deep groundwater well facilities or future renewable water projects. In this analysis, staff assumed additional groundwater wells will be developed in the Cherry Creek basin meet the Town’s needs out until 2050. These wells would be pumped continuously and discharged into Cherry Creek, to be pumped out downstream and stored in Rueter-Hess. A more likely scenario is that, instead of firming the imported renewable water proposed in Stillwater’s project with groundwater, this project would be combined with another renewable water project to meet full build out demands without additional development of the Town’s deep aquifer supplies.

Legal Considerations of the Project Concept
The water rights associated with Stillwater’s project are municipal effluent or senior irrigation rights along the South Platte. To the extent that the Town could acquire municipal effluent, the legal risk would be minimized, as effluent does not need to be changed or quantified in the Water Court. Stillwater’s proposal includes acquiring “options” to purchase the water rights and well field instead of purchasing them outright. This would allow the Town to minimize its initial financial risk. Also, initial capital outlay is delayed until the Water Court approves the change of water rights (for irrigation rights) and augmentation plan (for irrigation water and/or effluent). There is a risk that water from Box Elder Creek could be unreliable as a long-term solution. The creek is somewhat dependent on the operation of the Henrylyn Irrigation District and Farmers Reservoir Irrigation Company’s systems. It is estimated that those systems contribute as much as 40 percent of the inflows into the basin. The Colorado Supreme Court’s decision in Burlington Ditch, Reservoir and Land Company v. Englewood may further reduce inflows to Box Elder Creek by as much as 25 percent. This project concept is vulnerable to operational changes of the Henrylyn and Farmers Reservoir systems.
Stillwater proposes to replace depletions from the well field in Box Elder Creek by making augmentation water available at the South Platte River, instead of where the pumping occurs. There are approximately 350 irrigation wells in the Box Elder Creek Basin. In the early 2000s, the Division Engineer curtailed pumping for a majority of those wells. Central Colorado Water Conservancy District operates large-scale augmentation plans for irrigation wells, including the wells detailed in the Stillwater proposal. There is risk that if Central was able to offer augmentation water in quantities sufficient to allow full irrigation pumping to resume, the aquifer could be taxed, and the Town’s pumping would be curtailed to prevent injury to senior irrigation wells. Even without full irrigation resuming, opponents to the Town’s application for augmentation plan could require the Town to replace depletions by delivering augmentation water to Box Elder Creek, instead of 25 miles downstream at the South Platte River. Even though this is a significant risk of the project, a 25-mile pipeline from the South Platte River to the Box Elder Creek well field could resolve it. This cost is not included in the financial analysis.

Financial Analysis

Staff compiled a Long-Term Capital Improvement Plan for the Stillwater proposal, for both full-scale and scaled-back projects (See Appendix B-C). These cost tables provided the cornerstone to evaluating the impacts to the Town and its customers by including the Stillwater proposal as part of the Town’s water resources program. The tables and figures in this section illustrate the key observations and findings.

The net present value of the full-scale option is $424 million. The values for the scaled-back options are $223 million (no supplemental groundwater) and $389 million (with supplemental groundwater). Figure S-1 shows the net present value for all three options and breaks out the capital and operation and maintenance costs. The net present value for the Stillwater full-scale project shows a relatively low capital cost, due to the low unit price of the targeted water rights. The scaled-back option without groundwater shows a significant decrease in operation and maintenance costs due to the shortened time period (2012-2030). There is a slight reduction in the capital costs for the scaled-back project due to the decrease in the amount of water rights. The net present value of the scaled-back project with groundwater reflects the added costs to develop a groundwater source to meet demands beyond 2,000 acre-feet of renewable water.
As mentioned in the legal analysis, our consultants feel there is significant risk to the project if the Town is required to replace depletions by delivering augmentation water to Box Elder Creek, instead of 25 miles downstream at the South Platte River. A 25-mile pipeline from the South Platte River to the Box Elder Creek well field could resolve the issue; however, this cost is not included in the financial analysis. The cost is estimated to be $30 million and would be included in any Town project with Stillwater. This was not modeled and would increase the net present value of the Stillwater options.

Figure S-1

Stillwater – Total long-term water program costs (net present value)

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<tr>
<td>Full Scale</td>
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<td>Scaled Back without Groundwater (2012-2030)</td>
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<td>Scaled Back with Groundwater (2012-2050)</td>
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Figure S-2 presents the water supply portfolio over time including Stillwater’s project, to the goal of 75 percent renewable water. The full scale water supply from Stillwater is sufficient for the Town to reach its goal of 75 percent renewable water by 2030. However, it does not meet the goal build out.
Figures S-3 through S-5 show the impact on customers’ combined Water and Water Resources monthly bill for the full-scale and scaled-back projects. For reference, the adopted 2012-2015 combined monthly Water and Water Resources payments are shown on each chart. These charges are based on a water resources program that will import close to 6,000 acre-feet of renewable water evenly over time by the year 2050. Where the adopted rates stopped, the charges are escalated at 3 percent per year.

**Figure S-3**

**Residential combined monthly Water/Water Resources payment**

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For the full-scale project, each customer class will see larger increases, as compared to the 2012-2015 adopted rates, resulting from the initial capital investment to develop the Box Elder Creek water supply. The scaled-back project tracks close to the adopted charges but stays lower over time. However, in 2030, the impact of the high operating costs of the groundwater supply – as well as additional investment in the non-Town-owned regional water treatment plant – are felt, as the charges increase sharply though 2050.
Figures S-6 and S-7 show the affordability of the water resources program for the residential customer for all three financing scenarios. The total annual utility payment is considered affordable if it stays below 2 percent of the Median Household Income. In both the full-scale and scaled-back projects, annual utility payments remain affordable throughout the study period (2012-2050).

Figure S-6
Stillwater – Residential affordability – Full scale

Figure S-7
Stillwater – Residential affordability – Scaled back
From a debt perspective, Stillwater’s full-scale proposal revenue bond scenario requires no issuance of debt until around 2050. The maximum debt proceeds issued is $24 million.

For the scaled-back project, the revenue bond scenario requires $14 million in debt proceeds issued in 2020 and reaches maximum debt issuance of $26 million in 2040. Here again, the closeness in costs between Stillwater’s full-scale and scaled-back solutions are reflected in the comparable cumulative debt proceeds. Cumulative debt proceeds are higher for the scaled-back project due to the timing of the capital versus operation and maintenance costs.

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Environmental and Permitting Considerations

The largest permitting issue will be any change of water rights, and the approval of an augmentation plan through Water Court. The Water Court application would most likely draw significant opposition from northern Front Range water users.

Stillwater proposes that the Town utilize water rights owned by Henrylyn (estimated yield of 300 acre-feet consumptive use credits) that legally accompany the farm. There is substantial risk that Henrylyn will not approve the change to these water rights so that the Town could use them outside of the Henrylyn service area for augmentation and/or municipal uses. The pumping of the existing wells at the farm has been augmented pursuant to the Central Colorado Water Conservancy District’s augmentation plan (decreed in Case No. 02CW332). There is a significant risk that Central will not authorize the Town to convert the existing contracts for up to 300 acre-feet of augmentation of municipal use in Douglas County. The evaluation team agrees that the Town should consider acquiring an additional 600 acre-feet of effluent or senior irrigation water rights on which to rely.

Based on the routine nature of the work, it is reasonable to assume that all other permits required for this project could be obtained.
**United Water and Sanitation District**

United Water and Sanitation District is a water and sanitation district created in 2003 pursuant to Article 1 of Title 32 of the Colorado Revised Statutes and has a statewide service plan. Bob Lembke and Ron von Lembke lead United as president and chief of staff, respectively. They, along with their staff, work to acquire, construct, finance and maintain water resources and water infrastructure in the State of Colorado. In the last eight years, United, with its several enterprises and with related districts, has completed water transactions with East Cherry Creek Valley, Arapahoe County Water and Wastewater Authority and the Town of Lochbuie.

**Project Concept**

United Water and Sanitation District proposes to supply the Town with up to 6,000 acre-feet of renewable water on average. United would identify a diversified portfolio of 6,000 average acre-feet of agricultural rights in the lower South Platte River basin. United and the Town would work together to analyze the water rights and, if acceptable, purchase and adjudicate them. The water rights would ultimately be conveyed from farms or ditches by means of exchange, diversion and pipeline conveyance to Barr Lake, where the water will be recharged through United’s recharge facilities in the alluvium of the Beebe Draw. The water would be treated at East Cherry Creek Valley’s water treatment plant in Brighton and conveyed via pipeline to E-470 and Chambers Road. For this project, United proposes that the Town and United form a separate Authority, pursuant to Article 1 of Title 32 of the Colorado Revised Statutes, for the purpose of acquiring,
constructing, developing and operating this renewable water system for the Town.

The new and existing facilities required to develop United’s project concept for the Town and a table of costs for both the full-scale and scaled-back projects are detailed below.

**Water Rights**

United will identify and review title for senior irrigation water rights on the South Platte River from Greeley to Fort Morgan, or upstream of Greeley on the Cache la Poudre River. United would use its well-located reservoirs, pipelines and diversion facilities to overcome any limitations the water rights may have due to their historic farm location. For the package of water rights offered to the Town, United proposes to target an average annual yield of 6,000 acre-feet and a dry-year yield of 3,400 acre-feet, or 60 percent of the average annual yield. The Town would pay $23,850 per acre-foot, based on the average annual amount of fully consumable water approved by the Water Court. The unit cost of the water, which includes the water right itself, also includes the integration into United’s system and all infrastructures required to capture, retie and deliver the water to the East Cherry Creek Valley Northern Water Treatment Plant in Brighton. The Town and United would jointly prosecute a Water Court application, and the Water Court would determine the average annual yield and dry-year yield. United also proposes to purchase, at its own expense, an additional 600 acre-feet of approved senior irrigation water rights to act as an insurance policy if any of the minimum requirements are not met after the Water Court issues its decree.

**Northern Raw Water Storage** - In order to achieve a firm annual yield of 6,000 acre-feet, raw water storage is required, because the dry-year yield could be as low as 3,600 acre-feet. Water resources consultant Wheeler estimates that 5,000 acre-feet of storage would be required for the full-scale project, and 1,200 acre-feet for the scaled-back project. The additional cost (approximately $30 million) for northern raw water storage is included in this analysis due to the delivery schedule United proposes. Because the water is delivered when the Town has the greatest demands, very little of this water may be stored in Rueter-Hess, so northern raw water storage is required.

**Gilcrest Reservoir** – In order to reduce pumping costs from the 70 Ranch and to improve the water quality delivered to the Northern Water Treatment Plant, storage would be needed at Gilcrest Reservoir and near United’s Diversion No. 3. This storage would enhance the opportunity for exchange at the St. Vrain pipeline. The storage enhances the project by reducing the pumping costs from the 70 Ranch and improving water quality. However, it is not necessary for the success of the project. This cost has been considered but is not included in the total costs for the project.

**Water Treatment Plant** – United will deliver the full yield produced by the water rights to East Cherry Creek Valley’s Northern Water Treatment Plant on whatever demand schedule the Town desires, up to 12 million gallons per day. The water delivered will be groundwater, either from wells near the South Platte River on United’s 70 Ranch or from the Beebe Draw aquifer.
The Town would be responsible for negotiating with East Cherry Creek Valley for up to 12 million gallons per day of capacity in the Northern Water Treatment Plant.

Conveyance System – A combination of existing and newly constructed infrastructure would be used to convey water from the Northern Water Treatment Plant to E-470 and Chambers. The Town would need to negotiate an additional 10.4 million gallons per day of capacity in East Cherry Creek Valley’s north/south pipe (above the 1.4 million gallons per day the Town currently owns) for the full-scale project and 5.5 million gallons per day for the scaled-back project. Also, the Town would purchase 12 million gallons per day (full scale) or 5.3 million gallons per day (scaled back) of capacity in East Cherry Creek Valley’s North and South Pump Stations, which would move the water from the Northern Water Treatment Plant south to East Cherry Creek Valley’s Tank Farm at E-470 and Smoky Hill Road. The last piece of the conveyance system would be a pipeline from East Cherry Creek Valley’s Tank Farm to E-470 and Chambers Road. United’s proposal includes the cost for a new 7.7-mile pipeline.

Legal Considerations of the Project Concept

This project is extremely complex, and future agreements between the Town and United would require a significant amount of negotiation and close monitoring to ensure post-closing obligations are met. United has already constructed a portion of the infrastructure required to deliver the water to the Town. United has committed to construct the 70 Ranch and St. Vrain pipelines to increase the reliability and possibly lower the cost of the project. The costs for those pipelines are included in the cost of the water rights. Any agreement between the Town and United regarding the construction of any future infrastructure needs to have definite timelines for performance, allocation of costs and stringent remedies for breaches of contract so that the Town can obtain water deliveries on time. United’s project concept relies on the delivery of water into the Upper Beebe Draw Aquifer. There are risks regarding the sustainable yield of the aquifer at the locations where United proposes to deliver and withdraw the water.

Financial Analysis

Staff compiled a Long-Term Capital Improvements Plan for the United proposal, for both a full-scale project and scaled-back project (See Appendix B-C). These cost tables provided the cornerstone to evaluating the impacts to the Town and its customers by including the United proposal as part of the Town’s water resources program. The tables and figures in this section illustrate the key observations and findings. The results are summarized for 2012; in five-year cumulative increments from 2015 through 2030; and then in 10-year cumulative increments thereafter through 2050.

The net present value of the full-scale option is $671 million. The values for the scaled-back options are $290 million (no supplemental groundwater) and $464 million (with supplemental groundwater). Figure U-1 shows the net present value for all three options and breaks out the capital and operation and maintenance costs. The net present value for the full-scale option is relatively large, due to the high cost of the water rights. The scaled-back project without groundwater shows a significant savings due to the reduced amount of water rights and a
slight reduction in the necessary size of the infrastructure. The scaled-back project backed by groundwater shows a slight increase in capital costs for the groundwater wells and shows an increase in the operation and maintenance because of the longer study period (2012-2050).

United’s proposal relies heavily on non-Town-owned infrastructure to accomplish its solution. These costs are included in the Capital Improvement Plan related to operation and maintenance. Reductions to water rights and infrastructure costs are reflected in the scaled-back options.

Figure U-2 compares the water supply portfolio over time, considering United’s project to the goal of 75 percent renewable water. By 2050, for the full-scale option, the Town reaches the goal at 75 percent renewable water; however, the scaled-back option is approximately 50 percent.
Figures U-3 through U-5 show the impact on customers’ combined Water and Water Resources monthly bill for the full-scale and scaled-back projects. For reference, the adopted 2012-2015 combined monthly Water and Water Resources payments are shown on each chart. These charges are based on a water resources program that will import close to 6,000 acre-feet of renewable water evenly over time by the year 2050. Where the adopted charges end in 2016, the charges were escalated at 3 percent per year.
For the full-scale project, each customer class would see large up-front bill increases resulting from the initial investment to develop United’s target water supply. The scaled-back project increases early and levels out from 2020 to 2030. However, in 2030 the impact of high operating costs of the groundwater supply and an additional investment of $27 million in non-Town owned assets is felt, as the charges increase sharply through 2050.
Figures U-6 and U-7 show the affordability of the water resources program for the residential customer for all three financing scenarios. In the full-scale project, by 2015, the annual utility payments are above the affordable threshold of 2 percent of the median household income. This is because of the up-front investments. By 2020, it is back down in the affordable range, but stays nearer to the 2 percent threshold for the rest of the study period. For the scaled-back project, the annual utility bills are consistently in the affordable range. In 2015, the payments almost rise to the 2 percent threshold.

**Figure U-6**

**United – Residential affordability – Full scale**

**Figure U-7**

**United – Residential affordability – Scaled back**
For the full-scale project, the United proposal would require $20 million in debt proceeds issued in 2015; it would reach maximum debt issuance of $35 million in 2020. Between 2016 and 2050, no further debt issuance would be required. The scaled-back project would require $18 million in debt proceeds issued in 2015, reaching a maximum debt issuance of $50 million in 2030. More debt could be issued in the scaled-back project, because there would be more Town-owned assets, which are bondable.

Table U-1

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Environmental and Permitting Considerations

The largest permitting issue will be the Water Court application. This action would be complex and very likely would draw significant opposition from northern Front Range water users.

Based on the routine nature of the projects, it is reasonable to assume that all other permits required for this project could be obtained.
WISE Partnership

The Water Infrastructure and Supply Efficiency Partnership is comprised of the City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water); the City of Aurora, acting by and through its Utility Enterprise (Aurora Water); and the South Metro Water Supply Authority. Denver Water serves water to 1.3 million people in the city of Denver and many surrounding suburbs. The utility is a public agency, established in 1918, and is Colorado’s oldest and largest water utility. Aurora Water, an enterprise fund utility, serves water to more than 310,000 customers. Under city charter, the Aurora City Council acts as the board overseeing Aurora Water; a Water Policy Committee, consisting of three council members, provides direction for the department. South Metro was founded in 2004 with the idea of creating a regional water authority for the smaller water entities in south Denver. There are currently 15 members of South Metro. Together, the members represent (by size) more than half of Douglas County and 10 percent of Arapahoe County.

The WISE Partnership was established under an Intergovernmental Agreement dated May 13, 2009. The agreement created a mechanism by which the three parties could jointly identify, share and acquire certain infrastructure, water rights and other assets that may be used in a joint project. In August 2009, Town Council passed a resolution approving the Denver – Aurora – South Metro IGA Participation Agreement, which committed the Town to the same joint efforts agreed to in the original agreement between Denver, Aurora and South Metro. Since the execution of the agreement, Denver, Aurora and South Metro have been exploring sustainable regional water supply opportunities and have prepared a draft water delivery agreement for Castle Rock’s consideration.

The intent of the agreement is to make Denver Water and Aurora Water’s excess reusable return flows available to the South Metro participants on a permanent, but intermittent, basis. Pursuant to the agreement, Denver Water and Aurora Water would supply South Metro participants up to 100,000 acre-feet of fully consumable and reusable water over a 10-year block. Extensive modeling has shown that the project could be expanded in the future by more than 60,000 acre-feet annually over a 10-year block. Castle Rock, as one of South Metro’s 15 members, may take delivery of any pro rata portion of South Metro’s water supply. Most of the infrastructure needed to divert, treat and convey renewable water to the

### South Metro Member Agencies

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<th>Agency Name</th>
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<tr>
<td>Castle Pines North Metropolitan District</td>
</tr>
<tr>
<td>Town of Castle Rock</td>
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<tr>
<td>Centennial Water and Sanitation District</td>
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<td>Dominion Water and Sanitation District</td>
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</table>
Town’s desired delivery point at E-470 and Chambers Road is already constructed. With minor additional infrastructure, WISE is ready to begin deliveries to South Metro members as soon as June 2013. The WISE partners would construct, operate and maintain all infrastructures necessary to deliver water to E-470 and Chambers Road.

For the full-scale project, costs modeled were based on a Town subscription level of 3,525 acre-feet; a 2,000 acre-feet subscription level was used for the scaled-back option. The cost models include groundwater development to supplement the water supply as demand grows.

From June 2013 through May 31, 2020, Denver Water and Aurora Water would make deliveries based on a “Phase-In” Schedule. The minimum amount of water delivered annually to South Metro would be 5,000 acre-feet. South Metro would be obligated to take (e.g. use and pay) or make payment to Denver and Aurora according to the following schedule:

<table>
<thead>
<tr>
<th>Delivery year</th>
<th>Take or pay amount (acre-feet/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/1/2013-5/31/2014</td>
<td>0</td>
</tr>
<tr>
<td>6/1/2014-5/31/2015</td>
<td>1,000</td>
</tr>
<tr>
<td>6/1/2015-5/31/2016</td>
<td>2,000</td>
</tr>
<tr>
<td>6/1/2016-5/31/2017</td>
<td>2,500</td>
</tr>
<tr>
<td>6/1/2017-5/31/2018</td>
<td>3,000</td>
</tr>
<tr>
<td>6/1/2018-5/31/2019</td>
<td>4,000</td>
</tr>
<tr>
<td>6/1/2019-5/31/2020</td>
<td>5,000</td>
</tr>
</tbody>
</table>

Water in excess of 5,000 acre-feet would be delivered as available. However, South Metro is not obligated to take or pay for it. In the worst case, during the phase-in delivery schedule, there could be no more than six months without any water delivery.

Beginning in June 2020, the water delivery schedule will transition to a permanent schedule. Denver Water and Aurora Water would provide South Metro fully consumable water totaling 100,000 acre-feet in each 10-year block. The permanent schedule has maximum and minimum limitations regarding the amount of water that can be delivered and, in the worst case, allows for:

- No significant deliveries during 35 consecutive months.
- A minimum total of 20,000 acre-feet delivered during nine consecutive years, averaging 2,200 acre-feet per year.
- A total of 90,000 acre-feet delivered during 5.2 consecutive years, averaging 17,300 acre-feet per year.

Denver Water and Aurora Water have conducted extensive modeling to confirm that they have adequate water supplies to meet the minimum delivery obligations. The modeling is based on hydrologic conditions from 1950 to 1991, overlain with current water rights and water administration practices.
Pursuant to an additional proposed agreement between Denver Water and Aurora Water, Denver will have a preferential option to take delivery of all of the WISE supplies from October through April in three years out of a 10-year period, and no more than 15 years out of a 100-year period. During those periods of deliveries to Denver Water, no water will be available to South Metro, except to extent required to meet the minimum delivery obligations per the permanent schedule.

The new and existing facilities required to connect South Metro to the Denver Water and Aurora Water systems, and a table of costs for the Town Rock’s pro rata share for both the full-scale and scaled-back projects, are detailed below.

**Water Rights**

The subject water rights are wholly owned by Aurora Water or Denver Water and can be used for all municipal uses. It is estimated that in 2013, South Metro would pay $5.38 per 1,000 gallons for fully consumable, reusable and treated water delivered to a master meter location. Pricing for the water is based upon American Water Works Association cost of service rate-setting principles and takes into account the value of water and infrastructure contributed by each partner. The billing rate will be periodically reviewed and adjusted to reflect then-current costs. Included in the rate are capital and operation and maintenance costs for the following partners’ assets used in the WISE Partnership (Table W-1).
Table W-1
WISE – Assets used to set water delivery rate

<table>
<thead>
<tr>
<th>Asset</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prairie Waters Project North Campus</td>
<td>Aurora</td>
</tr>
<tr>
<td>Prairie Waters Project Pump Stations</td>
<td>Aurora</td>
</tr>
<tr>
<td>Prairie Waters Project Pipelines</td>
<td>Aurora</td>
</tr>
<tr>
<td>Peter Binney Water Purification Facility</td>
<td>Aurora</td>
</tr>
<tr>
<td>East/west pipeline</td>
<td>East Cherry Creek Valley (sale to WISE Partnership is under negotiation)</td>
</tr>
<tr>
<td>Aurora Transmission System</td>
<td>Aurora</td>
</tr>
<tr>
<td>Denver International Airport Pipeline and Pump Station</td>
<td>Denver</td>
</tr>
<tr>
<td>Raw Water Supplies</td>
<td>Aurora and Denver</td>
</tr>
</tbody>
</table>

**WISE Project Subscription Fee**

Denver Water and Aurora Water ordinarily charge a system development charge, or tap fee, to customers connecting to their system. Instead, South Metro will pay a subscription fee to Denver Water and Aurora Water. The Denver Water fee is based on the current estimated cost of constructing an interconnect from the DIA pipeline to the Prairie Waters Project Pipeline. The Aurora fee is based on the cost of accelerating the construction of the remaining Prairie Waters capital projects by approximately five years in order to initiate average deliveries of 10,000 acre-feet in 2020.

**WISE Interconnect to Aurora**

In order to provide raw water to the WISE project prior to 2020, Aurora Water will construct an interconnect between its existing distribution system and the State Land Board pipeline located just south of the Aurora Reservoir and the Binney Water Purification Facility.

**Conveyance System**

East Cherry Creek Valley owns an existing pipeline (east/west pipe) along E-470 corridor. South Metro, Denver Water and Aurora Water are currently in negotiations with East Cherry Creek Valley to purchase the pipeline. Castle Rock could either participate in the purchase of the pipe with the other partners, or we could opt to construct a new pipeline to make the connection to the planned Chambers Pipeline. The cost for Castle Rock’s pro rata portion of a joint purchase of the existing pipeline ($5.9 million) is assumed in this project.
Denver Basin Aquifer Well Facilities
This project has an assumed maximum yield of 3,525 acre-feet. In order to meet water demands in the long term and to allow for large gaps between WISE deliveries, the Town must invest in new deep groundwater well facilities in the Cherry Creek basin. These wells would be pumped continuously into Cherry Creek and then pumped out downstream for storage in Rueter-Hess. A more likely scenario is that, instead of supplementing the supply with groundwater, this project would be combined with another renewable water project to meet full build out demands without additional development of the Town’s deep aquifer supplies.

Legal Considerations of the Project Concept
The Town will not own the water rights; however, all of the water sources to be delivered to South Metro are fully consumable, reusable and available for delivery without any additional Water Court approvals.

The permanent schedule is the biggest concern with the WISE Partnership project. There will be pressure to deliver large volumes in the first few years of each 10-year block. Once the obligation is met, no significant deliveries could be made for 35 consecutive months. This project relies on storage to bridge the periods of minimum deliveries. The Town currently owns 8,000 acre-feet in Rueter-Hess and is planning an aquifer storage and recovery program to develop further underground storage. It is highly likely that Denver Water and Aurora Water will meet the required deliveries under all future hydrologic conditions and that this project will be reliable long-term. Denver Water and Aurora Water expect that much more than 100,000 acre-feet in each 10-year block will actually be available, and the evaluation team believes this to be reasonable. Denver and Aurora, like any other municipal water provider, will likely continue to maintain and enhance their water supplies so that there is a substantial surplus at most times to cover worst-case droughts or other emergency conditions. Also, large volumes of water would be available for WISE deliveries during wetter-than-average years and periods of free river in the South Platte River Basin.

The agreement requires South Metro’s participants to (1) permanently abstain from pursuing or participating in any projects that would result in any new depletion of the Colorado River above the confluence with the Gunnison River and (2) abstain from pursuing or participating in any project that would result in any new depletion of the Gunnison and Yampa River basins for at least 25 years. South Metro has a legal opinion from its special legal counsel that this would not affect its ability to participate in the Flaming Gorge Project. The Town is participating in a feasibility study on the Flaming Gorge Project.

Financial Analysis
Staff compiled a Long Term Capital Improvements Plan for the WISE proposal for both a full-scale project and scaled-back project (See Appendix B-C). These cost tables provided the cornerstone to evaluating the impacts to the Town and its customers by including the WISE proposal as part of the Town’s water resources program. The tables and figures in this section illustrate the key observations and findings.
The net present value of the full-scale option is $603 million. The values for the scaled-back options are $253 million (no supplemental groundwater) and $444 million (with supplemental groundwater). Figure W-1 shows the net present value for all three options and breaks out the capital and operation and maintenance costs. As illustrated in the chart below, the full-scale project has little capital costs, however, it has significant operation and maintenance costs. There is a slight increase in capital costs for the scaled-back project with groundwater because of the costs of the groundwater facilities. Operation and maintenance costs for the scaled-back option with groundwater is less than the full-scale option, because having only 2,000 acre-feet of WISE water mitigates the unit cost and the costs associated with the high variability of the delivery schedule.

![Figure W-1](image)

The Capital Improvement Program related to operation and maintenance costs are high in both the full-scale and scaled-back projects due to: the cost of water per thousand gallons; the operating costs associated with the Plum Creek Water Purification Facility; and the large proportion of non-Town-owned assets. The scaled-back project capital costs are not significantly different than the full-scale costs due to minimal savings in Town-owned assets and a small increase in costs for groundwater development.

Below is a chart that compares the water supply portfolio over time considering the WISE project to the goal of 75 percent renewable water. In 2015, the WISE project would begin to deliver renewable water to Rueter-Hess, and the percentage of renewable water supply would be approximately 50 percent. For both the full-scale and scaled-back WISE project, the percentage of renewable water would hover around 60 percent. Because the delivery schedule is highly variable, a large portion of the WISE water would be stored for use during high-demand periods.
Figures W-3 through W-5 show the impact on customers’ combined Water and Water Resources monthly bill for the full-scale and scaled-back projects. For reference, the adopted 2012-2015 combined monthly Water and Water Resources payments are shown on each chart. These charges are based on a water resources program that will import close to 6,000 acre-feet of renewable water evenly over time by 2050. Where the adopted charges end in 2016, the charges are escalated at 3 percent per year.
For the full-scale project, each customer class will see large up-front bill increases resulting from the initial investment to develop the WISE, non-Town-owned project infrastructure. The bills stabilize for a time after 2015, as WISE deliveries from Denver and Aurora ramp up to the full 10,000 acre-feet annual average. After 2020, bills climb sharply, as water deliveries are initially plentiful but fall off as a result of periods of no water deliveries from Denver and Aurora, requiring ground water supplementation. The highly variable delivery schedule and the non-Town-owned infrastructure would impact the consistency of bills passed along to the Town’s customers. The scaled-back project follows the same trend as the full-scale project. However,
the bills would not be not as volatile, because the subscription amount and investment in non-
Town-owned capital projects would be reduced to 2,000 acre-feet.

Figures W-6 and W-7 show the affordability of the water resources program for the residential
customer for all three financing scenarios. In the full-scale project, the annual utility payments
are in the mid-to-upper affordable range. In 2030, for the revenue bond scenario, the payments
rise a bit above the 2 percent threshold. This is because of the infrastructure investment in
treatment of the water once WISE no longer has Denver’s mountain supplies to blend with the
South Platte River supplies. For the scaled-back project, the annual utility bills are consistently
in the affordable range.

**Figure W-6**

*WISE – Residential affordability – Full scale*

**Figure W-7**

*WISE – Residential affordability – Scaled back*
For the both the full-scale and scaled-back projects, the WISE proposal requires no debt issuance. The small amount of Town-owned capital can be cash-funded, and the larger amount of non-Town-owned assets is not eligible for bonding.

**Environmental and Permitting Considerations**

The success of the WISE project is highly dependent on storage for South Metro participants. The WISE Partnership has made significant progress with the Army Corps of Engineers in amending the current permit for Reuter-Hess Reservoir in order to allow for the storage of WISE supplies. The water delivery agreement as currently drafted is contingent upon the Rueter-Hess permit being amended to allow the storage of WISE water.
**Hybrid Option**

The hybrid option was developed to maximize the value of the renewable water supply while reducing early bill impacts early for Town customers. This option combines the WISE project at a 1,000 acre-feet subscription level with 2,000 acre-feet of South Platte water rights.

The WISE project has low up-front capital costs, because the Town would not purchase water rights and would use non-Town infrastructure. It also has relatively high operating costs in the middle to late years. By subscribing at 1,000 acre-feet, the variability and operating costs in the out years are reduced. The WISE project requires a large amount of storage. That storage will either be accomplished in Rueter-Hess (once the permit is amended) or in the aquifers underlying the WISE participants. There is little risk that Denver and Aurora would not meet the terms of the draft water delivery agreement.

The second component of this project is to purchase alluvial wells near the South Platte, or in a tributary drainage, and up to 2,000 acre-feet of senior irrigation water rights on the South Platte River now, to develop in 2030. Securing the water rights early in the project while delaying the infrastructure cost until later, rather than attempting both supply and infrastructure projects in a similar time frame, will reduce the bill impacts to each customer.

**Legal Considerations of the Project Concept**

The hybrid project has similar risk considerations as described in the analysis of the four proposals above.

**Financial Analysis**

As with all of the other projects, staff compiled a Long Term Capital Improvements Plan for the hybrid option (See Appendix D). The cost tables provided the cornerstone to evaluating the impacts to the Town and its customers. The tables and figures in this section illustrate the key observations and findings.

The hybrid option was analyzed using only revenue bond debt.

The net present value of the scenario, plus operating costs for 2012 through 2050, total approximately $455 million, supplemented with groundwater in starting in 2045. The net present value for a hybrid with no groundwater is $443 million. Figure H-1 shows a break out of the capital and operation and maintenance costs.
Below is a chart that compares the water supply portfolio over time, including the hybrid project to the goal of 75 percent renewable water.

In 2015, the water supply from WISE would ramp up to the full 1,000 acre-feet subscription level. By 2030, the Town’s water supply would have 56 percent renewable water. By 2050, the water supply would be close to the ultimate goal, at 70 percent renewable water. The hybrid project meets demands out until approximately 2048. At this point, the Town may develop another renewable water supply or may supplement the supply by further developing deep groundwater. For the purpose of this analysis, two options were considered: (1) with supplemental groundwater developed in 2045 and (2) with no groundwater. The option with no groundwater can meet the Town’s needs out to the year 2048.
Figures H-3 through H-5 show the impact on customers’ combined Water and Water Resources monthly bill for the hybrid option. For reference, the adopted 2012-2015 combined monthly Water and Water Resources payments are shown on each chart. These charges are based on a water resources program that will import close to 6,000 acre-feet of renewable water evenly over time by 2050. Where the adopted charges end in 2016, the charges are escalated at 3 percent annually.
Across all customer classes, the hybrid option is able to maintain the water rates that have been adopted through 2015. However, the water resources charges must be increased above the adopted rates.

Figure H-6 shows the affordability of the water resources program for the residential customer for only the revenue bond financing scenario. The hybrid option remains in the affordable range the entire study period. Out-year affordability approaches 2 percent as more debt is issued and as operating costs increase.
The hybrid project would require the issuance of debt beginning in 2020 of $3 million, with a maximum debt issuance of $114 million by 2050.

Table H-1
Hybrid – Year-end cumulative debt proceeds (in millions)

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Bond</td>
<td>$0</td>
<td>$0</td>
<td>$3</td>
<td>$12</td>
<td>$15</td>
<td>$66</td>
<td>$114</td>
</tr>
</tbody>
</table>
KEY OBSERVATIONS | THREE
The following section is intended to provide a summary of the key financial findings for the various options.

Figure K-1 presents side-by-side the net present value for full-scale and scaled-back options (with and without supplemental groundwater) for each proposal. The hybrid options were also included.

Figure K-1
Net present value – All options

Figure K-2 presents side-by-side the percent of renewable water for full-scale and scaled-back options for each proposal. For the individual proposals, the scaled-back options had the same renewable percentage, regardless of whether they were supplemented with groundwater. The hybrid option was also included.
The following figures graph a residential, 3/4-inch commercial and 2-inch commercial customer’s Water and Water Resources monthly charges for both the full-scale and scaled-back options (with groundwater). The hybrid option was also included.
Figure K-3
Residential combined monthly Water/Water Resources payment – Full scale

<table>
<thead>
<tr>
<th>Year</th>
<th>WISE</th>
<th>Stillwater</th>
<th>United</th>
<th>Renew</th>
<th>Hybrid</th>
<th>Adopted 2012-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>$84.95</td>
<td>$85.41</td>
<td>$91.85</td>
<td>$148.20</td>
<td>$71.52</td>
<td>$71.52</td>
</tr>
<tr>
<td>2015</td>
<td>$110.11</td>
<td>$104.06</td>
<td>$127.75</td>
<td>$148.20</td>
<td>$77.90</td>
<td>$77.90</td>
</tr>
<tr>
<td>2020</td>
<td>$111.72</td>
<td>$104.06</td>
<td>$125.70</td>
<td>$122.44</td>
<td>$88.32</td>
<td>$90.31</td>
</tr>
<tr>
<td>2025</td>
<td>$140.03</td>
<td>$98.40</td>
<td>$134.65</td>
<td>$122.59</td>
<td>$101.98</td>
<td>$104.69</td>
</tr>
<tr>
<td>2030</td>
<td>$174.13</td>
<td>$110.99</td>
<td>$140.73</td>
<td>$134.00</td>
<td>$117.40</td>
<td>$121.37</td>
</tr>
<tr>
<td>2040</td>
<td>$177.63</td>
<td>$136.33</td>
<td>$158.97</td>
<td>$159.35</td>
<td>$152.82</td>
<td>$163.11</td>
</tr>
<tr>
<td>2050</td>
<td>$210.97</td>
<td>$170.37</td>
<td>$186.84</td>
<td>$178.95</td>
<td>$204.01</td>
<td>$219.20</td>
</tr>
</tbody>
</table>

Figure K-4
Residential combined monthly Water/Water Resources payment – Scaled back

<table>
<thead>
<tr>
<th>Year</th>
<th>WISE</th>
<th>Stillwater</th>
<th>United</th>
<th>Renew</th>
<th>Hybrid</th>
<th>Adopted 2012-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>$74.28</td>
<td>$74.05</td>
<td>$77.73</td>
<td>$74.74</td>
<td>$71.52</td>
<td>$71.52</td>
</tr>
<tr>
<td>2015</td>
<td>$93.00</td>
<td>$86.42</td>
<td>$119.47</td>
<td>$91.02</td>
<td>$79.69</td>
<td>$77.90</td>
</tr>
<tr>
<td>2020</td>
<td>$100.78</td>
<td>$91.82</td>
<td>$103.76</td>
<td>$95.27</td>
<td>$88.32</td>
<td>$90.31</td>
</tr>
<tr>
<td>2025</td>
<td>$108.59</td>
<td>$97.82</td>
<td>$103.76</td>
<td>$101.07</td>
<td>$101.98</td>
<td>$104.69</td>
</tr>
<tr>
<td>2030</td>
<td>$124.45</td>
<td>$108.68</td>
<td>$111.48</td>
<td>$113.83</td>
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<td>$121.37</td>
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<td>$133.61</td>
<td>$141.31</td>
<td>$135.69</td>
<td>$144.11</td>
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<td>$163.11</td>
</tr>
<tr>
<td>2050</td>
<td>$165.26</td>
<td>$175.75</td>
<td>$168.23</td>
<td>$178.81</td>
<td>$204.01</td>
<td>$219.20</td>
</tr>
</tbody>
</table>
Figure K-5
Commercial (3/4-inch) combined monthly Water/Water Resources payment – Full scale

![Chart showing monthly payments for different sources over time.]

<table>
<thead>
<tr>
<th>Year</th>
<th>Wise</th>
<th>Stillwater</th>
<th>United</th>
<th>Renew</th>
<th>Hybrid</th>
<th>Adopted 2012-2015</th>
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</thead>
<tbody>
<tr>
<td>2012</td>
<td>$87.89</td>
<td>$88.35</td>
<td>$94.79</td>
<td>$151.14</td>
<td>$74.02</td>
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<td>$107.00</td>
<td>$130.69</td>
<td>$151.14</td>
<td>$82.42</td>
<td>$80.63</td>
</tr>
<tr>
<td>2020</td>
<td>$114.66</td>
<td>$107.00</td>
<td>$130.41</td>
<td>$125.38</td>
<td>$91.46</td>
<td>$93.48</td>
</tr>
<tr>
<td>2025</td>
<td>$143.43</td>
<td>$101.59</td>
<td>$140.11</td>
<td>$125.85</td>
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<td>$108.36</td>
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<tr>
<td>2030</td>
<td>$177.90</td>
<td>$114.84</td>
<td>$146.71</td>
<td>$137.85</td>
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<td>$125.62</td>
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<tr>
<td>2040</td>
<td>$182.70</td>
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<td>$167.00</td>
<td>$164.53</td>
<td>$158.17</td>
<td>$168.83</td>
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<tr>
<td>2050</td>
<td>$217.78</td>
<td>$177.33</td>
<td>$197.62</td>
<td>$185.91</td>
<td>$211.19</td>
<td>$226.89</td>
</tr>
</tbody>
</table>

Figure K-6
Commercial (3/4-inch) combined monthly Water/Water Resources payment – Scaled back

![Chart showing scaled monthly payments for different sources over time.]

<table>
<thead>
<tr>
<th>Year</th>
<th>Wise</th>
<th>Stillwater</th>
<th>United</th>
<th>Renew</th>
<th>Hybrid</th>
<th>Adopted 2012-2015</th>
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</thead>
<tbody>
<tr>
<td>2012</td>
<td>$76.78</td>
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<td>$80.23</td>
<td>$77.24</td>
<td>$74.02</td>
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<td>$115.77</td>
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<td>$108.36</td>
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<tr>
<td>2050</td>
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<td>$182.79</td>
<td>$174.88</td>
<td>$185.90</td>
<td>$211.19</td>
<td>$226.89</td>
</tr>
</tbody>
</table>
Figure K-7
Commercial (2-inch) combined monthly Water/Water Resources payment – Full scale

![Graph showing monthly payment for different sources over time]

- WISE: $860.10 to $1,856.52
- Stillwater: $865.62 to $1,355.44
- United: $942.83 to $1,662.51
- Renew: $1,618.47 to $1,770.28
- Hybrid: $722.67 to $2,058.54
- Adopted 2012-2015: $722.67 to $2,213.60

Figure K-8
Commercial (2-inch) combined monthly Water/Water Resources payment – Scaled back

![Graph showing monthly payment for different sources over time]

- WISE: $755.77 to $1,622.31
- Stillwater: $753.01 to $1,727.79
- United: $797.13 to $1,758.60
- Renew: $761.28 to $1,761.60
- Hybrid: $722.67 to $2,058.54
- Adopted 2012-2015: $722.67 to $2,213.60
The following definitions were provided from research at http://www.ext.colostate.edu/pubs/crops/04717.html

Acre-foot - The volume of water required to cover one acre of land to a depth of one foot (43,560 cubic feet, or 325,851 gallons).

Adjudication – The judicial process through which the existence of a water right is confirmed by court decree.

Alluvial groundwater - Groundwater that is hydrologically connected to a surface stream that is present in permeable geologic material, usually small rock and gravel.

Aquifer - Underground deposits of sand, gravel or rock, saturated with water. The two major types of aquifers are confined and unconfined.

Augmentation plan - A court-approved plan that allows a junior water user to divert water out of priority, so long as adequate replacement is made to affected stream systems, preventing injury to the water rights of senior users.

Basin - The area of land that drains to a particular river.

Call - The request by an appropriator for water to which the person is entitled under his decree; such a call will force users with junior decrees to cease or diminish their diversions and pass the requested amount of water to the downstream senior making the call.

Change of water right - Any change in a way a water right is used. Can be changed in type, place, time of use, point of diversion, adding points of diversion, etc. Changes of water rights must be approved by the Water Court to assure that no injury occurs to other water rights.

Consumptive Use – (1) Any use of water that permanently removes water from the natural stream system. (2) Water that has been evaporated, transpired or incorporated into products, plant tissue or animal tissue and is not available for immediate reuse.

Decree - An official document issued by the court defining the priority, amount, use and location of a water right.

Decreed water right - A court decision placed on a water right that is then administered by Colorado’s Water Resources Department.

Depletion - The loss of water from surface water reservoirs or groundwater aquifers at a rate greater than that of recharge.

Designated groundwater - Groundwater which, in its natural course, is not available to or required for the fulfillment of decreed surface rights, and which is within the geographic boundaries of a designated groundwater basin.
Designated groundwater basins - Areas of the state established by the Ground Water Commission located in the Front Range and Eastern Colorado.

Diversion - Removal of water from its natural course or location by canal, pipe or other conduit.

Division engineer - The state engineer’s principal water official in each of the seven water divisions.

Effluent - Water discharged after use.

Effluent exchange - The practice of exchanging wastewater effluent for other water sources without causing injury to other water rights; a replacement source of water for the diversion of water farther upstream that would otherwise have been out of priority.

Exchange - A process by which water, under certain conditions, may be diverted out of priority at one point by replacing it with a like amount of water at another point.

Firm annual yield - The yearly amount of water that can be dependably supplied from the raw water sources of a given water-supply system.

Free river – When there are no calls on a river, and any legitimate rights holder can divert the full amount decreed to them.

Groundwater - Groundwater, as opposed to surface water, is water that does not run off, and is not taken up by plants, but soaks down into an aquifer; a supply of fresh water under the earth’s surface that forms a natural reservoir.

Ground Water Commission - A 12-member body created by the Legislature, nine of which are appointed by the Governor, to carry out and enforce the state statutes, rules, regulations, decisions, orders and policies of the commission dealing with designated groundwater.

Ground Water Management District - Any district organized for the purpose of consulting with the Ground Water Commission on all designated groundwater matters within a particular district.

Hydrologic Cycle - The cycle of water movement from the atmosphere to earth and back again through evaporation, transpiration, condensation, precipitation, percolation, runoff and storage. See water cycle.

Irrigation district - A legal entity created by statute in order to develop large irrigation projects.

Irrigation year - The irrigation year, for the purposes of recording annual diversions of water for irrigation in Colorado, begins Nov. 1 and ends Oct. 31 each year.

Junior rights - Water rights that are more recent than older or more senior rights.

Municipal water system - A network of pipes, pumps and storage and treatment facilities, designed to deliver potable water to homes, schools, businesses and other users in a city or town, and to remove and treat waste materials.
National Environmental Policy Act - Federal law enacted to ensure the integration of natural and social sciences and environmental design in planning and decision-making for federal projects or projects on federal lands.

Nonconsumptive use - Water drawn for use that is not consumed. For example, water withdrawn for purposes such as hydropower generation. It also includes uses such as boating or fishing, where the water is still available for other uses at the same site.

Nontributary groundwater - Underground water in an aquifer that is situated so that it neither draws from, nor contributes to, a natural surface stream in any measurable degree.

Not nontributary groundwater - Statutorily defined as groundwater located within those portions of the Dawson, Denver, Arapahoe and Laramie-Fox Hills aquifers that is outside of any designated groundwater basin in existence on Jan. 1, 1985.

Point of diversion - A specifically named place where water is removed from a body of water.

Potable - Water that is considered safe for domestic human consumption; drinkable water.

Priority - (1) The right of an earlier appropriator to divert from a natural stream in preference to a later appropriator. (2) Seniority date of a water right or conditional water right to determine their relative seniority to other water rights and conditional water rights deriving water from a common source. Priority is a function of both the appropriation date and the relevant adjudication date of the right.

Priority date - The date of establishment of a water right. The rights established by application have the application date as the date of priority.

Raw water - Untreated water.

Recharge - Groundwater supplies are replenished, or recharged, when rain or snowmelt enters the saturation zone.

Recharge area - Reservoirs and ditches that are designed to replenish groundwater depletions due to out-of-priority diversions, by artificially introducing water into the groundwater aquifer.

Reclaimed water - Effluent usable for irrigation or ready for release into lakes and rivers.

Reservoir - A natural or artificial place to store water; water storage created by building a dam; a pond, lake or basin used for the storage, regulation and control of water.

Resume - A monthly publication by the Water Court of a summary of water rights applications filed in the court that month.

Return flow - The amount of water that reaches a surface or groundwater source after it has been released from the point of use and, thus, becomes available for further reuse.

Reuse - To use again; to intercept for subsequent beneficial use, either directly or by exchange. Water that would otherwise return to the steam system.
Reverse osmosis - A water-treatment method used to remove dissolved inorganic chemicals and suspended particulate matter from a water supply. Water, under pressure, is forced through a semipermeable membrane that removes molecules larger than the pores of the membrane.

River basin - The land area surrounding one river from its headwaters to its mouth; the area drained by a river and its tributaries.

River call – Usually, a written document filed with the division engineer, stating that as of a certain date and time, a water right holder is not receiving all of the water to which he or she is entitled to by decree. The document requests that the division engineer shut down or curtail all upstream water rights junior to the rights in question until the senior rights are satisfied.


Senior rights - Water rights that have been established first and are older than junior rights.

Single Family Equivalent – A numerical value assigned to a specific property based on the relative size and capacity of the potable water needed.

State engineer - The chief executive officer in the executive department of the state government who administers the adjudication decrees of the Water Court, defining water rights.

Storage water rights - Colorado law provides for “appropriation by storage” of water that will be captured in reservoirs and subsequently put to beneficial use in priority. Storage water applications are submitted to Water Court for adjudication and decree, similar to other water rights.

Structure - Any apparatus constructed to divert water, such as a head gate, pipe or well.

System Development Fee– One-time fees paid by new growth to connect into the Town’s water system.

Surface water - Water on the surface of the ground (lakes, rivers, ponds, floodwater, oceans, etc.); precipitation which does not soak into the ground or return to the atmosphere by evaporation or transpiration.

Treated water - Water that has been filtered and/or disinfected; sometimes used interchangeably with “potable” water.

Tributary - A tributary is generally regarded as a surface water drainage system that is interconnected with a river system. Under Colorado law, all surface and groundwater, the withdrawal of which would affect the rate or direction of flow of a surface stream within 100 years, is considered to be tributary to a natural stream.
Tributary groundwater - Water presently below the earth’s surface that is hydrologically connected to a natural surface stream.

Wastewater - Water that has been used and contains unwanted materials from homes, businesses and industries; a mixture of water and dissolved or suspended substances.

Wastewater treatment - Any of the mechanical or chemical processes used to modify the quality of wastewater in order to make it more compatible or acceptable to humans and the environment.

Water and sanitation districts - A special taxing district formed by the residents of the district for the combined purpose of providing potable water and sanitary wastewater services.

Water commissioner - State water officials, appointed by the state engineer and working under the direction of the division engineers, who perform the day-to-day administration of surface and groundwater in each water district.

Water Court - A special division of a District Court with a District Judge designated as and called the Water Judge to deal with certain specific water matters principally having to do with adjudication and change of point of diversion. There are seven water courts in Colorado.

Water cycle - Transition and movement of water involving evaporation, transpiration, condensation, precipitation, percolation, runoff and storage.

Water development - The process of building diversion, storage, pumping and/or conveyance facilities.

Water districts - Eighty geographical divisions of the state that originally were used for the granting of water rights. The districts are now largely used for administrative purposes.

Water diversion - Changing the natural flow of water to another location by using dams, canals or pipelines.

Water quality standard - Recommended or enforceable maximum contaminant levels of chemicals or substances in water. These levels are established for water used by municipalities, industries, agriculture and recreation. Standards may also be narrative.

Water right - A right to use, in accordance with its priority, a certain amount of water.

Water storage - The locations in which water is stored. They can be above ground in lakes, rivers and other waterways, or below ground as groundwater.

Water table - The upper level of groundwater; the level below which soil and rock are saturated with water.

Watershed - The region draining into a river, river system or body of water; the total land area, regardless of size, above a given point on a waterway that contributes runoff water to the flow at that point; all the land that serves as a drainage for a specific stream or river.
Well - Any structure or device used for the purpose of or with the effect of obtaining groundwater for beneficial use from an aquifer. A shaft or hole into the Earth to tap an underground supply of water.