WATER RESOURCES REPORT

for

SMH Consultants
Porcelain Pines Subdivision

EPC Parcel – Tax ID #: 8322200018

November 2023

Prepared By:

JDS-HYDRO CONSULTANTS, INC.
A Division of RESPEC Company, LLC

RESPEC

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PORCELAIN PINES SUBDIVISION
EPC Parcel – Tax Schedule #8322200018

WATER RESOURCES REPORT

November 2023

Prepared for:

SMH Consultants
411 South Tejon Street
Colorado Springs, CO 80903

Prepared by:

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Colorado Springs, CO 80919

Table of Contents

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

The purpose of this report is to address the specific water needs of the proposed three (3) lot residential subdivision off the future Nampa Road in the Cascade / Chipeta Park area west of Manitou Springs. This project is currently seeking approval of their *Preliminary Plan* through El Paso County, and this report is a requirement of approval. It must be known that this report was based on *Conceptual Plan* level drawings (***Appendix A***) and information, and that the final approved project could differ from the information used to generate this report.

<u>*EXECUTIVE SUMMARY*</u>*:* **Colorado Springs Utilities (CSU) has adequate water supply to meet the needs of the proposed subdivision on a 300-year basis. Wastewater treatment will be provided by individual on-site wastewater treatment systems and is addressed in the wastewater disposal report.**

2.0 PROJECTED LAND USES

2.1 Projected Land Uses

The 36.15 acres of land within the subject area (located on El Paso County Parcel – Tax ID #8322200018) has been planned as a residential development. This report and associated commitments pertain to the lands proposed to encompass the land use for a three (3) lot subdivision in the Cascade / Chipeta Park area. Please refer to the Land Use Exhibit in ***Appendix A****.*

2.2 Water Demands for the Subject Property

Lots within the subject area have been planned as a residential development. The three (3) lots will demand a typical residential constant of 0.26 AF/year per El Paso County Land Code. Each lot is also projected to support a maximum of 13,000 ft^2 of irrigatable land at a constant of 0.0566 AF/1,000 ft^2. An assumed demand of 0.011 AF/year per stock is also assumed supporting two (2) horses per residence. Overall demands for the three (3) lot subdivision are 3.05 AF/year as presented in **Table 2-1**.

2.3 Service

The proposed subdivision is located outside of the City of Colorado Springs city limits. However, it is located within the areas of Cascade and Chipeta Park, which are within the Colorado Springs Utilities (Utilities) electric and water satellite service territories, known as the Ute Pass Service Area. Therefore, the three (3) lots can be provided with electric and water services by the Utilities (see availability letter by the Utilities provided in ***Appendix C***, schematic of water services provided in ***Appendix D,*** *as well as Figure 4-3 in the Colorado Springs Utilities Integrated Water Resources Plan found in* ***Appendix F***). In order to provide service to the three (3) proposed lots, a water main must be extended to the proposed subdivision from the intersection of Mountain Road and Kulsa Road along the planned Nampa Road. At this point, the final size of the water main has not yet been determined nor designed. However, it is estimated that a

6” or 8” water main would probably be sufficient to provide adequate water service pressure and fire flows. The developer’s engineer will need to work with the Utilities’ development department and the jurisdictional fire department (in this case being the Cascade Fire Protection District) to determine the final alignment and size of the proposed water main to facilitate adequate fire flows. A preliminary depiction of the potential water main and associated fire hydrants is shown in ***Appendix E.***

Given the elevation of the proposed properties in the development versus the service pressures that can be provided to the Ute Pass Special Service Area, the developer will need to obtain special consideration to receive service from Utilities. The service area can provide roughly 60 psi of pressure to most residences at or below 7,880 feet in elevation. However, some of the residences in Porcelain Pines may incorporate structures at or above 7,890 feet. Those structures that are above 7,880 feet in elevation may need to install individual booster pumps in their basements to boost service pressure into the homes to develop pressures greater than 40 psi to 50 psi. Upon design of the above-mentioned water main, the developer’s engineer will also need work with the Utilities’ development team to assist with the special consideration determination and design requirements.

Summary of Expected Water Demands & Wastewater Loads

Table 2-1

Porcelain Pines Subdivision
Estimate of Water Demands & Wastewater Loads

Water						Wastewater
# of SFE's	Annual Indoor Use 0.26 (AF/YR/SFE)	Average Daily Indoor Use (GPD)	Irrigation 0.0566 (AF/1,000 SF)	Domestic Watering 0.011 (AF/Horse/Year)	Total Indoor, Watering, & Irrigation (AF)	ADF (@ 90% Indoor Use (GPD)
	Note 1		*Note 2*	*Note 3*		
3	0.780	696	2.207	0.066	3.05	627

Note 1: ***Per 8.4.7(B)(7)(d) of the EPC Land Development Code (LDC)***

Note 2: ***Per 8.4.7(B)(7)(d) of the EPC LDC, assuming 13,000 ft^2 of irrigation per lot***

Note 2: ***Assuming 2 horses per lot***

3.0 DISTRICT WATER NEEDS AND PROJECTED DEMANDS

3.1 Actual Water Demand Summary

Colorado Springs Utilities tracks water demands and water use on an annual basis. Their Integrated Water Resources Plan (IWRP), Figure 4-1 shows annual demand from 1950 through 2015. Overall, demand has generally increased from 1950 through 2015. However, from the drought of 2002 through 2015, defined trend is difficult to assign. With the advent of water restrictions, water conservation methods, and water efficient fixtures overall water demand within Colorado Springs has been volatile and dropped since 2003. At last estimate, the City of Colorado Springs used just under 70,000 AF/year. Please see Figure 4-1 in IWRP in **Appendix F**.

3.2 Unit Water User Characteristics

Unit water user characteristics are counted on a Single-Family Equivalent (SFE) basis. In 2018 Colorado Springs Utilities estimated that average demand per capita was 138 gallons/day/capita (or 0.151 AF/year/capita). However, the Utilities has moved away from an SFE basis for supply evaluation and has moved to the more risk-based evaluation for planning called reliably met demand (RMD). At the time of the report, the RMD for its source water and delivery system is 95,000 AF/year (otherwise known as "firm yield"). This is described on page 6-1 of the IWRP.

For the purposes of this report a Single Family Equivalent demand of 0.26 AF/SFE/day was derived from the El Paso County Land Development Code Section 8.4.7(B)(7)(d). With the mountainous environment and natural environment for landscaping, this is a conservative estimate for indoor water use. For this report, all single-family homes are counted as one SFE.

3.3 Current Demands versus Supply

As mentioned above, Colorado Springs Utilities' current source water system can supply 95,000 AF/year while meeting the goals of maintaining indoor water demand 100% of the time. The system can also maintain a minimum of 1.0 year of raw water storage 100% of the time and maintain a minimum of 1.5 years of demand in storage 90% of the time. The most recently documented data for water demand as seen in the IWRP was less than 70,000 AF of water demand for that year (Figure 4-1), but demand has been recorded as being as high as 95,000 AF/year in 2000. The population in 2015 was 470,513. The population in 2021 per the City of Colorado Springs Budget was 498,879 allowing for sufficient supply for the current population while implementing current water saving measures. Using ratios, this increased population would require an additional 5,673 AF annually which is significantly less that the additional 25,000 AF in excess supply (70,000 AF/year vs. 95,000 AF/year).

4.0 WATER RIGHTS AND SUPPLY

4.1 Utility Water Rights

Colorado Springs Utilities (Utilities) has water rights from several different surface and ground water sources. Rights are secured in the Arkansas River Basin, the Colorado River Basin, and the South Platte River Basin. In addition, the Utilities also has local supplies in the form of surface rights off Fountain Creek, reservoirs on Pikes Peak, and Pueblo Reservoirs. Approximately ¾ of these surface water supplies is legally reusable. Also, "Colorado Springs holds numerous exchange water rights." In 2016, Colorado Springs was able to secure a decree to exchange leased water." Part 3.3 of the IWRP provides a detailed description of the water sources available to Colorado Springs Utilities.

4.2 Adequacy of Water Rights

Current water rights holdings are adequate for current demands. Currently, Utilities predicts that full buildout demand will range from 119,000 AF/year to 159,000 AF/year. This represents an approximate gap of 41,000 AF/year for full Colorado Springs Utilities buildout as moderate growth rates post 2070. However, stated growth estimates are extremely conservative and do not account for the observed decrease in water consumption per capita. The Utilities' planned holdings are also within 30% of meeting 2040 and 2060 buildout projections on a 300-year basis (Colorado Springs buildout is expected to occur post 2070). However, the Utilities expect to make acquisitions and employ both indirect and direct potable and non-potable reuse to more than offset the perceived shortage.

4.3 Description of Current Water Rights/Sources

The Utilities' current water rights include non-renewable supplies in the Denver Basin (which are not currently in use) as well as rights from the Arkansas River Basin, the Colorado River Basin, and a lesser amount in the South Platte River Basin. These are each discussed further in this section. A description of these sources, deliveries, and treatments are contained in Figure 3-2 and Section 3.3 of the IWRP.

<u>Mountain Water Sources</u>

Seventy five percent of Colorado Springs Utilities water supply originates from the mountains near Aspen, Leadville, and Breckenridge. Water from the Colorado River Basin comes from the western slope of Colorado and is transported to storage reservoirs via pipelines to reservoirs. A schematic of this water transportation and storage system can be found on page 3-3 of the IWRP.

<u>Local Surface Water Sources</u>

Supplies from local surface water collection systems is used to supplement the mountain water sources. The local collection surface water sources are the Catamount Reservoirs, Crystal Reservoir, South Slope Reservoir, and tributaries, North and South Cheyenne Creeks, Fountain Creek, Pikeview Reservoir, Rampart and Northfield Reservoirs, and Pueblo Reservoir.

Non-Renewable Denver Basin Supply

The second type of source water in the Denver Basin. The Denver Basin is a vast, deep-rock aquifer that stretches from south of Colorado Springs northerly to beyond Denver. Rights that are granted in the Denver basin are based on the ownership of the surface property, the larger the parcel, the larger the allocation. This water is much deeper, ranging up to 2,650 feet deep. Denver Basin water is considered finite and therefore non-renewable water. In the Falcon area, there are four main formations that make up the Denver Basin: Dawson, Denver, Arapahoe, and Laramie-Fox Hills, described from top to bottom. The Dawson is not present in the Colorado Springs Utilities service area.

Colorado Springs Utilities is not using their groundwater sources as the maintenance and return of this water is significantly less than their surface water supplies. The Utilities has two wells drilled into the Denver aquifer and two wells drilled into the Arapahoe aquifer. All four wells were deactivated in July 2015.

5.0 WATER SYSTEM FACILITIES AND PHYSICAL SUPPLY

5.1 Source of Supply

See Section 4.3 above for description of available water sources

5.2 Water Treatment

Colorado Springs Utilities owns and operates six (6) water treatment facilities. All source water is treated before distribution through one of the six water treatment plants. These water treatment plants include the Bailey WTP, Pine Valley WTP, McCullough WTP, Ute Pass WTP, Mesa WTP, and Fountain Valley Authority WTP. See Section 5.6 below for a description of the resulting water quality resulting from treatment processes employed at the six water treatment plants. Overall, the Utilities water treatment system has 214 Million Gallons per Day (MGD) of sustained water treatment capacity.

5.3 Water Storage

The Utility has several raw water reservoirs throughout Colorado which store the water rights possessed by the Utilities as they become available. Raw water storage exists on the six different raw water collections systems as described below:

- Local Collections System (Pikes Peak / Fountain Creek)
- Blue River
- Homestake
- Twin Lakes
- Fry-Ark Project (FVA)
- Colorado Canal

A description of these available raw water storage facilities is shown in Figure 3-2, Table 3-1, and Section 3.3 of the IWRP. Overall, the Utilities has twenty-five (25) raw water storage reservoirs and three raw water storage tanks within its source water and non-potable water system.

The Utilities also employs over thirty-seven (37) potable water storage tanks to provide equalizing finished water storage while maintaining distribution system pressures, as necessary.

5.4 Distribution, Pumping, and Transmission Lines

Colorado Springs Utilities delivers potable water to most residential and commercial entities. However, the Utilities can also deliver non-potable sources to community parks that are owned and maintained by the city. The following is a description of potable and non-potable facilities employed by the Utilities:

<u>Description of Potable Water System Facilities</u>

- 145,238 water service points
- Six (6) potable water treatment plants
- Thirty-seven (37) potable water storage tanks
- 2,152 miles of transmission mains / distribution mains

Description of Non-potable Water System Facilities

- Three (3) raw water storage tanks
- Twenty-five (25) raw water storage facilities
- 261 miles of raw water transmission lines
- Twenty-seven (27) miles of non-potable water distribution piping

5.5 Recent and Upcoming System Expansions

The Utilities has undertaken an extensive evaluation of potential alternatives to expand its water source, treatment, and delivery portfolio. A summary of this evaluation is included in Sections 6 – 10 of the IWRP. The evaluation provides for prioritization of near term and long-term expansion projects which would enable Colorado Springs to meet its short-term and long-term buildout water demand needs. The list below summarizes the shorter-term projects planned between the years of 2017-2030 (from Table 11-4 of the IWRP).

Direct Potable Reuse Pilot

Colorado Springs Utilities has received a Colorado Water Conservation Board grant and has created a mobile pilot for direct potable reuse.

Mesa Water Treatment Plant

The Utility is also working on upgrades at the Phillip H. Tollefson Water Treatment Plant on the Mesa. These upgrades include reconfiguring the solids drying beds, construction of new main pretreatment building, and constructing a new raw water vault. This plant treats water that falls as rain and snow in the Pikes Peak watershed. More information on this project is available on the Colorado Springs Utilities website.

Bear Creek Intake

Construction of a 3 MGD surface water intake structure on Bear Creek which is already included in Utilities' current Capital Improvement Plan.

Pikeview to Mesa Transfer Expansion

Would provide up to 8 MGD of additional capacity to the potable water delivery system by bringing raw water from the Pikeview storage pond (off Fountain Creek) up to the Mesa Water Treatment Plant. Already included in Utilities' current Capital Improvement Plan.

Shortage response leasing of raw water

Would increase raw water capacity by 5,000 AF/year. Project is currently underway.

Upper Williams Creek Reservoir

Would provide 28,000 AF/year of additional raw water storage for the Southern Delivery System up from Pueblo Reservoir on the east side of Colorado Springs. Project is currently underway.

Montgomery Reservoir Enlargement

Would provide up to 7,500 AF/year of additional raw water storage near the headwaters of the Arkansas River Basin. Project is currently underway.

Gravel pit reservoir off Fountain Creek

Would provide up to 5,000 AF/year of additional raw water storage off Fountain Creek near the southern end of the city. This project is complementary to other potential projects and can be phased in.

Gravel pit reservoir off Arkansas River

Would provide up to 5,000 AF/year of additional raw water storage off the Arkansas River in Pueblo County. This project is complementary to other potential projects and can be phased in.

5.6 Water Quality

Colorado Springs Utilities treats and filters all its raw water sources at the six (6) water treatment plants described above in Section 5.2. Water is disinfected to meet or exceed all CDPHE drinking water standards. ***Appendix G*** contains a copy of the "2021 Drinking Water Quality Report" as well as the "2021 Water Quality Summary Report" which outlines water quality delivered to Utilities' consumers.

6.0 EL PASO COUNTY MASTER PLANNING ELEMENTS

6.1 County Water Master Plan 2040 and 2060 Projections

Porcelain Pines lies within the El Paso County Master Planning area, Region #1. Porcelain Pines will be served by Colorado Springs Utilities for water service.

Buildout:

Colorado Springs utilities has future predicted population growth as well as water demand predictions through 2070 to buildout. Please see Table 4-1 in the IWRP located in **Appendix F** for population projections and Figure 4-2 for projected water demands through 2020**.**

Based on known and future projection of development, it is expected that the Utilities' buildout may approach 723,037 persons and garner water demands between 119,000 AF/year to 159,000 AF/year, depending upon the buildout scenario

2040 Buildout:

By 2040, the population in the service area of Colorado Springs Utilities is predicted to serve almost 90,000 more customers for a total population of 588,596. With a continued focus on water conservation as well as continued water resource strategy portfolios (i.e., demand management, reuse and non-potable supplies, Colorado River Basin supplies, agriculture acquisitions/transfers, increased storage, conveyance, and groundwater) the Utilities are positioned to provide sufficient water for a 2040 buildout.

2060 Buildout:

By 2060, the population in the service area of Colorado Springs Utilities is predicted to serve nearly 170,000 additional customers for a total population of 668,729. With a continued focus on water conservation as well as continued water resource strategy portfolios (i.e., demand management, reuse and non-potable supplies, Colorado River Basin supplies, agriculture acquisitions/transfers, increased storage, conveyance, and groundwater) the Utilities are positioned to provide sufficient water for a 2060 buildout.

6.2 Description of Long-Term Planning and Future Sources of Supply

In theory, the 300-year supply of water for Porcelain Pines served by Colorado Springs Utilities appears to be more than adequate for full buildout, which would include both the 2040 and 2060 scenarios. The Porcelain Pines subdivision does not anticipate growing beyond the current four (4) lots projected for the current development.

The Utilities currently relies on all its water supply to come from renewable water sources and has the potential through potable reuse to extend the water to extinction, creating more water availability to the Utilities.

In 2017, the Utilities developed the Integrated Water Resources Plan water policy intended to facilitate the goal of continued addition of water with a priority of seeking additional renewable resources. Future Water Resources Strategies described in the IWRP focus on seven general water strategies:

1. Demand Management is where the Utilities continue to educate the customer on water conservation, landscape alternatives, and reducing system leaks, among other options. Demand Management strategies will be required in permitting all new residential and commercial projects.

2. Reuse and Non-potable Supplies strategy includes using the exchange program, potable and non-potable reuse, graywater reuse, and rain harvesting. Wastewater effluent is the most abundant source of reuse water. Reuse provides multiple uses from a single diversion.

   Exchange Program will maximize the use of reusable water. Reusable effluent can be traded against flows on the river that were captured upstream. This exchange program will be a major source of supply for the potable water system.

   Non-potable System Water Use can deliver untreated water for irrigation uses and be used as industrial process water. This option will provide little increases to the yield of the water system.

   Indirect and Direct Potable Reuse uses treated, recycled, or reclaimed water and blends it with a natural water source before reintroducing that water into the potable water system for further treatment. Indirect potable reuse will save water that would be lost in the exchange program due to transit losses. Direct potable reuse first treats wastewater effluent to drinking water standards and then blends it with existing raw water. This blended raw water and reuse water will be treated in one of the six water treatment plants before distribution. This would allow water to be used repeatedly to extinction.

   Graywater and Rainwater allows for the reuse of drain water in a home to be used for irrigation purposes. Estimates suggest that for every 1,000 homes with installed graywater systems, the Utilities could save approximately fifty acre-feet annually. Utilities already reuses most of its available water through the exchange program, so customers using graywater in their homes will produce little benefit to the Utilities meeting its overall demands. Rainwater harvesting produces very little reduction in water demands due to the arid climate in the area.

3. Colorado River Basin (CRB) Supplies currently accounts for about 70% of the Utilities' water supply when including reuse water. CRB water rights are currently underdeveloped. Colorado Springs Utilities plans to continue to develop existing projects to expand the water supply from CRB.

4. Agricultural Transfers would be used by the Utilities to meet future water supply needs. These would occur in the Arkansas River Basin and would be permanent, leased acquisitions or a hybrid. Benefits of these transfers would be diversification of the water portfolio, maintain in-basin supplies, and

water can be used to extinction. Challenges to these transfers would be poorer water quality, uncertainty in water exchange potential, and local opposition.

5. Increased Storage allows the Utilities to store their existing water rights and provides reserves for drought years.
6. Conveyance would increase Utilities' ability to move water from one location to another. This allows for better use of existing supply as well as potentially accessing new sources of supply.
7. Groundwater is one of the most labor intensive and least reliable water production option of the seven. The Utilities abandoned the four Denver aquifer wells in 2015. According to Resolution 233-86, Utilities is allowed to use Denver Basin groundwater for emergency water or limited non-potable purposes.

Although there is no near-term perceived shortage expected in supply, the Utilities will be increasing water reliability, increasing efficiency, and acquiring/improving sources of supply over time. For additional information regarding future water strategies by the Utilities please see Sections 6 through 11 in the IWRP, contained in ***Appendix F***.

7.0 CONCLUSION

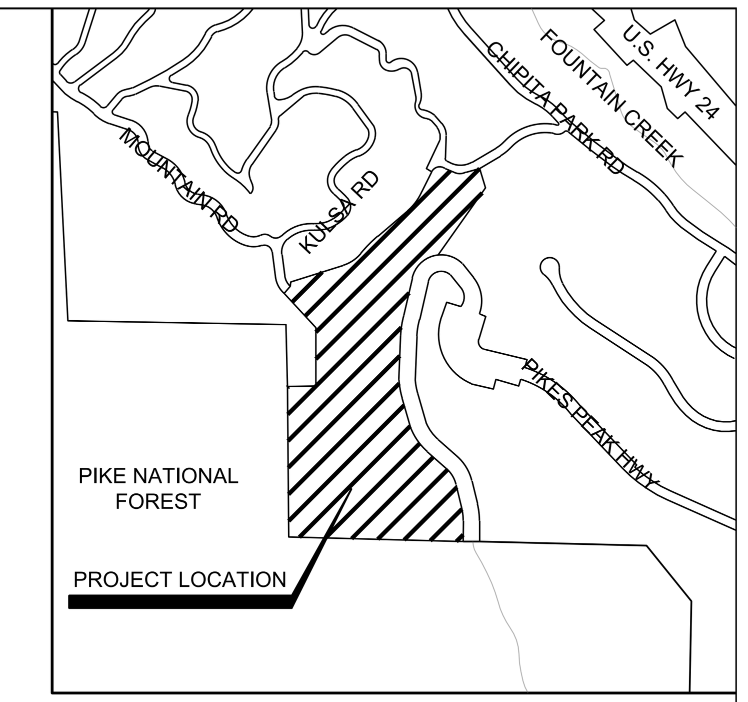
Colorado Springs Utilities (CSU) has adequate water supply to meet the needs of this proposed land use on a 300-year basis.

Appendix A

Final Plat

GUNTZELMAN PORCELAIN PINES SUBDIVISION

PART OF THE NORTHWEST 1/4 OF SECTION 22, TOWNSHIP 13 SOUTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF EL PASO, STATE OF COLORADO



VICINITY MAP
(NOT TO SCALE)

KNOW ALL MEN BY THESE PRESENTS:

That the undersigned, Kristian & Christa Guntzelman, being the owner of the following described tract of land:

DESCRIPTION:

A portion of the parcel described in that Quitclaim Deed, recorded January 22, 2020 under Reception No. 220009194, in the Official Public Records of El Paso County, Colorado, located in the Northwest 1/4 of Section 22, Township 13 South, Range 68 West, of the 6^{th} P.M., being more particularly described as follows,

COMMENCING at the Center 1/4 Corner of said Section 22; thence along the south line of the Southeast 1/4 of the Northwest 1/4 of said Section 22, N88°57'03"W, (Bearings are based on the south line of the Southeast 1/4 of the Northwest 1/4 of said Section 22, monumented at the Center 1/4 Corner of said Section 22 by a 1" iron pipe with a 2-1/2" brass cap stamped "1938 U.S. GENERAL LAND OFFICE SURVEY", 0.5' above grade and monumented at the West Center 1/16 Corner by a 1" iron pipe with a 2-1/2" brass cap stamped 1938 U.S. GENERAL LAND OFFICE SURVEY", flush with grade, having a measured bearing of N88°57'03"W, a distance of 1301.48 feet), a distance of 234.34 feet to the southeast corner of said parcel, being the POINT OF BEGINNING; thence continuing along said south line of the Southeast 1/4 of the Northwest 1/4 of said Section 22, N88°57'03"W, a distance of 1067.14 feet to the West 1/16 Corner of said Section 22; thence along the North-South Center line of the Northwest 1/4 of said Section 22, N01°07'31"W, a distance of 932.25 feet; thence leaving said North-South Center line, N88°52'29"E, a distance of 182.97 feet; thence N01°08'07"W, a distance of 353.05 feet; thence N41°49'19"W, a distance of 283.92 feet to a point on south right-of-way line of Nampa Road; thence along the south right-of-way line of said Nampa Road, the following seven (7) courses:

1. N48°13'23"E, a distance of 60.11 feet;
2. along the arc of a non-tangent curve to the right, whose center bears N48°07'42"E, having a radius of 23.65 feet, a central angle of 115°53'06", a distance of 47.83 feet;
3. N73°46'14"E, a distance of 315.39 feet;
4. along the arc of a non-tangent curve to the left, whose center bears N16°10'04"W, having a radius of 245.85 feet, a central angle of 38°16'52", a distance of 164.26 feet;
5. along the arc of a reverse curve to the right, whose center bears S54°53'21"E, having a radius of 303.82 feet, a central angle 14°01'04", a distance of 74.33 feet;
6. N49°31'01"E, a distance of 285.03 feet;
7. along the arc of a non-tangent curve to the left, whose center bears N40°28'22"W, having a radius of 364.10 feet, a central angle of 23°57'14", a distance of 152.22 feet, to a point on the southeast line of that Right-of-Way Vacation recorded under Book 3122 Page 824 in the Official Public Records of El Paso County, Colorado;

Thence continuing along said southeast line of said Right-of-Way Vacation, N25°35'01"E, a distance of 134.87 feet; thence S64°25'10"E a distance of 27.90 feet; thence N25°34'50"E a distance of 134.68 feet; thence N64°25'10"W a distance of 27.90 feet to a point on the south right-of-way line of Nampa Road; thence along said south right-of-way line, the following five (5) courses:

1. along the arc of a non-tangent curve to the right, whose center bears S64°28'18"E, having a radius of 59.60 feet, a central angle of 95°53'57", a distance of 99.76 feet;
2. S58°29'48"E, a distance of 40.03 feet;
3. along the arc of a non-tangent curve to the left, whose center bears N31°15'02"E, having a radius of 96.71 feet, a central angle of 48°28'43", a distance of 81.83 feet;
4. N72°58'37"E, a distance of 67.62 feet;
5. along the arc of a non-tangent curve to the left, whose center bears N12°19'30"W, having a radius of 96.71 feet, a central angle of 22°07'11", a distance of 37.34 feet, to a point on the west line of Pikes Peak Mountain Estates, recorded November 5, 2001 under Reception No. 201161507;

Thence continuing along said west line of Pikes Peak Mountain Estates, the following two (2) courses:

1. S18°49'36"E, a distance of 138.79 feet;
2. S35°59'27"W, a distance of 515.72 feet, to a point on the west right-of-way line of Pikes Peak Toll Road;

Thence continuing along said west right-of-way line of Pikes Peak Toll Road, the following, thirteen (13) courses:

1. Along the arc of a non-tangent curve to the left, whose center bears S11°39'01"E, having a radius of 193.42 feet, a central angle of 64°29'48", a distance of 217.73 feet;
2. S13°45'10"W, a distance of 216.22 feet;
3. Along the arc of a non-tangent curve to the left, whose center bears S76°02'47"E, having a radius of 1005.40 feet, a central angle of 11°10'16", a distance of 196.03 feet;
4. S02°43'25"W, a distance of 173.36 feet;
5. Along the arc of a non-tangent curve to the left, whose center bears S87°14'50"E, having a radius of 460.30 feet, a central angle of 17°26'00", a distance of 140.06 feet;
6. S14°46'15"E, a distance of 167.06 feet;
7. Along the arc of a non-tangent curve to the left, whose center bears S74°40'19"E, having a radius of 338.00 feet, a central angle of 31°57'04", a distance of 188.49 feet;
8. S45°59'03"E, a distance of 171.85 feet;
9. Along the arc of a non-tangent curve to the right, whose center bears S43°26'18"E, having a radius of 238.00 feet, a central angle of 31°14'04", a distance of 129.74 feet;
10. S15°27'25"E, a distance of 155.45 feet;
11. Along the arc of a non-tangent curve to the right, whose center bears S74°31'58"E, having a radius of 238.00 feet, a central angle of 19°18'37", a distance of 80.21 feet;
12. S43°26'18"E, a distance of 46.77 feet;
13. Along the arc of a non-tangent curve to the left, whose center bears S86°04'29"E, having a radius of 363.70 feet, a central angle of 09°00'56", a distance of 57.23 feet, to the POINT OF BEGINNING.

For a total of 35.07 acres.

SURVEYOR'S CERTIFICATE:

I, Tim Sloan, a duly registered Professional Land Surveyor in the State of Colorado, do hereby certify that this plat truly and correctly represents the results of a survey made on July 6, 2022, by me or under my direct supervision and that all monuments exist as shown hereon; that mathematical closure errors are less than 1:10,000; and that said plat has been prepared in full compliance with all applicable laws of the State of Colorado dealing with monuments, subdivision, or surveying of land and all applicable provisions of the El Paso County Land Development Code.

I attest on this ___________ day of __________, 20__.

COLORADO LICENSED TIM SLOAN 38374 PROFESSIONAL LAND SURVEYOR

______________________________ __________
Tim Sloan, Professional Land Surveyor Date
Colorado Registered PLS #38374

DEDICATION:

The undersigned, being all the Owners, Mortgages, Beneficiaries of Deeds of Trust and holders of other interests in the land described herein, have laid out, subdivided, and platted said lands into lots, and easements as shown hereon under the name and subdivision of "GUNTZELMAN PORCELAIN PINES SUBDIVISION". All public improvements so platted are hereby dedicated to public use and said Owner does hereby covenant and agree that the public improvements will be constructed to El Paso County standards and that proper drainage and erosion control for some will be provided at said Owner's expense, all to the satisfaction of the Board of County Commissioners of El Paso County, Colorado. Upon acceptance by resolution, all public improvements so dedicated will become matters of maintenance by El Paso County, Colorado. The utility easements shown hereon are hereby dedicated for public utilities and communication systems and other purposes as shown hereon. The entities responsible for providing the services for which the easements are established are hereby granted the perpetual right of ingress and egress from and to adjacent properties for installation, maintenance, and replacement of utility lines and related facilities.

IN WITNESS WHEREOF:

The aforementioned Kristian & Christa Guntzelman, have executed this instrument this

_________ day of _____________________, 20___ A.D.

______________________________ ______________________________
KRISTIAN GUNTZELMAN CHRISTA GUNTZELMAN

NOTARIAL:

STATE OF COLORADO)
COUNTY OF EL PASO) SS

The foregoing instrument was acknowledged before me this _________ day of

_____________________, 20___ A.D. by KRISTIAN & CHRISTA GUNTZELMAN

Witness my hand and seal ______________________________

Address ______________________________

____

My Commission expires ______________________________

RECORDINGS:

STATE OF COLORADO)
COUNTY OF EL PASO) SS

I hereby certify that this instrument was filed for record in my office at

___________O'clock _____.M. this _________ day of ____________________,

20___ A.D., and is duly recorded under Reception Number

____________________ of the records of El Paso County, State of Colorado.

By: ______________________________ __________________
El Paso County Clerk and Recorder Date

BOARD OF COUNTY COMMISSIONERS CERTIFICATE:

This Plat GUNTZELMAN PORCELAIN PINES SUBDIVISION was approved for filing by the El Paso County, Colorado Board of County Commissioners on the _________ day of ______________________, 20___, subject to any notes specified hereon and any conditions included in the resolution of approval. The dedications of land to the public easements are accepted, but public improvements thereon will not become the maintenance responsibility of El Paso County until preliminary acceptance of the public improvements in accordance with the requirements of the Land Development Code and Engineering Criteria Manual, and the Subdivision Improvements Agreement.

____
Chair, Board of County Commissioners Date

____
Director, Planning and Community Development Department Date

NOTICE:

ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF CERTIFICATION SHOWN HEREON.

ENVIRONMENTAL:

DEVELOPER SHALL COMPLY WITH FEDERAL AND STATE LAWS, REGULATIONS, ORDINANCES, REVIEW AND PERMIT REQUIREMENTS, AND OTHER AGENCY REQUIREMENTS, IF ANY, OF APPLICABLE AGENCIES, INCLUDING, BUT NOT LIMITED TO, THE COLORADO DEPARTMENT OF WILDLIFE, COLORADO DEPARTMENT OF TRANSPORTATION, U.S. ARMY CORPS OF ENGINEERS, AND THE U.S. FISH & WILDLIFE SERVICE REGARDING THE ENDANGERED SPECIES ACT PARTICULARLY AS IT RELATES TO THE LISTED SPECIES (E.G. PREBLE'S MEADOW JUMPING MOUSE).

EASEMENTS:

UNLESS OTHERWISE INDICATED, ALL SIDE, FRONT, AND REAR LOT LINES ARE HEREBY PLATTED ON EITHER SIDE WITH A 10-FOOT PUBLIC UTILITY AND DRAINAGE EASEMENT. ALL EXTERIOR SUBDIVISION BOUNDARIES ARE HEREBY PLATTED WITH A 20-FOOT PUBLIC UTILITY AND DRAINAGE EASEMENT. THE SOLE RESPONSIBILITY FOR THE MAINTENANCE OF THESE EASEMENTS IS HEREBY VESTED WITH THE INDIVIDUAL PROPERTY OWNERS.

ALL PUBLIC UTILITY EASEMENTS, DEDICATED VIA THIS PLAT, ARE SUBJECT TO COLORADO SPRINGS UTILITIES' TERMS AND CONDITIONS RECORDED AT RECEPTION NO. 212112548 OF THE RECORDS OF EL PASO COUNTY CLERK AND RECORDER.

NOTES:

1. NO EASEMENTS, RESTRICTIONS, RESERVATIONS, SETBACKS, OR OTHER MATTER OF RECORD, IF ANY, AFFECTING THE TITLE OF THIS PROPERTY ARE SHOWN, EXCEPT AS PLATTED, AS PER AGREEMENT WITH THE LANDOWNER.
2. NO GAPS OR OVERLAPS EXIST.
3. THERE ARE NO LINES OF POSSESSION THAT AFFECT THIS SURVEY.
4. PARENT TRACT IS RECORDED AS RECEPTION NO. 221114676, CLERK AND RECORDER'S OFFICE, EL PASO COUNTY, COLORADO.
5. THERE ARE NO BUILDINGS ON THE SUBJECT PROPERTY.
6. ALL BUILDING SETBACK REQUIREMENTS SHALL BE DETERMINED BY THE ZONING DISTRICT, UNLESS OTHERWISE NOTED.
7. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY SMH CONSULTANTS, TO DETERMINE OWNERSHIP OR EASEMENTS OF RECORD. FOR INFORMATION REGARDING EASEMENTS AND RIGHT OF WAY, SMH CONSULTANTS RELIED UPON THE TITLE POLICY PREPARED BY LAND TITLE GUARANTEE COMPANY, ORDER # SR55106050, DATED JUNE 9, 2022.
8. BASIS OF BEARINGS IS THE SOUTH LINE OF THE SOUTHEAST 1/4 OF THE NORTHWEST 1/4 OF SECTION 22, TOWNSHIP 13 SOUTH, RANGE 68 WEST, MONUMENTED AT THE CENTER 1/4 CORNER BY A 1" IRON PIPE WITH A 2-1/2" BRASS CAP STAMPED "1938 U.S. GENERAL LAND OFFICE SURVEY", 0.5' ABOVE GRADE AND AT THE WEST 1/16 CENTER CORNER BY A 1" IRON PIPE WITH A 2-1/2" BRASS CAP STAMPED "1938 U.S. GENERAL LAND OFFICE SURVEY AND ASSUMED TO BEAR NORTH 88 DEGREES 58 MINUTES 46 SECONDS WEST, 1301.48 FEET.
9. SEWAGE TREATMENT IS THE RESPONSIBILITY OF EACH INDIVIDUAL PROPERTY OWNER. THE EL PASO COUNTY HEALTH AND ENVIRONMENT DEPARTMENT MUST APPROVE EACH SYSTEM AND, IN SOME CASES, THE DEPARTMENT MAY REQUIRE AN ENGINEER-DESIGNED SYSTEM PRIOR TO PERMITTING APPROVAL.
10. ALL PROPERTY OWNERS ARE RESPONSIBLE FOR MAINTAINING PROPER STORMWATER DRAINAGE IN AND THROUGH THEIR PROPERTY. PUBLIC DRAINAGE EASEMENTS AS SPECIFICALLY NOTED ON THE PLAT SHALL BE MAINTAINED BY THE INDIVIDUAL LOT OWNERS UNLESS OTHERWISE INDICATED. STRUCTURES, FENCES, MATERIALS OR LANDSCAPING THAT COULD IMPEDE THE FLOW OF RUNOFF SHALL NOT BE PLACED IN DRAINAGE EASEMENTS.
11. DUE TO WILDFIRE CONCERNS, THE PROPERTY OWNER IS ENCOURAGED TO INCORPORATE WILDFIRE FUEL BREAK PROVISIONS AS RECOMMENDED BY THE COLORADO STATE FOREST SERVICE AND ILLUSTRATED THROUGH PUBLICATIONS AVAILABLE THROUGH THE STATE FOREST SERVICE.
12. NO DRIVEWAY SHALL BE ESTABLISHED UNLESS AN ACCESS PERMIT HAS BEEN GRANTED BY EL PASO COUNTY PLANNING DEVELOPMENT. INDIVIDUAL LOT PURCHASERS ARE RESPONSIBLE FOR CONSTRUCTING DRIVEWAYS, INCLUDING NECESSARY DRAINAGE CULVERTS PER LAND DEVELOPMENT CODE SECTION 6.3.3.C.2 AND 6.3.3.C.3. DUE TO THEIR LENGTH, SOME OF THE DRIVEWAYS WILL NEED TO BE SPECIFICALLY APPROVED BY THE CASCADE FIRE PROTECTION DISTRICT.
13. NO STRUCTURES OR MAJOR MATERIAL STORAGE ACTIVITIES ARE PERMITTED WITHIN THE DESIGNATED DRAINAGE EASEMENTS, EXCEPT FENCES; FENCES SHALL NOT IMPEDE RUNOFF FROM REACHING DRAINAGE SWALES.
14. ALL STRUCTURAL FOUNDATIONS SHALL BE LOCATED AND DESIGNED BY A PROFESSIONAL ENGINEER, CURRENTLY REGISTERED IN THE STATE OF COLORADO. NATURAL DRAINAGE LOCATIONS SHALL BE AVOIDED BY CONSTRUCTION AND SITE-SPECIFIC FOUNDATION/SEPTIC INVESTIGATIONS SHALL BE REQUIRED.
15. MAILBOXES SHALL BE INSTALLED IN ACCORDANCE WITH ALL EL PASO COUNTY AND THE UNITED STATES POSTAL SERVICE REGULATIONS.
16. THE ADDRESSES EXHIBITED ON THIS PLAT ARE FOR INFORMATIONAL PURPOSES ONLY. THEY ARE NOT THE LEGAL DESCRIPTION AND ARE SUBJECT TO CHANGE.
17. THE FOLLOWING REPORTS HAVE BEEN SUBMITTED AND ARE ON FILE AT THE EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT: DRAINAGE REPORT, WATER RESOURCES REPORT, WASTEWATER DISPOSAL REPORT, GEOLOGY AND SOILS REPORT, FIRE PROTECTION REPORT, WILDLAND FIRE & HAZARD MITIGATION REPORT, FORESTRY MANAGEMENT REPORT, NATURAL FEATURES REPORT, AND WILDLIFE REPORT.
18. ANY PERSON WHO KNOWINGLY REMOVES, ALTERS OR DEFACES ANY PUBLIC LAND SURVEY MONUMENT OR LAND BOUNDARY MONUMENT OR ACCESSORY COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO C.R.S. § 18-4-508.
19. THERE SHALL BE NO DIRECT LOT ACCESS TO PIKES PEAK HIGHWAY.
20. ACCESS TO ALL LOTS SHALL BE THROUGH THE SHOWN INGRESS/EGRESS EASEMENTS. THE RESPONSIBILITY AND MAINTENANCE OF SAID EASEMENT IS SUBJECT TO THE MAINTENANCE AGREEMENT AND ALL COVENANTS AND RESTRICTIONS CONTAINED THEREIN, AS RECORDED AT RECEPTION NO. __________________ OF THE RECORDS OF EL PASO COUNTY CLERK AND RECORDER.
21. THE SUBDIVIDER(S) AGREES ON BEHALF OF HIM/HERSELF AND ANY DEVELOPER OR BUILDER SUCCESSORS AND ASSIGNEES THAT SUBDIVIDER AND/OR SAID SUCCESSORS AND ASSIGNS SHALL BE REQUIRED TO PAY TRAFFIC IMPACT FEES IN ACCORDANCE WITH EL PASO COUNTY ROAD IMPACT FEE PROGRAM RESOLUTION (RESOLUTION NO. 19-471), OR ANY AMENDMENTS THERETO, AT OR PRIOR TO THE TIME OF BUILDING PERMIT SUBMITTALS. THE FEE OBLIGATION, IF NOT PAID AT FINAL PLAT RECORDING, SHALL BE DOCUMENTED ON ALL SALES DOCUMENTS AND PLAT NOTES TO ENSURE THAT A TITLE SEARCH WOULD FIND THE FEE OBLIGATION BEFORE SALE OF THE PROPERTY.
22. A LOT-SPECIFIC SUBSURFACE SOIL INVESTIGATION WILL BE REQUIRED FOR ALL PROPOSED BUILDING STRUCTURES INCLUDING (BUT NOT LIMITED TO) RESIDENCES, RETAINING WALLS, ETC. NO BASEMENTS OR INHABITABLE BELOW-GRADE AREAS ARE ALLOWED UNLESS GROUNDWATER MONITORING (THROUGH THE ANNUAL SEASONAL FLUCTUATIONS) BEFORE CONSTRUCTION DEMONSTRATES THAT BELOW-GRADE AREAS CAN MAINTAIN 3-5 FEET BETWEEN THE BOTTOM OF THE FOUNDATION AND THE GROUNDWATER, OR SITE GRADING INDICATES THAT IT WILL MITIGATE THE DEPTH TO GROUNDWATER.
23. INDIVIDUAL LOTS SHALL SUBMIT AN ENGINEERED SITE PLAN AT THE TIME OF BUILDING PERMIT APPLICATION.
24. THIS SUBDIVISION HAS BEEN FOUND TO BE PARTIALLY IMPACTED BY GEOLOGIC CONSTRAINS DUE TO POTENTIALLY UNSTABLE SLOPES AND SLOPES GREATER THAN 30%. NO BUILDING, NO SEPTIC SYSTEM AND NO CONSTRUCTION DISTURBANCE IS PERMITTED WITH THE AREAS OF IDENTIFIED GEOLOGIC CONSTRAINTS. SEE THE FINAL PLAT DRAWING AND THE SOILS AND GEOLOGY STUDY PREPARED BY RMG ENGINEER DATED JANUARY 10, 2023.
25. FUTURE OWNERS OF LOTS 1-3 ARE RESPONSIBLE FOR OBTAINING A WETLANDS DETERMINATION, AND 404 PERMIT IF REQUIRED FROM THE U.S. CORPS OF ENGINEERS AT TIME OF BUILDING PERMIT.
26. EASEMENT DESCRIBED IN BOOK 3113, PAGE 392 IS A NON-PLOTTABLE ITEM THAT COULD AFFECT THE SUBJECT PROPERTY. IN DISCUSSION WITH COLORADO SPRINGS UTILITIES, THEY INDICATED THEY WOULD NOT BE ABLE TO ENFORCE THIS EASEMENT.
27. THE SUBDIVIDER/DEVELOPER IS RESPONSIBLE FOR EXTENDING ACCESS AND UTILITIES TO EACH LOT, TRACT OR BUILDING SITE
28. WATER AND ELECTRIC SERVICE FOR THIS SUBDIVISION IS PROVIDED BY COLORADO SPRINGS UTILITIES SUBJECT TO THE PROVIDERS' RULES, REGULATIONS AND SPECIFICATIONS.
29. GAS SERVICE FOR THIS SUBDIVISION IS PROVIDED BY BLACK HILLS ENERGY SUBJECT TO THE PROVIDERS' RULES, REGULATIONS AND SPECIFICATIONS.

SOIL AND GEOLOGY CONDITIONS:

GEOLOGIC HAZARD NOTE - FINAL PLAT: (TO BE CUSTOMIZED BASED UPON THE INDIVIDUAL CIRCUMSTANCES)
THE FOLLOWING LOTS HAVE BEEN FOUND TO BE IMPACTED BY GEOLOGIC HAZARDS. MITIGATION MEASURES AND A MAP OF THE HAZARD AREA CAN BE FOUND IN THE REPORT (TITLE OF REPORT, GENERALLY FROM THE PRELIMINARY PLAN FILE) BY (AUTHOR OF REPORT) (DATE OF REPORT) IN FILE (NAME OF FILE AND FILE NUMBER) AVAILABLE AT THE EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT:

- DOWNSLOPE CREEP:
- ROCKFALL SOURCE:
- ROCKFALL RUNOUT ZONE:
- POTENTIALLY SEASONALLY HIGH GROUND WATER:
- OTHER HAZARD:

IN AREAS OF HIGH GROUNDWATER:
DUE TO HIGH GROUNDWATER IN THE AREA, ALL FOUNDATIONS SHALL INCORPORATE AN UNDERGROUND DRAINAGE SYSTEM.

FLOODPLAIN NOTE:

FLOOD INSURANCE RATE MAP, MAP NUMBER 0841C0486G EFFECTIVE DATE DECEMBER 7, 2018, INDICATES THAT THE AREA WITHIN THE SURVEYED PROPERTY TO BE LOCATED IN ZONE X (AREAS OF MINIMAL FLOOD HAZARD) AND ZONE D (AREAS IN WHICH FLOOD HAZARDS ARE UNDETERMINED, BUT POSSIBLE).

UTILITY NOTES:

ANY UTILITY COMPANY THAT LOCATES FACILITIES IN ANY EASEMENT SHALL HAVE THE RIGHT TO PRUNE, REMOVE, ERADICATE, CUT AND CLEAR AWAY ANY TREES, LIMBS, VINES, AND BRUSH ON THE UTILITY EASEMENT NOW OR AT ANY FUTURE TIME AND PRUNE AND CLEAR AWAY ANY TREE LIMBS, VINES, AND BRUSH ON LANDS ADJACENT TO THE UTILITY EASEMENT WHENEVER, IN THE UTILITY COMPANIES JUDGMENT, SUCH MAY INTERFERE WITH OR ENDANGER THE CONSTRUCTION, OPERATION, OR MAINTENANCE OF ITS FACILITIES, TOGETHER WITH THE RIGHT OF INGRESS TO AND EGRESS FROM THE UTILITY EASEMENT AND CONTIGUOUS LAND SUBJECT TO THIS PLAT FOR THE PURPOSE OF SURVEYING, ERECTING, CONSTRUCTING, MAINTAINING, INSPECTING, REBUILDING, REPLACING, AND WITH OR ENDANGERING THE CONSTRUCTION, OPERATION OR MAINTENANCE OF SAID FACILITIES.

DATE SUBMITTED: 02/10/2023
REVISIONS:
1

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Civil Engineering • Land Surveying • Landscape Architecture
www.smhconsultants.com
Manhattan, KS - HQ P: (785) 776-0541 • **Dodge City, KS** P: (620) 255-1952
Kansas City, KS P: (913) 444-9615 •**Colorado Springs, CO** P: (719) 465-2145

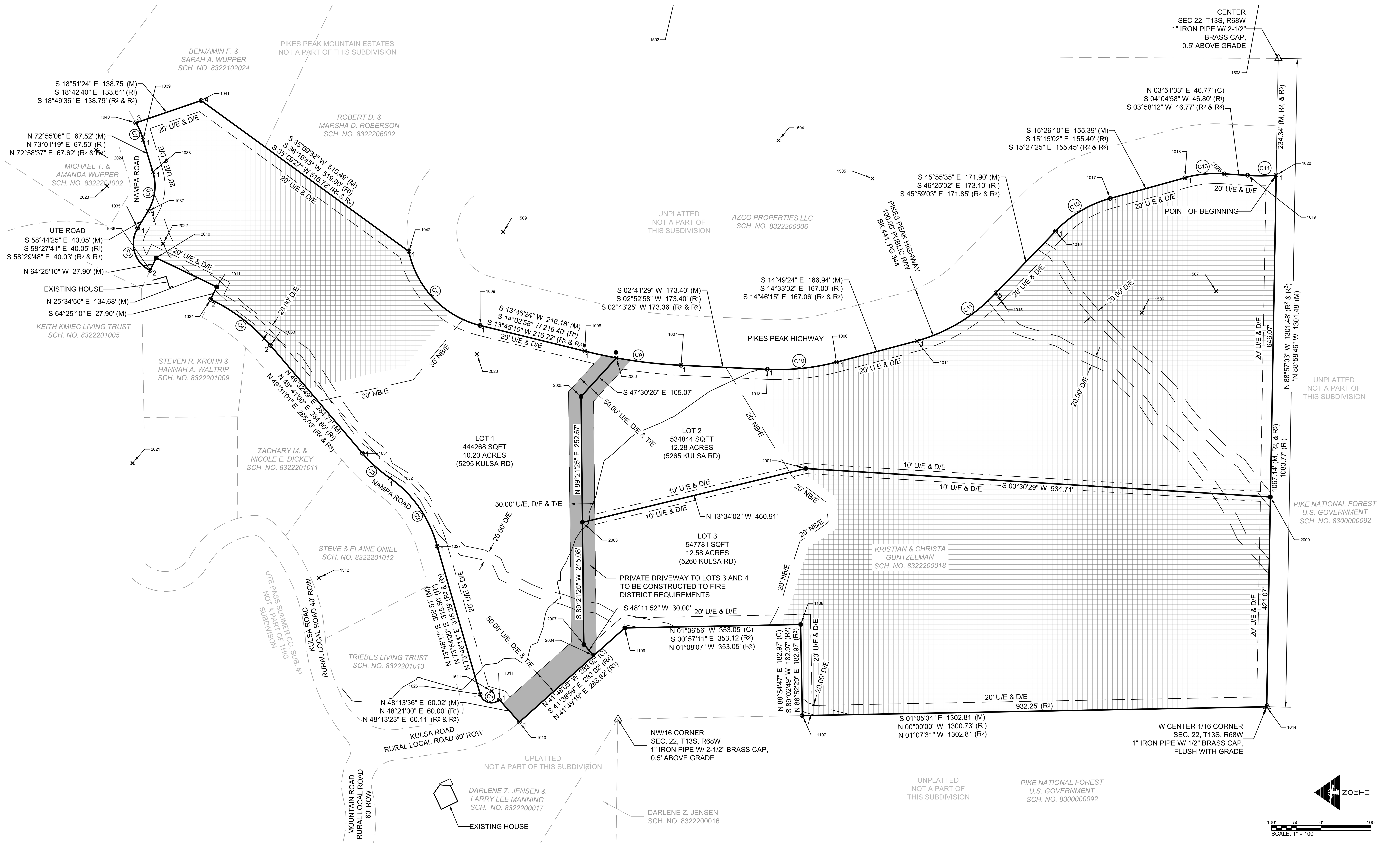
Survey Prepared July 6, 2022
Drawn By:JAM Project #2107-0307 DD #TDS87 PCD File #MS234

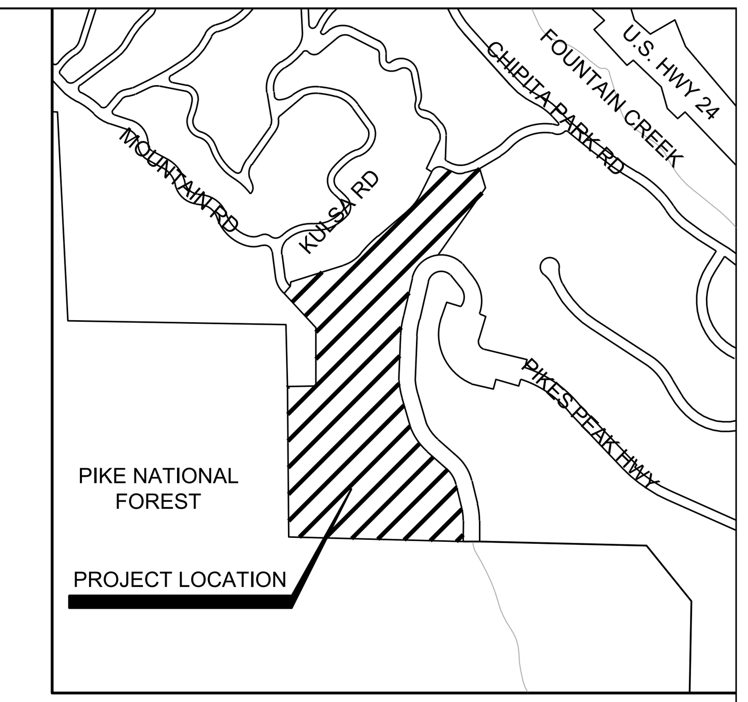
OCTOBER 2023

Final Plat

GUNTZELMAN PORCELAIN PINES SUBDIVISION

PART OF THE NORTHWEST 1/4 OF SECTION 22, TOWNSHIP 13 SOUTH, RANGE 68 WEST OF
THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF EL PASO, STATE OF COLORADO





VICINITY MAP
(NOT TO SCALE)

PROPERTY LINE CURVE DATA (M)						
CURVE #	RADIUS	ARC	CHORD	DELTA	TANGENT	BEARING
C1	23.65	47.79	40.06	115°46'20"	37.68	S 16°00'33" W
C2	245.85	169.99	166.62	39°36'59"	88.55	N 55°16'26" E
C3	303.82	74.43	74.25	14°02'13"	37.40	S 42°04'32" W
C4	364.10	152.45	151.34	23°59'24"	77.36	N 37°31'37" E
C5	59.60	99.60	88.41	95°44'58"	65.90	S 73°25'40" W
C6	96.71	81.76	79.35	48°26'25"	43.50	S 82°50'32" E
C7	96.71	37.25	37.02	22°04'15"	18.86	N 66°40'32" E
C8	193.42	217.52	206.23	64°26'00"	121.88	S 46°06'01" W
C9	1005.40	195.84	195.53	11°09'38"	98.23	S 08°22'53" W
C10	460.30	140.08	139.54	17°26'11"	70.59	S 05°56'13" E
C11	338.00	188.35	185.92	31°55'41"	96.69	S 31°19'00" E
C12	238.00	129.45	127.86	31°09'51"	66.37	N 30°59'04" W
C13	236.00	80.20	79.82	19°28'19"	40.49	N 05°47'46" W
C14	363.70	57.31	57.25	9°01'44"	28.72	S 00°24'16" E

PROPERTY LINE CURVE DATA (R^1)				
CURVE #	RADIUS	ARC	DELTA	BEARING
C1	23.65	47.70	115°33'00"	N 16°07'30" E
C2	245.85	164.27	38°17'00"	N 54°45'30" E
C3	303.82	74.59	14°04'00"	N 42°39'00" E
C4	364.10	152.09	23°56'00"	N 37°43'00" E
C5	59.60	99.64	95°47'19"	N 73°38'40" E
C6	96.71	81.89	48°31'00"	S 82°43'11" E
C7	174.20	37.29	12°14'00"	N 66°54'19" E
C8	193.42	217.62	64°27'52"	S 46°16'54" W
C9	1005.40	195.95	11°10'00"	S 08°27'58" W
C10	460.30	140.06	17°26'00"	S 05°50'02" E
C11	338.00	187.99	31°52'00"	S 30°29'02" E
C12	238.00	129.46	31°10'00"	S 30°50'02" E
C13	238.00	80.31	19°20'00"	S 05°35'02" E
C14	363.70	31.06	4°53'37"	S 01°38'09" W

PROPERTY LINE CURVE DATA (R^2 & R^3)				
CURVE #	RADIUS	ARC	DELTA	BEARING
C1	23.65	47.83	115°53'06"	N 48°07'42" E
C2	245.85	164.26	38°16'52"	N 16°10'04" W
C3	303.82	74.33	14°01'04"	S 54°53'21" E
C4	364.10	152.22	23°57'14"	N 40°28'22" W
C5	59.60	99.76	95°53'57"	S 64°28'18" E
C6	96.71	81.83	48°28'43"	N 31°15'02" E
C7	96.71	37.34	22°07'11"	N 12°19'30" W
C8	193.42	217.73	64°29'48"	S 11°39'01" E
C9	1005.40	196.03	11°10'16"	S 76°02'47" E
C10	460.30	140.05	17°26'00"	S 87°14'50" E
C11	338.00	188.49	31°57'04"	S 74°40'19" E
C12	238.00	129.74	31°14'04"	S 43°26'18" E
C13	238.00	80.21	19°18'37"	S 74°31'58" E
C14	363.70	57.23	09°00'56"	S 86°04'29" E

DENSITY AND DIMENSIONAL STANDARDS FOR RESIDENTIAL TOPOGRAPHIC DISTRICT R-T							
ZONING DISTRICT	MIN. AREA	WIDTH (AT FRONT SETBACK LINE)	FRONT SETBACK	REAR SETBACK	SIDE SETBACK	MAXIMUM LOT COVERAGE	MAXIMUM HEIGHT
R-T	5 ACRES	200 Ft	25 Ft	25 Ft	25 Ft	30%	30Ft

LINETYPE LEGEND

- PROPERTY LINE
- ADJACENT PROPERTY LINE
- SECTION LINE
- PUBLIC UTILITY, DRAINAGE &TRAVEL EASEMENT LINE
- UTILITY & DRAINAGE EASEMENT LINE
- NO BUILD EASEMENT LINE

LEGEND

- ● 1/2"x24" Rebar w/PLS38374 Cap Set
- △ Found GLO Monument (As Noted)
- * Basis of Bearing
- (1) Curve Number
- (C) Calculated Dimension
- (M) Measured Dimension
- (R^1) Recorded Dimension - Quitclaim Deed dated January 17, 2020 recorded under Rec. No. 220009194
- (R^2) Recorded Dimension - Land Survey Plat by Clark Land Surveying, Inc. dated May 25, 2021
- (R^3) Recorded Dimension - Warranty Deed dated June 11, 2021 recorded under Rec. No. 221114676
- Public Utility, Drainage & Travel Easement
- No Build Area
- O_1 Found 1-1/4" Orange Plastic Cap, PLS 25955, Flush w/grade
- O_2 Found #5 Rebar w/ broken Orange Cap, Illegible, Flush w/ grade
- O_3 Found 1/2" Rebar w/ Cap, Illegible, Flush w/ grade
- O_4 Found 1-1/2" Aluminum Cap, PLS 28658, Flush w/ grade
- O_5 Found 1/2" Disc w/ Mag. Nail, PLS 25955, In Rock
- U/E Public Utility Easement
- D/E Drainage Easement
- T/E Travel Easement
- NB/E No Build Easement

TOTAL ACREAGE:
LOT 1 = 10.20 ACRES
LOT 2 = 12.28 ACRES
LOT 3 = 12.58 ACRES
TOTAL = 35.06 ACRES

SERVICE PROVIDERS:
CASCADE FIRE PROTECTION DISTRICT
COLORADO SPRINGS UTILITIES
BLACK HILLS ENERGY
INDIVIDUAL SEWAGE DISPOSAL SYSTEMS

FEES:
PARK FEE: $1840
SCHOOL FEE: ______________________
DRAINAGE FEE: ______________________
BRIDGE FEE: ______________________

OWNER:
KRISTIAN & CHRISTA GUNZELMAN
5381 SUGAR CAMP ROAD
MILFORD, OH 45150
513-722-4343

SURVEYOR:
TIM SLOAN, VICE-PRESIDENT
SMH CONSULTANTS, P.A.
411 SOUTH TEJON STREET, STE I
COLORADO SPRINGS, CO 80903
719-465-2145

ENGINEER:
BRETT LOUK
SMH CONSULTANTS, P.A.
411 SOUTH TEJON STREET, STE I
COLORADO SPRINGS, CO 80903
719-465-2145

DATE SUBMITTED: 02/10/2023	
REVISIONS:	
1	

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Survey Prepared July 6, 2022
Drawn By:JAM Project #2107-0307 DD #TDS87 PCD File #

OCTOBER 2023

Appendix B

WATER SUPPLY INFORMATION SUMMARY

Section 30-28-133,(d), C.R.S. requires that the applicant submit to the County, "Adequate evidence that a Water supply that is sufficient in terms of quantity, quality, and dependability will be available to ensure an adeuate supply of water"

1. NAME OF DEVELOPMENT AS PROPOSED Porcelain Pines Subdivision

2. LAND USE ACTION Minor Subdivision

3. NAME OF EXISTING PARCEL AS RECORDED Nampa Road

SUBDIVISION See Above **FILING** N/A **BLOCK** N/A **Lot** N/A

4. TOTAL ACERAGE 35.16 | **5. NUMBER OF LOTS PROPOSED** 3 | **PLAT MAPS ENCLOSED** [x]

6. PARCEL HISTORY - Please attach copies of deeds, plats, or other evidence or documentation. (In submittal package)

A. Was parcel recorded with county prior to June 1, 1972? [ ] YES [x] NO

B. Has the parcel ever been part of a division of land action since June 1, 1972? [ ] YES [x] NO

If yes, describe the previous action

7. LOCATION OF PARCEL - Include a map deliniating the project area and tie to a section corner. (In submittal)

SE1/4 and NE1/4 **OF** NW 1/4 **SECTION** 22 **TOWNSHIP** 13 South [ ] N [x] S **RANGE** 68 [ ] E [x] W

PRINCIPAL MERIDIAN: [x] 6TH [ ] N.M. [ ] UTE [ ] COSTILLA

8. PLAT - Location of all wells on property must be plotted and permit numbers provided.

Surveyors plat [x] YES [ ] NO If not, scaled hand -drawn sketch Y [ ] NO

9. ESTIMATED WATER REQUIREMENTS - Gallons per Day or Acre Foot per Year

HOUSEHOLD USE [1]	3 **of units**	0.260 **AF/SFE/YR**	0.780 **AF**
COMMERCIAL USE	0 **SF**	- **GPD**	- **AF**
IRRIGATION [2]	0.0566 **AF/1000SF**	1,971 **GPD**	2.207 **AF**
ANIMAL WATERING [3]	6 **Horses**	0.011 **AF/Horse/Year**	0.066 **AF**
		GPD	**AF**
TOTAL		2,726 **GPD**	**3.05** **AF ***

1) Per 8.4.7 (B)(7)(d) of the EPC Land Development Code

2) Per 8.4.7 (B)(7)(d) of the EPC Land Development Code, assuming 13,000 ft[2] of irrigatible land per residence

3) Assuming two (2) horses per lot

10. WATER SUPPLY SOURCE Colorado Springs Utilities

[x] EXISTING [ ] DEVELOPED

WELLS SPRING

WELL PERMIT NUMBERS

[ ] NEW WELLS

Proposed Aquifers - (Check One)

[ ] Alluvial [ ] Upper Arapahoe
[ ] Upper Dawson [ ] Lower Arapahoe
[ ] Lower Dawson [ ] Laramie Fox Hills
[ ] Denver [ ] Dakota
[ ] Other

[x] MUNICIPAL
[ ] ASSOCIATION
[ ] COMPANY
[ ] DISTRICT

NAME: N/A

LETTER OF COMMITMENT FOR SERVICE [x] YES [ ] NO

WATER COURT DECREE CASE NUMBERS

11. ENGINEER'S WATER SUPPLY REPORT [x] YES [ ] NO If yes, please forward with this form. (This may be required before our review is completed)

12. TYPE OF SEWAGE DISPOSAL SYSTEM

[x] SEPTIC TANK/LEACH FIELD
[ ] CENTRAL SYSTEM - DISTRICT NAME:
[ ] LAGOON
[ ] VAULT - LOCATION SEWAGE HAULED TO:
[ ] ENGINEERED SYSTEM (Attach a copy of engineering design)
[ ] OTHER:

Appendix C

Colorado Springs Utilities
It's how we're all connected
448-4800
www.csu.org

April 5, 2022

Kristian Guntzelman
5381 Sugar Camp Road
Milford, OH 45150

RE: Availability of utility service to the property located outside the City of Colorado Springs city limits and outside the corporate limits of the Town of Green Mountain Falls as follows:

The parcel of land with Tax Schedule No 8322200018 located in Section 22, Township 13 South, Range 68 West, of the 6th Principal Meridian, County of El Paso, Colorado.

Dear Kristian Guntzelman,

In regard to the availability of electric service from Colorado Springs Utilities (CSU), the above referenced property (Property) is located outside the City of Colorado Springs (City) city limits and outside the corporate limits of the Town of Green Mountain Falls (GMF), but within the CSU electric service territory and can be provided electric service by CSU, subject to certain conditions, including but not limited to, those conditions presented in this letter.

The Property is not located within CSU's gas or wastewater service territories; These services cannot be provided to the Property by CSU.

Additionally in regard to CSU water service, CSU has authorization to operate a satellite water distribution system to provide water service to properties within the area defined as the Ute Pass Service Area ("UP Service Area"). CSU's research indicates that the Property is located within the UP Service Area and is subject to those conditions presented in this letter. Accordingly, CSU water service can be made available to the Property provided that: the structures within the Property are situated below the elevation that can be served by CSU's existing Ute Pass Water Treatment Plant, which is 7,880 feet. New water connections for the Property may also be subject to approval by and restrictions of the appropriate fire district (Green Mountain Falls/Chipita Park Fire District).

Moreover, connections to CSU water system in the UP Service Area are contingent upon the customer meeting all the requirements of any applicable CSU's tariffs and City ordinances that are in effect for each requested utility service at the time the application for service is made by the customer and formally accepted by CSU. Connection requirements may include provisions for necessary line extensions, pumping facilities, and/or other system improvements, and payment of all applicable system development charges, recovery agreement charges, and other fees or charges applicable to the requested service. Information concerning these requirements can be obtained from the Utilities Development Services Office.

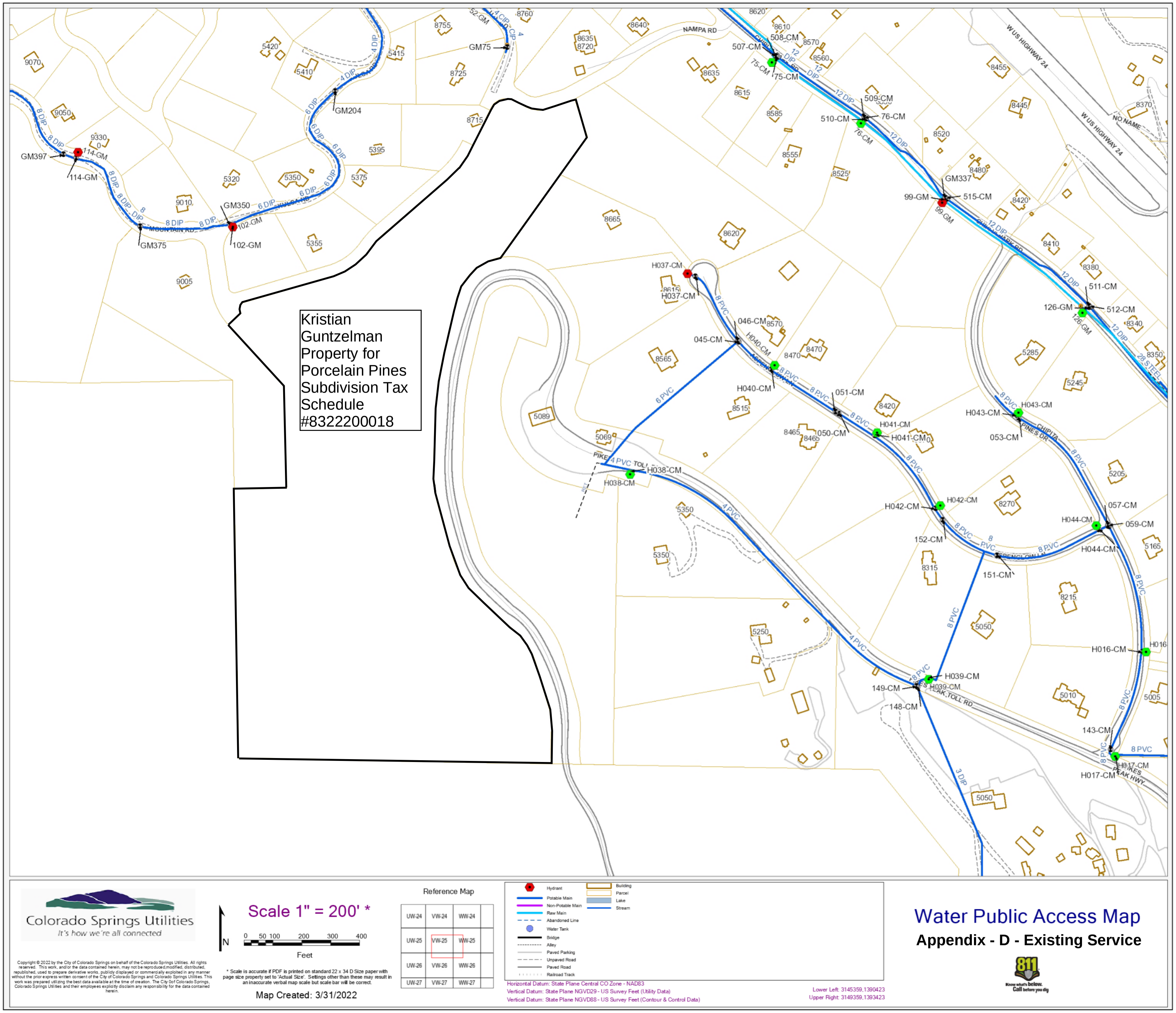
Although CSU diligently seeks to expand its supplies and facilities as necessary to meet anticipated load growth, CSU services are provided to eligible customers at the time of connection to the distribution system on a "first come, first served" basis after CSU's acceptance of the customer's application. In certain instances, CSU supplies and system capacities are limited. Accordingly, no specific allocations or amounts of CSU facilities or supplies are reserved for service to the Property, and no commitments are made as to the availability of utility service at future times.

If you have any questions, concerns or if you would like to further pursue this matter, please contact Bill Davis at wtdavis@csu.org, 719-668-8254 or myself at bmludiker@csu.org.

Sincerely,

Blanche M Ludiker
Colorado Springs Utilities
Development Services

Appendix D


Kristian Guntzelman Property for Porcelain Pines Subdivision Tax Schedule #8322200018
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MOUNTAIN RD
PINES DR
PIKES PEAK TOLL RD
PIKES PEAK HWY
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GM375
GM350
102-GM
GM204
GM75
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4 DIP
12 DIP
28 STEEL
8 PVC
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3 DIP
Reference Map
UW-24
VW-24
WW-24
UW-25
VW-25
WW-25
UW-26
VW-26
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WW-27
Hydrant
Potable Main
Non-Potable Main
Raw Main
Abandoned Line
Water Tank
Bridge
Alley
Paved Parking
Unpaved Road
Paved Road
Railroad Track
Building
Parcel
Lake
Stream
Colorado Springs Utilities
It's how we're all connected
N
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0 50 100 200 300 400
Feet
* Scale is accurate if PDF is printed on standard 22 x 34 D Size paper with page size property set to 'Actual Size'. Settings other than these may result in an inaccurate verbal map scale but scale bar will be correct.
Map Created: 3/31/2022
Horizontal Datum: State Plane Central CO Zone - NAD83
Vertical Datum: State Plane NGVD29 - US Survey Feet (Utility Data)
Vertical Datum: State Plane NGVD88 - US Survey Feet (Contour & Control Data)
Lower Left: 3145359,1390423
Upper Right: 3149359,1393423
Water Public Access Map
Appendix - D - Existing Service
811
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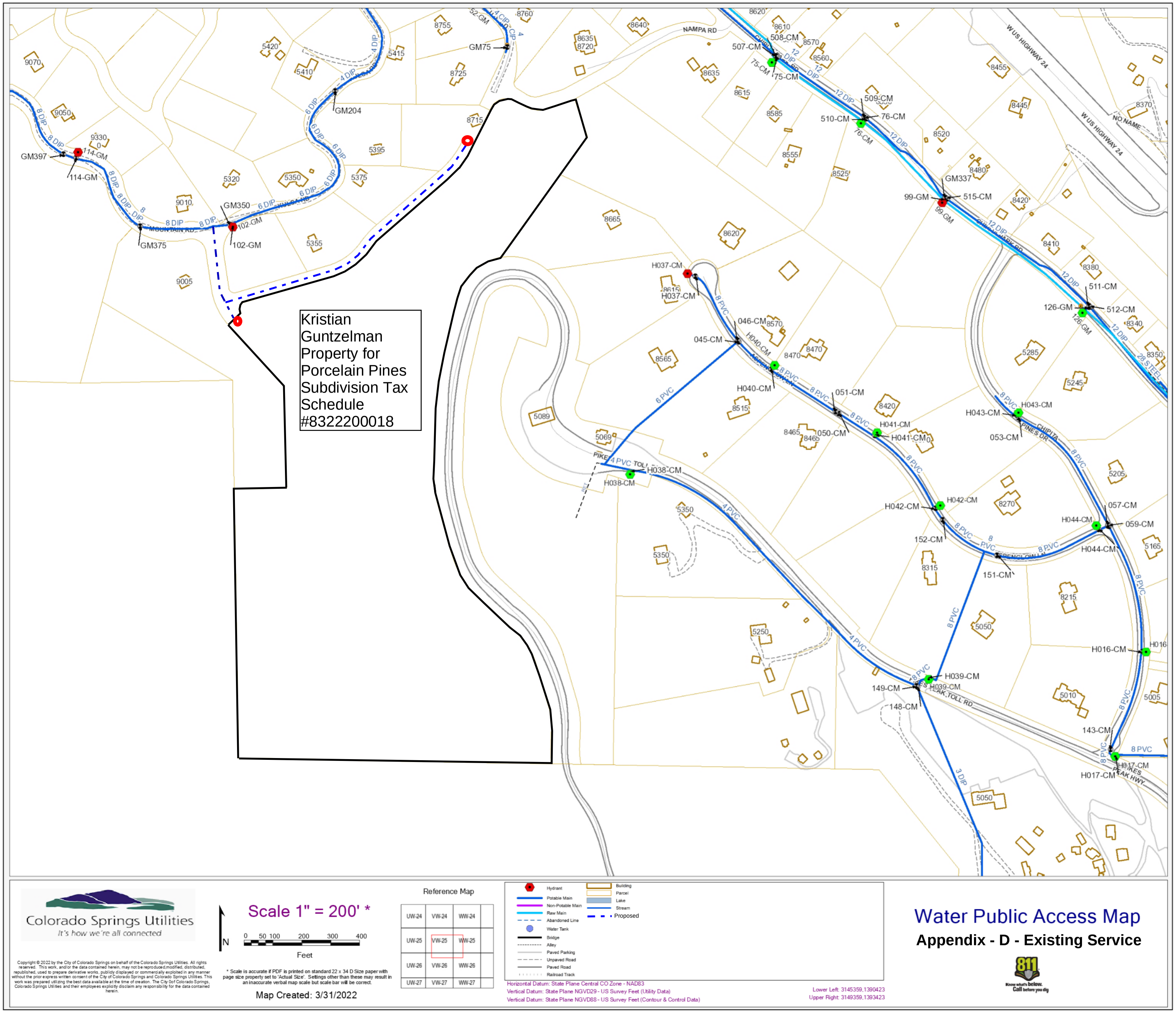
Appendix E



Water Public Access Map
Appendix - D - Existing Service
Kristian Guntzelman Property for Porcelain Pines Subdivision Tax Schedule #8322200018
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Feet
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Map Created: 3/31/2022
Reference Map
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UW-25 VW-25 WW-25
UW-26 VW-26 WW-26
UW-27 VW-27 WW-27
Hydrant
Potable Main
Non-Potable Main
Raw Main
Abandoned Line
Water Tank
Bridge
Alley
Paved Parking
Unpaved Road
Paved Road
Railroad Track
Building
Parcel
Lake
Stream
Proposed
Horizontal Datum: State Plane Central CO Zone - NAD83
Vertical Datum: State Plane NGVD29 - US Survey Feet (Utility Data)
Vertical Datum: State Plane NGVD88 - US Survey Feet (Contour & Control Data)
Lower Left: 3145359,1390423
Upper Right: 3149359,1393423
Colorado Springs Utilities
It's how we're all connected
W US HIGHWAY 24
NAMPA RD
PIKES PEAK TOLL RD
MOUNTAIN RD
CHIPITA PINES DR

Appendix F

PREPARED FOR

Colorado Springs Utilities

It's how we're all connected

Integrated Water Resources Plan

Final Report

FEBRUARY 2017

FINAL REPORT

MWH now part of Stantec

BLACK & VEATCH
Building a world of difference.

Table of Contents

List of Tables

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List of Acronyms and Abbreviations

The following acronyms are used in this report.

ac-ft	acre-foot or acre-feet
ac-ft/yr	acre-foot per year or acre-feet per year
CWP	Colorado's Water Plan
DPR	direct potable reuse
EIS	Environmental Impact Statement
EL	Executive Limitation
ERMOU	Eagle River Memorandum of Understanding
Fry-Ark	Fryingpan-Arkansas Project
FVA	Fountain Valley Authority
GCM	Global Climate Model
IBCC	Interbasin Compact Committee
IPR	indirect potable reuse
IWRP	Integrated Water Resources Plan
MOEA	multi-objective evolutionary algorithm
MOU	Memorandum of Understanding
MGD	million gallons per day
O&M	operation and maintenance
OYM	Operations and Yield Model
RMD	reliably met demand
SDS	Southern Delivery System
SME	subject matter expert
SWSI	Statewide Water Supply Initiative
T&P	temperature and precipitation
TM	Technical Memorandum
Utilities	Colorado Springs Utilities
WEAP	Watershed Evaluation and Planning System Model
WPAG	Water Planning Advisory Group
WRP	Water Resource Plan
WTP	water treatment plant
WWTP	wastewater treatment plant
YOD	years of demand

Glossary

Adaptive Management – Approach to planning in which the recommendation is not static or fixed, but rather can be changed as future conditions change.

Alternative Transfer Methods (ATM) –Methods by which water owned by agricultural entities could be transferred (either temporarily or permanently) to municipal entities for their own beneficial use without adversely impacting the agricultural water users.

Buildout – Future condition when Utilities' existing service area is fully built out according to an assumed mixture of residential, commercial, and industrial development and density; assumed to occur around 2070.

Colorado River Compact – Agreement between the seven Colorado River Basin states and Mexico to allocate Colorado River water. Upper Basin states (CO, UT, NV, and WY) must deliver 7.5 million acre-ft/year at the outflow of Lake Powell on a 10-year rolling average. Major driver of regional, state, and local planning efforts.

Demand Management – Practices to reduce customer water demand and promote the responsible, wise, efficient, and sustainable use of water resources, also referred to as conservation. Demand management practices include landscape conversion, water efficient fixtures, education, and reducing system leaks, among other options.

Direct Potable Reuse (DPR) –Treating wastewater to levels that meet or exceed drinking water quality standards at a wastewater treatment plant (WWTP), then routing this water to the potable water treatment plant (WTP) for additional treatment and delivery to the potable water system.

Exchanges – Water right accounting procedure where volumes of legally and physically available water can be administratively transferred to a location at a higher point along the river. Allows Utilities to exchange water rights from return flows to locations that can then re-serve the Utilities service area.

Firm Yield – Volume of annual demand that can always be met under historical recorded hydrology for an assumed water supply system configuration.

Global Climate Model (GCM) – Computer model that projects future climate conditions (e.g., temperature and precipitation) based on an assumed set of environmental and emissions inputs.

Graywater Reuse – Use of wastewater collected from selected fixtures within residential, commercial, or industrial buildings (including bathroom or laundry sinks, bathtubs, showers, or laundry machines) by Utilities' customers as a source of nonpotable water for onsite water uses.

Indirect Potable Reuse (IPR) –Taking treated, recycled, or reclaimed water and then blending it with a natural water source (e.g., natural flow in a stream channel or reservoir water, which acts as an environmental buffer) prior to re-introduction into the water system for further treatment and distribution for potable water uses.

Identified Programs and Policies (IP&P) – Projects identified in the Colorado Water Plan as proposed by municipal, agricultural and industrial water users.

Level of Service Goals – Metrics used by Utilities to measure performance of the water supply system with respect to the governing policies set by the Executive Limitations.

Life-Cycle Cost – Estimated cost for a project or a collection of projects that includes both the capital cost and 50 years of operations and maintenance costs.

Metrics – Quantifiable measures used to assess the performance of an aspect of Utilities' water supply system.

Nonpotable Water – Water that has not been treated to drinking water standards but can be used for non-drinking applications such as irrigation and industrial processes.

Operations and Yield Model – Computer model of Utilities' water supply and collection system used to simulation operations under different future conditions and assist decision makers in the planning process.

Portfolio – Collection of individual projects.

Rainwater Harvesting – The process of capturing rainwater on an individual residential property for onsite use.

Regionalization – Concept that individual water providers share common goals, challenges, and opportunities and thus there are times when it is in the best interest of the region for these water providers to coordinate. For the IWRP, this refers to Utilities coordinating with small water providers in the Pikes Peak region.

Reliability – The percentage of time that some measure of the water supply system is in an acceptable state (e.g., percentage of years with total system storage above 1.0 Year of Demand, or percentage of years in which all demands are met).

Reliably Met Demand – Volume of annual demand that can be met while maintaining the Level of Service goals for an assumed future condition.

Reservoir System Storage – Total volume of water stored in all Utilities' reservoirs and in Utilities' accounts in reservoirs owned by others.

Resilience – The measure of the ability of the system to recover from an unacceptable state into an acceptable one.

Robustness – The ability of the system to maintain Level of Service goals for a variety of different futures with different system stressors (e.g. warmer climate, higher demands, pipeline outage, etc.)

Signpost – Conditions or factors that may have an effect on the system's performance and are monitored to see if action is needed.

Shortage Response Plan – Set of responses (e.g. outdoor watering restrictions) that Utilities enacts during periods of water supply shortage, either caused by drought or an unplanned emergency outage.

Storage Reserve – Volume of water that Utilities plans to always maintain in total system storage to mitigate against unknown events.

Temperature & Precipitation Offset – Future climate condition with a prescribed change in temperature (either warmer or cooler) and a prescribed change in precipitation (either drier or wetter) compared to current climate.

Transmountain Diversion – Process in which water derived from the Colorado River Basin is diverted across the Continental Divide to the Arkansas River Basin (or other East Slope basin).

Triple Bottom Line – Describes diverse performance criteria used to evaluate potential projects, including social, environmental, and economic criteria (sometimes referred to as People-Planet-Profit).

Vulnerability – The measure of how severe the system is in an unacceptable state.

Water Resource Options – Potential program, project, or policy Utilities could pursue to improve water supply system performance.

Water Resource Strategies – Collection of options that have similar characteristics, benefits and challenges that Utilities could pursue to improve water supply system performance (e.g., new reservoir storage, demand management, water reuse).

Water Reuse – The process of reusing water that Utilities has legal right to, either by exchange or a reclaimed water distribution system.

Years of Demand in Storage (YOD) – Method Utilities uses to characterize the total reservoir system storage in which the storage volume in acre-feet is translated into an equivalent number of years of annual demand (e.g., if total reservoir system storage is 160,000 ac-ft and annual demand is 80,000 ac-ft, reservoir storage is 2.0 YOD).

Acknowledgements

Colorado Springs Utilities would like to thank the following people for their collaborative contributions to the Integrated Water Resources Plan. Their technical expertise and professional insight were invaluable in developing and implementing the complex computational approaches used in the IWRP.

Dr. David Yates of the National Center for Atmospheric Research for his assistance in developing data sets, calibrating hydrologic models, preparing input files to the system model, assisting with the demand model, and climate change insight.

Dr. Balaji Rajagopalan of the University of Colorado at Boulder for his guidance and assistance with statistical analysis of paleo streamflow data and time series development.

Dr. Casey Brown of the University of Massachusetts at Amherst and Dr. Scott Steinschneider of Cornell University, for the development of the temperature and precipitation sequences and general climate science insight.

Dr. Patrick Reed (now of Cornell University) for his part in allowing us to use of the Borg multi-objective evolutionary algorithm and for his thoughtful application insights.

Colorado Springs Utilities would also like to thank members of the IWRP citizen's Water Planning Advisory Group for their time and dedication to our community. The members spent a great deal of time over the course of two and a half years learning the details of our water system and the future challenges our community will experience. They engaged in thoughtful discussion and provided valuable insight and input into the planning process. In alphabetical order, the group members and the areas of the Colorado Springs community that they represented were:

- Alicia Archibald, Environmental Community
- Tom Binnings, Business Community
- Sean Chambers, Smaller Regional Water Providers
- Dirk Draper, Business Community
- Tim Emick, Landscaping Community
- Paul Fuschich, Industrial User Community
- Vince Guthrie, Military Community
- Ian Johnson, Education and Large Commercial User Community
- Donna Major, Real Estate Community
- Eric Moroski, Landscaping Community
- Marla Novak, Business Community
- Karen Palus, City of Colorado Springs
- Jane Ard Smith, Environmental Community

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Executive Summary

ES-1 Introduction

The Colorado Springs Utilities (Utilities) Integrated Water Resource Plan (IWRP) is a long-term strategic plan for providing a reliable and sustainable water supply to Utilities' customers in a cost-effective manner. It is a comprehensive approach to water resource planning that incorporates water supply and demand, water quality, infrastructure reliability, environmental protection, water reuse, financial planning, energy use, regulatory and legal concerns, and public participation. Key IWRP activities are shown in **Figure ES-1** and include strategic water resource planning, technical studies, and stakeholder involvement. The IWRP presents a strategic water supply plan that addresses a range of possible conditions in Utilities' existing service area at Buildout (50 or more years in the future) and sets policy level direction for Utilities to follow in meeting the future needs of the community.

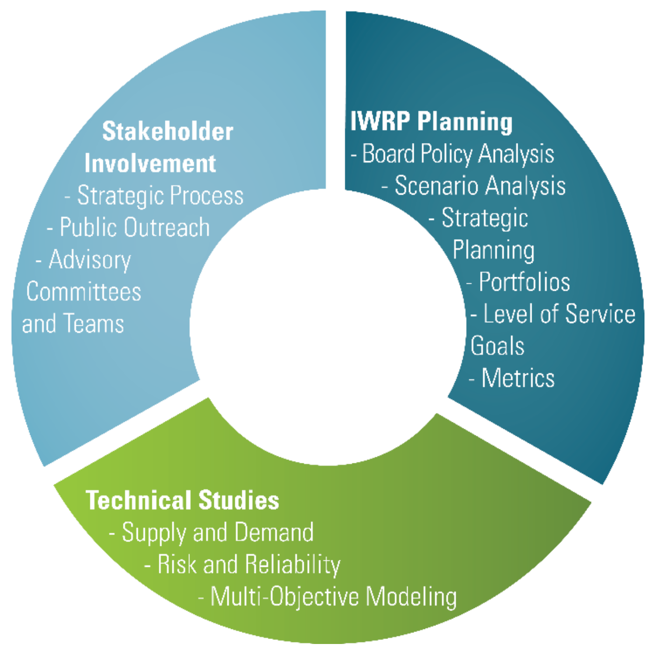


Figure ES-1. Key IWRP Activities

ES-2 Planning Approach and Assumptions

The IWRP focused on key policy questions which required input and direction from the Colorado Springs Utilities Board (Utilities Board). The policy questions addressed in the IWRP are:

1) What is an acceptable level of risk in addressing future water demands? (Risk Tolerance and Level of Service)
2) What is an appropriate approach for Colorado Springs Utilities to follow in meeting regional water demands within the Pikes Peak Region? (Proactive vs. Reactive Regionalization)

3) What role do different supply options contribute to achieving a balanced water supply portfolio? (Appropriate amounts of New Supply, Storage, Conveyance, Demand Management, and Reuse)
4) How do we ensure a proper level of investment in Colorado Springs Utilities' existing and future water system to maintain an acceptable level of risk? (Balancing Costs, Risks, and Project Phasing)

The IWRP adopted a risk-based planning approach that is "forward looking" in which risks and uncertainties affecting future raw water system performance were identified and analyzed in the context of multiple possible future scenarios. This new approach is a departure from previous planning processes in which water supply plans were "backward looking," and developed using a single set of assumed conditions and historical hydrology, where a static "firm yield" estimate was used to measure water system performance.

The key metrics now used to assess raw water system performance were total reservoir system storage and frequency of the need for shortage response actions. The Level of Service criteria used to quantify acceptable performance were:

1) Meet indoor water demand 100 percent of the time
2) Maintain a minimum of 1.0 year of demand in storage at all times; and
3) Maintain a minimum of 1.5 years of demand in storage 90 percent of the time.

ES-3 Technical Analyses

A water resources and water rights simulation model developed in the past by Utilities was combined with a decision support system, a weather generator, a hydrologic rainfall and runoff model, and an multi-objective optimization routine to evaluate the impact of potential risks and the benefits provided by future potential water supply projects. These analytical tools were used to estimate demands that can be reliably met by the water system for different level of service goals.

The current raw water system can reliably meet a demand of 95,000 acre-feet/year (ac-ft/yr) and still meet level of service goals. Buildout demand is estimated to be about 136,000 ac-ft/yr so if Utilities expects to maintain level of service goals at Buildout, it will need to add supply and infrastructure to address this significant water supply gap of approximately 41,000 ac-ft/yr.

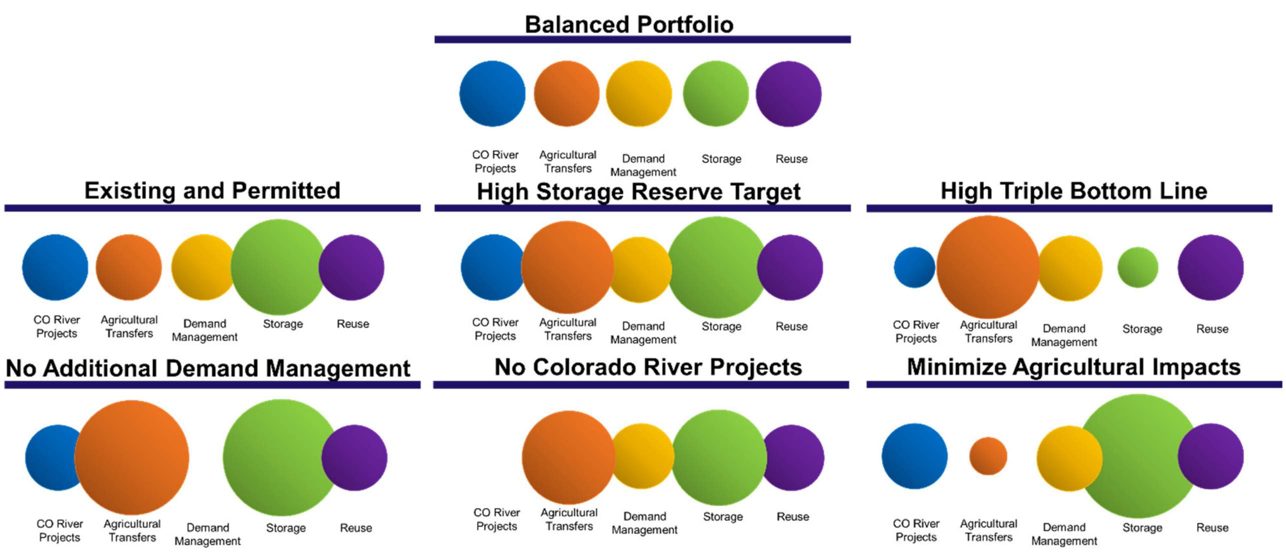
Internal subject matter experts identified over 60 risks and uncertainties in the six major categories shown in **Figure ES-2**. Key climate-related risks included drought and trends toward warmer temperatures as seen in the historical record. Key system (or non-hydrologic) related risks are associated with legal, administrative, or environmental factors which may impact Utilities' yields, Colorado River Compact administration, and emergency infrastructure outages.

Utilities has many strategies available for mitigating future water supply and demand uncertainties. Each has its own unique benefits and challenges that must be weighed when creating a future portfolio of projects, programs, and policies that addresses a broad range of future conditions. The six general water

Figure ES-2. Categories of Risk and Uncertainty

resources strategies considered in the creation of water supply portfolios were: Demand Management, Reuse and Non-Potable Water, Colorado River Basin Supplies, Agricultural Transfers, Increased Storage, and Conveyance. Within these strategies, over 50 individual projects, programs and policies were considered for improving Utilities' ability to meet level of service goals at Buildout conditions. Individual projects were evaluated and compared using triple bottom line criteria (i.e., environmental, social, economic), and life-cycle cost.

Several portfolio themes were developed to explore different ways to meet Buildout demands. These are shown in **Figure ES-3**, and demonstrate that there are many ways to meet Buildout demands with the available strategies and projects.



Note: Sizes of circles represent the relative magnitude of options to the Balanced Portfolio.

Figure ES-3. Portfolio Themes and Ranges of Total Project Sizes

The recommended water supply plan is to pursue a Balanced Portfolio, shown conceptually in **Figure ES-4**. This portfolio meets the level of service goals at an acceptable life-cycle cost and with a good triple bottom line score.

Figure ES-4. Components of Recommended Water Supply Balanced Portfolio

The IWRP analysis also demonstrates that it is possible for Utilities to pursue a proactive approach to Regionalization. By implementing the Balanced Portfolio and acquiring 5,000 to 10,000 ac-ft/yr of additional supply, Utilities would possess adequate supplies to meet the full Buildout demand of all regional entities (about 25,000 ac-ft/yr) while maintaining the desired level of service for all Utilities customers and regional customers. As a different approach to assisting regional entities in meeting their water needs, the water system has seasonal unused conveyance capacity now and at Buildout in off-peak months, which can accommodate deliveries to other water providers in the Pikes Peak region.

A phased project implementation schedule was prepared for the components of the Balanced Portfolio over a period of about 50 years.

ES-4 Findings and Recommendations

Utilities performed extensive technical analyses and collected public input from a broad range of sources to develop recommendations for the four policy questions posed above. The recommendations associated with each policy question are shown in **Figure ES-5**.

Implementation of the IWRP will require adaptive management in order to provide flexibility in the face of future uncertainty. Adaptive management will require careful tracking of key indicators of change or "signposts" such as annual water demand, per capita water demand, population, climate trends (i.e., magnitude and rate of change for mean annual temperature, precipitation, and stream flows), regulatory changes, and changes in water rights administration. These indicators will inform Utilities as to what projects, policies, and water supply strategies should be implemented at various points in time. Adaptive management concepts will also be used to determine a schedule for implementing or modifying the Balanced Portfolio in a manner that appropriately considers all relevant factors and conditions, including those listed above, plus acquisition and construction opportunities and financial capacity.

The IWRP recommends that Utilities make responsible, deliberate, and consistent investment in the water system to implement the Balanced Portfolio in a manner that balances costs and risks between now and Buildout. Projects will be actively developed in the short term, mid-term and long term according to an established phasing framework to accomplish this goal. There will necessarily be numerous follow-up studies and planning efforts to be able to accomplish the objectives set forth in this Plan.

Policy Question	RECOMMENDATIONS
Policy Question 1: Level of Service What is an acceptable level of risk in addressing future water demands?	• Affirm current policy of triggering shortage analysis at 1.5 years of demand (YOD) • Accept planning criteria of 90 percent reliability for 1.5 YOD in storage • Formalize planning criteria of maintaining 1.0 YOD in storage at all times
Policy Question 2: Regionalization What is an appropriate approach for Colorado Springs Utilities to follow in meeting water demands within the Pikes Peak Region?	• Proactively pursue regionalization in a manner that assists in meeting regional water demands, while protecting ratepayer interests and water supply investments and providing a benefit to Colorado Springs Utilities ratepayers and citizen owners
Policy Question 3: Buildout Portfolio What role do different supply options contribute to achieving a balanced portfolio?	• Pursue a balanced portfolio that includes a diversity of Demand Management, Supply, Storage, Reuse, and Conveyance options
Policy Question 4: Portfolio Phasing How do we ensure a proper level of investment in Colorado Springs Utilities' existing and future water system to maintain an acceptable level of risk?	• Pursue a consistent and incremental investment so as to implement a balanced portfolio that balances costs and risks

Figure ES-5. Policy Question Recommendations

ES-5 IWRP Approval and Policy Direction

Colorado Springs' Utilities Board approved the Integrated Water Resource Plan, including the recommendations associated with the four policy questions, at its regular meeting on February 22, 2017. This Plan and these recommendations establish a policy direction and will be the tenets governing the provision of a reliable and sustainable long-term water supply to Utilities' customers in a cost-effective manner.

SECTION 1

Background

The Integrated Water Resources Plan (IWRP) for Colorado Springs Utilities (Utilities) is a long-term strategic plan for providing a reliable and sustainable water supply to Utilities' customers in a cost-effective manner. It is a comprehensive approach to water resource planning that incorporates water supply and demand, water quality, infrastructure reliability, environmental protection, water reuse, financial planning, energy use, regulatory and legal concerns, and public participation. Key IWRP activities are shown in **Figure 1-1** and include strategic water resource planning, technical studies, and stakeholder involvement. The IWRP presents a strategic water supply plan that addresses a range of possible conditions in Utilities' service area on an approximate 50 year time horizon and sets policy level direction for Utilities to follow in order to meet that goal.

The IWRP is a comprehensive long-term strategic plan for providing a reliable and sustainable water supply to Utilities' customers in a cost-effective manner.

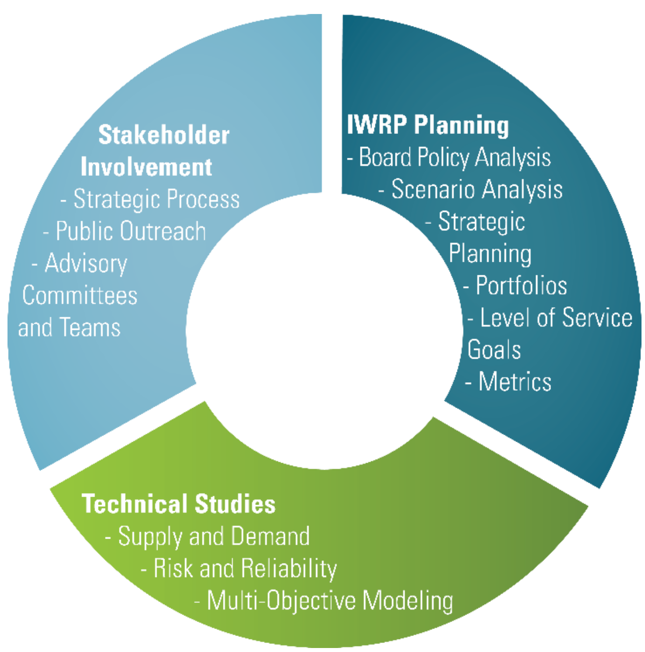


Figure 1-1. IWRP Activities

The IWRP was prepared by the Utilities Water Resource Management Section, with assistance from a number of subject-matter experts from across Utilities, as needed, and MWH, which served as the program management and modeling consultant for the IWRP. Additional technical and drafting assistance was provided by Black & Veatch.

1.1 Goals and Objectives

The goal of the IWRP is to develop a water resource planning and management strategy for Utilities that has the following attributes:

- **Robust** – Flexible and resilient to adapt to a variety of possible future conditions.
- **Sustainable** – Capable of being implemented over the long term using the resources expected to be available to Utilities and its customers
- **Reliable** – Able to deliver necessary water supplies from renewable sources of supply using dependable facilities.
- **Economical** – Able to deliver water supplies in a cost-effective manner at a price supportable by Utilities' customers.
- **Ecological** – Able to reasonably mitigate environmental consequences and maintain environmental quality.
- **Acceptable** – Supported by Utilities customers and other stakeholders
- **Explainable** – Well written, with objectives, strategies, and consequences that can be readily understood by Utilities customers and other stakeholders.

Strategic water supply planning for the IWRP was conducted in accordance with Utilities' mission and several of the Utilities Board's Executive Limitations (EL). EL-4 and EL-10 focus on protecting and developing Colorado Springs' water rights and water-related services. EL-11 requires Risk Management Plans designed to identify, monitor, manage, and report potential risks. EL-13 emphasizes the importance of maintaining existing infrastructure, while identifying and planning for future resource and infrastructure needs.

Figure 1-2 summarizes the four phases of the IWRP technical analysis: 1) identifying issues, risks, and uncertainties affecting Utilities' water system; 2) assessing vulnerabilities; 3) developing water supply strategies and options; and 4) developing a strategic plan. The previously published Planning Factors Report summarized the first phase, in which the Utilities' water system features were described and issues, risks, and uncertainties were identified and prioritized for future analysis. A separate and subsequent study, The Vulnerability Assessment Report, analyzed these issues, risks, and uncertainties (both climate change/hydrologic and non-hydrologic), and identified those to which the current water system was vulnerable.

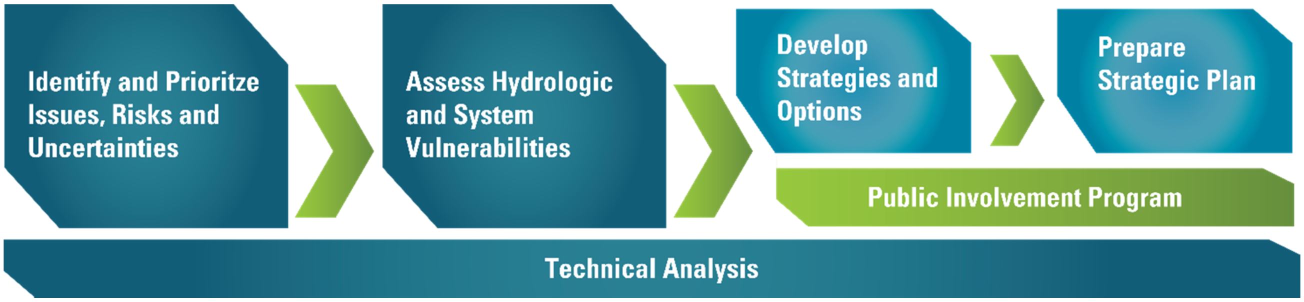


Figure 1-2. IWRP Phasing

1.2 Key Policy Questions

The IWRP focused on key policy questions which required input and direction from the Utilities Board. Several key policy questions were considered throughout the IWRP process in response to direction from Utilities management and the Utilities Board. This report and the associated IWRP recommendations are structured to answer the following questions:

1) What is an acceptable level of risk in addressing future water demands? (Risk Tolerance and Level of Service)
2) What is an appropriate approach for Colorado Springs Utilities to follow in meeting regional water demands within the Pikes Peak Region? (Proactive vs. Reactive Regionalization)
3) What role do different supply options contribute to achieving a balanced water supply portfolio? (Appropriate amounts of New Supply, Storage, Conveyance, Demand Management, and Reuse)
4) How do we ensure a proper level of investment in Colorado Springs Utilities' existing and future water system to maintain an acceptable level of risk? (Balancing Costs and Risks and Project Phasing)

The following subsections provide a brief background explanation for each of these policy questions.

1.2.1 POLICY QUESTION #1: WHAT IS AN ACCEPTABLE LEVEL OF RISK IN ADDRESSING FUTURE WATER DEMANDS? (RISK TOLERANCE AND LEVEL OF SERVICE)

This policy question addresses the level of risk that our community is willing to accept, with the answer driving the technical aspects of the IWRP analyses. The reliability of a water system is affected by supply availability and variability, as well as customer demand level and variability. Water storage serves as a buffer between supply and demand, and therefore reservoir storage levels can be used as an indicator of overall water system performance and ability to meet customer demands. Tracking storage levels then provides an appropriate measure of system performance and risk.

As described in Section 5-Risk Identification and Assessment, the Utilities water system will be subject to an increasing variety and severity of risks and uncertainties in the future. Maintaining a water storage reserve is a proven way to mitigate against unknown risks (**Figure 1-3**). It serves as an insurance policy. The desired storage reserve volume impacts how many supply and infrastructure projects will be required to maintain that desired level. Because of the variability in the annual amounts of both supply and demand, it can be very expensive to rely solely on new supplies and additional conveyance to maintain the desired storage reserves. Another powerful tool to mitigate this risk is to implement shortage response measures, which may include mandatory watering restrictions and other measures, during occasional times of shortage. Therefore, the desired level of reserve storage also affects how often Colorado Springs customers may need to be in watering restrictions. The scale in **Figure 1-4** shows conceptually the balance that must be struck between maintaining water in storage, increasing supply, and frequency. Through the IWRP process, factors associated with this balance were analyzed and weighed resulting in a recommendation for the acceptable tradeoff between risk and reservoir storage.

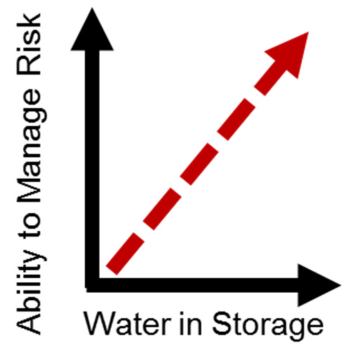


Figure 1-3. Relationship between Reservoir Storage and Risk Management

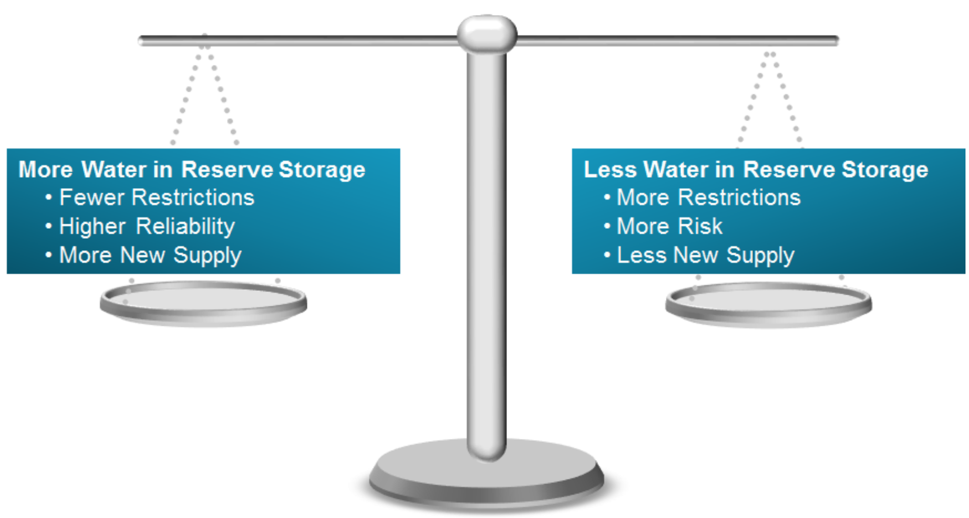


Figure 1-4. Tradeoffs in Setting Reserve Storage Level

1.2.2 POLICY QUESTION #2: WHAT IS AN APPROPRIATE APPROACH FOR UTILITIES TO FOLLOW IN MEETING REGIONAL WATER DEMANDS WITHIN THE PIKES PEAK REGION? (PROACTIVE VS. REACTIVE REGIONALIZATION)

Utilities anticipates increasing opportunities and demands relative to the provision of some form of water service to other communities in the greater Pikes Peak Region. These will most often arise in association with water availability and water quality challenges faced by those entities. This circumstance results in complex policy choices, as there are many ways in which Utilities could interact with other water supply entities in the region. One of the possible choices would be to forego any partnership or other contractual arrangements. This would have no direct water supply impact on Utilities' system, although there may be direct and indirect social and economic consequences. Providing regional water service would also have some level of direct system impact.

In order to assess the direct system impacts of providing regional water service, the following two analyses were performed to help inform the regionalization discussion. (Numerous variations of these concepts could be explored in the future.)

1) **Full Regionalization** – Assumes Utilities would meet, as a wholesale provider, full Buildout demands of all water providers within the region (25,000 ac-ft/yr total assumed demand) who could be physically served at a reasonable cost.
2) **If/When Regionalization** – Assumes Utilities would make unused conveyance capacity in the water system available to regional entities, which would be used to convey their own water supplies to their distribution areas and/or storage vessels.

The primary policy consideration is whether Utilities should be: (1) reactive to regional needs, i.e., providing water capacity and/or supply only in response to emergency demands, which is an approach which represents a potential risk to Utilities' water system if not approached carefully; or (b) proactively pursuing a regionalization strategy, which could represent an opportunity to Utilities and future regional participants by allowing thoughtful and careful consideration of how to provide benefits to both Utilities' customers and the regional participants.

1.2.3 POLICY QUESTION #3: WHAT ROLE DO DIFFERENT SUPPLY OPTIONS CONTRIBUTE TO ACHIEVING A BALANCED WATER SUPPLY PORTFOLIO? (APPROPRIATE AMOUNTS OF NEW SUPPLY, STORAGE, CONVEYANCE, DEMAND MANAGEMENT, AND REUSE)

This question addresses the major categories of water supply options Utilities could potentially employ in a portfolio (i.e., collection of water supply projects, programs and policies) to meet the future demands associated with Buildout. Buildout for planning purposes represents the maximum demands Utilities will need to meet when the current Utilities service area is fully built out based on current land use planning information. These main categories of potential future water supply options are:

- Water demand management
- Utilization of reuse, groundwater, and nonpotable water where economically and technically appropriate.
- Complete existing projects to provide additional water from the Colorado River Basin;
- An increased level of agricultural to urban water transfers, primarily from the Lower Arkansas Basin in the form of permanent (acquisition) and/or temporary (lease) transfers;
- An increase in water storage capacity; and
- Additional conveyance capacity.

As shown in **Figure 1-5**, Utilities investigated a variety of different water supply strategies that can be designed to address the risks to future water system reliability while maintaining a desired level of service. These are described in Sections 6 and 7. The primary policy question involves determining the relative amounts of the various water supply options that are appropriate for Utilities to pursue considering all the challenges and benefits associated with of each.

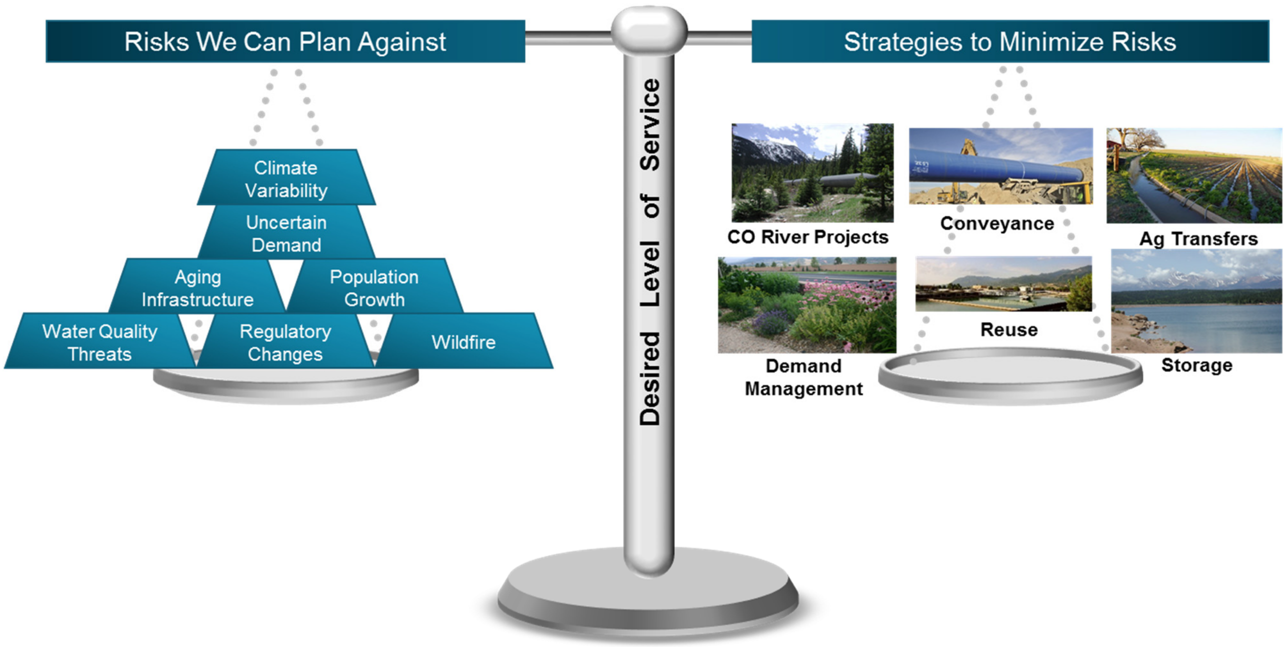


Figure 1-5. Factors Influencing Selection of a Balanced Portfolio

1.2.4 POLICY QUESTION #4: HOW DO WE ENSURE A PROPER LEVEL OF INVESTMENT IN UTILITIES' EXISTING AND FUTURE WATER SYSTEM TO MAINTAIN AN ACCEPTABLE LEVEL OF RISK? (BALANCING COSTS AND RISKS AND PROJECT PHASING)

This broad question encompasses many financial issues, including the appropriate level of investment for operation and maintenance (O&M) of the existing water system, appropriate pricing strategies, implementation of new water projects in the context of competing needs in other Utility service sectors, costs of other services, and other related financial issues. To help address certain aspects of this question, Utilities focused its IWRP analysis on the phasing and timing of projects in the Buildout portfolio. The financial analysis performed in the IWRP was used to make general comparisons between different portfolios and phasing scenarios. More detailed financial analyses for the existing and future water system (e.g., budget and rate impact studies) may be performed in separate post-IWRP evaluations.

General financial strategies that can be implemented to balance costs and risks include:

- Portfolio phasing and minimizing large or abrupt budget increases, and
- A dedicated water supply monetary fund, an opportunistic acquisition policy, and streamlined processes that would allow Utilities Management to respond quickly to unique opportunities when they arise.

Responding to this policy question resulted in an approach to project scheduling and investment that would balance strict system performance in meeting water needs with other relevant factors, such as competition for resources, windows of opportunity to implement certain projects, and Utilities-level financial planning. Utilities engages in the budget process every year to support and implement its planning goals. Thus, a high level strategy to guide this engagement is critically important. This is described in more detail in Section 11-Reccomended Plan.

1.3 Prior Plans

This IWRP is the latest water resource strategic planning effort for Utilities. The previous effort was Utilities' 1996 Water Resource Plan (WRP), which recommended a four-part strategy for enhancing water supplies to address future water needs using:

- Conservation,
- Water Reuse,
- Existing System Improvements, and
- Major New Delivery System.

Substantial progress has been made in each of those areas. In the area of conservation, Utilities has an award-winning conservation program, and Utilities customers have reduced their per capita water use substantially over the past 15 years. In 2001, the Nonpotable Master Plan was developed, and later in 2005, the Nonpotable Strategy outlined a long-term strategy for the nonpotable system. Several key improvements have been made to the existing system in the past last 20 years, including expansion of the Otero Pump Station and Lower Homestake Pipeline. The SDS, for which Phase 1 was completed in April 2016, is filling the requirement for a major new delivery system.

Since the adoption of the 1996 WRP, Utilities has completed numerous additional supply, infrastructure, water rights, conservation, and drought management plans and studies. Some of these include the 1998 Operations and Yield Model Study, the 1999 Local Water Use Study, the 1999 Otero Expansion Study, the 2001 Non-Potable Master Plan, the 2005 Raw Water Yield Study, and the 2007 Mesa Master Plan. In addition, water supply and demand studies were prepared for the SDS Environmental Impact Statement (EIS) between 2004 and 2008. The direction and recommendations proceeding from these plans and studies have led to numerous projects, acquisitions, and activities including new structures, purchases of water rights, and the adjudication of new water rights decrees. Utilities never stops planning for the future of its water supply system. However, this IWRP is the first comprehensive water resources assessment that has been completed since the 1996 WRP.

Finally, statewide planning efforts have been taken into consideration in the development of the IWRP. These efforts include the Statewide Water Supply Initiative (SWSI) studies of 2004 and 2010, the various Basin Implementation Plans developed by the Basin Roundtables for the Arkansas River and Colorado River Basins formed as part of the HB 1077 Interbasin Compact Committee (IBCC) process, and Colorado's Water Plan (CWP) of 2015. These statewide planning efforts identify conservation, reuse, alternative transfer methods for agricultural water, new Colorado River supply development, and storage as ways to meet the project water supply gap in Colorado. The IWRP is consistent with these statewide plans and processes.

SECTION 2

Planning Process

2.1 Overview

Traditional planning processes are no longer adequate for long-term water supply planning due to the many uncertainties surrounding future conditions, including demand, hydrology, and many other factors. A risk-based planning process was adopted for the IWRP.

The IWRP planning process was governed by two basic tenets: policy-level direction and technical support. Policy level direction is set by the Colorado Springs Utilities Board, and technical support encompasses all of the technical data, tools, and analyses necessary to inform and assist the Utilities Board in setting that policy direction. Four components supported these two tenets: 1) specific Board policy questions directed from Utilities staff to the Board; 2) metrics and planning goals to serve as a foundation for the technical work; (3) technical analyses to assess risks, investigate water supply options, and develop feasible water supply portfolios; and 4) internal coordination and external stakeholder discussion supporting the technical and policy analyses. These four components were essential in the development of a successful plan for Utilities designed to meet future water demands in an increasingly complex world (see **Figure 1-1**).

2.2 Planning Process Overview

Previous water supply planning approaches were "backward looking," and typically only considered a single future in which the conditions for hydrology, climate, and other risks were assumed to be the same as from the observed past. A firm yield (defined as the highest demand that could be met in all years based on observed hydrology) was determined based on this single future. Water supply projects were selected based on their ability to increase this firm yield to the level required to meet projected demands. However, as recent history has shown, the complexity of municipal water supply planning is increasing significantly, being influenced by such factors such as climate change, infrastructure vulnerability, demand uncertainty, dynamic legal and regulatory environments, and changing social values. All these factors are important when evaluating the need for water supply projects. Utilities recognized the need to move away from the traditional firm yield planning approach to a new planning framework. This new "forward looking" planning framework provides a more robust approach for planning and decision making, in which a variety of future situations and potential options are processed and evaluated simultaneously based on differing objectives, while taking into account the associated uncertainty.

2.3 Risk-Based Planning Process

A key to moving away from firm yield as the primary decision-making metric is utilizing risk-based planning. In this approach, the performance of the system is captured in key "metrics" (defined in Section 2.5-Level of Service Goals), with level of service goals defining success and failure of those metrics (defined in Section 2.4-System Evaluation Metrics). These metrics are used to evaluate the performance of the system under a variety of futures, ultimately allowing Utilities to determine how much effort it will expend to maintain level of service and how much risk it is willing to accept. This analysis was used to inform and support the policy question analysis and recommend a certain level of risk tolerance.

To accomplish this process, Utilities developed a type of Robust Decision Making framework that allowed it to consider tens of thousands of plausible futures, evaluate risk factor combinations and the resulting impacts to the water system. Climate change impacts were evaluated by applying changes in future temperature and precipitation (T&P) and "stress testing" Utilities' water system. This process searched for possible future changes in average T&P that would impact policy or infrastructure decisions; these are also known as signposts, which are discussed in Section 11.7.2-Signposts.

The Robust Decision Making framework was combined with a state-of-the-art multi-objective optimization model that was coupled with Utilities' existing water system simulation model to efficiently and effectively evaluate the many projects that could be employed to maintain level of service across a large subset of climate and other risk factors. This powerful combination of tools gave Utilities the necessary information required to help evaluate tradeoffs and compare the effects of a broad range of future uncertainties and management strategies.

The goal of this process was to identify the water supply strategies that perform best over the broadest range of future conditions rather than the one strategy that performs best under one single assumed most likely future condition. More water suppliers are transitioning to risk-based planning and moving away from traditional firm yield type analyses, and as an early adopter of this new planning paradigm, Utilities continues to be a leader in responsible water resource planning.

2.4 System Evaluation Metrics

As described above, the risk-based planning process requires development of key system measures (referred to as "metrics") that Utilities believes adequately capture the performance of the water system. Because the primary responsibility of Utilities is meeting customer demand, this is a basic performance metric. In addition, Utilities' water system is heavily reliant on water storage to manage the amount, variability, and timing of both supply and demand; therefore reservoir storage acts as a buffer and is an accurate metric for overall system performance.

Utilities chose to evaluate the performance of the water system based on the ability to (1) meet various levels of demand, while (2) keeping specified volumes of water in total reservoir system storage. Key metrics used were reliability (*how often* a certain level of demand is met or a volume of reservoir storage is maintained), resilience (*how long* a demand is not met or the volume of storage is not maintained), and vulnerability (*how much* demand was short or how far volume of storage goes below the desired level). These metrics capture frequency, duration, and severity of demands not being met or a certain desired level of storage not being maintained. **Figure 2-1** is a visual representation of these three metrics as applied to a generic time series plot of total reservoir system storage, with the volume of total storage expressed as years of demand (YOD).

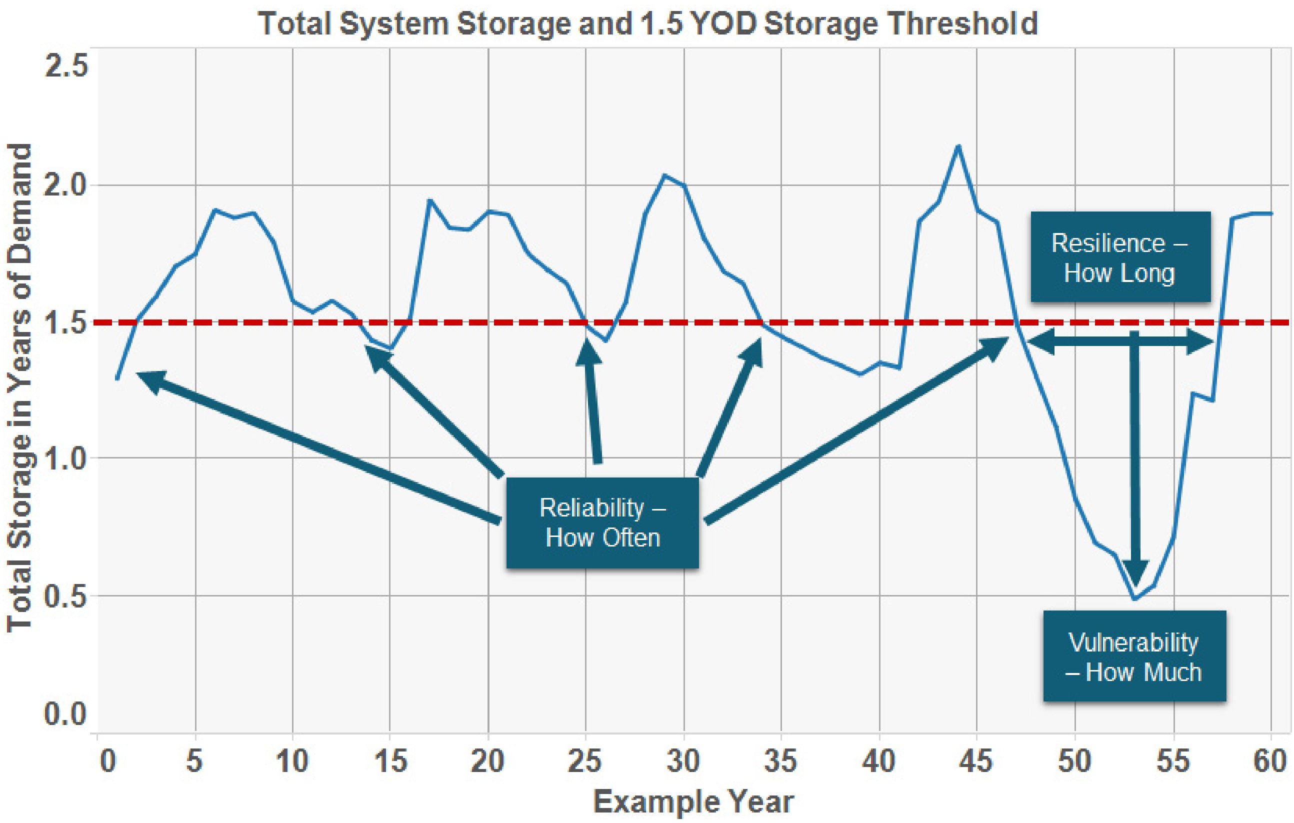


Figure 2-1. Conceptual Reservoir Storage Time Series Depicting Metric Definitions (YOD refers to Years of Demand in Storage)

2.5 Level of Service Goals

Two main questions were asked during the IWRP process in terms of level of service, each of which relates to answering Policy Question #1:

1) What is an acceptable frequency for implementing a shortage response (i.e. imposing water restrictions) on Utilities' customers?
2) What is the appropriate minimum amount of total reservoir system storage reserve that will adequately manage future risk?

To address these questions, level of service metrics were defined to broadly covers two concepts: the key reservoir system storage thresholds and the desired reliability of meeting the thresholds. Underlying those concepts is the basic level of service requirement to always meet indoor demands.

Three specific level of service goals were used for system stress testing designed to determine the future conditions under which the system can maintain acceptable performance. These are:

1) Maintain a minimum of 1.0 YOD in storage reserve at all times (100 percent reliability) – this represents an emergency storage reserve to mitigate against unforeseen or unprecedented events; and
2) Maintain a minimum of 1.5 YOD in storage reserve 90 percent of the time (90 percent reliability) – this represents a reasonable level at which to initiate shortage response analysis.
3) Meet indoor demands at all times (100 percent reliability)

These three criteria work together to define system performance and level of service. Adding different mixes of projects would improve both reliability and resiliency, while minimizing vulnerability of the system, as defined above. Increasing level of service goals and system performance requires increased investment in water supply projects, as shown conceptually in **Figure 2-2**

The primary goal of the IWRP portfolio analysis was to find portfolios that meet the adopted level of service goals while minimizing the amount of new projects, programs, and policies that must be implemented.

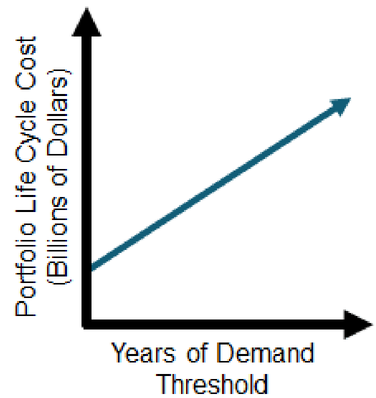


Figure 2-2. Conceptual Relationship between Level of Service and System Cost

2.6 Water Resources System Model and Decision Support System

Adequately assessing system performance requires a large amount of data and a detailed system model. The IWRP modeling approach utilized industry leading approaches and technology. The foundation of the technical analysis was Utilities' existing water system model, the Operations and Yield Model, which has been developed over the course of two decades. This model was combined with a new data management system and a state-of-the-art multi-objective optimization tool to allow Utilities to analyze the large and complex problems posed through the Risk Based Planning Process.

Modeling inputs included extremely large amounts of data such as hydrology, demands, etc., which were stored in a database format. Demand forecasts were prepared by Utilities staff for Buildout conditions and intermediate years. Inflow data were generated from a set of two models. A weather generator model was used to develop temperature and precipitation (T&P) sequences to simulate over 10,000 different potential future weather cycles. These weather cycles were subsequently used as inputs to the Watershed Evaluation and Planning (WEAP) hydrologic rainfall and runoff model to simulate available water supply and inflows. The demand and inflow data were used as inputs into the Operations and Yield Model. After simulations were performed, results were stored in the database and could then be accessed for visualization and analysis to assist Utilities in its understanding and summary of the results. The modeling approach and technical analysis performed, including a complete description of the models used, including a discussion of calibration and validation, are documented in detail in the *TM #11 – IWRP Modeling Systems*. These models were indispensable to the process because they provide the data and analysis used to inform decisions, however, it is Utilities staff and management that are the decision makers.

2.7 Internal and External Coordination

The IWRP was developed by an extensive cross-disciplinary team consisting of Utilities staff, consultants and external stakeholders. Internally, the IWRP planning structure consisted of a Technical Team, a Management Team, and a Public Process Implementation Team. The Technical Team was composed of subject matter experts (SMEs) from across Utilities, including Water Resource Management, Water System Operations, Water Planning & Design, Environmental Services, Water Conservation, Financial Planning, Risk Management, and the SDS Team. The teams participated in identification and prioritization of system risks, methods review, results analyses, and portfolio recommendations.

The Management Team members were from Planning, Engineering, and Resource Management, System Extensions, Water Conservation, Environmental Services, Government Affairs, Risk Management, Customer Care, and the SDS Team. Primary Management Team responsibilities were centered upon project guidance, which included work product reviews, policy consistency, and general Utilities consistency across the Water Division.

A comprehensive public/stakeholder outreach plan was a priority from the beginning of the IWRP. The Bleiker process was used to guide development of an outreach and communications plan for achieving informed consent upon completion of the IWRP. The Public Process Implementation Team included staff from Water Resource Management, Issues Management, Government and Corporate Affairs, Customer Research, and Water Conservation and Education. Its role was to develop and implement the public and stakeholder engagement program.

An extensive external public process was used to solicit feedback from a broad variety of stakeholders. A 12-member Water Planning Advisory Group (WPAG) represented a broad cross section of stakeholder interests (e.g., business community, landscapers, environmental groups, and military community), with which Utilities could vet different aspects of the planning process in greater detail. Other means of communication included a web page, open houses, customer surveys, focus groups, stakeholder group meetings, newsletters, and printed materials.

The Public Process is discussed in more detail in Section 10.

SECTION 3

Existing Service Area and Water Supplies

3.1 Service Area Description

The IWRP provides a strategy for meeting future water needs at full Buildout of the Colorado Springs Utilities' Water Service Area based on current land use planning information. **Figure 3-1** is a map of the current Water Service Area. The 2015 population within the Colorado Springs City limits was 470,513. The forecasted Buildout population is about 723,000, based on State Demographer's projections. However, as with any forecast, estimated Buildout population and consequently water use could vary significantly depending on a number of assumptions, including population growth rate, density of future development, and other demographic factors.

Utilities plans to augment its current system and supplies to meet full Buildout demands in its water service area.

3.2 Current Water Resources Facilities

Utilities currently obtains water from many local and regional sources. Water is utilized from three major river basins: the Arkansas River Basin, the Colorado River Basin, and a small amount from the South Platte River Basin. Water is obtained from the Twin Lakes, Fryingpan-Arkansas, Homestake, Blue River, Colorado Canal, and Local/Pikes Peak collection systems. This water comes primarily from surface water sources and is conveyed to Colorado Springs through four major pipelines and many other smaller raw water delivery pipelines. The major yield systems (i.e., water collection systems) and delivery systems (i.e., water conveyance systems) are shown in **Figure 3-2**.

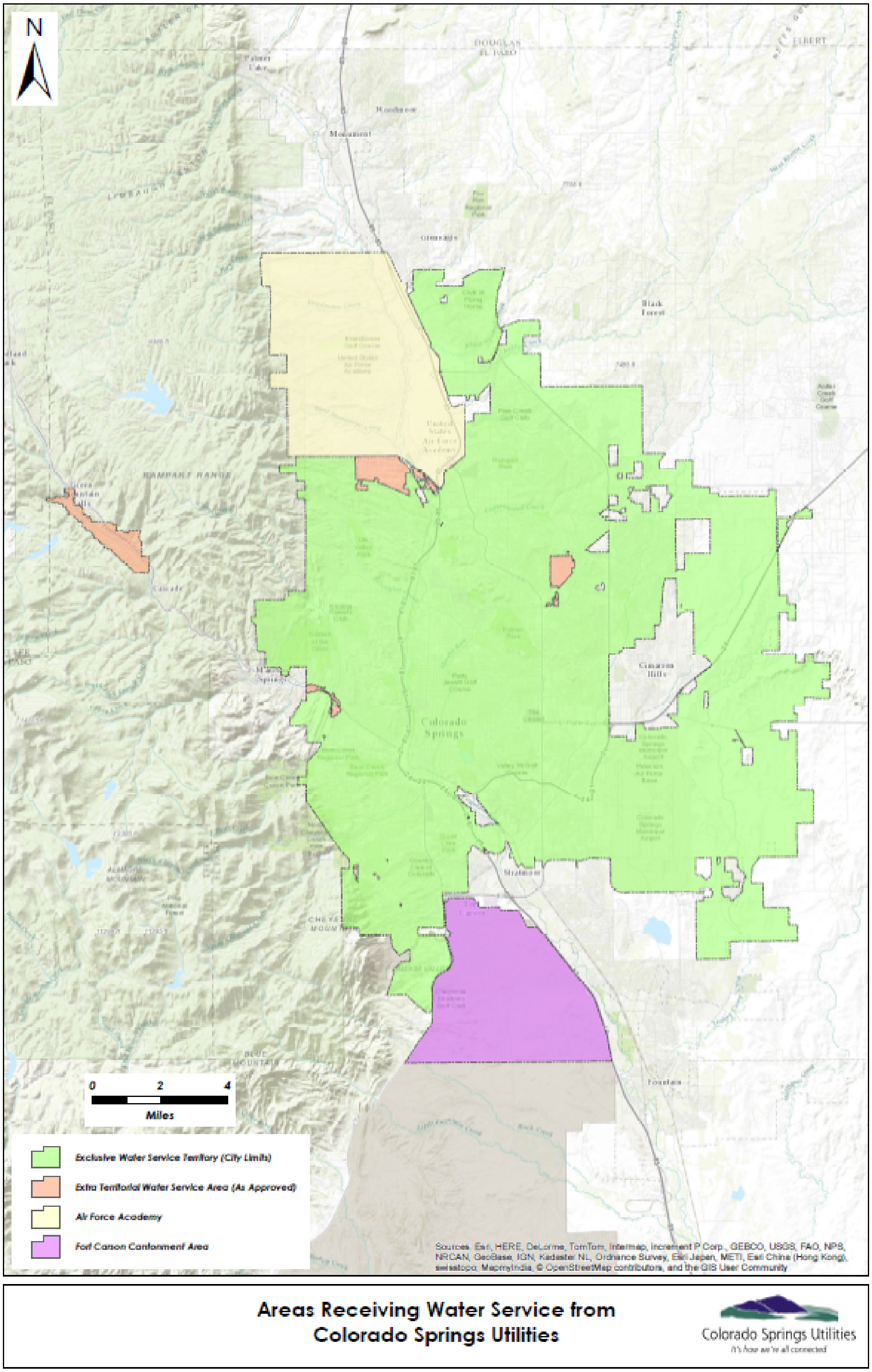


Figure 3-1. Colorado Springs Utilities Water Service Area

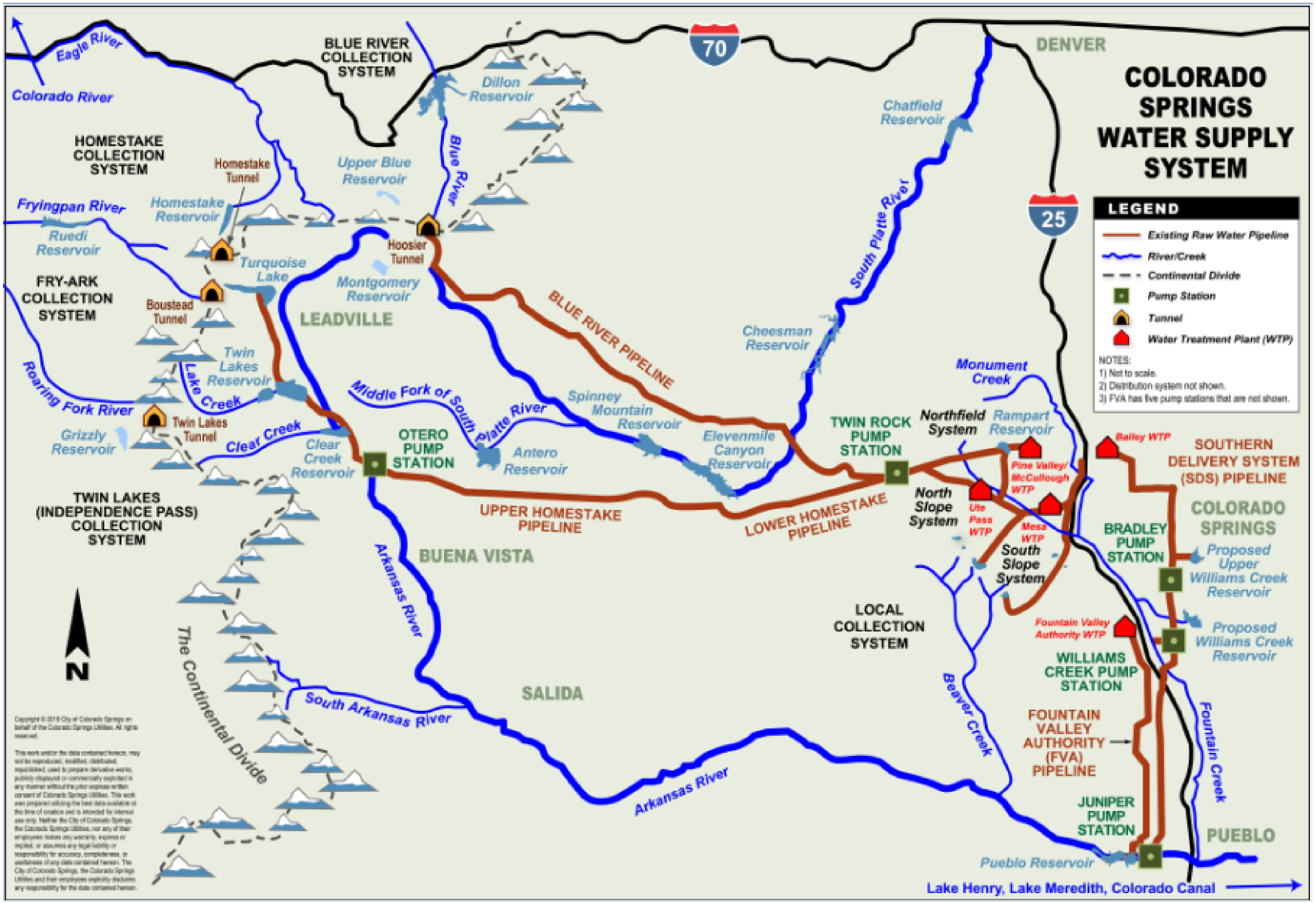


Figure 3-2. Colorado Springs Water System Map

3.3 Current Sources of Supply

When determining the amount of available water supply, Utilities quantifies what is called "legally and physically" available water. This quantification accounts for both the water produced by each watershed (physically) and Utilities' water right priorities with respect to other entities' senior water rights (legally). These inflow volumes represent new water available from existing rights to the water system on an annual basis. The average historical inflow volumes that were legally and physically available to the major collection systems during the 1950 – 2008 period and the critical drought year of 2002 are shown in **Table 3-1**. The study Period of 1950 – 2008 was chosen based on the availability of reliable streamflow and hydrology data at the start of the IWRP study, and encompasses a representative set of wet, average and dry years.

Table 3-1. Historical Legally and Physically Available Inflows

Collection System	Average Inflows (ac-ft/year)	2002 Inflows* (ac-ft/year)
Local System	58,000	29,786
Blue River	7,818	1,091
Homestake	15,429	1,039
Twin Lakes	25,726	10,617
Fry Ark Project (FVA)	14,952	2,585
Colorado Canal	29,634	8,654

* 2002 is the critical drought year during the Study Period.

An additional component of water available for use in the supply system that is not listed in the table is water reuse. Approximately three quarters of the water supply described in the table is legally reusable, meaning that Utilities can reuse that water until extinction (i.e., until it is all used up). How this works in practice is that when demands are met using reusable water, the return flows resulting from that water use (e.g. waste water effluent) can be captured and reused by Utilities. There are two primary ways Utilities reuses this type of water: it can be reused directly as nonpotable or potable supply, or through a series of water trades known as exchanges. The total amount of reusable return flow available is dependent on the amount of water used in the system, and grows over time as the city grows and demands increase.

The complex interactions between the inflows that are legally and physically available to Utilities, the configuration of the water system, and water use by customers are evaluated to determining the "reliably met demand" for the water system. A more detailed discussion of how to determine this reliably met demand is found in Section 6.2-Need for Strategies.

SECTION 4
Water Use

4.1 Historical and Current Water Use

Based on moderate assumptions for future growth and climate, total Buildout water use system wide is expected to be about 50% greater than recent total water use.

Water use is a measure of complex human behavior in response to many external influences, such as weather, economics, demographics, and others. **Figure 4-1** shows historical water use and population in Utilities' service territory from 1950 through 2015. The graph shows that the trend in water use generally followed the trend in population growth until the drought of 2002-2003. After this time there is not a clear correlation between population and water use, and per capita use declined.

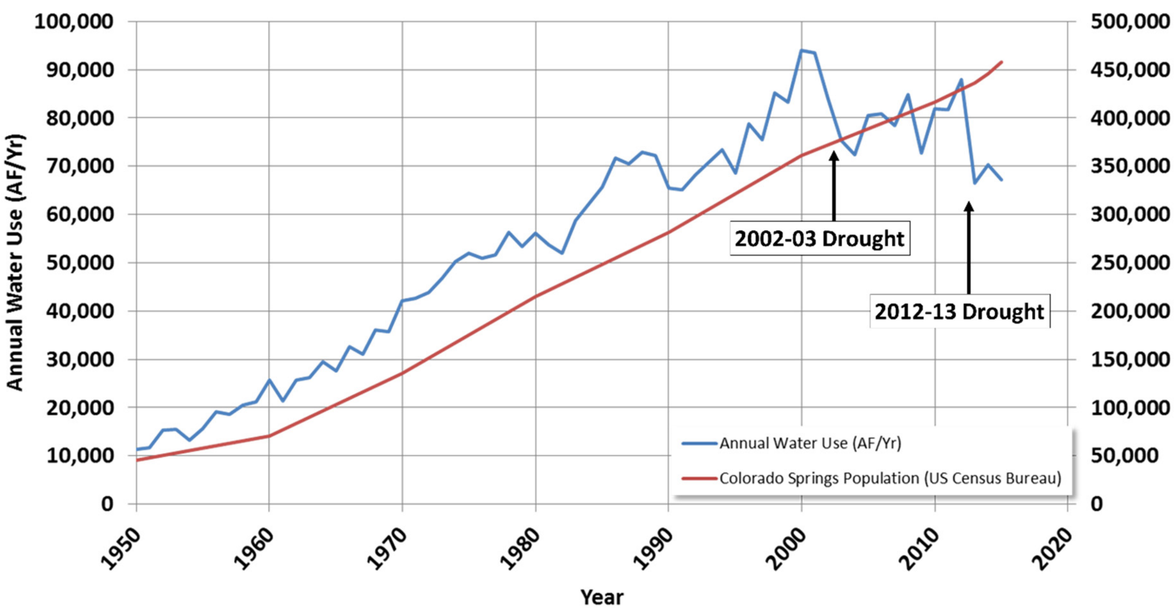


Figure 4-1. Historical Colorado Springs Population and Water Use, 1950-2015

The decline in per capita water use is attributable to a wide variety of social, political, and economic factors and conditions that have occurred over the past 15 years. A portion of the decrease in use is attributable to Demand Management. The introduction of more efficient indoor fixtures (showers, appliances, etc.), more efficient irrigation practices, and new landscapes have reduced the amount of water customers require.

Many other factors have also played a large role in the change in customer behavior and water use. The drought cycles of 2002-2005 and 2012-2013 changed customer water use patterns and habits. In addition, the economic recession of the late 2000's and other economic factors likely caused many customers to reduce or eliminate outdoor watering.

One of the most significant factors contributing to the drop in water use over the last few years has been the abandonment of landscapes. The social, political, and economic factors in combination with multiple years of drought have contributed to landscape abandonment by many customers who have not converted to more sustainable landscapes (e.g., native or drought tolerant vegetation). Utilities estimates that up to 30 percent of previously landscaped areas in Colorado Springs are not currently being maintained or irrigated. This trend, which is not a part of Utilities' demand management program or objectives, adds a level of uncertainty for Utilities, in that there is no reliable way of predicting when or if these landscapes will be restored, and if so, to what level of health and water use.

This persistent reduction in per capita water use since 2002 has become an important factor in forecasting future water demands, and has introduced significant uncertainty into the demand forecasting process. Because of this uncertainty, the responsible approach is to plan for supplying sufficient water to support what would be considered normal, reasonable, healthy residential and commercial landscapes and a healthy environment, as well as a robust business community. Therefore, Utilities has assumed for purposes of planning and forecasting future water use that a sustainable level of annual water demand in 2016 would be 88,000 ac-ft/yr, the approximate level of demands prior to the 2012-2013 drought. This is used as a Baseline demand in the analysis.

4.2 Estimated Future Water Use

Below is an analysis performed to estimate future water use in Utilities' water service area. Water use estimates are described in detail in *TM #15 – Demand Analysis*.

4.2.1 MUNICIPAL & INDUSTRIAL GROWTH ESTIMATE IN SERVICE AREA

Table 4-1 lists the estimated population growth inside Utilities' water service area through Buildout. This estimate is based on a moderate growth assumption provided by the State Demographer and shows a 59 percent increase between 2015 and Buildout. These estimates only include population inside Colorado Springs City limits and Utilities' current water service area and assumed no significant new areas would be annexed to the Utilities' water service area.

Table 4-1. Colorado Springs Historical and Forecasted Population

Year	City Population
2000	360,890
2010	420,716
2020	474,312
2030	533,261
2040	588,596
2050	631,133
2060	668,729
2070	706,324
Buildout	**723,037**

4.2.2 METHOD OF WATER USE FORECASTING

Future water use forecasts for Buildout conditions were prepared using a regional regression model developed by Utilities that estimates water use based on a number of demographic, economic, and climate variables. Separate water use estimates were prepared for indoor and outdoor use in the residential and non-residential sectors, which were then aggregated into an estimate of total water use in the Utilities' water service area.

Three demand scenarios were developed to estimate the possible range of water demand at Buildout. These are described in Table 4-2.

Table 4-2. Buildout Demand Scenarios

Demand Scenario	Assumptions
Moderate Demand Scenario	Normal economic conditions, known water-using appliance efficiency standards at the State and Federal level, planned population density, current commercial/industrial mix, and current climate
Low Demand Scenario	Some combination of poor economic conditions, increasing efficiency standards at the State or Federal level, increased population density, changes in the commercial/industrial mix, and other natural market forces, with current climate
High Demand Scenario	Some combination of excellent economic conditions, no new efficiency standards at the State or Federal level, decreased population density, changes in the commercial/industrial mix, and other natural market forces, with current climate

4.2.4 CURRENT DEMAND MANAGEMENT PROGRAM

Colorado Springs has a long history of wise and responsible water management, including water conservation and efficient water use. The concept of wise and efficient water use is known by many terms including conservation, water use efficiency, and demand management. In this document, the term demand management will be used as it best encompasses the concepts of efficiency, demand reduction when appropriate, and wise and sustainable water use. Demand management has been an integral part of water resource planning and management for over 60 years, and Colorado Springs is seen as a leader in demand management among Colorado municipal water utilities. With increased competition for state and regional water resources, demand management offers an element of flexibility given a semi-arid climate, changing conditions, and system uncertainties. Utilities educates and encourages customers to save water, and use it sustainably, because "it's the right thing to do," and because of resource, economic, lifestyle, and community benefits. Utilities also manages programs that address supply-side efficiency measures that optimize water resources through water reuse systems and distribution system efficiency.

4.2.5 BUILDOUT WATER USE FORECAST

Baseline water use assumed for the IWRP and forecasts of Buildout water use for the low, moderate, and high demand scenarios are shown in **Figure 4-2**.

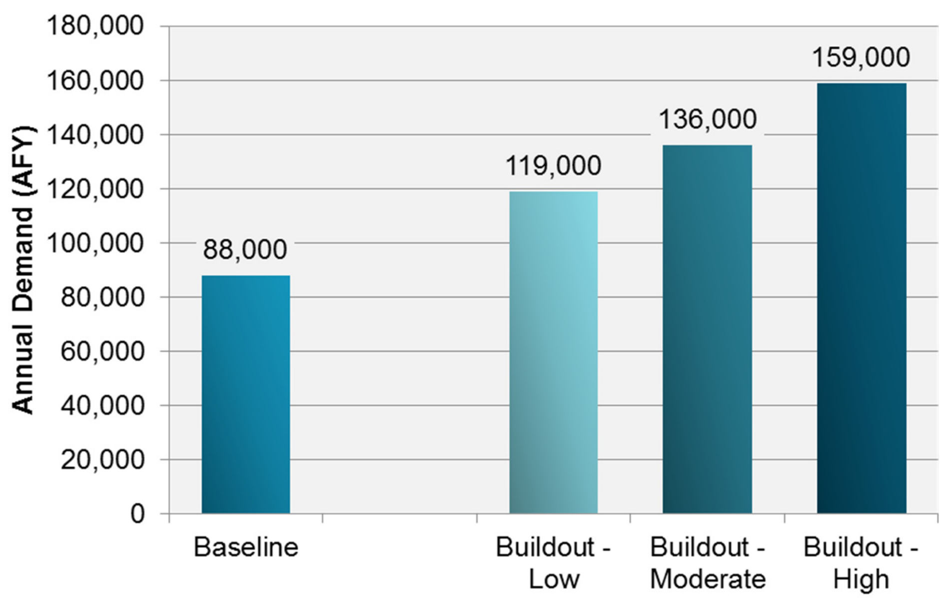


Figure 4-2. Water Use Forecasts Used for IWRP

4.2.6 POTENTIAL EXTRATERRITORIAL DEMANDS

The Pikes Peak Region outside of Colorado Springs City limits is served by many water providers (see **Figure 4-3**), some of whom Utilities could assist by providing water and/or access to infrastructure. In northern El Paso County, many of these water providers have grown largely dependent on non-renewable groundwater supplies from the Denver Basin aquifers. Other water providers in southern El Paso County rely on various alluvial groundwater and surface water sources that have experienced water quality and reliability issues. The cost of operating and maintaining groundwater wells is increasing, while production declines and water quality are becoming a greater issue. Additionally, it is difficult for these relatively small water providers to secure renewable surface supplies due to the permitting, environmental, and financial challenges. One option for Utilities is to continue having these water districts meet their own demands without outside assistance. However, these water districts serve as bedroom communities for Colorado Springs and contribute to the interdependent economic vitality of the Pikes Peak Region. Therefore, maintaining reliable water supply for the region is a desirable objective for Utilities.

The potential Buildout demands of many water providers in the Colorado Springs region that cannot be met with renewable supplies were estimated; this is their potential demand "gap." Utilities made these estimates for the IWRP to consider potential issues associated with Utilities providing regional water service. Estimates were derived from planning studies performed for El Paso County water users and other technical resources including studies by Pikes Peak Regional Water Authority. Not all water providers in the region can reasonably be served by Utilities water system because of location or legal constraints, however, many may be able to participate in a regional solution. Total Buildout demand for these water providers in the Colorado Springs vicinity is about 44,000 ac-ft/yr, and their maximum potential gap, i.e., water not currently available is around 25,000 ac-ft/yr.

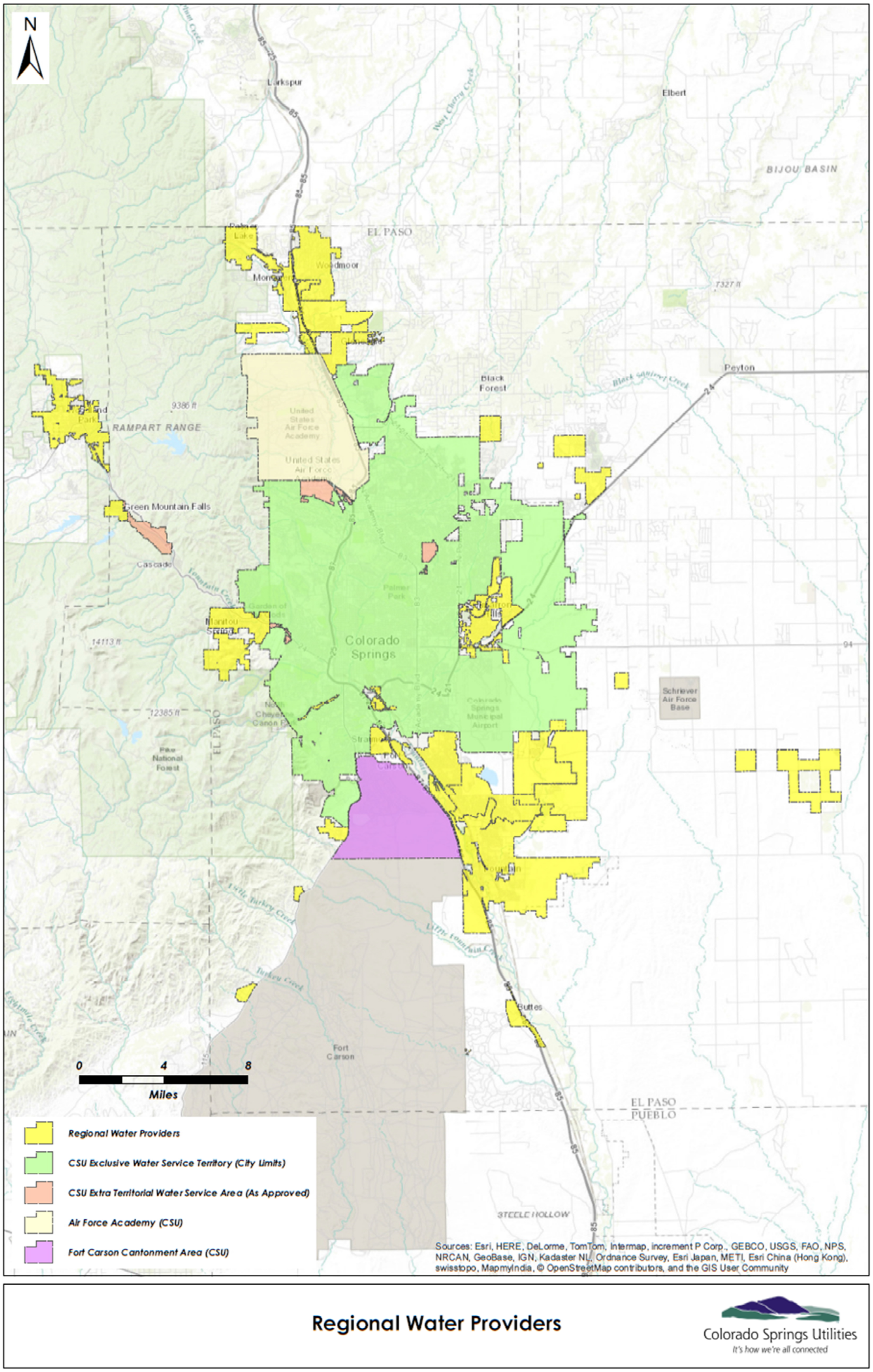


Figure 4-3. Water Providers in the Pikes Peak Region

SECTION 5
Risk Identification and Assessment

Risk and uncertainty were key drivers for the IWRP analysis, and inform future conditions under which Utilities water system must perform in order to meet customer water demands. This section describes the analysis used to determine the risks and uncertainties that have the potential to impact Utilities' future operations and therefore warrant inclusion in the analysis of future water supply strategies and options.

5.1 Risk Identification and Prioritization

5.1.1 PROCESS FOR IDENTIFYING RISKS

The foundation of the current IWRP process is the recognition that there are a large number of risks facing Utilities' water system. Therefore, the process has been approached as a risk management and mitigation problem and was performed in a systematic and robust way. Ten workgroups were formed to brainstorm and prioritize risks in the following categories: climate/hydrology, conservation, infrastructure, environmental, water reuse/nonpotable, regulatory/legal, political/social, water/energy, regionalization, and financial. During the peak of this phase of the analysis, about 40 SMEs were involved with workgroups. Findings from the 10 workgroups were consolidated into six thematic areas, as shown in Figure 5-1.

Over 60 risks and uncertainties in six main categories were identified and prioritized. Risks and uncertainties associated with hydrology/climate and West Slope sources were found to have the most potential impact on the water system reliability.

Figure 5-1. IWRP Risk Categories

5.1.2 RISK PRIORITIZATION

Each workgroup scored risks in terms of likelihood of occurrence and impact, both with scores ranging from 1 to 5, with 5 being the most likely or most impactful. The product of likelihood and impact (25 maximum) became the risk score. Due to the disparate nature and relative impacts of events across the different areas, weighting or merging scores across workgroups was not desirable. For example, a high scoring climate change related risk of reduced hydrologic runoff would have a far greater impact than poorly funded O&M for the nonpotable system, which may have had a high score within the water reuse/nonpotable workgroup. To compare risks, Utilities ranked each risk as high, medium, or low in terms of overall system impacts. Utilities used these scores and professional judgment to identify the most impactful risks to carry forward for quantitative modeling.

The risk identification and prioritization process and results are described in detail in the IWRP Planning Factors Report.

5.2 Risk Assessment

Climate and hydrologic risks, along with certain infrastructure risks, were identified as the most impactful by the workgroups. They were then evaluated using the Utilities' water supply Operations and Yield model. Since these risks can occur individually or in combination and impact Utilities system in different and possibly unanticipated ways, multiple risk combinations were modeled that included both acute/short duration (12 months) and chronic/long duration (entire simulation) events. In total, over 1,000 risk scenarios were modeled. To evaluate these different types of risks, the metrics described in Section 2-Planning Process were used to quantify frequency, duration, and severity of the impacts.

5.2.1 CLIMATE AND HYDROLOGIC IMPACTS

To best capture climate and hydrologic impacts, several different methods of generating hydrologic flows beyond those captured in the historical 1950-2008 record were considered. These methods included resequencing historical flows based on historical drought patterns, two methods of resequencing historical flows based on drought patterns seen in the longer paleo reconstructed tree ring record, and generating new simulated flows using the weather generator model linked with the WEAP rainfall/runoff model for both the Upper Colorado and Upper Arkansas River Basins. After comparing all data sets, the simulated hydrology produced using the weather generator and rainfall/runoff models was determined to be representative of all data sets. It was also determined to be the most useful dataset for simulating and analyzing potential future flows, and was therefore selected as the basis for the hydrologic impact analysis.

The hydrology simulation procedure is summarized by the flow diagram in **Figure 5-2**. Step 1 was to generate 10,000 different temperature and precipitation (T&P) sequences (trials) for the Upper Colorado and Upper Arkansas River basins, keeping the mean temperature and precipitation across the entire trial within 2 percent of the respective historical means. Step 2 was to reduce the number of trial to a practical number for purposes analysis. This was done by sorting the resulting trials based on the length and severity of droughts and selecting 40 representative trials containing a rich variety of drought and wet conditions that would be used. These selected trials did not have any long-term climate change imposed and represented potential future weather under the current climate conditions. Step 3 was to run the 40 trials through the WEAP models, which simulated legally and physically available flows for each trial. This produced a range of future flows possible under the current climate that was carried forward for further analysis in Utilities Operations and Yield Model. Finally, Step 4 applied temperature and precipitation changes to the T&P time series to generate new legally and physically available flows reflecting the potential impacts of climate change for use in Utilities' water supply planning Operations and Yield Model. These time series represented the climate change hydrologic ensemble (i.e., a range of future flows possible under the climate change). Step 4 is described in more detail below.

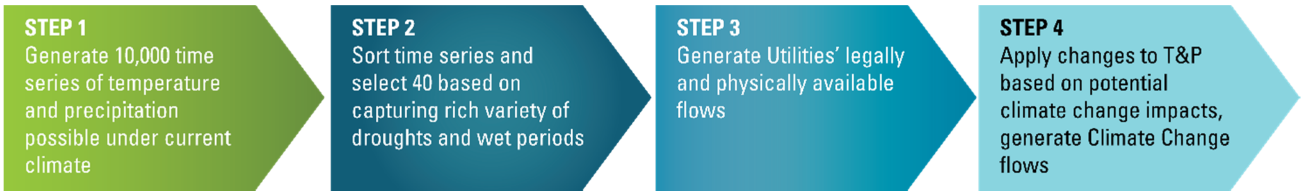


Figure 5-2. Weather Generator Procedure

To determine what changes to apply to the T&P time series required in Step 4, results from many Global Climate Models (GCMs) were evaluated. These GCMs are all separate models that reflect different methods and incorporate different assumptions about the future. Though no one GCM can be considered correct or better than another, considering all of these GCM results provides a range of possible future climates with the expectation that the range will bracket actual future conditions. GCM results suggests a broad range of potential future T&P changes in the Upper Arkansas River and Upper Colorado River Basins that supply water for Utilities. **Figure 5-3** shows the results of 112 GCMs in the form of changes to T&P around the year 2060 as compared to recently observed temperature and precipitation data. These climate model data have been widely used in the western United States by Federal, State, and municipal entities for water supply planning purposes.

The changes applied to the T&P time series were determined by bracketing the GCM results that best capture a reasonably plausible range of future climates of concern for water supply planning. This bracketed region is shown as a red box in **Figure 5-3**. The offsets from the historical mean in temperature ranged from -2°F to +7°F in increments of 1°F, and the offsets from the historical mean in precipitation ranged from -10% to +10% of the mean in 5% increments, giving a total of 50 T&P offset scenarios. Because significantly wetter conditions would not stress the Utilities' water system (despite the temperature increases and resulting changes in run-off timing) or increase the difficulty of meeting future demands, wetter future conditions were not analyzed for the IWRP.

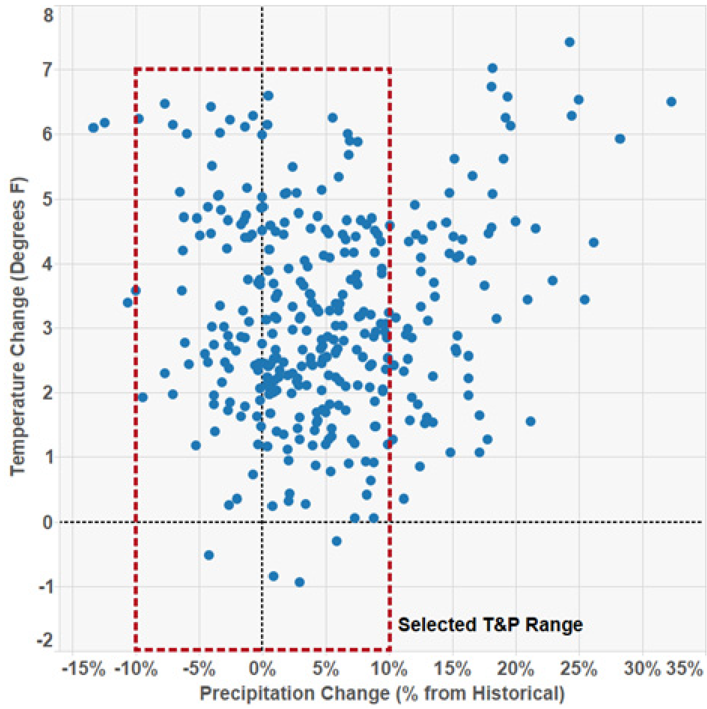


Figure 5-3. GCM and Climate Change Ranges used for IWRP

5.2.2 NON-CLIMATE SYSTEM RISK IMPACTS

The non-hydrologic risks to the Utilities' system, or system risks, were also evaluated as part of the IWRP. These system risks encompass a broad range of factors that could negatively impact Utilities' water system and represent the impact of some kind of event (e.g., a wild fire) on Utilities' water system (e.g., a reduction in yield from a watershed). These system risks were classified into acute, short duration impacts (e.g., emergency pipeline outage, reservoir maintenance, diversion tunnel collapse) and chronic, long term impacts (e.g., new minimum stream flow regulations, water quality impacts on supply, reduction in water yield from a basin, reduction in storage due to sedimentation). For this analysis, chronic risks were imposed for the entire study period. Acute risks were activated at one of three different outage times during the study period. These outage periods were chosen to correspond to different hydrologic events (entry into a drought, bottom of a drought, recovery from a drought).

In all, over 100 different risks were identified, and of these more than 60 were explicitly analyzed for their impacts on water system performance. A more detailed explanation of the system risks analysis methods and results can be found in the Vulnerability Assessment Report.

5.2.3 SUMMARY OF RISK ASSESSMENT

5.2.3.1 Hydrologic Risks

The baseline analysis evaluated system performance at 2016 and Buildout conditions under a range of hydrology that is possible under current climate conditions. At 2016 baseline conditions, system performance meets or exceeds all of Utilities' level of service goals. However, at Buildout baseline conditions system performance failed to meet the level of service goals.

System performance under the previously discussed climate change hydrology was simulated under Buildout conditions. The impact of climate change on system performance varies widely depending on the T&P scenario; however, performance of the system was below the level of service goals for all T&P scenarios. Because climate change is a gradual process, climate conditions can be monitored as part of a signpost approach, and the assessment can be repeated as new data becomes available.

5.2.3.2 Non-Hydrologic Risks

System risk analysis results demonstrated that the system had a wide variety of impacts resulting from the imposition of the various risks ranging from inconsequential to significant. However, Utilities' most critical non-hydrologic vulnerabilities are risks that impact West Slope yields or risks that compromise key delivery infrastructure. Though these risks were previously understood as vulnerabilities by Utilities staff, through the IWRP, the magnitude and severity of their potential impact the water system was better understood. Additionally, the nature and severity of other vulnerabilities, such as risks related to Colorado Canal storage, were identified and studied for the first time in the IWRP. These identified vulnerabilities were then used in the development of portfolios of projects that could still meet Buildout demands and level of service goals, while satisfying the key policy questions.

5.3 Risks and Uncertainties Selected for Analysis of Portfolios

Results from the assessment of hydrologic and non-hydrologic risks were incorporated into the Buildout portfolio selection process in two ways. One set of risks, listed in **Table 5-1**, were applied during the portfolio selection process and represent a combination of future hydrologic conditions and system conditions that are reasonably likely to occur and could significantly stress Utilities' water system. An additional set of risks, listed in **Table 5-2**, were applied to screened portfolios as part of the robustness analysis to evaluate their performance over a broader range of the possible future conditions. Application of these risks and uncertainties in the portfolio development process is described in Section 9-Development and Evaluation of Portfolios.

Table 5-1. Risks used for Initial Buildout Portfolio Development

Risks Selected for Portfolio Development	
Hydrology	Hydrologic traces with droughts greater severity and different timing than in the historical record
Climate	3°F warmer climate (consistent with recently observed temperature trends of 1°F warming per decade) No change in mean precipitation
System Risks	One year Otero Pump Station/Pipeline outage due to infrastructure failure, maintenance requirements, or natural disaster impacts (wildfire, landslide, etc.). Shortages in the Colorado River Basin result in: 20 percent reduction in all West Slope yields for a 10-year period 25 percent reduction in all exchange potential during same period (resulting from reduced flows in the Arkansas River due to reduced overall transmountain water imports by Utilities and others)

Table 5-2. Risks used for Buildout Portfolio Robustness

Additional Risks used for Portfolio Robustness	
Hydrology	Additional hydrologic traces
Additional Climates (18 total)	0°F, +1°F, +2°F, +3°F, +4°F, and +5°F temperature increases 0%, -5%, and -10% precipitation changes
Additional System Risks (each listed was applied individually)	Chronic 50% exchange potential reduction 1-year outage at each of the three major water treatment plants (applied individually) due to plant failure or inflow water quality impairment Chronic 25% reduction in Pueblo Reservoir or Local System storage capacity due to water quality problems or storage restriction due to structural issues No Colorado Canal system storage (every year) due to water quality impairment or other factors Colorado River Compact Curtailment with no West Slope supplies for 10 years due to unprecedented drought in the Colorado River Basin

SECTION 6

Future Water Resources Strategies

6.1 Introduction

Utilities must pursue a variety of different water resources strategies in addition to new storage to achieve its level of service goals.

Utilities has many strategies available for mitigating future water supply and demand uncertainties. Each has its own unique benefits and challenges that must be weighed when creating a future portfolio of projects, programs, and policies that addresses a broad range of future conditions. This section describes the seven general water resources strategies considered by Utilities in the creation of water supply portfolios: Demand Management, Reuse and Nonpotable Supplies, Colorado River Basin Supplies, Agricultural Acquisitions/Transfers, Increased Storage, Conveyance, and Groundwater. Specific options for projects or programs to implement each strategy are described in Section 7-Future Water Resources Options.

6.2 Need for Strategies

As discussed in Section 2.2-Planning Process Overview, Utilities has transitioned away from the concept of firm yield to a risk based planning methodology. As a result of this transition, the concepts of firm yield and risk based planning can be blended using what is called "reliably met demand" (RMD). The RMD represents the maximum demand level that can be met while maintaining the level of service goals described in Section 2.5-Level of Service Goals. Determining the RMD of the current system establishes whether there is a need to pursue strategies to develop future supplies. Therefore, the RMD of the current system was determined.

The RMD was determined using the alternative hydrologic sequences developed for possible future conditions as described in Section 5.2.1-Climate and Hydrologic Impacts, but assumed no additional climate or system risks. The RMD of the system as it exists at the time of this report is 95,000 ac-ft of annual demand. The RMD of the current system is much less than the estimated Buildout demand of 136,000 ac-ft/yr. Therefore, additional strategies will be required.

6.3 Demand Management

Benefits	Challenges
• Consistency with growing customer expectation that lower water use landscaping will become the norm	• At highest savings levels, may require some additional amount of regulation and oversight for new construction
• Delays the need for new infrastructure projects or acquisition of additional water supplies	• Demand hardening (achievable water savings during shortage response decreases as more customer demand becomes nondiscretionary)
• Consistent with Colorado Water Plan and likely a prerequisite to permitting new water supply projects	• Demand volatility (uncertainty of the permanence and level of savings)
• Reduces costs to convey, treat and deliver water to support a given population	• Negative short term and long term revenue impact may require rate redesign

Figure 6-1. Demand Management Benefits and Challenges

Demand management can be defined as the responsible, wise, efficient, and sustainable use of water resources. Demand management practices include landscape conversion, water efficient fixtures, education, and reducing system leaks, among other options. Demand management has been integrated into Utilities' business model and is reflected in Utilities' Water Use Efficiency Plan submitted to the CWCB, and was one of the key components of the 1996 Water Resources Plan. Results from the IWRP public process customer surveys and focus groups from the Colorado Springs community (discussed in Section 10-Public Process) identified demand management as an important future strategy. Demand management was also identified as a key strategy in the Colorado Water Plan and is in most cases considered a prerequisite for permitting new major projects. Benefits and challenges of implementing Demand Management are summarized in **Figure 6-1**.

6.4 Reuse and Nonpotable Supplies

This strategy includes enhanced use of local water sources, including the exchange program, nonpotable water, potable reuse, graywater reuse, and rainwater harvesting. While Utilities makes good use of many of these options, local geography, water rights law, and insufficient regulatory guidance make implementation of some of these options difficult for Utilities at this time.

The primary source for most of these options is reusable wastewater effluent. As discussed in Section 3.3, reusable water is very valuable to Colorado Springs because it represents the opportunity for multiple uses from a single initial diversion. Reusable water provides a larger water supply benefit compared to other water types, which are legally allowed only one use before we are obligated to return the water to the next user downstream. Therefore, it is important for Utilities to carefully manage these supplies to achieve the maximum overall water supply benefit. The strategies in this section that rely on reusable water compete with each other for reusable water supply, and therefore are properly considered alternate conveyance mechanisms as opposed to new sources of supply. The implications and impacts associated with this concept are discussed in more detail below.

6.4.1 EXCHANGE PROGRAM

The most efficient way to maximize the use of reusable water is the Exchange Program. This operation allows reusable effluent to be traded against flows on the river that are recaptured in existing upstream facilities to be returned to Colorado Springs for subsequent use. The exchange program is a major source of supply for the potable water system. Colorado Springs holds numerous exchange water rights, including rights to exchange to local Pikes Peak watersheds, and rights to exchange return flows to numerous locations on the Arkansas River extending from Rocky Ford to Leadville. In 2016, Colorado Springs was able to secure a decree to exchange leased water. The Case No. D2-05CW96 decree will be critical to the success of Utilities' Agricultural Transfer strategy described in Section 6.6. Maximizing our exchange program to increase water supply at minimal cost is a baseline strategy for all scenarios and futures, and therefore is not considered explicitly as a separate option in the IWRP analysis.

6.4.2 NONPOTABLE SYSTEM WATER USE

Utilities' nonpotable water system can deliver both untreated raw water and reclaimed wastewater return flows for nonpotable uses such as landscape irrigation and industrial process water. The existing system could be expanded, but its potential benefits have limits. Utilities already efficiently reuses its transmountain water rights through the water right exchange program, so redirecting that exchangeable water to nonpotable reuse provides little if any appreciable increased yield to the water system, but may provide financial, social, environmental, or other benefits. Therefore, the challenge is to find the appropriate balance of expanding the nonpotable system to achieve these benefits without significantly reducing water available through exchange. In addition, expansion of the nonpotable system would be dependent on identifying large customers with outdoor irrigation or industrial process water demands. The nonpotable reuse benefits and challenges are summarized in **Figure 6-2**.

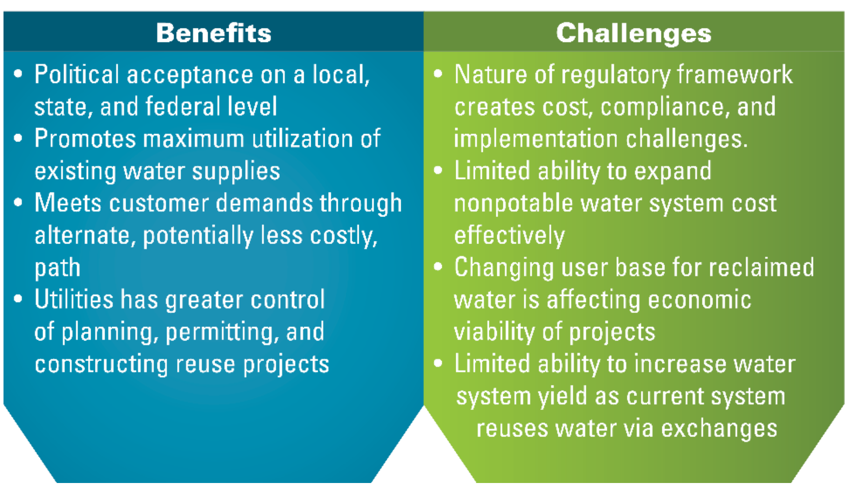


Figure 6-2. Nonpotable Reuse Benefits and Challenges

6.4.3 INDIRECT AND DIRECT POTABLE REUSE

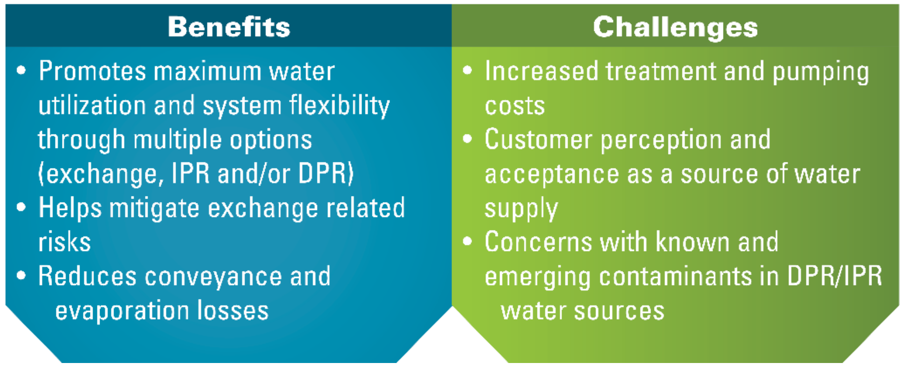


Figure 6-3. Potable Reuse (IPR and DPR) Benefits and Challenges

Indirect Potable Reuse (IPR) involves taking treated, recycled, or reclaimed water and then blending it with a natural water source (e.g., natural flow in a stream channel or reservoir water, which acts as an environmental buffer) prior to re-introduction into the water system for further treatment. For Utilities, IPR has the benefit of short-circuiting the process of exchanging reusable return flows, thereby reducing Utilities' risk to issues related to future limitations on exchange potential. IPR can also save water that would have been lost in the exchange program as the result of transit losses due to seepage and evaporation as water flows downstream.

Direct potable reuse (DPR), on the other hand, involves first treating wastewater to levels that meet or exceed drinking water quality standards at a wastewater treatment plant (WWTP), then routing this water to a connection between the wastewater treatment plant (WWTP) to and the potable water treatment plant (WTP) for additional treatment and delivery to the potable water system. It has the same benefits as IPR with respect to the exchange program. Neither IPR nor DPR are part of Utilities' current water supply portfolio. Both IPR and DPR would become more financially viable if nutrient discharge regulations or other regulations for wastewater discharge become more stringent. Those more stringent regulations would likely require more advanced treatment and would narrow the gap between wastewater discharge and potable water standards. Potable reuse benefits and challenges are summarized in **Figure 6-3**.

6.4.4 GRAYWATER AND RAINWATER

Graywater is wastewater collected from selected fixtures within residential, commercial, or industrial buildings (including bathroom or laundry sinks, bathtubs, showers, or laundry machines). It is typically used for landscape watering, but also can be used for toilet flushing and other limited applications. Rough estimates suggest that for every 1,000 graywater systems installed in single-family homes, overall customer potable water demand is reduced by about 50 ac-ft each year[1]. However, because Utilities already reuses most of its available water through the exchange program, customers reusing graywater at home will produce little if any net benefit in meeting Utilities' overall water needs. This is due to the fact that any reduction in demand resulting from graywater reuse is offset by an equal reduction in the supply of reusable water available as reusable return flows.

[1] One acre-foot of water meets the needs of 2-3 families in Colorado Springs for one year.

Rainwater harvesting involves capturing rainwater on an individual residential property for onsite use. Until recently, rainwater harvesting was not allowed under Colorado water law. During the course of the IWRP, rainwater harvesting was legalized in Colorado for single family residential use. However, because of the small amount of estimated water savings, the semi-arid climate in Colorado, and the limited number of customers expected to participate, the savings from rainwater harvesting are nominal. Even so, one main benefit of rainwater harvesting is customer education and awareness as to the value of water.

Due to the small benefits and the uncertainties regarding the extent of future customer adoption, graywater use and rainwater harvesting were not considered as significant future sources of supply, and were not explicitly included in the analysis.

6.5 Colorado River Basin Supplies

Existing Colorado River Basin (CRB) supplies are a critical component of Utilities' current water supply portfolio. As several of our existing systems were constructed in a phased manner, there are portions of some of these systems yet to be completed, and there is potential to develop more water from this basin with the completion of these projects. Colorado Springs already holds relatively senior water rights for these projects.

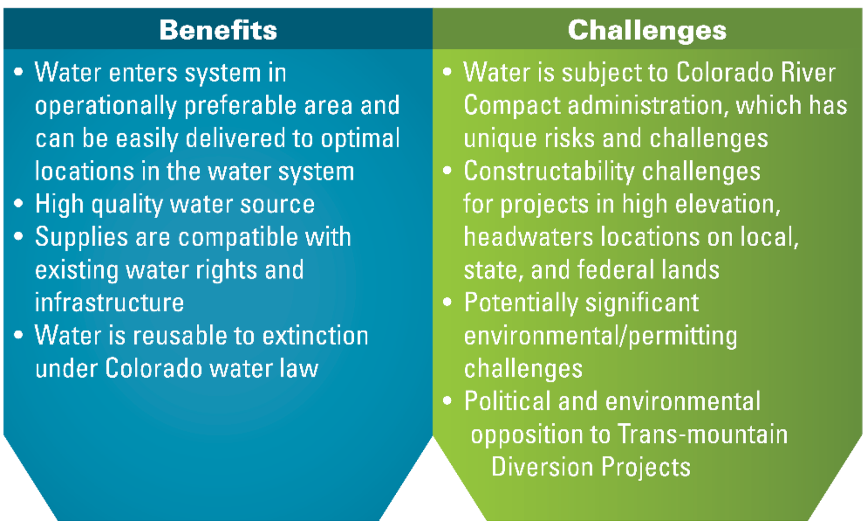


Figure 6-4. Colorado River Basin Supply Benefits and Challenges

Through first use, the CRB provides about 50 percent of Colorado Springs' water supply. When reuse and exchange are considered, the CRB typically accounts for around 70 percent of Colorado Springs' water supply. Utilities has been considering additional CRB projects for several years and owns CRB water rights that are currently undeveloped. Although Utilities has no plans to seek any new, large CRB projects, continued development and completion of existing CRB projects are already in the planning and permitting stages and will be pursued. These projects will have the benefits and challenges as shown in **Figure 6-4**.

Statewide planning efforts, including the Statewide Water Supply Initiative (SWSI) studies, Basin Implementation Plans (BIPs), and the Colorado Water Plan (CWP) recognize that responsible development of Colorado River supplies is an integral part of State water planning and an important option for meeting Colorado's water supply gap. Two of Colorado Springs proposed projects, the ERMOU Project and Montgomery Reservoir Enlargement Project, are included in these statewide planning documents as Identified Projects and Processes (IP&P's). This is an explicit recognition of these projects as being important to meeting the statewide water supply gap.

6.6 Agricultural Transfers

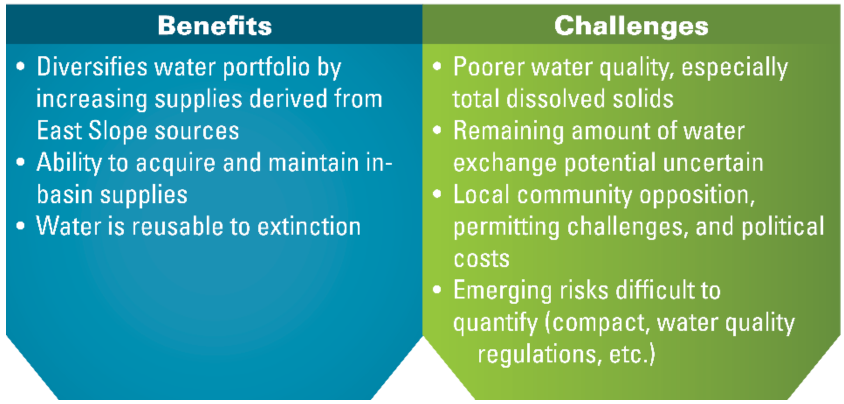


Figure 6-5. Agricultural Transfer Benefits and Challenges

Agricultural to municipal water transfers to meet future water supply needs for Utilities would occur in the Arkansas River Basin and could take many forms, ranging from permanent acquisitions to a leasing program, with a continuum of hybrid options between these two bookends. Temporary water transfers, referred to as alternative transfer methods or "ATMs" in the Colorado Water Plan, involve any agricultural to municipal water transfer that does not result in a permanent transfer of water rights or assets from an agricultural owner to a municipal water provider. Leasing/fallowing is an agricultural transfer for which agricultural lands are fallowed on a temporary basis and the water that would otherwise be consumed by crops is transferred to another water user on an intermittent basis, typically through a lease. Other options include deficit irrigation, co-ownership of rights, and conservation easements.

Water from new agricultural transfers could be conveyed to the Utilities' service area by exchange to existing conveyance systems subject to existing and potentially modified permitting conditions (i.e., Otero Pipeline, or Fountain Valley Authority Pipeline, etc.). Benefits and challenges associated with agricultural transfers in the Arkansas River Basin are shown in **Figure 6-5**.

6.7 Increased Storage

Storage Options for Utilities system can be categorized as terminal, regulatory, and return flow storage. Terminal storage is located near the demand centers and water treatment plants, and serve to manage timing and fluctuation in peak demands, both daily and seasonally. Regulatory storage is located near the collection systems and is used to manage the timing of inflows and diversions to capture large amounts of water during runoff, and make it available at other times of the year. Regulatory storage is also useful for long term carry-over or reserve storage, to manage fluctuations in yield from year to year. Finally, return flow storage is useful to recapture and manage delivery of reusable return flows for direct use or exchange.

Utilities is heavily reliant on its existing reservoir storage facilities to mitigate water system risks and manage its water supplies through the full range of hydrologic conditions and other emergencies. Utilities' water reserves in storage are particularly critical for meeting customer demands and mitigating water system risks during droughts or system outages. Generally, increasing system storage capacity would have

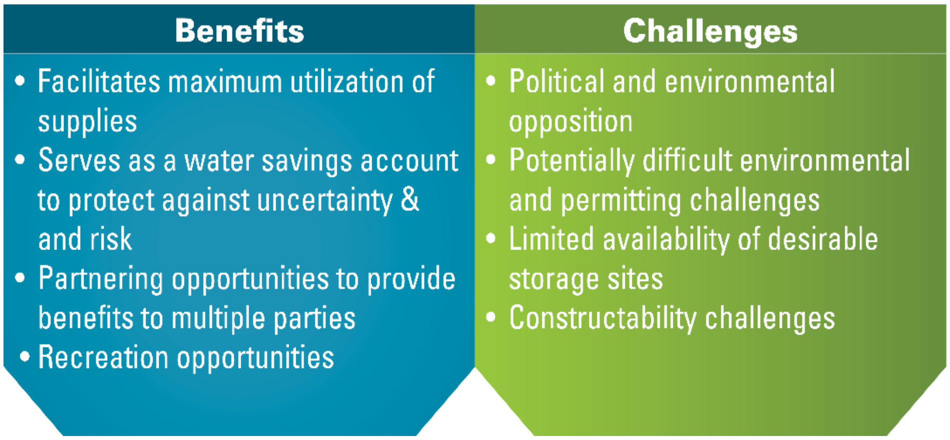


Figure 6-6. Increased East Slope Storage Benefits and Challenges

benefits towards meeting the level of service goals related to maintaining water in storage, as described in Section 2- Planning Process. Strategies to increase storage include enlarging existing reservoirs, new traditional on and off channel reservoirs, and excavated storage, (i.e. gravel lake storage).

This strategy includes only reservoirs to capture East Slope water. Storage options that capture CRB water are included under the CRB strategy. Benefits and challenges to increased East Slope storage are shown in **Figure 6-6**.

6.8 Conveyance

Conveyance projects move water from one location to another, often from remote storage and diversion facilities to local terminal storage facilities that feed a water treatment plant. The water can be either first use water or exchangeable water and can either be conveyed by pumping or gravity depending on system topography. New conveyance projects would most likely consist of some configuration of pipelines, pump stations, and related facilities. Since Utilities is not located on or near a major source of water such as a river or lake, additional conveyance projects often provide the added benefit of system redundancy in the event of an outage on another portion of Utilities' vast and complex water system. Part of the recently completed pipeline component of Phase 1 of SDS is an example of a conveyance project that delivers water and provides for partial system redundancy. In addition, new conveyance may provide access to new sources of supply by adding the ability to deliver water from locations that were previously difficult or impossible to access.

6.9 Groundwater

Two local sources of groundwater are the Denver Basin aquifers (deep bedrock aquifers) and alluvial aquifers (hydraulically connected to a stream). Denver Basin groundwater is a non-renewable resource, and is the sole source of supply for many of the small regional water providers in the Pikes Peak Region. Utilities explored groundwater resources for augmenting supplies during periods of shortage following the 2002 drought. Several wells were put into service; however, challenges with low yields, water quality, and operations made the continued use of those wells undesirable. Aquifer storage and recovery (ASR) in the Denver Basin aquifers was also explored, but was unsuccessful due to the unfavorable characteristics of the aquifers in the Colorado Springs area. Per existing policy (Resolution 233-86), Utilities is only allowed to utilize Denver Basin groundwater for emergency supplemental supply and limited nonpotable water purposes. Based on these technical and policy limitations, development of additional Denver Basin groundwater supplies was not considered for the IWRP.

Utilities has historically used alluvial groundwater for limited potable and nonpotable water purposes. Development of additional alluvial groundwater supplies is problematic because alluvial groundwater wells would be located in areas which are not operationally advantageous to Utilities, the water rights are too junior in priority to yield water, and there are growing concerns about water quality in the alluvial aquifers from which water would be withdrawn. Based on these and other factors, alluvial groundwater was not considered as a source of future supply for the IWRP.

6.10 Currently Planned Local System Improvements

Utilities is always considering ways to improve the efficiency of its local supply system. The following local system improvements are included in the current capital improvement plan and are thus part of any future water supply plan:

- Rehabilitation of the 33rd Street Pump Station
- Mesa WTP Improvements
- Pikeview to Mesa Transfer Pipeline Upgrade
- Bear Creek Intake

6.11 Watershed Management

The health and quality of watersheds directly and indirectly affects and impacts the quantity and quality of water supplies available for use. Multiple factors affect water supply, including forest health conditions, wildfire, development, recreational use, security, source water contamination, invasive species, threatened and endangered species and changing regulations. A proactive approach to managing these factors is essential in meeting Utilities' overall mission. Utilities has a robust Watershed Management Program that is designed to proactively manage watershed lands and natural resources while honoring operational needs and community values. This Program is managed by a dedicated group of professionals in the Watershed Planning Team. The main activities of the Program are described below.

6.11.1 FOREST MANAGEMENT AND WILDFIRE MITIGATION

Sound forest management reduces the risk and severity of wildfire by mitigating the amount, types and structure of forest fuels. It also serves to stabilize and recover natural areas after a wildfire has occurred. Pre-fire mitigation activities help restore forest ecosystems to more natural conditions, making them more resilient to catastrophic wildfire, insect infestations and disease. Some management techniques include forest thinning, creating large openings up to 40 acres, cutting in fuel breaks and the responsible use of prescribed fire. Post-fire mitigation is performed to stabilize areas prone to erosion and to re-establish appropriate groundcover to protect watershed health, prevent damage to water infrastructure, and avert water quality degradation.

6.11.2 WATERSHED PARTNERSHIPS

The Watershed Planning Team depends on partners in a variety of local, regional and statewide capacities, as well as private landowners to address complex issues through holistic and collaborative management.

6.11.3 INVASIVE AQUATIC SPECIES MANAGEMENT

Invasive aquatic species, such as zebra and quagga mussels, are a growing threat to Colorado water resources and water system infrastructure. To reduce the risks and potential impacts associated with invasive aquatic species, a broad based coalition of stakeholders are working collaboratively to take actions which prevent or minimize their spread. As part of this effort, Utilities assisted in the development of the Colorado State Invasive Mussel Management Plan and works with partners to implement watercraft inspection and decontamination programs to protect water supplies and infrastructure.

6.11.4 SOURCE WATER PROTECTION & OUTREACH

The Colorado Source Water Assessment and Protection (SWAP) Program is part of a national program established under The Safe Drinking Water Act and administered by Colorado Department of Public Health and Environment and the United States Environmental Protection Agency. Utilities has assessed the susceptibility of source waters and are engaged in the watershed protection planning phase of the SWAP program. Source water protection is a focus area in Utilities' watershed management plans and protection strategies have been developed for the North Slope, South Slope of Pikes Peak and Local Systems. Current plans are in development for the Blue River watershed. Source water protection assessments will be conducted for other areas of Utilities' water system as additional watershed management plans are developed.

6.11.5 RECREATION AND PUBLIC ACCESS

More than 15,200 acres of municipal watershed lands and nine reservoirs are open to recreational use. Utilities jointly manages many of the lands and reservoirs with other agencies such as the U.S. Forest Service, Colorado Parks and Wildlife, El Paso County and Colorado Springs Parks, Recreation and Cultural Services. For the past several decades, Utilities has engaged in intensive public discussion to define and implement allowable recreational uses.

Utilities' reservoirs and watersheds are a natural attraction for anglers, families, hikers, bikers and other outdoor enthusiasts. Through this strategy of Watershed Management, Utilities strive to balance operational needs, environmental stewardship and recreational uses; providing clean, reliable drinking water is the first priority. As this strategy underlies all of Utilities' activities, it is assumed to be embedded in all future plans, activities, and operations to assure reliable supplies into the future.

SECTION 7

Future Water Resources Options

7.1 Approach to Option Identification and Definition

There are many options for implementing future water supply strategies. However, all the "easy" projects have been built.

This section describes the future water supply options evaluated in the IWRP. Water Supply Options (Options[2]) are projects, programs, and policies that can be implemented to address future water supply concerns. These options were identified based on previous assessments of potential water supply conducted by Utilities staff, previous technical studies, and input from the IWRP Technical Team.

Options are the specific methods by which the future water supply strategies, described in Section 6-Future Water Resources Strategies could be implemented. The options described in this section were evaluated and compared using the criteria described in Section 8-Evaluation of Options, and then combined into potential water supply portfolios as described in Section 9-Development and Evaluation of Portfolios. Specific options and a range of sizes assumed for each are described briefly below, and in more detail in *TM #18 – Lever Descriptions*. Some options were identified by the IWRP Technical Team, but were screened out prior to analyses because of technical/political infeasibility, the availability of another similar/better option, or because the anticipated benefit associated with it is small, i.e. below the level of precision of the planning model. **Figure 7-1** is a map of the main infrastructure options.

The various demand management, nonpotable and reuse, new supply, storage, and conveyance options identified below were all analyzed, in some level of detail, as part of the IWRP process. Given the long-term nature of the planning process, the types of risks and uncertainties identified, and the estimated Buildout demand, it is expected that not all of the options will be actively pursued or implemented, or remain in the form as described herein. This is true even though they may appear, today, to be technically and economically feasible. Option selection will be an iterative process occurring into the future, and will take into consideration all of those factors identified in this initial analysis. Option selection will include the political, environmental, social and financial acceptability of the alternatives at the time of consideration. Both internal and external outreach efforts will help inform this selection process.

[2] Options are alternately referred to as Levers in supporting technical memo's and reports.

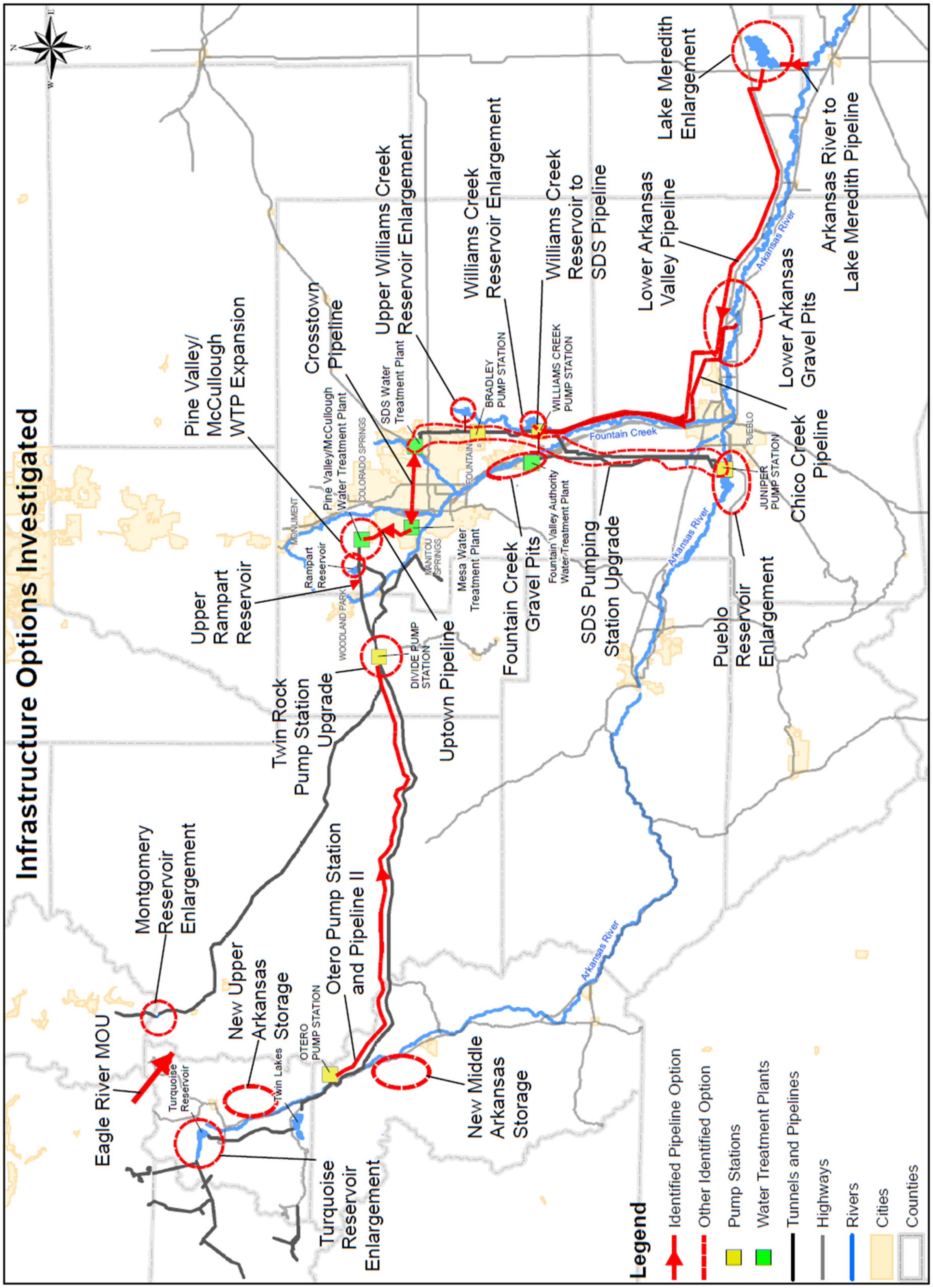


Figure 7-1. Map of Selected Infrastructure Options

7.2 Demand Management Options

Demand Management I: Demand management program that consists of additional measures similar to those currently being implemented, such as rebates, education, and tiered water pricing. This program reduces demand by approximately 2% at Buildout compared to only implementing the current Demand Management program.

Demand Management II: In addition to implementing the strategies in Demand Management I, this option implements more aggressive indoor and outdoor water efficiency incentives, as well significant investment in distribution system water loss reduction. This program reduced demand by approximately 7% at Buildout compared to only implementing the current Demand Management program.

Demand Management III: In addition to implementing the strategies in Demand Management I and II, this option implements more aggressive outdoor water efficiency incentives, as well as outdoor landscaping standards for new construction. This program is estimated to reduce demand by approximately 10% at Buildout compared to only implementing the current Demand Management program.

While individual demand management scenarios were developed for planning purposes, Utilities will ultimately seek some combination of measures that are financially sound, grounded and consistent with community values. For the purposes of the IWRP, ranges of percentage savings based on the above were used.

7.3 Reuse and Nonpotable Supply Options

Indirect Potable Reuse: New pipeline to transfer water from Fountain Creek return flow storage to the new SDS Bailey Water Treatment Plant (Bailey WTP) (assuming adequate blending water is available to meet treatment requirements at the Bailey WTP).

Indirect Potable Reuse with Additional Treatment: New pipeline to transfer water from Fountain Creek return flow storage to the Bailey WTP with additional treatment (assuming available blending water is not adequate to meet treatment requirements at the Bailey WTP).

Direct Potable Reuse: Advanced treatment of water at Las Vegas Street Wastewater Treatment Plant and J.D. Phillips Wastewater Treatment plant to drinking water standards, then pumping directly to either Mesa WTP or Bailey WTP for further treatment and delivery to the distribution system.

Optimized Nonpotable System – Expansion of the nonpotable system to the largest possible size without reducing the amount of return flows available for exchange. This represents a maximum increase of about 2,500 ac-ft/yr over the current nonpotable system capacity. Nonpotable water could be supplied from raw water sources (surface or ground water) or from treated wastewater.

Dual Nonpotable Distribution System – Strategic Deployment: Installation of a dual nonpotable system, but only in areas where feasible, both strategically and financially (e.g., to "anchor customers" like such as large parks or golf courses, and installed concurrent with development).

7.4 New Supply – Colorado River Options

Eagle River Memorandum of Understanding (MOU): Proposed system of new West Slope reservoir(s), diversions and pump stations to deliver decreed Colorado River Basin water from the Eagle River and its tributaries to the existing Homestake system. Currently, this project is envisioned as a joint-use project between Colorado Springs, Aurora, and West Slope partners and is seen as a replacement for the previously planned Homestake II Project. The assumed average annual yield of this project for Utilities is 10,000 ac-ft/yr. The ERMOU is an IP&P as discussed in section 6.5.

Transmountain Ditch Rights: Acquisition of West Slope ditch rights from East Slope or West Slope owners. It is assumed that Utilities would either acquire a portion all of an existing transmountain diversion system, or that transmountain water rights would be acquired in locations where they could be conveyed to existing Homestake, Fry-Ark, Twin Lakes, or Blue River collection and storage systems, such that new transmountain diversion facilities would not be needed. The average annual yield of these rights is assumed to be between 500 ac-ft/yr and 2,500 ac-ft/yr.

Montgomery Reservoir Enlargement: Enlargement of existing Montgomery Reservoir to provide Utilities with additional storage for water yielded under Utilities' Blue River and South Platte water rights. The enlargement size can be between 2,000 ac-ft and 7,000 ac-ft. The Montgomery Enlargement Project is an IP&P as discussed in section 6.5.

7.5 New Supply – Agricultural Transfer Options

Lower Arkansas Water Leases for Base Supply: Uses Lower Arkansas Basin agricultural water leases or interruptible supply agreements to provide an additional source of base supply in every year. It is assumed that such agreements may need to be executed with willing ditch companies instead of or in addition to individual farmers to gain access to sufficient water supplies and to comply with ditch company bylaws. The average annual yield of these collective leases is assumed to be between 5,000 ac-ft/yr and 30,000 ac-ft/yr.

Lower Arkansas Water Leases for Drought Response: Uses Lower Arkansas Basin agricultural water leases or interruptible supply agreements as an additional source of supply during droughts. The frequency of deliveries under the lease agreements is assumed to be three years out of ten, though the leasing arrangement would extend in-perpetuity. Agricultural water users would retain ownership of their water rights and would have access to their water in years when it is not called for by Utilities. The average annual yield of these leases is assumed to be between 500 ac-ft/yr and 3,000 ac-ft/yr.

Lower Arkansas Water Leases for Drought Recovery: Same as leasing for drought response, but in this option, leasing would occur in the years following droughts to refill reservoir storage accounts. The average annual yield of these leases is assumed to be between 5,000 ac-ft/yr and 20,000 ac-ft/yr.

Lower Arkansas Water Rights Purchases: Purchase of lower Arkansas Basin agricultural rights from willing sellers and converting them to annual municipal base supply. The average annual yield of these water rights is assumed to be between 5,000 ac-ft/yr and 30,000 ac-ft/yr.

Upper Arkansas Water Rights Purchases: Purchase of upper Arkansas Basin agricultural rights from willing sellers and converting them to annual municipal base supply. The average annual yield of these water rights is assumed to be between 500 ac-ft/yr and 2,500 ac-ft/yr.

7.6 Storage Options

7.6.1 NEW RESERVOIRS

Lower Williams Creek Reservoir – New reservoir planned in SDS Phase II of 25,000 ac-ft to store reusable return flows and additional Colorado Springs return flows diverted from Fountain Creek.

Lower Williams Creek Reservoir Enlargement: Enlargement of the proposed Lower Williams Creek Reservoir to greater than 25,000 ac-ft. The size of this expansion can be between 5,000 ac-ft and 25,000 ac-ft.

Upper Williams Creek Reservoir – Terminal storage reservoir planned in SDS Phase II that would store water for subsequent delivery to the SDS water treatment plant. The reservoir size is 28,000 ac-ft.

Upper Williams Creek Reservoir Enlargement: Expansion of the proposed Upper Williams Creek Reservoir to greater than 28,000 ac-ft. The size of this expansion can be between 5,000 ac-ft and 30,000 ac-ft.

Upper Rampart Reservoir: Construct a new reservoir immediately upstream of existing Rampart Reservoir, a key terminal storage reservoir in Utilities' system that receives transmountain and Upper Arkansas Basin water from the Otero Pump Station and Pipeline system. The size of this reservoir can be between 5,000 ac-ft and 15,000 ac-ft. Upper Rampart Reservoir would serve a function similar to that of existing Rampart Reservoir.

New Middle Arkansas Basin Storage: New off channel reservoir storage in the Arkansas River Basin upstream of Pueblo Reservoir and downstream of Twin Lakes Reservoir. The additional storage could be created by a new traditional dam(s) or gravel pit complex. The total size of this storage can be between 10,000 ac-ft and 75,000 ac-ft.

New Upper Arkansas Basin Storage: New off channel reservoir storage in the upper Arkansas River Basin, upstream of the Twin Lakes area. It is assumed that the additional storage would be created by a new dam(s) and reservoir(s). The total size of this storage can be between 10,000 ac-ft and 50,000 ac-ft.

7.6.2 ENLARGEMENTS OF EXISTING RESERVOIRS

Turquoise Reservoir Enlargement: Enlargement of Turquoise Reservoir would provide increased storage capacity for Utilities and improve the ability to store transmountain water, which could improve operational flexibility for the Fry-Ark Project and Homestake projects. The size of this enlargement can be between 12,000 ac-ft and 20,000 ac-ft.

Pueblo Reservoir Enlargement: Enlargement of Pueblo Reservoir would increase storage capacity for Utilities, improve operational flexibility for the SDS and FVA systems that draw water from the reservoir.

It would also improve the ability to operate lower Arkansas River and upper Arkansas River exchanges, and increase the potential for long-term excess capacity contract storage. The size of this enlargement can be between 25,000 ac-ft and 75,000 ac-ft, however Utilities' allocation of space would be less than the total size of enlargement.

Lake Meredith Enlargement for Return Flow Storage: Enlargement of existing Lake Meredith would provide additional storage of Utilities' return flows. This additional storage capacity would potentially improve Utilities' ability to exchange return flows to Pueblo Reservoir for diversion to the FVA or SDS pipelines, or to Twin Lakes. The size of this enlargement can be between 15,000 ac-ft and 75,000 ac-ft.

7.6.3 GRAVEL PIT STORAGE

Fountain Creek Gravel Pits: Storage for return flows in gravel pits located along Fountain Creek. Gravel pit storage would serve the same return flow storage function as Williams Creek Reservoir and enlargement. The cumulative size of these gravel pits can be between 5,000 ac-ft and 20,000 ac-ft.

Lower Arkansas Basin Gravel Pits: Storage along the lower Arkansas River downstream of the Fountain Creek/Arkansas River confluence. Used to facilitate the use of Lower Arkansas River leases or purchases. The cumulative size of these gravel pits can be between 5,000 ac-ft and 20,000 ac-ft.

7.7 Conveyance Options

7.7.1 DELIVERY PIPELINES

These Options would add new delivery capacity to the water supply system, and increase the total amount of water that could be delivered.

Pipeline from the Arkansas River below Fountain Creek to SDS System (Chico Creek Pipeline): This pipeline would convey Utilities' reusable return flows or other Lower Arkansas supplies to the Utilities' service area, with the assumed intake point on the Arkansas River near the Chico Creek confluence and outtake at SDS Williams Creek Pump Station. The size of this pipeline can be between 10 MGD and 78 MGD.

SDS Expansion to Current Permitted Capacity: Upgrade SDS conveyance capacity to 78 MGD.

SDS Pumping Capacity Upgrade: Upgrade pumping capacity of SDS pipeline from Pueblo Reservoir to 100 MGD.

Lower Arkansas Valley Pipeline: Pipeline from Lake Meredith to the SDS pipeline that would convey reusable return flows and other water (leased, purchased, etc.) stored in Lake Meredith directly to the SDS system for delivery to the Utilities service area. The size of this pipeline can be between 10 MGD and 78 MGD.

Otero Pump Station and Pipeline II: Expand Otero Pump Station capacity and construct a new pipeline parallel to the existing Otero Pipeline to convey flows from the Upper Arkansas River to Utilities terminal storage in Rampart Reservoir. The size of this pipeline can be between 10 MGD and 68 MGD.

Pikeview to Mesa WTP Transfer Upgrade: Increase the capacity of the pipeline that transfers water from Pikeview Reservoir to the Mesa WTP from 6 MGD.

Twin Rock Pump Station Upgrade: Upgrade the Twin Rock Pump Station to improve its ability to transfer water to either the North Slope Reservoirs for subsequent delivery to the Mesa WTP, or to Rampart Reservoir for subsequent delivery to the Pine Valley/McCullough WTP. The pump station takes water from the Homestake Pipeline and the Blue River Pipeline and directs it to either Rampart Reservoir or the Local System. The size of this upgrade is 10 MGD.

Pipeline from Williams Creek Reservoir/Fountain Creek Return Flow Storage to SDS: A new conveyance pipeline from return flow storage to the SDS raw water system for treatment and IPR. This assumes either Williams Creek Reservoir or Fountain Creek Return Flow Gravel Pits have been constructed and that stored return flows would be blended with water in the SDS system prior to treatment at the Bailey WTP. The size of this pipeline can be between 10 MGD and 78 MGD.

7.7.2 REDUNDANCY PIPELINES

These Options would provide redundant delivery capacity to existing conveyance to improve flexibility and efficiency of delivery, but would not increase the overall amount of conveyance capacity

Crosstown Pipeline (Mesa WTP to SDS WTP) – Full Redundancy: Two bi-directional pipelines between the Mesa WTP and the Bailey WTPs, one for treated water and the other for raw water. This would allow conveyance of water in either direction between the Bailey WTP and the Mesa WTPs. The size of these pipelines can be between 20 MGD and 100 MGD each.

Crosstown Pipeline (Mesa WTP to SDS WTP) – Partial Redundancy: One bi-directional pipeline between the Mesa WTP and the Bailey WTPs. It would be able to deliver raw water from the Mesa WTP to the Bailey WTP, and or finished water from the Bailey WTP to the Mesa WTP. This option would provide only partial redundancy and operational flexibility compared to the full redundancy option, but would be less expensive. The size of these pipelines can be between 20 MGD and 100 MGD each.

Uptown Pipeline (Mesa WTP to Pine Valley and McCullough WTP) – Full Redundancy: Pair of bi-directional pipelines between the Mesa WTP and the Pine Valley/McCullough WTP. This would allow conveyance of finished water in either direction between the Mesa WTP and the Pine Valley/McCullough WTP, and similarly concurrent conveyance of raw water in either direction. The size of these pipelines can be between 20 MGD and 100 MGD each.

Arkansas River to Lake Meredith Pipeline: A pipeline from the Arkansas River to Lake Meredith to convey Utilities' return flows to storage. Return flows are currently conveyed in the Colorado Canal from the headgate to Lake Meredith. This option is an alternative to lining the Colorado Canal to reduce significant conveyance losses. The size of this pipeline is 50 MGD.

Rampart Reservoir Bypass: A bypass conveyance system for Rampart Reservoir. This would convey water around the reservoir to the downstream delivery system in the event of an outage such as an outlet works failure. The size of this pipeline can be between 10 MGD and 78 MGD.

7.8 Other Options

Mesa Water Treatment Plant Upgrades: Modification of the Mesa WTP to be able to treat high fluoride source water, or other difficult to treat sources, to allow more full use of local supplies.

Pine Valley/McCullough Water Treatment Plant Upgrades: Expansion of the McCullough WTP portion of the Pine Valley/McCullough WTP complex, increasing the ability to meet demands on the north end of Utilities' service territory and feed more water into lower pressure zones without pumping. The size of this expansion is between 10 MGD and 75 MGD total.

Bear Creek Intake Relocation: Construction of a new Bear Creek Intake to improve the ability to capture water that is legally and physically available to be diverted by Utilities.

7.9 Options Screened Out

The following options were screened out prior to analysis for various reasons including:

- Significant technical, political, economic, or environmental feasibility issues exist
- A better alternative option exists
- Anticipated benefits to the water system small relative to the precision of the analysis
- There is high uncertainty about what the option configuration would be and/or how to appropriately analyze its impacts
- The option is already considered or included as part of the analysis in some other way

7.9.1 STORAGE

Jimmy Camp Creek Reservoir: Originally proposed in the SDS EIS, but was eliminated in favor of Upper Williams Creek Reservoir.

New Storage at 33rd Street Diversion: This storage option would allow management of volume, and timing issues, and sedimentation problems that have been experienced at the existing 33rd Street Diversion/Pump Station.

Gold Camp and South Suburban Reservoir Enlargement: Enlargement of existing Gold Camp and South Suburban Reservoirs would capture more local runoff water from North and South Cheyenne Creeks and the Rosemont system.

Pikeview Reservoir Enlargement: Enlargement of existing Pikeview Reservoir would capture more local water from Monument Creek.

7.9.2 CONVEYANCE

Otero River Intake Repair: Repair a currently non-functioning intake to the Otero Pump Station that would allow water to be exchanged directly to it. Work on this project began during the IWRP process; therefore it was removed as an option from the IWRP analysis, but included as part of the existing system.

7.9.3 COLORADO RIVER

Northern Supply Source: Additional West Slope water supply from an undetermined source from north of Colorado Springs. For purposes of the IWRP, this option was assumed to be a regional or state-wide project, such as the Flaming Gorge Pipeline Project.

Gunnison Basin Pumpback Project: New storage and delivery system from the Gunnison River Basin on the West Slope to deliver additional water to the East Slope.

Proactive Drought Response in Upper Colorado River Basin by East Slope Municipal Water Users: Proactive, temporary, and voluntary reduction of water imports from the Colorado River Basin to prevent a Colorado River Compact Curtailment. (A similar condition was assumed to be involuntarily imposed and applied as a risk in the Portfolio Development analysis described in section 9.1)

Colorado River Water Bank: Participation in a cooperative water banking operation on the West Slope to make senior agricultural water available to junior East Slope municipalities as mitigation for reduced Colorado River Basin yields.

New West Slope Reservoir: New reservoir storage project on the West Slope shared with other Front Range water providers in which Utilities would have a fixed share of the storage space that it could operate as necessary.

Ruedi Pumpback Project: State or Southeastern Colorado Water Conservancy District led project consisting of a new pipeline and associated facilities to capture Colorado River water in Ruedi Reservoir and then pump it to the Continental Divide.

7.9.4 OTHER OPTIONS

Denver Basin Groundwater Wells: Development of Denver Basin groundwater as a source of supply, which is currently not used by Utilities.

Denver Basin Groundwater Wells as Drought Supply: Development of Denver Basin groundwater as a source of supplemental supply during periods of droughts.

Rainwater Harvesting: Rainwater harvesting by Utilities' residential customers (recently approved under State law) as a nonpotable water source.

Graywater Use: Use of graywater by Utilities' customers as source of nonpotable water for onsite water uses.

Cloud Seeding: Program for cloud seeding to increase production of snowpack over Utilities' source watersheds. Currently an ongoing project where Utilities provides financial support in conjunction with other stakeholders in the Upper and Lower Colorado River basin.

Expanded Shortage Response Policy: Expanded or enhanced shortage response policy that would achieve greater waters savings during periods of watering restrictions, or would trigger shortage response measures at different times.

Dual Nonpotable Distribution System: Creation of a dual potable and nonpotable water distribution system in all areas of new development and an extension of the current nonpotable water system to all portions of currently developed service territory.

These options are described more fully in *TM #18 – Lever Descriptions*, which includes more detail on the configurations for all potential IWRP options.

SECTION 8

Evaluation of Options

8.1 Introduction

This section describes the process used to evaluate water supply options considered. Quantifiably evaluating options provides an objective basis for comparing their relative merits when creating water supply portfolios. The evaluation process consisted of preparing high level, life cycle cost estimates and conducting a multi-criteria assessment for each option, including criteria for technical, economic, environmental, and social factors.

All options were evaluated using technical, environmental, social, and economic criteria.

8.2 Cost Analysis

8.2.1 CAPITAL COST ESTIMATES

Capital cost estimates were developed for each of the options remaining after the results of the initial screening. The conceptual level cost estimates were prepared based on the best available information regarding the major project components (e.g., dam, pipeline, pump station). In some cases, conceptual designs existed and costs were available from those previous studies and were used. In other cases, a conceptual project definition and cost estimates had to be prepared using unit costs derived from other studies. In estimating costs, the accuracy of the cost estimates can vary depending on the level of detail of study, planning, and design associated with the project. For the sake of the IWRP, all costs should be considered as high level, preliminary costs, or Conceptual level cost estimates, and are subject to further refinement with additional study and design work. The Conceptual level cost estimates developed for use in the IWRP are considered Class V estimates based on the criteria promulgated by the Association for the Advancement of Cost Engineering International. Expected accuracy ranges are from –50% on the low side to +100% on the high side, depending on technological complexity of the project, appropriate reference information, and the level of contingency.

8.2.2 LIFE-CYCLE COST ESTIMATES

In addition to the capital costs of options developed, annual O&M costs were also estimated. O&M costs are those standard costs that are required for physically maintaining project facilities as well as the costs to operate the overall facility. O&M costs for the options were calculated as percentages of capital cost, plus where applicable, annual energy costs associated with supplying energy to pump stations and WTPs based on estimated flows.

Evaluation of total life-cycle costs for options required determination of the present worth of capital expenditures and the present worth of annual costs for O&M and energy. Present worth values of operation and maintenance (O&M) and energy costs were separately calculated and escalated for inflation over the project life span (assumed to be 50 years for all projects and programs) using an interest rate of 5 percent.

8.2.3 OPTION COST ESTIMATES

Estimates of capital and life-cycle costs for Options were prepared with lower/upper cost bounds corresponding to the lower/upper size bound of the option size (if applicable). These cost estimates were used to select Options that provide the best performance (see Section 9) at the most reasonable cost. Cost was also an important factor in the overall portfolio analysis. A cost filtering approach was applied to the relatively small number of portfolios that met the level of service and performance criteria and were determined to be technically feasible to implement. Details regarding how cost was considered during the portfolio selection process can be found in *TM # 21 – Portfolio Development and Evaluation.* Details of the cost analysis, methodologies, assumptions, unit costs, etc. used to develop conceptual level cost estimates are available in *TM # 20 – Lever Cost Estimates*.

8.3 Multi-Criteria Assessment

A key component was an evaluation of potential options using technical, environmental, social, and economic criteria. The purpose of the evaluation was to develop scores and ranks for the options that could be used when assessing water supply portfolios. Option evaluations were conducted by the IWRP Water Planning Advisory Group (WPAG) (the citizens' advisory group) and the Technical Team (Utilities' subject matter experts). The option evaluation approach employed a multi-criteria analysis, with weighted scores for each option derived from detailed input by each group. The two groups developed option scores independently based on their own knowledge, values, and understanding of issues.

The WPAG and Technical Team selected four categories for option evaluation criteria: the three triple bottom line categories of economic, environment, and social criteria, plus a technical category based on the analyses performed for option performance (i.e., from the modeling analysis). Twenty specific criteria were selected in these categories, as shown in **Figure 8-1**. The WPAG and Technical Team then independently scored each option for each criterion. The Technical Team performed an evaluation and sensitivity exercise for the previously described categories. Due to the wide diversity of issues and options considered, and relative insensitivity to weighing, each of the four categories were assigned equal weight. Finally, the total score was calculated by each group as the sum of the scores for all the criteria.

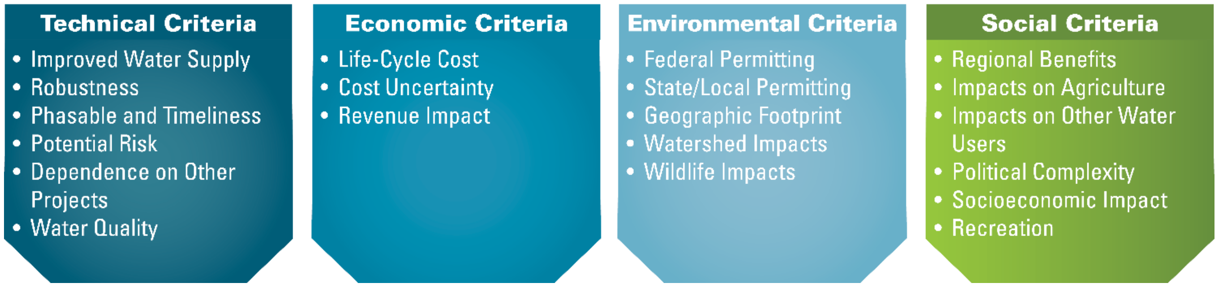


Figure 8-1. Criteria Used to Evaluate Options

The scores were reviewed and adjusted to reconcile any significant differences based on further discussion and professional judgment. The scores were then carried forward for use in the portfolio assembly process. In general, higher scoring options were the demand management programs, already permitted projects, enlargements to existing reservoirs, and improvements to existing facilities. Lower scoring options were new West Slope projects (supply and storage), large new reservoirs, and large new conveyance systems.

Option scores, as well as the details of the entire option evaluation process, are available in *TM #19 – Lever Evaluations*.

SECTION 9

Development and Evaluation of Portfolios

9.1 Analysis and Modeling Assumptions

A flexible, balanced portfolio will meet Utilities' level of service goals across a broad range of possible conditions at Buildout.

The final step of the IWRP technical analysis was to develop portfolios of projects to meet the level of service goals at Buildout. To define the future conditions at Buildout for purposes of portfolio development, Utilities reviewed its recent history. In 2002, Utilities experienced a combination of system stresses: a severe drought, an unfavorable Blue River decree administrative action, an Otero Pump Station outage, and reduced reservoir storage at Pueblo Reservoir due to safety of dam maintenance work. Utilities staff and management realized that multiple significant system impacts can occur at once and therefore wanted to select portfolios accounting for similar potential situations at Buildout. Using results from the climate, hydrology, and system risk as well as past experience, Utilities developed the future for Buildout portfolio selection described in Table 9-1.

Table 9-1. Buildout Assumptions for Portfolio Development

Buildout Future Summary	
Hydrology	180 years of simulation with a variety of droughts, including those more severe than the historical record
Climate	3°F warmer climate (consistent with recently observed temperature trends of 1°F warming per decade) No change in mean precipitation
System Risks	One year Otero Pump Station/Pipeline outage due to infrastructure failure, maintenance requirements, or natural disaster impacts (wildfire, landslide, etc.). Shortages in the Colorado River Basin result in: 20 percent reduction in all West Slope yields for a 10-year period 25 percent reduction in all exchange potential during same period (resulting from reduced flows on the Arkansas River due to reduced overall transmountain water imports by Utilities and others)

9.2 Development of Buildout Portfolios

9.2.1 MODELING ANALYSIS

A challenge for the modeling component of this analysis was the large number of potential portfolios to evaluate. As detailed in Section 7-Future Water Resources Options, Utilities had identified over 40 potential options, many with variable sizes and configurations. A state-of-the-art Multi-Objective Evolutionary Algorithm (MOEA) was used to help evaluate the tradeoffs between competing objectives such as maximizing system performance metrics and minimizing the amount of projects that Utilities would have to build in the future. The MOEA is a computer tool that automatically assembles a portfolio of options, runs the water supply planning model with those options across the Buildout future described above, and processes the resulting metrics to determine how well the portfolio performed as compared to others. This process was repeated thousands of times, generating a set of portfolios that represented the better options available to Utilities.

Several of these multi-objective optimization runs were completed, and in total tens of thousands of possible project combinations were evaluated. Utilities went through a portfolio identification process to showcase how several different strategies could meet the same desired level of level of service. Utilities then investigated model results and filtered portfolio results using professional judgment to reflect non-technical attributes, such as triple bottom line criteria and operational difficulties. Utilities did not take results as the final answer, but considered many additional factors and rigorously questioned and investigated model output.

9.2.2 LEVEL OF SERVICE GOAL DEVELOPMENT

Part of the Buildout Portfolio analysis involved developing recommended level of service performance goals. To accomplish this, Utilities looked at setting different level of service goals when selecting Buildout portfolios and then further evaluating the resulting portfolios. As a starting point for level of service goals, Utilities utilized prior planning criteria, such as the existing Water Shortage Ordinance (WSO) that requires analysis/recommendations if storage is projected to fall below 1.5 YOD and a past unofficial policy planning goal to always keep storage above 1.0 YOD. The 1.0 YOD storage level is used as a reserve to help protect against unforeseen or worse than anticipated circumstances or events. Historically, Colorado Springs has imposed the shortage response measure of mandatory watering restrictions 9 out of the last 60 years, which corresponds to 85% reliability.

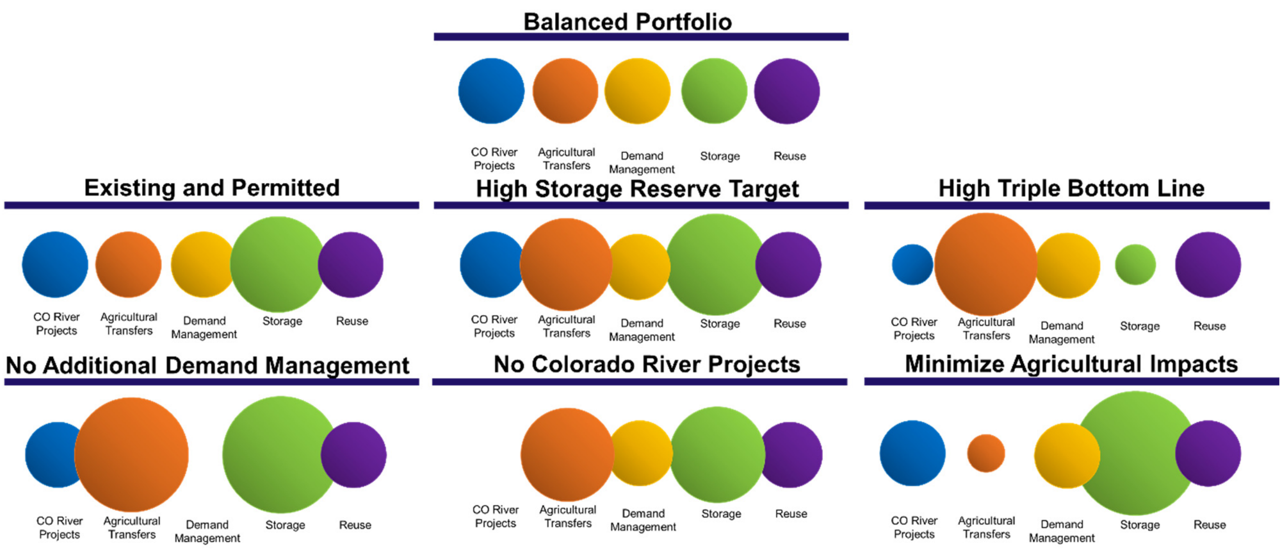
The target reliability that portfolios would have around these two storage levels was then varied in the analysis. Ultimately, Utilities found the two level of service goals of 1) meeting the 1.5 YOD threshold at a 90 percent reliability level while 2) maintaining the 1.0 YOD threshold at 100 percent reliability, as appropriately balancing risk with project development, and ultimately cost. All portfolios that were carried forward in the Buildout Portfolio analysis met these level of service goals. The portfolios that did not meet these level of service criteria were removed from further consideration in the Buildout Portfolio analysis.

9.2.3 TECHNICAL AND STAKEHOLDER INPUT

Through a combination of rigorous technical analysis by Utilities, WPAG, and other stakeholder input, several portfolios themes were developed, as shown in **Figure 9-1**. In this figure, each colored circle represents a different major water resources strategy as described in Section 6-Future Water Resources Strategies (with the exception of the Groundwater strategy, which was screened out). For the sake of presentation, the Balanced Portfolio was selected as a baseline for comparison, and the size of each of the colored circles in the other portfolios corresponds to the relative contribution of that strategy to the amount contained in the Balanced Portfolio. Portfolio themes were essentially bookends that were developed for testing policy questions and exploring options under different planning goals (e.g., no additional Colorado River Basin supplies, or maximize the triple bottom line score of the water supply options comprising the portfolio).

In addition to these themed portfolios, a portfolio that best represents a sound balance between the five major water resource strategies was selected and is described in greater detail in Section 9-Development and Evaluation of Portfolios. These portfolios demonstrate there are many ways to meet level of service goals at Buildout, and show that doing less of one type of project means doing more of another. All portfolios contain difficult projects, are expensive, and pose many political, environmental, and social challenges.

One unanticipated result of this analysis was that traditional conveyance projects were not included in any of the selected water supply portfolios. Conveyance projects that would increase deliveries from source water areas such as the lower Arkansas River Basin (e.g., Chico Creek Pipeline) were found to be inferior to other options based on cost and triple bottom line score. Conveyance projects that would improve the ability to move water between different parts of Utilities' treatment and distribution system (e.g., Crosstown Pipeline) would provide redundancy benefits but would not significantly improve system performance for the Buildout conditions selected for portfolio development. Thus the analysis shows that from a water supply point of view, the water system is not significantly conveyance limited. This is not surprising given the recent completion of a major conveyance project, the SDS pipeline. As a result, no traditional conveyance options were carried forward to the portfolio development phase. However, further study and assessment of benefits and drawbacks of redundancy conveyance should be analyzed in post-IWRP planning studies.



Note: Sizes of circles represent the contribution of the water resources strategy in the portfolio relative to the Balanced Portfolio.

Figure 9-1. Portfolio Strategies Based on Themes

9.3 Robustness Analysis for Buildout Portfolios

The Buildout portfolios in the previous section were selected based on their performance against a representative set of system stresses. However, because the future at Buildout is uncertain, it was important to evaluate the performance of the various Buildout portfolios across a variety of many possible futures conditions in addition to the one outlined in Section 9.1-Analysis and Modeling Assumptions. These alternate futures were used to (i) evaluate how robust the Buildout portfolios were by determining if they continued to meet level of service goals across a variety of these futures and (ii) identify if one portfolio consistently performed better than the others. This robustness analysis was the last major piece of the Robust Decision Making process used for the IWRP.

Table 9-2 lists the future conditions evaluated in the robustness analysis:

Table 9-2. Additional Future Conditions for Robustness Analysis

Additional Risks used for Portfolio Robustness	
Hydrology	Additional hydrologic traces
Additional Climates (18 total)	0°F, +1°F, +2°F, +3°F, +4°F, and +5°F temperature increases 0%, -5%, and -10% precipitation changes
Additional System Risks (each listed was applied individually)	• Chronic 50% exchange potential reduction • 1-year outage at each of the three major water treatment plants (applied individually) due to plant failure or inflow water quality impairment • Chronic 25% reduction in Pueblo Reservoir or Local System storage capacity due to water quality problems or storage restriction due to structural issues • No Colorado Canal system storage (every year) due to water quality impairment or other factors • Colorado River Compact Curtailment with no West Slope supplies for 10 years due to unprecedented drought in the Colorado River Basin

Results from this robustness analysis showed that if the future climate is slightly warmer or slightly drier than what was assumed, or if additional system risk occurs, the Buildout portfolios are nevertheless adequately robust to meet future demands. However, the portfolios are unable to maintain the level of service performance goals for futures that are both warmer and significantly drier, or futures with an extended Colorado River curtailment. In addition, they do not protect against acute water treatment plant outages. This result was consistent across all Buildout portfolios. Finally, the Balanced Portfolio performs similar to or slightly better than the other portfolio alternatives.

9.4 Buildout Regionalization Analysis

A technical analysis of regionalization concepts at Buildout was also performed on the portfolios described above. These analyses were completed to evaluate the high-level technical feasibility of regionalization at Buildout. This analysis only considered the ability of the water system to serve regional needs on a water supply and infrastructure basis. A more detailed regionalization analysis, including consideration of broader issues such as costs, development policy, economic impacts, etc. is proposed as a post-IWRP effort. To determine the feasibility, it was assumed that a regional supply gap of around 25,000 ac-ft/yr as described in Section 4.2.5-Potential Extraterritorial Demands would be met by Utilities under two different service scenarios.

In the first part of the regionalization analysis, the available unused conveyance capacity in the system was evaluated to determine whether Utilities could facilitate the delivery of water owned by regional entities utilizing existing Utilities infrastructure. For the technical analysis, the capacity and utilization of the SDS pipeline was used as a surrogate for any existing conveyance facilities that could assist in meeting regional needs. At Buildout, there is sufficient unused capacity in the system, at least the off peak months, to deliver enough water to meet the full annual need of these regional entities, assuming storage was available to these entities in shared facilities or their own facilities to manage the timing of deliveries.

The second part of the regionalization analysis assumed Utilities would act as a wholesale water provider to regional entities in the greater Pikes Peak Region. This analysis assumes Utilities would deliver treated water to the entities at a master meter connection of its potable water distribution system. The regional demands described in Section 4.2.6-Potential Extraterritorial Demands were added to the water supply planning model, and the additional amount of supply required to meet these regional demands was determined. The result of this analysis, displayed in **Figure 9-2**, showed that Utilities could meet these regional demands by adding between 5,000 ac-ft/yr and 10,000 ac-ft/yr of water supply to the system, while still meeting level of service goals. It is assumed that the additional water introduced would be reusable water, and therefore the reuse and subsequent uses of that water would provide the additional supplies necessary to make up the full amount of additional demand.

These two analysis approaches demonstrate that the water system is generally not a limitation to pursuing regionalization if such a proactive approach to regionalization is approved by the Utilities Board.

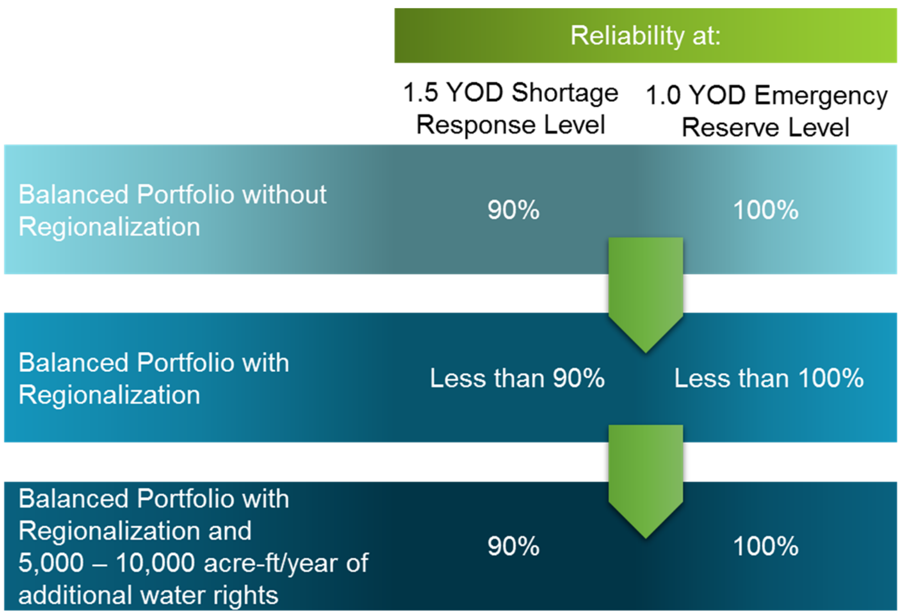


Figure 9-2. Regionalization Results

SECTION 10
Public Process

The IWRP utilized both technical and public processes to develop the long term water plan. The public process employed a comprehensive approach to capture feedback and opinions from a diverse group of stakeholders in the community. This comprehensive approach utilized a variety of communication and feedback methods designed to reach different audiences and gather different kinds of feedback. These are summarized in **Figure 10-1** and described in more detail below. Further information on the IWRP public process can be found in *TM #22 – Public Process*.

A wide variety of methods were used to gather and incorporate input from key stakeholders and the Colorado Springs community.

Figure 10-1. IWRP Public Engagement Methods

10.1 Methods

10.1.1 WATER PLANNING ADVISORY GROUP

Utilities convened a citizens' Water Planning Advisory Group (WPAG) consisting of 12 people to assist with the IWRP. WPAG members were selected based on active involvement in the community; had good working relationships across Colorado Springs and the surrounding communities; were informed on local issues; had specific technical water expertise; and were seen as an active water user. The WPAG participants represented the following customer segments: nonprofits, environmental organizations, water districts, landscape professionals, large water users, local businesses, military, higher education, city government, real estate, and the development community.

The group met 10 times with Utilities staff over the course of about two years. Specifically, the WPAG provided feedback to Utilities by reviewing baseline data and assumptions, reviewing results from the risk identification and assessment analysis, scoring water supply options based on triple bottom line criteria, and providing input on key recommendations.

10.1.2 OPEN HOUSES

Utilities held five open house format meetings between October 2014 and January 2017 which drew more than 90 members of the public. These open houses were scheduled at key transitions points during the IWRP, with the each open house having a different emphasis. In each case the overall goal was public education and outreach. The goals of the first two open houses were to educate attendees on Utilities' water system and the water supply planning process, and solicit general feedback on the IWRP objectives and approach. The goal of the third open house was to educate attendees on the broad strategies Utilities could pursue in the future to address water supply challenges. The goal of the last two open houses was to introduce the key Board policy questions and the proposed approach for a reliable water system at Buildout.

10.1.3 FOCUS GROUPS

In 2014, Utilities conducted two focus groups to gather input from customers on their main concerns related to water supply reliability and their preferences for addressing future water shortages. A total of 25 customers participated in the two groups. Utilities staff led participants through a structured process of gathering input on water issues of concern (e.g., shortages, water quality, cost) and preferences for meeting growing water demands in the future (e.g., more conservation, more storage, more agricultural water acquisitions).

10.1.4 SURVEYS

Utilities conducted customer surveys to gather input on their understanding of current water issues, values around water, and preferences for addressing future water needs. Some IWRP surveys were coordinated with other Utilities customer surveys for efficiency. In 2014, surveys were sent randomly to over 600 community members to gather feedback on water values and understanding. In 2016, surveys were sent to the Utilities customer panel that consists of customers who have agreed to receive occasional on-line surveys and other information. Of the 2,000 people from the on-line panel, 687 completed the survey and provided input on their concerns related to existing and future water issues and their preferences for different types of water supply strategies.

10.1.5 STAKEHOLDER MEETINGS

Nearly 50 meetings were held with a wide variety of community stakeholder groups over a period of about four years, with over 1,300 total attendees. Presentations were made to many different community groups and ranged, from professional associations of realtors and landscapers to a Military Forum. These stakeholder meetings were held to not only reach organizations and corporations, but to reach out to the community through the Council of Neighbors and Organizations (CONO) and Organization of Westside Neighbors (OWN). These two groups alone represented more than 100 homeowner associations. Stakeholder meetings were used to provide the public with information on the IWRP goals and study approach, the risks and uncertainties affecting future water supply planning, and the strategies available to address those risks and uncertainties.

10.1.6 OTHER METHODS

Additional methods were used in order to provide education and solicit feedback from a wider range of stakeholders.

1) **Water Outreach Centers** – partnered with various libraries, colleges, and community centers in delivering and distributing IWRP planning documents and other water resources materials.
2) **Web Page** – web page on Colorado Springs Utilities website included IWRP goals, public process opportunities, process flow chart, issue summaries, generally relevant water resource information, and contact information for providing feedback or asking questions.
3) **Employee (Internal) Communication** – used Insight eNewsletter, ambassador meetings, and talk at the Officer Meetings.
4) **Public (External) Communication** – used Utilities Connection regular newsletter, regular stakeholder newsletters, and the local Colorado Springs newspaper (The Gazette) to promote the open houses and planning efforts.
5) **Leadership Engagement** – held ongoing meetings with the Management Team, Strategic Planning Committee of the Utilities Board, and the Utilities Board proper.

10.2 Key Messages

Through all of these methods of engagement, Utilities collected and documented a number of recurring themes and key messages that are important to customers and stakeholders. These are:

- Water quality is important, and is generally more of a concern to the public than water supply reliability.
- Maintain high standards for safety and aesthetics.
- Emphasize conservation and reuse and consider how they fit with other options.
- Make sure Colorado Springs has the water it needs to serve current customers and a growing community.

- Help meet regional water needs if possible.
- Repair and maintain aging infrastructure.
- Look at other methods to preserve/reuse water.
- Help customers understand how to use water efficiently.
- Try to minimize impacts to agriculture and the environment.
- Make sure costs are realistic for customers.
- It is prudent to take advantage of timely opportunities for supply acquisitions and projects.

The feedback Utilities received and the key messages gleaned from this feedback guided the technical and policy level analysis, and recommendations found in the IWRP. Utilities values active participation of the public in their planning processes as it ensures the planning process and recommendations are complementary to the needs and expectations of both the customers and neighboring communities.

SECTION 11
Recommended Plan

11.1 Introduction

This section presents a summary of the findings and recommendations of the IWRP. The discussion is organized around responses to the key policy questions that formed the basis of the planning effort, and recommendations for introducing adaptive implementation strategies into the plan.

Adopting recommended policies and implementing the recommended plan in an adaptive manner will keep Utilities on the path to a sustainable future.

11.2 Summary of Key Policy Recommendations

Recommendations related to the four key policy questions are summarized in **Figure 11-1**. Recommendations are based on the results of the technical analyses described previously, input from technical and management teams, input from customers and stakeholders, and input and direction for the Utilities Board. Policy recommendations are discussed in the following subsections.

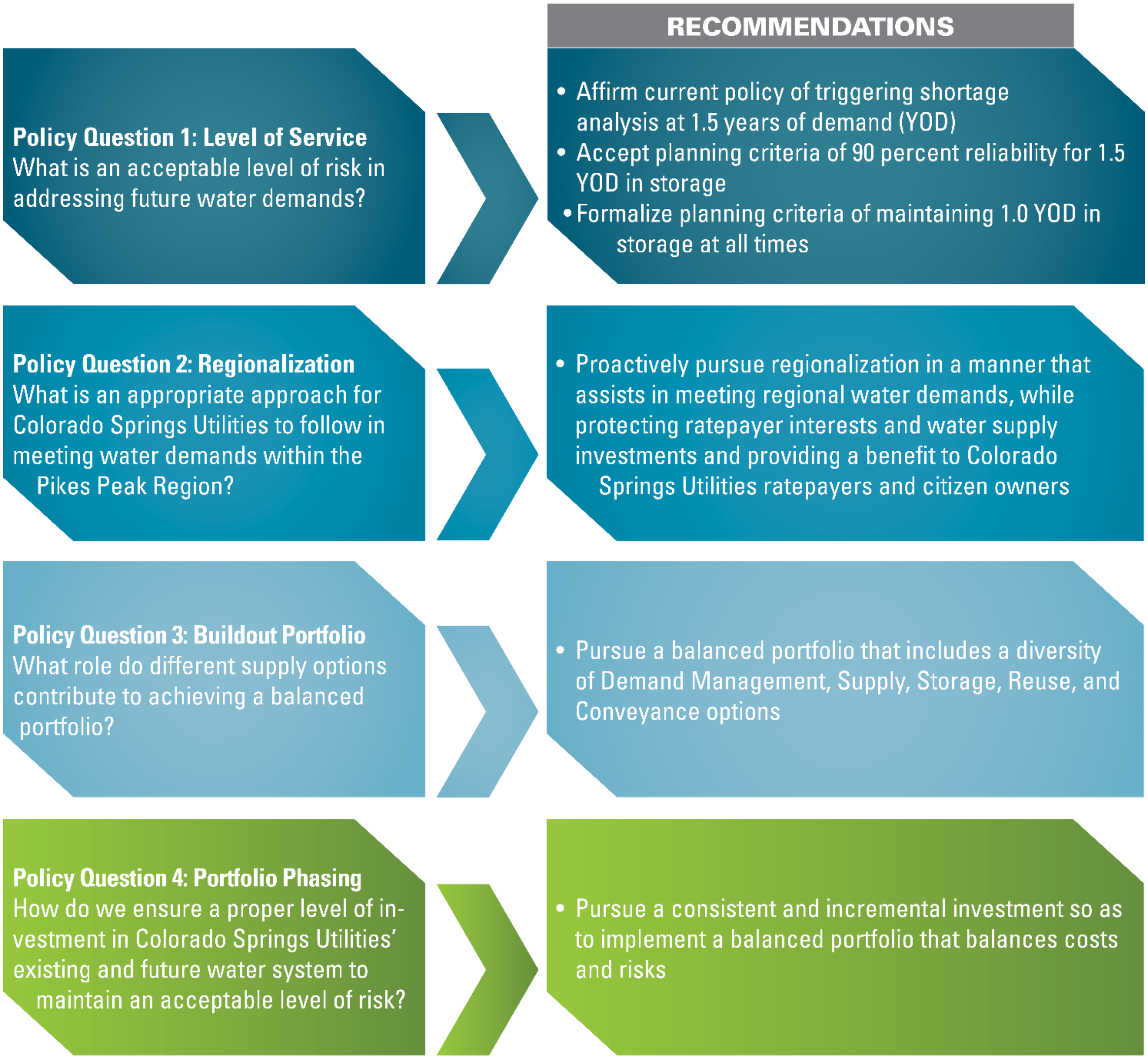


Figure 11-1. Summary of Policy Questions and Recommendations

11.3 Level of Service

Current drought risk mitigation policies and practices, and proposed changes based on the IWRP analyses, are summarized in **Table 11-1**. Setting a minimum threshold of 1.0 YOD for total reservoir storage provides sufficient protection against future unknown risks and against failing to meet indoor demands at all times. Triggering shortage response analyses when total reservoir storage falls to 1.5 YOD provides sufficient time to implement shortage response measures that would prevent storage from falling below the minimum threshold of 1.0 YOD.

Current policy contained in EL-10 states, that "the CEO shall not fail to protect existing and future consumers from compulsory restrictions on the use of water, specifically when considering and managing special contracts, except as provided for in the City Code". This policy has been interpreted to mean that shortage response should never be triggered and that the system reliability goal should be 100% in all cases. The IWRP recommendation is to modify the reliability goal of allowing implementation of shortage response measures no more than 10 percent of the time. This change is consistent with historical experience over the past 60 years, the results of the IWRP technical analysis, and with customer preferences. This represents a significant change in Utilities' water resource management strategy which acknowledges the need to provide a reasonable balance between the cost of new water supply infrastructure, water system risks, and customer impacts and establishes metrics which are both realistic and achievable given our current understanding and approach to risk-based planning.

Table 11-1. Risk Mitigation Policy Summary

Current Risk Mitigation Policies	Proposed Risk Mitigation Policies
Trigger shortage response analysis at 1.5 YOD in storage Reliability Goal: 100 Percent Never go into shortage response conditions	Trigger shortage response analysis at 1.5 YOD Reliability Goal: 90 Percent Shortage response 1 in 10 years on average
Planning Preference to maintain 1.0 YOD in storage at all times	Formalize policy planning criterion of maintaining 1.0 YOD in storage at all times as emergency reserve.

11.4 Regionalization

Findings of the regionalization technical analysis, public process, and Board communication support the recommendation that Utilities pursue a proactive approach to meeting regional water demands and generating financial benefits for its ratepayers as summarized in Table 11-2. Potential impacts to water supply reliability for Utilities' customers are small and can be overcome with a modest amount of additional supply, while there is also the potential to realize significant benefits associated with the receipt of supplemental revenue for Utilities and enhanced regional water supply security.

A goal of the IWRP analysis was to determine the feasibility, from a water supply and water system performance standpoint, of pursuing regionalization in a proactive manner. Additional regionalization studies will be conducted following the IWRP to more fully evaluate the technical, legal, political, and economic considerations associated with potential regionalization strategies.

Table 11-2. Summary of Findings of Regionalization Technical Analysis

Regionalization Option for Utilities	Possible Regionalization Strategies	Technical Findings
If/When Provider of Conveyance Capacity	Utilities would allow regional entities to use Utilities infrastructure to deliver their own water if/when capacity is available.	At Buildout, Utilities will have sufficient unused capacity in its system in the off peak months to be able to deliver water to regional suppliers, but additional storage may be needed by regional participants.
Wholesale Treated Water Provider	Utilities could provide regional entities with a firm supply of water as if they were service area customers.	At Buildout, Utilities could deliver full service treated water on a wholesale basis to regional entities with the addition of 5,000 to 10,000 ac-ft/yr of new supply.

11.5 Balanced Portfolio

The IWRP recommendation for implementing an appropriate mix of water supply options is to pursue a balanced portfolio that contains a diversity of supply, storage, demand management, reuse, and conveyance options. This section describes in more detail the contents of this the Balanced Portfolio, which is the Buildout portfolio that is recommended to be pursued by Utilities.

A summary of the five major water resources strategies that encompass the Buildout portfolio are shown in **Figure 11-2.** The specific projects, programs, and policies that comprise the Balanced Portfolio are listed in **Table 11-3**.

Figure 11-2. Water Resources Strategies in the Balanced Portfolio

Table 11-3. Components of the Balanced Portfolio

Water Resources Strategy Category	Water Resources Projects and Options
Colorado River Projects	New supply of 10,000 to 15,000 ac-ft/yr • Montgomery Reservoir Enlargement • Eagle River MOU
Agricultural Transfers	New supply of 15,000 to 25,000 ac-ft/yr • Drought response leases • Base supply leases • Water rights acquisitions
Demand Management	Annual demand savings of 11,000 to 13,000 ac-ft/yr • Conservation measures • Distribution system efficiency savings • Landscaping standards
Arkansas Basin Storage	New or enlarged storage of 90,000 to 120,000 ac-ft • Upper Williams Creek Reservoir • Phased gravel pit reservoirs along Fountain Creek • Phased gravel pit reservoirs along the Arkansas River below Pueblo Reservoir • Additional storage in the Upper Arkansas River Basin • Additional storage in the Middle Arkansas River Basin • Upper Rampart Reservoir
Reuse	Additional nonpotable demands of 1,200 to 2,500 ac-ft/yr Indirect potable reuse of 50 MGD to 75 MGD

The benefits of pursing the recommended Balanced Portfolio include:

- Flexibility in terms of the number of options available for meeting the future water supply "gap" (i.e., all eggs are not in one basket)
- Performs well against a wide range of potential risks and future conditions
- Distributes impacts of potential risks across a broad range of the water resources system
- Maximizes utilization of existing infrastructure (e.g., SDS) and water rights
- Is consistent with Colorado Water Plan recommendations
- Provides for use of adaptive management strategies to address changing and uncertain future conditions

Due to the flexibility in implementing the Balanced Portfolio, the Buildout RMD is estimated to be equal to or greater than the estimated Buildout Demand of 136,000 ac-ft/yr.

Overall, there are many potential configurations of portfolios to meet the level of service goals at Buildout and the recommendations in this plan represent a sound balance between the major project categories. For the specific Balanced Portfolio presented above, the total capital cost is about $1.7 billion and the total life-cycle cost for 50 years of operation is about $1.9 billion. All portfolio configurations require significant investments in projects and will face political, environmental, and/or social challenges. Therefore, implementing the Balanced Portfolio will require support across the Colorado Springs community.

This policy direction gives Utilities a roadmap of projects and options to pursue, and Utilities will implement this plan, and subsequent updates of this plan, as appropriate, over the next 50 years to meet customer demands. Utilities also recognizes that as conditions change, there is the ability to adjust the amounts, timing, and types of projects in order to assure that the water system meets level of service goals and assures that customer demands are met.

11.6 Implementation Timing

The projects listed in **Table 11-3,** or their equivalents, are all required to meet Buildout conditions and thus will all eventually be required at some level. As part of this plan, an overall approach for phased implementation of the projects in the Balanced Portfolio was developed and is discussed below. Timing estimates are based on a moderate population growth and water demand forecast and other relevant factors. Actual future conditions will vary, affecting the time periods in which projects must be brought on-line, but the timing outlined below is based on the best information available in February 2017.

Several approaches for determining the recommended timing for implementation of the projects in the Balanced Portfolio were evaluated to determine and demonstrate the consequences of each approach. These approaches were evaluated using a Revenue Impact Model, which translates a proposed phasing of projects over time into an estimate of revenue required in order to finance those projects. Utilities used this tool in conjunction with expert judgment to develop a reasonable, representative timing strategy based on opportunistic availability (i.e., projects that have a limited window of availability) and the goal of balancing project need with avoiding multiple large step increases in revenue requirements. The project implementation timeframe is divided into near-term projects (present-2030), mid-term projects (2031-2050), and long-term projects (2051-Buildout) and is detailed below.

The following sections list the IWRP projects scheduled for implementation in the three timeframes.

11.6.1 NEAR-TERM PORTFOLIO PROJECTS

The near-term portfolio projects are those scheduled for 2017-2030 because they are already budgeted for, have significant work already completed, or have a window of opportunity in the near term. Specific near-term projects and their justification for inclusion are listed in Table 11-4.

Table 11-4. Near-Term Projects in Balanced Portfolio

Short Term Projects	Justification
Mesa Treatment Plant Upgrades	Already included in capital improvement plan.
Bear Creek Intake – 3 MGD	Already included in capital improvement plan.
Pikeview to Mesa Transfer Expansion up to 8 MGD	Already included in capital improvement plan.
Shortage response Leasing at 5,000 ac-ft/yr	Significant existing progress.
Upper Williams Creek Reservoir – 28,000 ac-ft	Significant existing progress.
Montgomery Reservoir Enlargement – up to 7500 ac-ft	Significant existing progress.
Gravel pit reservoir off Fountain Creek at 5,000 ac-ft	Complementary to other projects and can be phased.
Gravel pit reservoir off Arkansas River at 5,000 ac-ft	Complementary to other projects and can be phased.

Implementation of the above projects is not limited to actual construction or contract execution. Each project requires a significant amount of associated activities and preliminary work prior to implementation. These associated activities include planning studies, design, negotiations and agreements, permitting, land acquisition and easements, option agreements, etc. Many of these associated activities entail a significant level of effort and a long lead time, therefore Utilities needs to commence these activities upon approval of the IWRP.

In addition to those projects listed above for implementation in the near term, Utilities must be prepared to act upon "Opportunistic Projects." Such opportunities including water rights acquisitions, project partnerships, land acquisition and easements, option agreements, and acquisition of storage facilities could arise anytime during the planning horizon. The timing is based on a combination of need, financial capacity, and when the opportunity presents itself. In addition, facilities, sites, and/or rights can be acquired opportunistically, but full development after acquisition can be phased based on need as demands and other conditions warrant. A recommended method to facilitate this is described in Section 11.7.1, Water Acquisition Fund.

11.6.2 MID-TERM PORTFOLIO PROJECTS

Projects that are to be completed in the mid-term future, between approximately 2031 and 2050 are listed in Table 11-5.

Table 11-5. Mid-Term Projects in Balanced Portfolio

Mid-Term Projects
Middle Arkansas New Reservoir – up to 15,000 ac-ft
Arkansas Basin Leasing as Base Supply at 10,000 ac-ft/yr
Eagle River MOU Project – 10,000 ac-ft/yr
Expanded Nonpotable System – up to 1500 ac-ft/yr
Upper Arkansas New Reservoir up to 13,000 ac-ft
Gravel pit reservoir off Fountain Creek at 5,000 ac-ft
Gravel pit reservoir off Arkansas River at 5,000 ac-ft.

Preliminary associated activities for these projects should be started in the next few years if these projects are to be developed in a timely manner.

11.6.3 LONG-TERM PORTFOLIO PROJECTS

Projects that are to be completed in the long-term future, between 2051 and Buildout are listed in Table 11-6.

Table 11-6. Long-Term Projects in Balanced Portfolio

Long-Term Projects
Upper Arkansas Water Rights at 1,500 ac-ft/yr
SDS Treatment/Pumping Expansion – up to 100 MGD/78 MGD Total
Upper Rampart Reservoir – up to 15,000 ac-ft
Gravel pit reservoir off Fountain Creek at 5,000 ac-ft
Gravel pit reservoir off Arkansas River at 5,000 ac-ft.
Indirect Potable Reuse at 50 – 75 MGD

Associated activities for these projects will need to be started approximately 10 – 15 years prior to the need date, depending on the project scope and complexity.

The implementation timing outlined above represents a responsible, consistent and incremental approach to investment in and development of the water supply system in order to meet customer demands and level of service goals at Buildout.

11.7 Adaptive Management Strategies

The plan set out in the IWRP is not a single set path, but rather a preferred path forward based on the information currently available; it therefore must be adaptable if the future proves to be different than what was assumed. This section details strategies designed to ensure the recommendations of this plan can be adapted to accommodate changing future conditions.

11.7.1 WATER ACQUISITION FUND

It is recommended that Utilities establish a Water Acquisition Fund, a proactive acquisition policy, and streamlined processes that would provide Utilities' management with a dedicated budget, direction and timely means with which it could pursue small projects or portions of large projects recommended in the IWRP on an opportunistic basis. For example, the Balanced Portfolio set forth in this plan contains 15,000 ac-ft to 25,000 ac-ft of agricultural water right transfers. The water rights that will eventually make up this element of the portfolio typically become available without much advanced warning, are on the market for only a brief period of time, and are subject to being quickly acquired by others. This makes traditional budgeting for acquiring these water rights difficult and could significantly weaken Utilities' future if they cannot be acquired. Therefore, Utilities will be best positioned if it sets up a Water Acquisition Fund, a proactive acquisition policy, and an effective process that can be relied upon to purchase these water rights as they become available.

11.7.2 SIGNPOSTS

An integral part of the IWRP is adaptive management. There are numerous possible futures, numerous paths to follow, and many opportunities and decision points along these paths. As time passes, conditions change, and new information is discovered or developed. Therefore, Utilities will be in a better position to discern which of the possible futures is materializing. These changing conditions and new information will serve as "signposts" that can inform Utilities as to which parts of the plan to implement at which points in time. Signposts are conditions or factors that may have an effect on the system's performance and are monitored to see if action is needed. Signposts inform responses and responses suggest actions that could include reassessment, corrective action, defensive action, or capitalizing actions. A response action could be specified after a critical value of a signpost variable has been reached. For example, reservoir levels or demand levels may give Utilities a composite look at the way many factors materialize and could be the trigger for implementing certain options or exploring additional options.

The recommendations of this IWRP are built upon foundational assumptions about what the future will look like in terms of climate, water use, demographics, regulations, and regionalization. However, there is substantial uncertainty around all these factors. Therefore, by monitoring indicators of future conditions (signposts), the recommendations of this plan can be adapted to the updated trends. Major signposts for this plan, the assumptions for the IWRP, trends to monitor, and potential impacts on the recommendations of this plan are summarized in Table 11-7.

Table 11-7. IWRP Signposts

Signpost	IWRP Assumption	Trends to Monitor	Impacts to Plan Recommendations
Climate	Future climate changes will be consistent with the recent past, with 1°F warming per decade and no change to average annual precipitation.	Means in temperature and precipitation, and rate of change compared to historical, both in Colorado Springs and in major source water areas.	More rapid temperature increases and/or precipitation decreases will require projects be completed earlier. Conversely, slower temperature increases and/or precipitation decreases can push projects farther into the future.
Annual Demands	Annual demands will recover to pre-2012 levels, then increase over time.	Annual demands compared to forecast.	If demand growth slows, then planned projects may not be required as soon. If demand grows more quickly, projects may need to be moved up in time.
Water Use	Per capita water use, outdoor water use, and water restriction savings will be consistent with high conservation assumptions	Per-capita water use compared to forecast.	Savings from demand management strategies may be more or less than what was assumed, affecting timing of future projects or implementation of demand management programs.
Demographics	Steady population growth in accordance with state demographer's projections.	Population growth; and if actual population growth is different than what was assumed.	Faster population growth may require projects to be online sooner, slower growth could delay projects.
Regionalization	Baseline analysis performed for Utilities Customers only.	Utilities decisions on regional partnerships, and levels of participation by regional entities.	Utilities taking on regional participants may increase overall demand, which may require projects to be completed sooner.

11.7.3 RESPONSES

There are outside factors or events that cannot be accounted for in the technical analysis. However, these factors or events can be accounted for by anticipating what they could be and identifying appropriate responses if they occur. Possible actions that can be taken in response to reaching signposts that represent a significant change in conditions could be:

- Modify planning criteria (e.g., YOD in storage thresholds, acceptable frequency of drought response)
- Modify policy (e.g,. impose land use regulations, more aggressive acquisition policy)
- Modify financial practices (e.g., rates, rate and/or structures, financial metrics)

- Modify portfolios or projects (e.g., timing, size)

The question of how to balance the trade-offs of building projects according to the IWRP implementation schedule versus waiting until a later time will be based on the same adaptive management strategies. The overall implementation schedule will be used to develop short term and long term budgets. At regular intervals, or as significant events emerge, Utilities will assess and evaluate all relevant factors and conditions, including water supply needs, opportunities, and financial conditions to determine if the construction of a project is warranted. Utilities will monitor the signposts and use planned responses in combination with professional judgment and collaborative decision making to determine the best path forward.

11.8 Ongoing Water Resource Activities

In addition to the proceeding primary recommendations related to the four policy questions, it is recommended that the following ongoing activities be continued to assure a reliable and sustainable water supply into the future:

- Continue to actively exercise and maximize the exchange program. This includes operating conditional exchange rights to make such conditional rights absolute.
- Continue to actively pursue watershed management for the protection of the natural environment, Colorado Springs' water supply, water infrastructure, and water quality.
- Actively engage at a state and national level to influence water policy and planning activities.

11.9 Recommendation Summary

Utilities is well positioned to meet current water demands with the existing system, but will need to implement additional projects, programs, and policies in the future to maintain level of service goals and prevent a water supply gap from developing. With the system as it exists today, Utilities can reliably meet up to 95,000 ac-ft/yr of demand. At Buildout the RMD increases to at least 136,000 ac-ft/year, depending on the final composition of the Balanced Portfolio. These RMD levels for the existing and future systems are summarized in **Table 11-8**

Table 11-8. Reliably Met Demand of the Water Supply System

System Configuration	Reliably Met Demand
Existing System (2016)	95,000 ac-ft/year
Existing System + Full Balanced Portfolio	136,000 ac-ft/year

It is recommended that Utilities adopt and use planning criteria that will result in a level of service that maintains 1.5 YOD in storage with a 90% reliability, triggering a shortage response analysis no more than 1 year out of 10 on average, and maintains 1.0 YOD in storage as emergency reserve with 100% reliability. It is also recommended that Utilities pursue a proactive approach to serving regional entities that protects and enhances our customer's interests. In addition, it is recommended that Utilities pursue a balanced portfolio that includes a diversity of Demand Management, Supply, Storage, Reuse, and Conveyance options, and make responsible, deliberate, and consistent investment in the water system to implement the Balanced Portfolio in a manner that balances costs and risks between now and Buildout.

11.10 IWRP Updates and Follow-up Studies

Updates to the IWRP are recommended to occur every 5 to 10 years or as significant new information becomes available such as improved climate science or changes associated with regional relationships. However, planning studies of various kinds will occur continuously between formal IWRP updates. Investment in the analytical framework created during the course of this study will greatly facilitate future water supply studies and formal plan updates.

This IWRP did not include a detailed analyses of all areas of interest or concern related to water supply planning due to budget constraints. It is recommended that the following post-IWRP studies be conducted as time and resources allow.

- Perform a more detailed analysis of impacts of various regionalization futures.
- Re-evaluate IPR/DPR; as representations for the IWRP were necessarily simplified.
- Perform a detailed analysis for Montgomery Reservoir Enlargement sizing.
- Continue to work collaboratively with parties to the 1998 Eagle River MOU to refine and finalize project configurations that can be successfully permitted, and constructed, and which meet the yield objectives of project participants.
- Perform a comprehensive storage site assessment to identify and prioritize opportunities for new and enlarged terminal, regulatory, and return flow storage sites. Develop a plan for meeting IWRP goals that contains an appropriate mix of New Upper Arkansas, Middle Arkansas, Lower Arkansas/Fountain Creek, and other storage facilities.
- Conduct a comprehensive assessment of the City's existing water rights portfolio with the purpose of adjusting and optimizing our portfolio to best position Utilities for future success. File new water appropriations, as necessary, to meet IWRP goals and consider taking other legal and administrative actions, as necessary to aggressively protect and develop Utilities' water rights portfolio consistent with Executive Limitation 10.
- Develop Operations and Yield Model hydrology for East Slope yields that better captures impacts of temperature and precipitation changes.
- Further evaluate various possible strategies for Utilities to manage through a Colorado River Compact curtailment or proactive reduction in West Slope supply.
- Evaluate impacts of wide-scale rainwater/graywater harvesting and if this is a strategy Utilities should promote.
- Update assumptions from the Finished Water Master Plan as demand projections have changed since those assumptions were last considered.
- Perform a more detailed distribution system and water treatment redundancy analysis to better identify and characterize risks and recommend appropriate mitigation.
- Develop an updated Nonpotable System Master Plan.

- Continue to identify, study and pursue potential gravel lake opportunities in the Fountain Creek and Arkansas River corridors.
- Conduct studies of potential agricultural water right leasing opportunities to refine the estimates of supplies that may be available from those sources.
- Perform detailed evaluation of risks associated with developing water supplies from the Arkansas River Basin to more fully understand how factors such as exchange potential, compact compliance (State of Kansas), and water quality may impact the ability to meet water supply goals.

11.11 IWRP Approval and Policy Direction

Colorado Springs' Utilities Board approved the Integrated Water Resource Plan, including the recommendations to the four policy questions, at its regular meeting on February 22, 2017. This Plan and these recommendations are now official policy direction set by the Utilities Board.

SECTION 12

Supporting Documentation

The IWRP technical analysis was documented in two separately bound technical reports and a number of technical memoranda that are compiled in a technical appendix. Available technical reports and technical memoranda are listed below.

Separately Bound Technical Reports

- Issues, Risks and Vulnerabilities Affecting Colorado Springs Water Resources System (Planning Factors Report), including technical appendices
- Vulnerability Assessment Report, including technical appendices

Separately Bound Technical Appendix

- Technical Memorandum #10 – Baseline Modeling Analysis
- Technical Memorandum #11 – IWRP Modeling Systems
- Technical Memorandum #12 – Method for Developing Risk and Lever Scenarios
- Technical Memorandum #13 – Baseline Analysis
- Technical Memorandum #15 – Demand Analysis
- Technical Memorandum #18 – Lever[3] Description
- Technical Memorandum #19 – Lever Evaluation
- Technical Memorandum #20 – Cost Analysis
- Technical Memorandum #21 – Portfolio Development and Evaluation
- Technical Memorandum #22 – Public Process
- Technical Memorandum #23 – Regionalization Analysis
- Technical Memorandum #24 – Reliably Met Demand Definition

[3] Projects, programs and policies collectively referred to as “options” in this report were often referred to as “levers” during the technical analysis based on the XLRM framework developed by RAND Corporation.

WATER SERVICE

SYSTEM STATISTICS

- **195 square miles** of water service area
- **145,238** water service points

Potable

- **6** potable treatment facilities
- **37** potable water tanks
- **2,152 miles** potable transmission main / potable distribution system main (pipes)

Nonpotable

- **3** raw water tanks
- **25** raw water storage reservoirs
- **261 miles** raw water transport pipes
- **27 miles** nonpotable water distribution pipes

SYSTEM RELIABILITY

- **9.22 minutes** System Average Interruption Duration Index (Apr 2019)
- **11.72** number of water failures / 100 miles of mainline (Apr 2019)

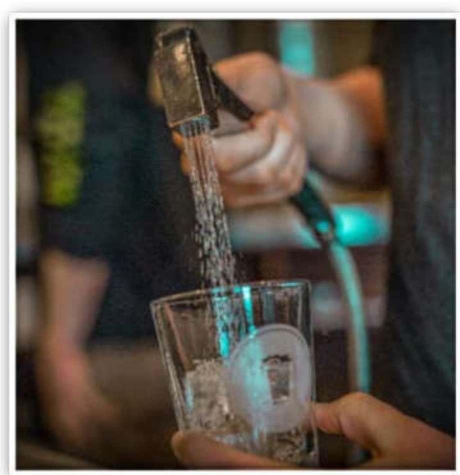
SYSTEM CAPACITY

- **214 MGD** sustained water treatment capacity
- **24.9 billion gallons** annual water system deliveries (potable) (2018)
- **138 gallons per day** community per capita demand (inside city) (2018)
- **182.4 million gallons** peak demand (July 2001)

Typical Rates*/Meter size as of May 1, 2019:	
Commercial Service in City Limits	**Typical Price Per Gallon**
Non-Residential (W-G)	$0.0086
Non-Seasonal (WLNS)	$0.0063

Other Rate Options available for:
Non-Potable Water Service
Augmentation for groundwater usage by private well owners
Large Potable - Irrigation rate for conservation
Water Service Outside City Limits

** Based on typical customer bills for each rate class. Actual rates will vary depending on customer consumption and demand.*



CHANGE THE CURRENT

Colorado Springs Utilities
It's how we're all connected

Office of Economic Development | 121 S. Tejon, Suite 400 Colorado Springs, CO 80903 | 719.668.7123 | OEDmail@csu.org | csu.org

Appendix G

TODAY WE WORK FOR TOMORROW

2021 DRINKING WATER QUALITY REPORT

Colorado Springs Utilities®

It's how we're all connected

PUBLIC WATER SYSTEM
I.D. CO0121150

This required report is prepared in accordance with federal and state regulations of the Safe Drinking Water Act.

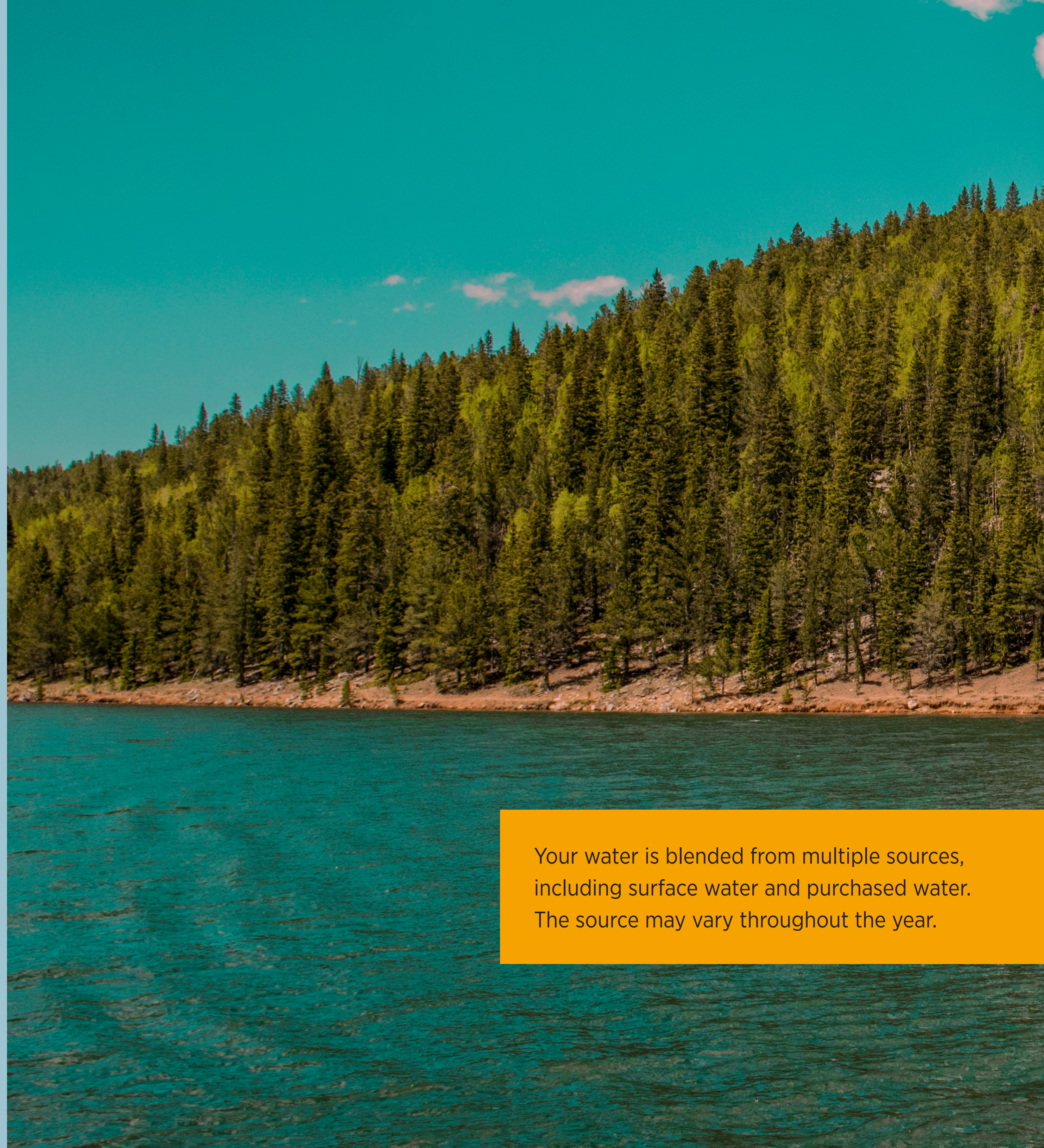
Esta informacion acerca de su aqua potable es importante.
Si usted no puede leer esto en ingles, por favor pidale a alquien.
Que le traduzca esta importante informacion o llame a Cuidado al Cliente al numero (719) 668-4800.

2020 was a challenging year for our nation and community. We all faced many uncertainties, but we remained committed to safely and reliably delivering clean drinking water to our customers. We continued to test and monitor water quality to ensure that water we delivered to homes and businesses exceeded the standards set forth by the federal Safe Drinking Water Act.

We're proud to share with you the 2021 Water Quality Report. It is designed to provide detailed information about your drinking water. If you have any questions about this report or the quality of your water, please contact us at (719) 668-4560.

DRINKING WATER SOURCES

WHERE DOES YOUR WATER COME FROM?



Your water is blended from multiple sources, including surface water and purchased water. The source may vary throughout the year.

Mountain water sources

With no major water source nearby, much of our raw water collection system originates from nearly 200 miles away, near Aspen, Leadville and Breckenridge. Almost 75% of our water originates from mountain streams. Water from these streams is collected and stored in numerous reservoirs along the Continental Divide. Collection systems in these areas consist of the Homestake, Fryingpan-Arkansas, Twin Lakes and Blue River systems.

The majority of this raw water is transferred to our city through pipelines that help protect it from contamination, such as herbicides, pesticides, heavy metals and other chemicals. After the long journey, water is stored locally at Rampart Reservoir and the Catamount Reservoirs on Pikes Peak.

Local surface sources

To supplement the water received from the mountain sources, we divert water from local surface water collection systems including:

- North and South Slopes of Pikes Peak – Catamount Reservoirs, Crystal Reservoir, South Slope Reservoirs and tributaries
- North and South Cheyenne Creeks
- Fountain Creek
- Monument Creek – Pikeview Reservoir
- Northfield Watershed – Rampart and Northfield Reservoirs
- Pueblo Reservoir

Local ground water sources

In July 2015, we deactivated two wells on the Denver aquifer (500- 700 feet deep) and two wells on the Arapahoe aquifer (900- 1,000 feet deep). We no longer use these wells.

Purchased water source

Fountain Valley Authority or FVA (PWSID#CO0121300) receives water from the Fryingpan-Arkansas Project – a system of pipes and tunnels that collects water in the Hunter-Fryingpan Wilderness Area near Aspen. Water collected from this system is diverted to the Arkansas River, near Buena Vista, and then flows about 150 miles downstream to Pueblo Reservoir. From there, the water travels through a pipeline to a water treatment plant before being delivered to Colorado Springs.

Water treatment

All water sources are treated at one of our six treatment plants prior to entering our drinking water distribution system, an intricate system of tanks, pumps and pipes that ultimately deliver water to your home or business.

COLORADO SOURCE WATER ASSESSMENT AND PROTECTION

SOURCE WATER ASSESSMENT REPORT

To obtain a copy from the Colorado Department of Public Health, please visit **https://cdphe.colorado.gov/ccr** or contact Laboratory Services at (719) 668-4560.

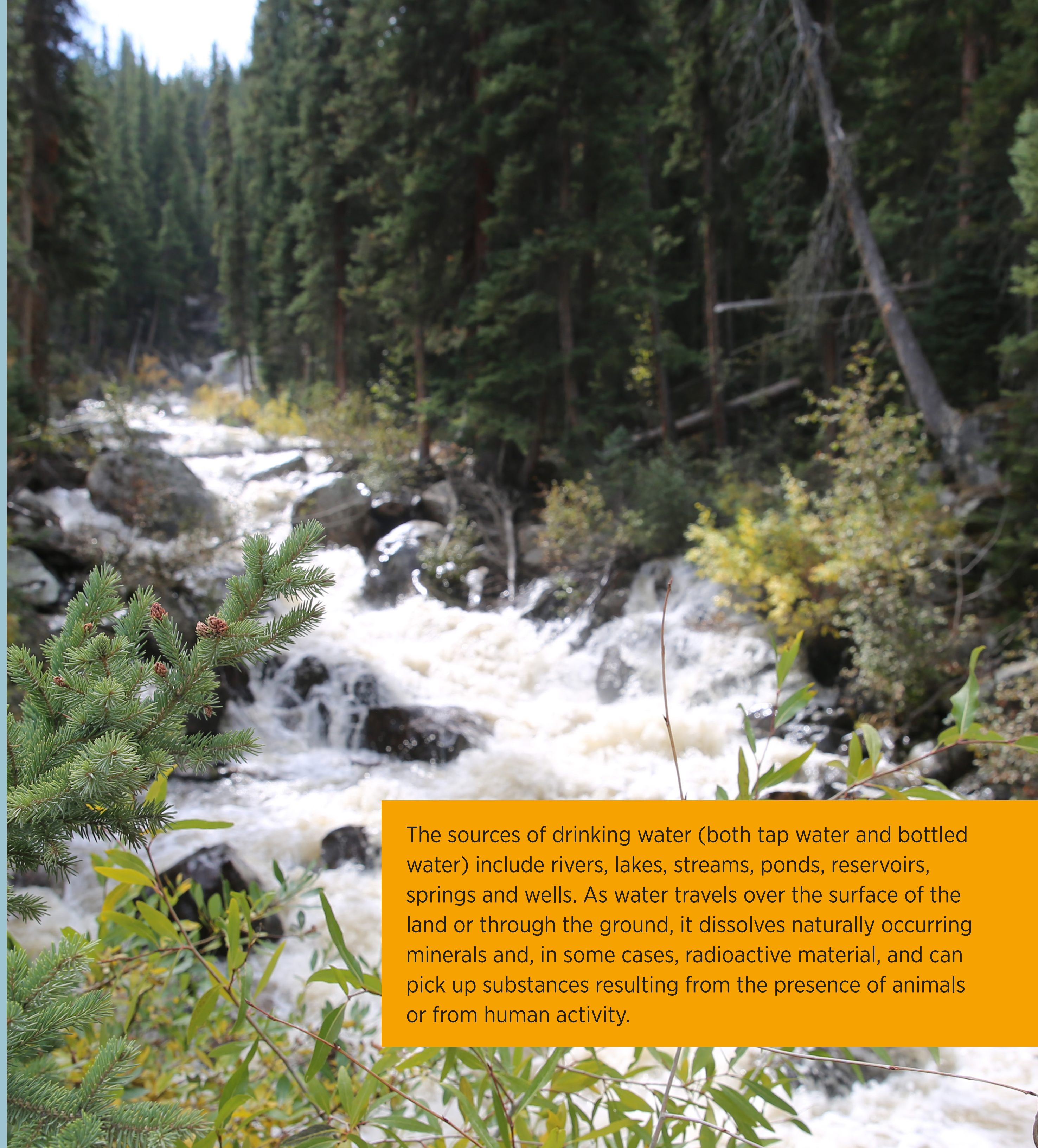
The Source Water Assessment Report provides a screening level evaluation of potential contamination that could occur. It does not mean that the contamination has occurred or will occur. We can use this information to evaluate the need to improve our current water treatment capabilities and prepare for future contamination threats. This can help us ensure that quality finished water is delivered to your home. In addition, the source water assessment results provide a starting point for developing a source water protection plan.

Potential sources of contamination to our source water areas may come from:

- Environmental Protection Agency (EPA) Superfund Sites
- EPA Abandoned Contaminated Sites
- EPA Hazardous Waste Generators
- EPA Chemical Inventory/Storage Sites
- EPA Toxic Release Inventory Sites
- Permitted Wastewater Discharge Sites
- Aboveground, Underground and Leaking Storage Tank Sites
- Solid Waste Sites
- Existing/Abandoned Mine Sites
- Concentrated Animal Feeding Operations
- Other Facilities
- Commercial/Industrial Transportation
- High-and-Low-Intensity Residential
- Urban Recreational Grasses
- Quarries/Strip Mines/Gravel Pits
- Agricultural Land (row crops, small grain, pasture/hay, orchards/vineyards, fallow and other)
- Forest
- Septic Systems
- Oil/Gas Wells
- Road Miles (runoff from the roads)

The results of the source water assessment are not a reflection of our treated water quality or the water you receive, but rather a rating of the susceptibility of source water contamination under the guidelines of the Colorado State Wildlife Action Plan.

WATER CONTAMINANTS

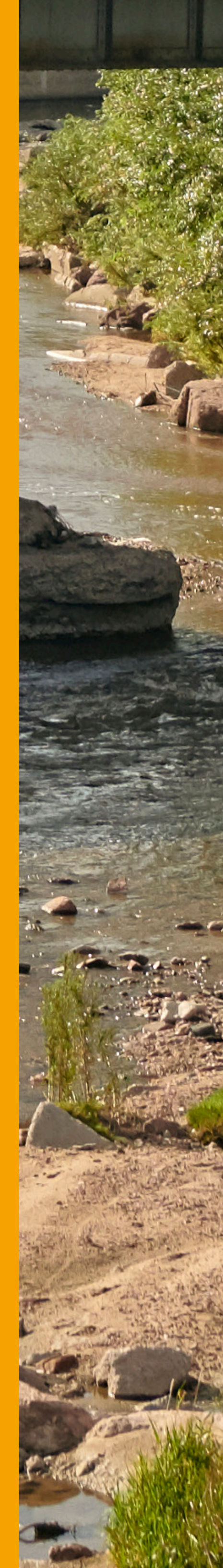


The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operation and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides that may come from a variety of sources, such as agriculture, urban stormwater runoff and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and may come from gas stations, urban stormwater runoff and septic systems.
- Radioactive contaminants that can be naturally occurring or the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Colorado Department of Public Health and Environment prescribes regulations limiting the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration regulations establish limits for contaminants in bottled water that must provide the same protection for public health.



Immunocompromised persons advisory

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791) or by visiting **https://www.epa.gov/ground-water-and-drinking-water**.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV-AIDS or other immune system disorders, some elderly and infants can be particularly at risk of infections. These people should seek advice about drinking water from their health care providers.

For more information about contaminants and potential health effects, or to receive a copy of the U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and microbiological contaminants call the EPA Safe Drinking Water Hotline at (1-800-426-4791).

LEAD AND FLUORIDE IN DRINKING WATER

Lead in drinking water

If present, elevated levels of lead can cause serious health problems (especially for pregnant women and young children). It is possible that lead levels at your home may be higher than other homes in the community as a result of materials used in your home's plumbing. If you are concerned about lead in your water, you may wish to have your water tested. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. Additional information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (1-800-426-4791) or at **http://www.epa.gov/safewater/lead**.

Fluoride in drinking water

Fluoride is a compound found naturally in many places, including soil, food, plants, animals and the human body. It is also found naturally at varying levels in all our water sources. We do not add fluoride to your drinking water. Any fluoride in the drinking water comes naturally from our source waters.

Per- and polyfluoroalkyl substances (PFAS)

PFAS are man-made chemicals present in food packaging, commercial household products, drinking water sources and manufacturing facilities. Currently, PFAS are not regulated under the National Primary Drinking Water Regulations. However, the EPA did issue a health advisory for specific perfluorinated compounds (PFOA and PFOS) of 70 parts per trillion (ppt). We tested for 18 PFAS compounds, including PFOA and PFOS, and none of these compounds were detected above the reporting limit of 1.9 parts per trillion at our water treatment facilities in 2020. For more information about PFAS click **https://www.epa.gov/pfas**.

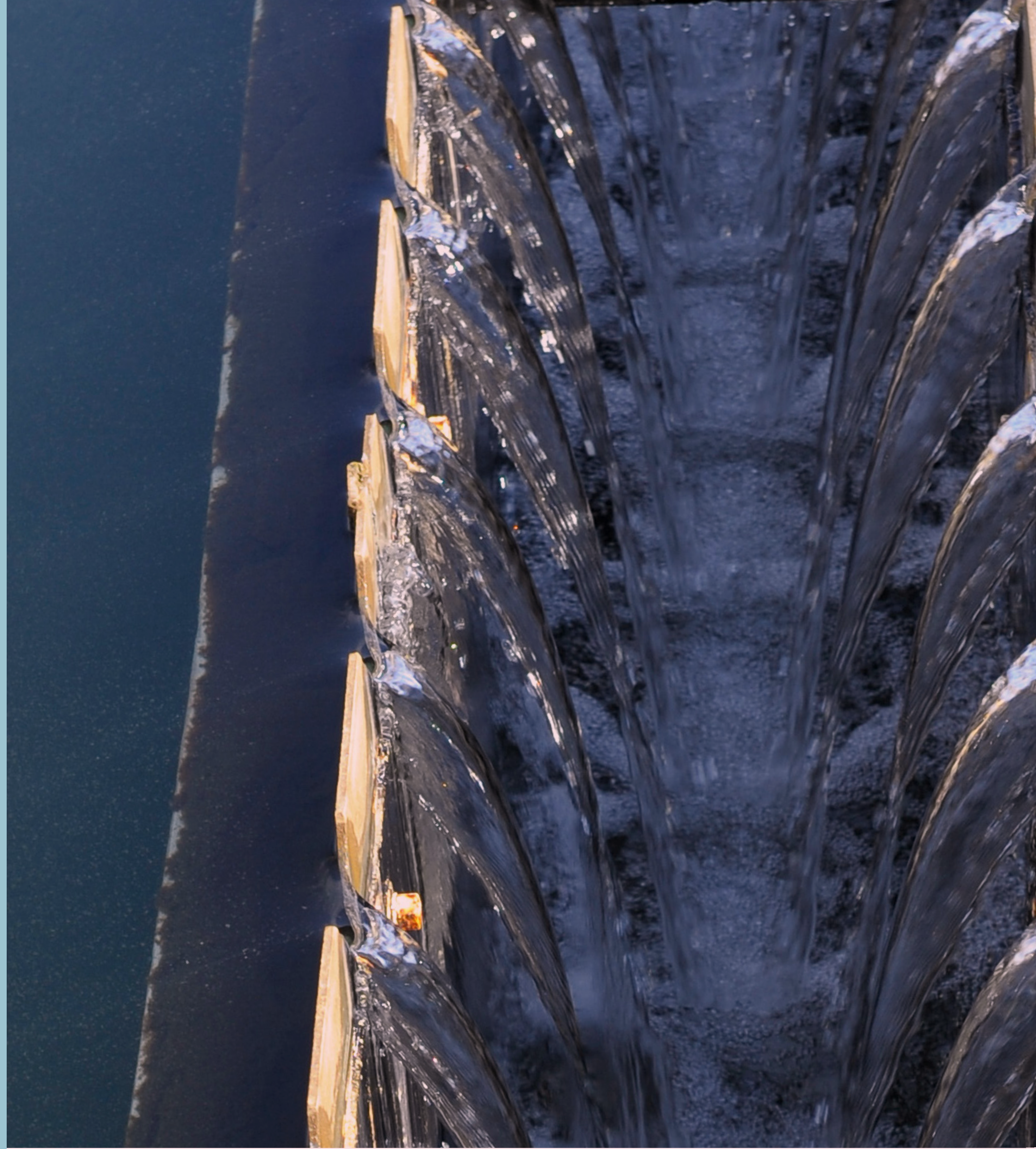
Terms, abbreviations & symbols

- **Maximum Contaminant Level (MCL) –** The highest level of a contaminant allowed in drinking water.
- **Treatment Technique (TT) –** A required process intended to reduce the level of a contaminant in drinking water.
- **Health-Based –** A violation of either a MCL or TT.
- **Non-Health-Based –** A violation that is not a MCL or TT.
- **Action Level (AL) –** The concentration of a contaminant which, if exceeded, triggers treatment and other regulatory requirements.
- **Maximum Residual Disinfectant Level (MRDL) –** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- **Maximum Contaminant Level Goal (MCLG) –** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- **Maximum Residual Disinfectant Level Goal (MRDLG) –** The level of a drinking water disinfectant, below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- **Violation (No abbreviation) –** Failure to meet a Colorado Primary Drinking Water Regulation.
- **Formal Enforcement Action (No abbreviation) –** Escalated action taken by the State (due to the risk to public health, or number or severity of violations) to bring a non-compliant water system back into compliance.
- **Variance and Exemptions (V/E) –** Department permission not to meet a MCL or treatment technique under certain conditions.
- **Gross Alpha (No abbreviation) –** Gross alpha particle activity compliance value. It includes radium-226, but excludes radon 222, and uranium.
- **Picocuries per liter (pCi/L) –** Measure of the radioactivity in water.
- **Nephelometric Turbidity Unit (NTU) –** Measure of the clarity or cloudiness of water. Turbidity in excess of 5 NTU is just noticeable to the typical person.
- **Compliance Value (No abbreviation) –** Single or calculated value used to determine if regulatory contaminant level (e.g. MCL) is met. Examples of calculated values are the 90th Percentile, Running Annual Average (RAA) and Locational Running Annual Average (LRAA).
- **Average (x-bar) –** Typical value.
- **Range (R) –** Lowest value to the highest value.
- **Sample Size (n) –** Number or count of values (i.e. number of water samples collected).
- **Parts per million = Milligrams per liter (ppm = mg/L) –** One part per million corresponds to one minute in two years or a single penny in $10,000.
- **Parts per billion = Micrograms per liter (ppb = ug/L) –** One part per billion corresponds to one minute in 2,000 years, or a single penny in $10,000,000.
- **Not Applicable (N/A) –** Does not apply or not available.
- **Level 1 Assessment –** Study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.
- **Level 2 Assessment –** Very detailed study of the water system to identify potential problems and determine (if possible) why an E. coli MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.

Data presented in the water quality report

We routinely monitor for contaminants in your drinking water according to federal and state laws. The tables on the following pages show the combined results of our monitoring for six water treatment plants, including our purchased water from Fountain Valley Authority, for the period of Jan. 1 through Dec. 31, 2020, unless otherwise noted. The State of Colorado requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. Therefore, some of our data, though representative, may be more than one year old. Only detected contaminants sampled within the last five years appear in this report. If no table appears in this section, then no contaminants were detected in the last round of monitoring.

DETECTED CONTAMINANTS TABLES



Inorganic Contaminants

Monitored at the treatment plant (entry point to the distribution system)

Contaminant	MCL	MCLG	Units	Range	Average	MCL violation	Sample dates	Possible source(s) of contamination
Barium	2	2	ppm	0.02 - 0.05	0.03	No	July 2020	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposit
Fluoride	4	4	ppm	0.12 - 0.85	0.39	No	July 2020	Erosion of natural deposits; discharge from fertilizer and aluminum factories
Nickel	n/a	n/a	ppb	0 - 1.6	0.45	No	July 2020	Erosion of natural deposits, discharge from industries, discharge from refinieries and steel mills
Nitrate (as Nitrogen)	10	10	ppm	0 - 0.33	0.11	No	July 2020	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Selenium	50	50	ppb	0 - 3.3	1.0	No	July 2020	Discharge from petroleum and metal refinieries; erosion of natural deposists; discharge from mines
Sodium*	n/a	n/a	ppm	6.93 - 20.30	12.25	No	July 2020	Erosion of natural deposit

*Secondary mCL (SMCL) is not enforceable but intended as guidelines. These contaminants in drinking water may affect the aesthetic qualities.

Organic Contaminants

Monitored at the treatment plant (entry point to the distribution system)

Contaminant	MCL	MCLG	Units	Range	Average	MCL violation	Sample dates	Possible source(s) of contamination
Di(2-ethylhexyl) phthalate	50	0	ppb	0 - 1.2	0.13	No	Jan, Feb, May, Jul, Oct 2020	Discharge from rubber and chemical factories
Xylenes	10,000	10,000	ppb	0 - 2.4	0.50	No	Jan, May, Jul, Oct 2020	Discharge from petroleum factories; discharge from chemical factories

Radionuclides

Monitored at the treatment plant (entry point to the distribution system)

Contaminant	MCL	MCLG	Units	Range	Average	MCL violation	Sample dates	Possible source(s) of contamination
Combined Radium	5	0	pCi/L	0 - 1.9	1.1	No	June 2020	Erosion of natural deposits
Combined Uranium	30	0	ppb	0 - 4.0	0.7	No	June 2020	Erosion of natural deposits
Gross Alpha	15	0	pCi/L	0 - 3.7	0.9	No	June 2020	Erosion of natural deposits

Turbidity

Continuously monitored at the treatment plant (entry point to the distribution system)

Contaminant	TT requirement	Level detected	TT violation	Sample dates	Possible source(s) of contamination
Turbidity	Maximum 1 NTU for any single measurement	Highest single measurement: 0.90 NTU, January	No	Jan - Dec 2020	Soil runoff
Turbidity	In any month, at least 95% of samples must be less than 0.3 NTU	Lowest monthly percentage of samples meeting TT requirement: 98%	No	Jan - Dec 2020	Soil runoff

Radionuclides

Continuously monitored at the treatment plant (entry point to the distribution system)

Contaminant	MRDL/TT requirement	Units	Level detected	MRDL/TT violation	Sample dates	Possible source(s) of contamination
Chlorine	TT= No more than 4 hours with a sample below 0.2 ppm	ppm	0 samples above or below the level	No	Jan - Dec 2020	Water additive used to control microbes

Total Organic Carbon (Disinfection Byproducts Precursor) Removal Ratio and Finished Water

Monitored at the treatment plant (entry point to the distribution system)

Contaminant	MCL	MCLG	Units	Range	Average	MCL violation	Sample dates	Possible source(s) of contamination
Total Organic Carbon (TOC)	TT minimum ratio = 1.00	n/a	n/a	1.00 - 2.86	1.38	No	Monthly - running annual average	Naturally present in the environment

Disinfection Byproducts

Monitored in the distribution system

Contaminant	MCL	MCLG	Units	Range	Average	Highest compliance value	MCL violation	Sample dates	Possible source(s) of contamination
Total Haloacetic Acids (HAA5)	60	n/a	ppb	8.0 - 55.4	31.8	43.7	No	Jan, Apr, Jul, Oct 2020	Byproduct of drinking water disinfection
Total Trihalomethanes (TTHM)	80	n/a	ppb	16.7 - 56.3	43.6	64.7	No	Jan, Apr, Jul, Oct 2020	Byproduct of drinking water disinfection

Disinfectants in the Distribution System

Contaminant	MRDL/TT	Lowest TT percentage	Number of samples below 0.2	Units	TT violation	Sample dates	Possible source(s) of contamination
Chlorine	MRDL = 4 ppm TT = At least 95% of samples per month must be at least 0.2 ppm	99% Feb	1	ppm	No	2020	Drinking water disinfectant used to control microbes

Lead and Copper

Monitored in the distribution system

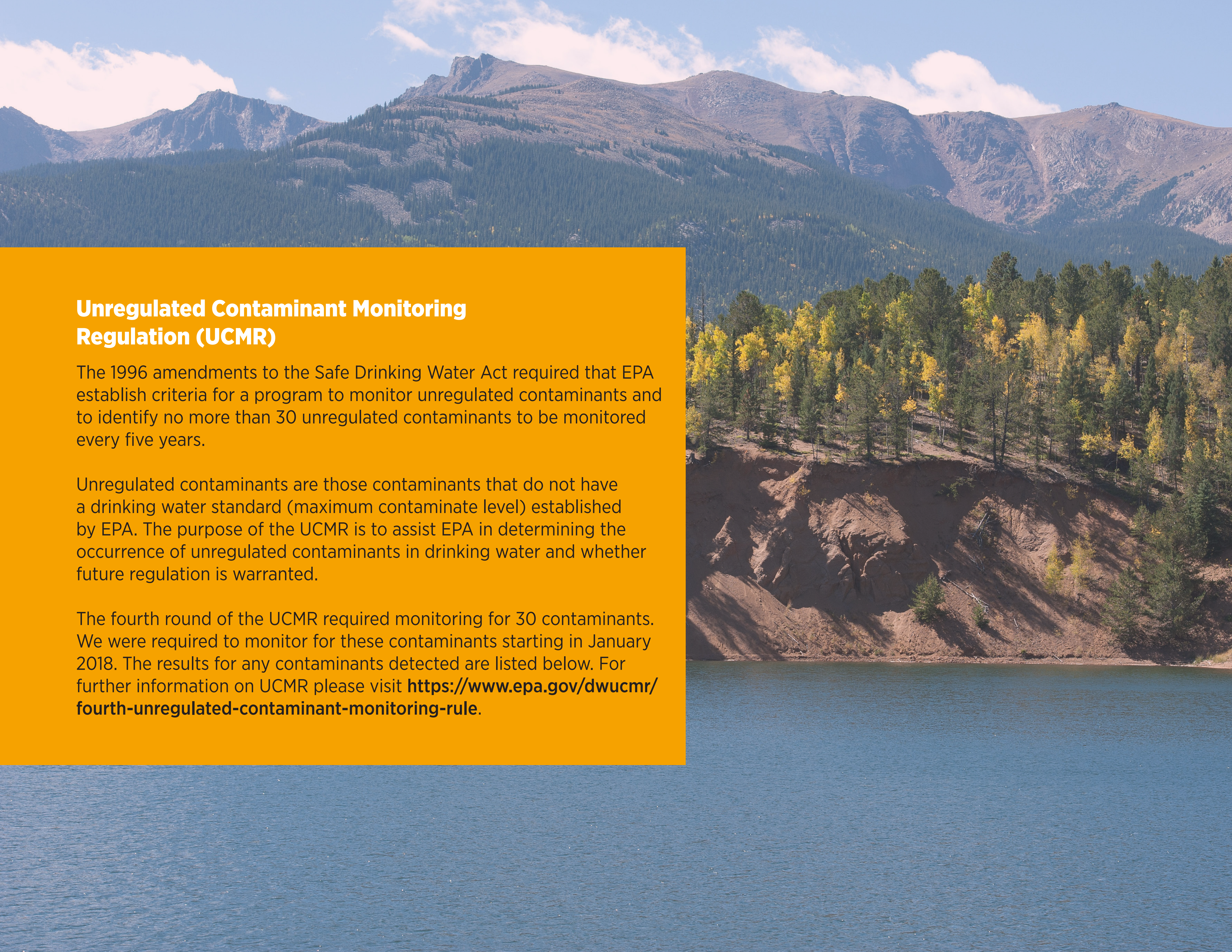
Contaminant	AL at the 90th percentile	MCLG	Units	90th percentile	Sample size	Sample sites above AL	AL exceedance	Sample dates	Possible source(s) of contamination
Copper	1.3	1.3	ppm	0.1065	50	0	No	June - Aug 2020	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead	15	0	ppb	3.7	50	0	No	June - Aug 2020	Corrosion of household plumbing systems; erosion of natural deposits

Contaminants with Secondary MCL requirements[1]

Monitored at the treatment plant (entry point to the distribution system)

Contaminant	SMCL	Units	Average level detected (range)	Sample dates	Possible source(s) of contamination
Aluminum	0.050 - 0.2	ppm	0.013 0 - 0.091	Monthly 2020	Erosion of natural deposits, water treatment chemical
Chloride	250	ppm	5.8 1.6 - 15.8	Quarterly 2020	Erosion of natural deposits
Manganese	0.5	ppm	0.0004 0 - 0.0166	Monthly 2020	Erosion of natural deposits
Iron	0.3	ppm	0.002 0 - 0.044	Monthly 2020	Erosion of natural deposists, leaching from plumbing materials
Sulfate	250	ppm	41.3 13.4 - 92.2	Quarterly 2020	Erosion of natural deposits
Zinc	5000	ppb	0.4 0 - 2.1	Annual 2020	Leaching from plumbing materials

*Secondary MCL (SMCL) is not enforceable but intended as guidelines. These contaminants in drinking water may affect the aesthetic qualities.



Unregulated Contaminant Monitoring Regulation (UCMR)

The 1996 amendments to the Safe Drinking Water Act required that EPA establish criteria for a program to monitor unregulated contaminants and to identify no more than 30 unregulated contaminants to be monitored every five years.

Unregulated contaminants are those contaminants that do not have a drinking water standard (maximum contaminate level) established by EPA. The purpose of the UCMR is to assist EPA in determining the occurrence of unregulated contaminants in drinking water and whether future regulation is warranted.

The fourth round of the UCMR required monitoring for 30 contaminants. We were required to monitor for these contaminants starting in January 2018. The results for any contaminants detected are listed below. For further information on UCMR please visit **https://www.epa.gov/dwucmr/fourth-unregulated-contaminant-monitoring-rule**.

Monitored at the treatment plant (entry point to the distribution system)

Contaminant	Average level detected	Range	Units	Sample dates	Possible source(s) of contamination
Manganese	1.2	0 - 11	ppb	Jan, Apr, Jul, Oct 2018	Naturally occurring element, commercially available in combination with other elements and minerals, a byproduct of zinc ore processing, used in infrared optics, fiber optic and systems electronics and solar applications
1-Butanol	1.07	0 - 13	ppb	Jan, Mar, Apr, Jul, Oct 2018	Used as a solvent, food additive and in the production of other chemicals
Quinoline	0.001	0 - 0.0318	ppb	Jan, Mar, Apr, Jul, Oct 2018; Feb, Mar 2019	Used as a pharmaceutical and flavoring agent, produced as a chemical intermediate, component of coal

Monitored at the treatment plant (entry point to the distribution system)

Contaminant	Average level detected	Range	Units	Sample dates	Possible source(s) of contamination
Haloacetic Acids 5 (HAA5)	33.9	10.2 - 55.0	ppb	Jan, Apr, Jul, Oct 2018	Byproduct of drinking water disinfection
Brominated Haloacetic Acids 6 (HAABr6)	3.18	0.79 - 9.10	ppb	Jan, Apr, Jul, Oct 2018	Byproduct of drinking water disinfection
Haloacetic Acids 9 (HAA9)	36.4	14.5 - 57.0	ppb	Jan, Apr, Jul, Oct 2018	Byproduct of drinking water disinfection

Customers have a voice

As a community-owned utility, we encourage participation in decisions affecting our drinking water. Visit csu.org to learn how you can participate in our monthly Utilities Board meetings.

To request a printed copy of this report or for questions call (719) 668-4560 or visit **csu.org/waterquality**. Past reports are also available online.

Colorado Springs Utilities®

It's how we're all connected

Colorado Springs Utilities

It's how we're all connected

2021 Water Quality Summary Report

JANUARY - DECEMBER

Colorado Springs Utilities is committed to providing our customers with a superior and reliable supply of high quality drinking water. Our drinking water continually meets or surpasses state and federal standards for drinking water. Your health, safety and satisfaction are of utmost priority.

Note: This report is provided to our customers as an additional service and is intended to be used for information only. Please refer to www.csu.org for the official Water Quality Report for Colorado Springs Utilities.

			Pine Valley/McCullough			Phillip H. Tollefson		
Treatment Plant Effluents	**Units**	**MCL**	Minimum	Maximum	Average	Minimum	Maximum	Average
Aluminum	ug/L	200*	<20.0	34.4	<20.0	51.5	279	142
Antimony	ug/L	6		<0.50			<0.50	
Arsenic	ug/L	10		<1.0			<1.0	
Cadmium	ug/L	5		<0.50			<0.50	
Calcium	ug/L	NL	7990	9500	8720	8240	14600	11400
Chloride	mg/L	250*	1.67	2.09	1.87	3.45	4.62	4.08
Chlorine Residual (free Cl2)	mg/L	4.00**	0.77	1.09	0.90	1.09	1.42	1.20
Chromium	ug/L	100		<1.0			<1.0	
Conductivity	µS/cm	NL	70	113	91	101	216	142
Copper	ug/L	1,000*		5.8			<1.0	
Fluoride	mg/L	2.0*, 4.0	0.13	0.32	0.16	0.68	1.66	1.10
Hardness (as CaCO3)	gr/Gal	NL	1.48	1.74	1.61	1.54	2.83	2.17
Hardness (as CaCO3)	mg/L	NL	25.3	29.7	27.6	26.4	48.5	37.3
Iron	ug/L	300*		<10.0			<10.0	
Lead	ug/L	15***		<0.50			<0.50	
Magnesium	ug/L	NL	1290	1560	1420	1410	2960	2150
Manganese	ug/L	50*	<5.00	5.03	<5.00	<5.00	5.03	<5.00
Mercury	ug/L	0.002		<0.2			<0.2	
Nitrate as Nitrogen	mg/L	10		<0.10		0.12	0.17	0.14
pH	SU	7.0 - 9.0 TT	7.6	8.1	7.8	7.7	8.0	7.8
Silica	ug/L	NL		4820			7020	
Sodium	ug/L	NL	4960	9560	6980	7470	19800	12300
Sulfate	mg/L	250*	17.2	19.9	18.3	12.9	20.1	15.6
Thallium	ug/L	2		<0.50			<0.50	
Total Alkalinity (as CaCO3)	mg/L	20-200 TT	22	35	25	30	40	35
Total Dissolved Solids	mg/L	500*	57	65	61	67	105	86
Turbidity	NTU	<0.3 NTU	0.05	0.14	0.07	0.05	0.37	0.10
Zinc	ug/L	5,000*		2.4			<2.0	

*Secondary non-enforceable standard; established for aesthetic reasons

**Maximum Residual Disinfectant Level (MRDL). The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectatnt is necessary for control of microbial contaminates.

***Action Level, 90% of residential sites must be below this level. Value listed is from the Treatment Plant Effluent.

°C- Centrigrade

MCL- Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. These standards are set by the EPA and enforceable by the Colorado Department of Public Health and Environment (CDPHE).

NL- No limit has been set

NTU- Nephelometric Turbidity Unit. A measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

mg/L- Milligrams per million, also expressed as parts per million (ppm): 1 part per million corresponds to one penny in $10,000

su- Standard Unit of Measurement

TT- Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water

ug/L- Micrograms per liter, also expressed as parts per billion (ppb): 1 part per billion corresponds to one penny in $10,000,000

µS/cm- Microsiemens per centimeter: Conductivity is the ability of a solution to transfer (conduct) electric current. It is the reciprocal of electrical resistivity (ohms)

Did you know- Colorado Springs Utilities Laboratory Services conducts over 1,000 tests per month to ensure the highest quality water possible

Treatment Plant Effluents	Units	MCL	**Fountain Valley Authority:** Supplies water to Fountain, Security, Widefield, Colorado Springs and Stratmoor Hills			**Edward W. Bailey:** Built in 2016, Bailey Treatment Plant currently provides water to the Southeast side of Colorado Springs		
			Minimum	Maximum	Average	Minimum	Maximum	Average
Aluminum	ug/L	200*	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Antimony	ug/L	6		<0.50			<0.50	
Arsenic	ug/L	10		<1.0			<1.0	
Cadmium	ug/L	5		<0.50			<0.50	
Calcium	ug/L	NL	37800	50200	43900	36200	48400	43600
Chloride	mg/L	250*	10.10	11.40	10.60	7.80	9.81	8.76
Chlorine Residual (free Cl2)	mg/L	4.00**	0.85	1.43	1.12	0.73	1.02	0.89
Chromium	ug/L	100		<1.0			<1.0	
Conductivity	µS/cm	NL	318	441	385	339	472	405
Copper	ug/L	1,000*		<1.0			1.6	
Fluoride	mg/L	2.0*, 4.0	0.36	0.45	0.41	0.38	0.44	0.42
Hardness (as CaCO3)	gr/Gal	NL	7.94	10.34	9.05	7.54	9.98	9.00
Hardness (as CaCO3)	mg/L	NL	136	177	155	129	171	154
Iron	ug/L	300*		21.4			<10.0	
Lead	ug/L	15***		<0.50			<0.50	
Magnesium	ug/L	NL	9570	12900	11000	9270	12500	10900
Manganese	ug/L	50*		<5.00			<5.00	
Mercury	ug/L	0.002		<0.2			<0.2	
Nitrate as Nitrogen	mg/L	10	0.14	0.31	0.21	0.16	0.38	0.23
pH	SU	7.0 - 9.0 TT	7.6	8.0	7.8	7.6	8.0	7.8
Silica	ug/L	NL		6260			5780	
Sodium	ug/L	NL	13400	20700	16900	17700	25200	21700
Sulfate	mg/L	250*	83.8	101	89.9	87.8	118	102
Thallium	ug/L	2		<0.50			<0.50	
Total Alkalinity (as CaCO3)	mg/L	20-200 TT	90	106	99	86	108	99
Total Dissolved Solids	mg/L	500*	230	262	246	263	302	283
Turbidity	NTU	<0.3 NTU	<0.05	0.12	<0.05	0.05	0.06	0.05
Zinc	ug/L	5,000*		3.1			<2.0	

Distribution System	Units	MCL	Minimum	Maximum	Average
pH	su	NL	7.2	8.9	8.0
Temperature	°C	NL	3	25	12
Chlorine Residual (free Cl2)	mg/L	4.00**	0.15	1.45	0.64

Organic Compounds: Additional organic compounds are analyzed periodically as required internally or by the EPA. These compounds include volatile organics chemicals, pesticides, herbicides and other synthetic organic chemicals. The concentrations of these compounds in the drinking water have never exceeded their respective MCLs.

Radionuclides: Radionuclides are analyzed periodically as required by the EPA. The concentrations have never exceeded the MCLs. Specific data available upon request.

Advisory: All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791), or by visiting www.epa.gov/safewater.

Questions?

Please contact Laboratory Services

719-668-4560 or Waterquality@csu.org

Did you know- Colorado Springs Utilities Laboratory Services conducts over 1,000 tests per month to ensure the highest quality water possible

Ute Pass: Built in 1987, Ute Pass Treatment Plant currently provides water to the communities of Green Mountain Falls, Chipita Park and Cascade

Treatment Plant Effluents	Units	MCL	Minimum	Maximum	Average
Aluminum	ug/L	200*	<20.0	50.9	<20.0
Antimony	ug/L	6		<0.50	
Arsenic	ug/L	10		<1.0	
Cadmium	ug/L	5		<0.50	
Calcium	ug/L	NL	10700	12800	11800
Chloride	mg/L	250*	5.03	5.58	5.23
Chlorine Residual (free Cl2)	mg/L	4.00**	0.78	1.14	1.03
Chromium	ug/L	100		<1.0	
Conductivity	µS/cm	NL	105	140	120
Copper	ug/L	1,000*		<1.0	
Fluoride	mg/L	2.0*, 4.0	0.28	0.40	0.33
Hardness (as CaCO3)	gr/Gal	NL	2.09	2.48	2.31
Hardness (as CaCO3)	mg/L	NL	35.8	42.5	39.6
Iron	ug/L	300*		47.4	
Lead	ug/L	15***		<0.50	
Magnesium	ug/L	NL	2200	2560	2430
Manganese	ug/L	50*		<5.00	
Mercury	ug/L	0.002		<0.2	
Nitrate as Nitrogen	mg/L	10	<0.10	0.15	<0.10
pH	SU	7.0 - 9.0 TT	7.7	8.0	7.8
Silica	ug/L	NL		2520	
Sodium	ug/L	NL	4150	13100	8170
Sulfate	mg/L	250*	15.4	15.7	15.6
Thallium	ug/L	2		<0.50	
Total Alkalinity (as CaCO3)	mg/L	20-200 TT	30	60	39
Total Dissolved Solids	mg/L	500*	70	72	71
Turbidity	NTU	<0.3 NTU	<0.05	0.06	<0.05
Zinc	ug/L	5,000*		<2.0	

Questions?

Please contact Laboratory Services

719-668-4560 or Waterquality@csu.org

Colorado Springs Utilities
It's how we're all connected

Colorado Springs Utilities (PWSID # CO0121150)
2021 Water Quality Report Information for:

US Air Force Academy (PWSID # CO0121845)
Donala Water and Sanitation District (PWSID # CO121175)

Water Sources

Your water is blended from multiple sources and treated at the Pine Valley and McCullough water treatment facilities.

Mountain Water Sources

With no major water source nearby, much of Colorado Springs Utilities raw water collection system originates from nearly 200 miles away, near Aspen, Leadville, and Breckenridge. Almost 75 percent of our water originates from mountain streams. Water from these streams is collected and stored in numerous reservoirs along the Continental Divide. Collection systems in this area consist of the Homestake, Fryingpan-Arkansas, Twin Lakes, and Blue River systems.

The majority of this raw water is transferred to our city through pipelines that help protect it from contamination, such as herbicides, pesticides, heavy metals and other chemicals. After the long journey, water is stored locally at Rampart Reservoir and the Catamount reservoirs on Pikes Peak.

Local Surface Sources

To supplement the water received from the mountain sources, Colorado Springs Utilities is able to divert water from local surface water collection systems including:

- North and South Slopes of Pikes Peak – Catamount Reservoirs, Crystal Reservoir, South Slope Reservoirs and tributaries
- North and South Cheyenne Creeks
- Fountain Creek
- Monument Creek – Pikeview Reservoir
- Northfield Watershed – Rampart and Northfield Reservoirs
- Pueblo Reservoir

Purchased Water Source

Fountain Valley Authority or FVA (PWSID#CO0121300) receives water from the Fryingpan-Arkansas Project – a system of pipes and tunnels that collects water in the Hunter- Fryingpan Wilderness Area near Aspen. Waters collected from this system are diverted to the Arkansas River, near Buena Vista, and then flow about 150 miles downstream to Pueblo Reservoir. From there, the water travels through a pipeline to a water treatment plant before being delivered to Colorado Springs.

All water sources are treated at one of our treatment plants (or in the case of FVA water at FVA's treatment plant) prior to entering our drinking water distribution system; an intricate system of tanks, pumps and pipes that ultimately deliver water to your home or business.

Colorado Source Water Assessment and Protection

The Colorado Department of Public Health and Environment has provided us with a Source Water Assessment Report for our water supply. For general information or to obtain a copy of the report please visit https://www.colorado.gov/cdphe/ccr The report is located under "Guidance: Source Water Assessment Reports." Search the table using 121150, COLORADO SPRINGS UTILITIES, or by contacting Laboratory Services at 719-668-4560. The Source Water Assessment Report provides a screening-level evaluation of potential contamination that ***could*** occur. It ***does not*** mean that the contamination ***has or will*** occur. We can use this information to evaluate the need to improve our current water treatment capabilities and prepare for future contamination threats. This can help us ensure that quality finished water is delivered to your homes. In addition, the source water assessment results provide a starting point for developing a source water protection plan. Potential sources of contamination in our source water area are listed below.

Potential sources of contamination to our source water areas may come from:

- EPA Superfund Sites
- EPA Abandoned Contaminated Sites
- EPA Hazardous Waste Generators
- EPA Chemical Inventory/Storage Sites
- EPA Toxic Release Inventory Sites
- Permitted Wastewater Discharge Sites
- Aboveground, Underground and Leaking Storage Tank Sites
- Solid Waste Sites
- Existing/Abandoned Mine Sites
- Concentrated Animal Feeding Operations
- Other Facilities
- Commercial/Industrial Transportation
- High-and-Low-Intensity Residential
- Urban Recreational Grasses
- Quarries/Strip Mines/Gravel Pits
- Agricultural Land (row crops, small grain, pasture/hay, orchards/vineyards, fallow and other)
- Forest
- Septic Systems
- Oil/Gas Wells
- Road Miles

The results of the source water assessment are not a reflection of our treated water quality or the water you receive, but rather a rating of the susceptibility of source water contamination under the guidelines of the Colorado SWAP program.

General Information

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

Contaminants that may be present in source water include:

• Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operation and wildlife.
• Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
• Pesticides and herbicides that may come from a variety of sources, such as agriculture, urban stormwater runoff and residential uses.
• Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and also may come from gas stations, urban stormwater runoff, and septic systems.
• Radioactive contaminants that can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Colorado Department of Public Health and Environment prescribes regulations limiting the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration regulations establish limits for contaminants in bottled water that must provide the same protection for public health.

Immunocompromised Persons Advisory

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791) or by visiting https://www.epa.gov/ground-water-and-drinking-water.
Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV-AIDS or other immune system disorders, some elderly, and infants can be particularly at risk of infections. These people should seek advice about drinking water from their health care providers. For more information about contaminants and potential health effects, or to receive a copy of the U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and microbiological contaminants call the EPA Safe Drinking Water Hotline at (1-800-426-4791).

Information About Lead in Drinking Water

If present, elevated levels of lead can cause serious health problems (especially for pregnant women and young children). It is possible that lead levels at your home may be higher than other homes in the community as a result of materials used in your home's plumbing. If you are concerned about lead in your water, you may wish to have your water tested. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. Additional information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (1-800-426-4791) or at http://www.epa.gov/safewater/lead.

Information about Fluoride

Fluoride is a compound found naturally in many places, including soil, food, plants, animals and the human body. It is also found naturally at varying levels in all Colorado Springs' water sources. Colorado Springs Utilities does not add additional fluoride to your drinking water. Any fluoride in the drinking water comes naturally from our source waters.

Terms, Abbreviations & Symbols

- **Maximum Contaminant Level (MCL)** − The highest level of a contaminant allowed in drinking water.
- **Treatment Technique (TT)** − A required process intended to reduce the level of a contaminant in drinking water.
- **Health-Based** − A violation of either a MCL or TT.
- **Non-Health-Based** − A violation that is not a MCL or TT.
- **Action Level (AL)** − The concentration of a contaminant which, if exceeded, triggers treatment and other regulatory requirements.
- **Maximum Residual Disinfectant Level (MRDL)** − The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- **Maximum Contaminant Level Goal (MCLG)** − The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- **Maximum Residual Disinfectant Level Goal (MRDLG)** − The level of a drinking water disinfectant, below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- **Violation (No Abbreviation)** − Failure to meet a Colorado Primary Drinking Water Regulation.
- **Formal Enforcement Action (No Abbreviation)** − Escalated action taken by the State (due to the risk to public health, or number or severity of violations) to bring a non-compliant water system back into compliance.
- **Variance and Exemptions (V/E)** − Department permission not to meet a MCL or treatment technique under certain conditions.
- **Gross Alpha (No Abbreviation)** − Gross alpha particle activity compliance value. It includes radium-226, but excludes radon 222, and uranium.
- **Picocuries per liter (pCi/L)** − Measure of the radioactivity in water.
- **Nephelometric Turbidity Unit (NTU)** − Measure of the clarity or cloudiness of water. Turbidity in excess of 5 NTU is just noticeable to the typical person.
- **Compliance Value (No Abbreviation)** – Single or calculated value used to determine if regulatory contaminant level (e.g. MCL) is met. Examples of calculated values are the 90^{th} Percentile, Running Annual Average (RAA) and Locational Running Annual Average (LRAA).
- **Average (x-bar)** − Typical value.
- **Range (R)** − Lowest value to the highest value.
- **Sample Size (n)** − Number or count of values (i.e. number of water samples collected).
- **Parts per million = Milligrams per liter (ppm = mg/L)** − One part per million corresponds to one minute in two years or a single penny in $10,000.
- **Parts per billion = Micrograms per liter (ppb = ug/L)** − One part per billion corresponds to one minute in 2,000 years, or a single penny in $10,000,000.
- **Not Applicable (N/A)** – Does not apply or not available.
- **Level 1 Assessment** – A study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.
- **Level 2 Assessment** – A very detailed study of the water system to identify potential problems and determine (if possible) why an E. coli MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.

Data Presented in the Water Quality Report

Colorado Springs Utilities routinely monitors for contaminants in your drinking water according to Federal and State laws. The table on the following pages shows the combined results of our monitoring for the Pine Valley and McCullough water treatment plants for the period of January 1 through December 31, 2020, unless otherwise noted. The State of Colorado requires us to monitor for certain contaminants less than once per your because the concentrations of these contaminants are not expected to vary significantly from year to year, or the system in not considered vulnerable to this type of contamination. Therefore, some of our data, though representative, may be more than a year old. Only detected contaminants sampled within the last 5 years appear in this report. If no table appears in this section, then no contaminants were detected in the last round of monitoring.

Detected Contaminants Tables

Colorado Springs Utilities (PWSID CO0121150)

Inorganic Contaminants

Monitored at the Treatment Plant (entry point to the distribution system)

Contaminant	MCL	MCLG	Units	Range	Average	MCL Violation	Sample Dates	Possible Source(s) of Contamination
Barium	2	2	ppm	0.02 – 0.02	0.02	No	July 2020	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Fluoride	4	4	ppm	0.12 – 0.19	0.16	No	July 2020	Erosion of natural deposits; discharge from fertilizer and aluminum factories
Sodium	N/A	N/A	ppm	6.93 – 7.45	7.19	No	July 2020	Erosion of natural deposits

Organic Contaminants

Monitored at the Treatment Plant (entry point to the distribution system)

Contaminant	MCL	MCLG	Units	Range Detected	Average	MCL Violation	Sample Dates	Possible Source(s) of Contamination
Di(2-ethylhexyl) phthalate	50	0	ppb	0 – 1.2	0.13	No	Jan, Feb, Apr, May, Jul, Oct 2020	Discharge from rubber and chemical factories

Radionuclides

Monitored at the Treatment Plant (entry point to the distribution system)

Contaminant	MCL	MCLG	Units	Range	Average	MCL Violation	Sample Dates	Possible Source(s) of Contamination
Combined Radium	5	0	pCi/L	0 – 1.8	0.9	No	June 2020	Erosion of natural deposits
Gross Alpha	15	0	pCi/L	0 – 0.4	0.2	No	June 2020	Erosion of natural deposits

Turbidity

Continuously monitored at the Treatment Plant (entry point to the distribution system)

Contaminant	TT Requirement	Level Detected	TT Violation	Sample Dates	Possible Source(s) of Contamination
Turbidity	Maximum 1 NTU for any single measurement	Highest Single Measurement: 0.55 NTU, June	No	Jan – Dec 2020	Soil Runoff
Turbidity	In any month, at least 95% of samples must be less than 0.3NTU	Lowest Monthly percentage of samples meeting TT requirement: 99%, June	No	Jan -Dec 2020	Soil Runoff

Disinfectants

Continuously monitored at the Treatment Plant (entry point to the distribution system)

Contaminant	MRDL/ TT Requirement	Units	Level Detected	MRDL/TT Violation	Sample Dates	Possible Source(s) of Contamination
Chlorine	TT= No more than 4 hours with a sample below 0.2 ppm	ppm	0 samples above or below the level	No	Jan – Dec 2020	Water additive used to control microbes

Total Organic Carbon (Disinfection Byproducts Precursor) Removal Ratio of Raw and Finished Water

Monitored at the Treatment Plant (entry point to the distribution system)

Contaminant	MCL	MCLG	Units	Average	Range Low - High	MCL Violation	Sample Dates	Possible Source(s) of Contamination
Total Organic Carbon (TOC)	TT minimum ratio = 1.00	N/A	N/A	1.31	1 – 1.52	No	Monthly - Running Annual Average	Naturally present in the environment

Disinfection Byproducts

Monitored in the distribution system

Contaminant	MCL	MCLG	Units	Range	Average	Highest Compliance Value	MCL Violation	Sample Dates	Possible Source(s) of Contamination

Total Haloacetic Acids (HAA5)	60	N/A	ppb	8.0 – 55.4	31.8	43.7	No	Jan, Apr, Jul, Oct 2020	Byproduct of drinking water disinfection
Total Trihalomethanes (TTHM)	80	N/A	ppb	16.7 – 56.3	43.6	64.7	No	Jan, Apr, Jul, Oct 2020	Byproduct of drinking water disinfection

Disinfectants in the Distribution System

Contaminant	MRDL/TT	Lowest TT Percentage	Number of samples below 0.2	Units	TT Violation	Sample Dates	Possible Source(s) of Contamination
Chlorine	MRDL = 4 ppm TT= At least 95% of samples per month must be at least 0.2ppm	99% February	1	ppm	No	2020	Drinking water disinfectant used to control microbes

Lead and Copper

Monitored in the distribution system

Contaminant	AL at the 90th Percentile	MCLG	Units	90th Percentile	Sample Size	Sample Sites Above AL	AL Exceedance	Sample Dates	Possible Source(s) of Contamination
Copper	1.3	1.3	ppm	0.1065	50	0	No	June - August 2020	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead	15	0	ppb	3.7	50	0	No	June - August 2020	Corrosion of household plumbing systems; erosion of natural deposits

Unregulated Contaminant Monitoring Regulation (UCMR)

The 1996 amendments to the Safe Drinking Water Act required that EPA establish criteria for a program to monitor unregulated contaminants and to identify no more than 30 unregulated contaminants to be monitored every five years.

Unregulated contaminants are those contaminants that do not have a drinking water standard (maximum contaminate level) established by EPA. The purpose of the UCMR is to assist EPA in determining the occurrence of unregulated contaminants in drinking water and whether future regulation is warranted.

The fourth round of the UCMR required monitoring for 30 contaminants. Colorado Springs Utilities was required to monitoring for these contaminants starting in January 2018. The results for any contaminants detected thus far are listed below. For further information on UCMR please visit https://www.epa.gov/dwucmr/fourth-unregulated-contaminant-monitoring-rule

Monitored at the Treatment Plant (entry point to the distribution system)

Contaminant	Average Level Detected	Range	Units	Sample Dates	Potential Sources of Contamination
Manganese	1.2	0 - 11	ppb	Jan, Apr, Jul, Oct 2018	Naturally occurring element, commercially available in combination with other elements and minerals, a byproduct of zinc ore processing, used in infrared optics, fiber optic systems electronics and solar applications
1-Butanol	1.07	0 – 13	ppb	Jan, Mar, Apr, Jul, Oct 2018	Used as a solvent, food additive, and in the production of other chemicals
Quinoline	0.001	0 – 0.0318	ppb	Jan, Mar, Apr, Jul, Oct 2018 Feb, Mar 2019	Used as a pharmaceutical and flavoring agent, produced as a chemical intermediate, component of coal

Monitored in the Distribution System

Contaminant	Average Level Detected	Range	Units	Sample Dates	Potential Sources of Contamination
Haloacetic Acids 5 (HAA5)	33.9	10.2 – 55.0	ppb	Jan, Apr, Jul, Oct 2018	Byproduct of drinking water disinfection
Brominated Haloacetic Acids 6 (HAABr6)	3.18	0.79 – 9.10	ppb	Jan, Apr, Jul, Oct 2018	Byproduct of drinking water disinfection
Haloacetic Acids 9 (HAA9)	36.4	14.5 – 57.0	ppb	Jan, Apr, Jul, Oct 2018	Byproduct of drinking water disinfection

Customers Have a Voice in Decisions

We encourage customer participation in decisions affecting our drinking water.

- Utilities Board – our governing body – meets the Wednesday between City Council meetings, 1 p.m. at the Plaza of the Rockies, South Tower, 121 S. Tejon St., Fifth floor.
- Call 719-668-4800 or click https://www.csu.org/pages/ub-r.aspx for information.

General Information

To request a printed copy of this report or for questions call 719-668-4560.
For more water quality information or to access past Drinking Water Quality Reports click https://www.csu.org/pages/water-quality-r.aspx