Central Iron County Water Conservancy District

Water Master Plan 2020

ENSIGN

CENTRAL IRON COUNTY WATER CONSERVANCY DISTRICT

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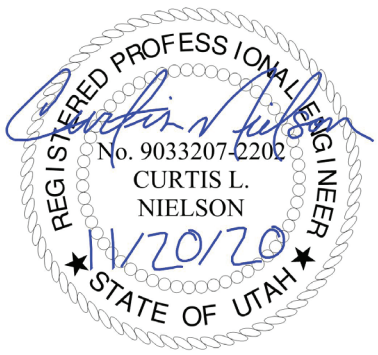
Water Master Plan 2020

FINAL | November 2020



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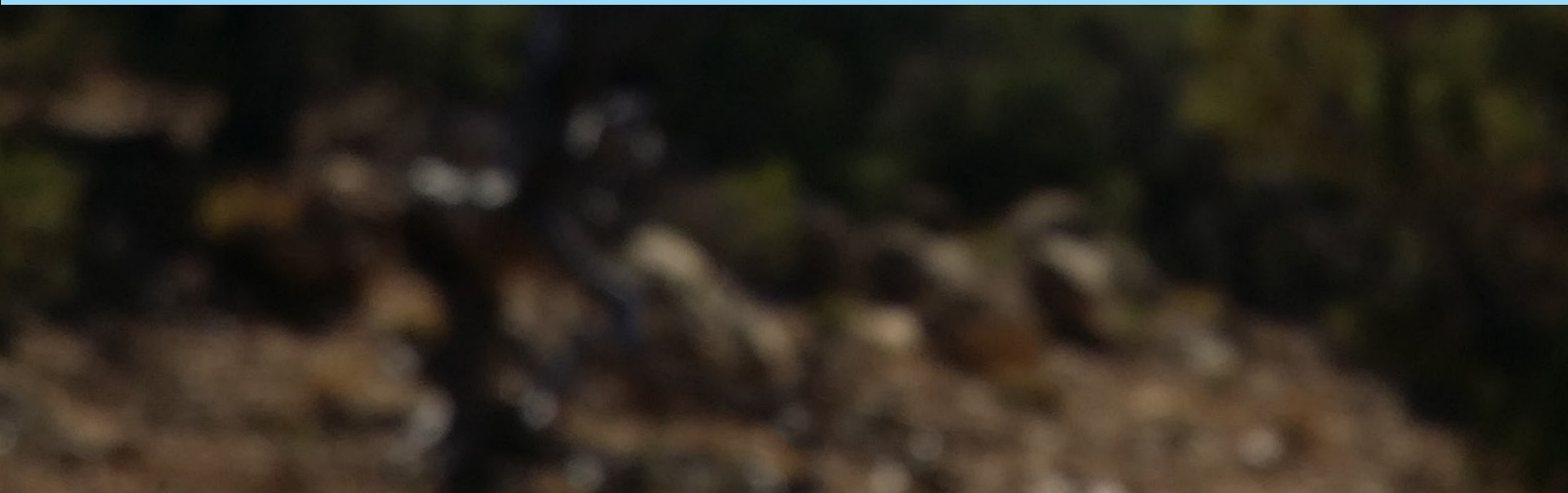
Abbreviations

AFY	Acre-feet per year
AGRC	Automated Geographic Reference Center
AWWA	American Water Works Association
Cedar City	Cedar City Corporation
cfs	Cubic feet per second
CICWCD	Central Iron County Water Conservancy District or District
DDW SRF	Utah State Division of Drinking Water State Revolving Fund
DNR	Department of Natural Resources
DWRi	Division of Water Rights
EIS	Environmental Impact Statement
Ensign	Ensign Engineering, Inc.
ERC	Equivalent Residential Connections
EPA	Environmental Protection Agency
FBPWNA	Financial Business Plan and Water Needs Assessment
GMP	Groundwater Management Plan
GOMB	Governor's Office of Management and Budget
gpcd	Gallons per capita per day
gpm	Gallons per minute
Kgals	Thousands of gallons
LEPA	Low Energy Precision Application
LESA	Low Elevation Application
MAGI	Median Adjusted Gross Income
N/A	Not Applicable
O&M	Operation and Maintenance
PVWS	Pine Valley Water Supply & Conservation Project
ROD	Record of Decision
SRF	State Revolving Fund
TDS	Total Desolved Solids
USDA	United States Department of Agriculture
UGS	Utah Geological Survey
USGS	United States Geological Survery
WWTP	Wastewater Treatment Plant

Executive Summary



EXECUTIVE SUMMARY

Use of this Water Master Plan Report

This master plan document and the calculations included were performed using known and accepted methods. Actual information (usage numbers, water rate fees, population baselines) were used when available. If such information was not found, engineering estimates and assumptions were made. All such estimates or assumptions are duly noted throughout the document. Estimated figures are specific to the region, Iron County, and water systems of comparable size within the region.

It is anticipated that this master plan document will be used as a prominent planning tool when considering the future growth within the Central Iron County Water Conservancy District (CICWCD). The information herein will allow CICWCD to be informed and aware of the current overall functioning status of the culinary water system and of any existing deficiencies.

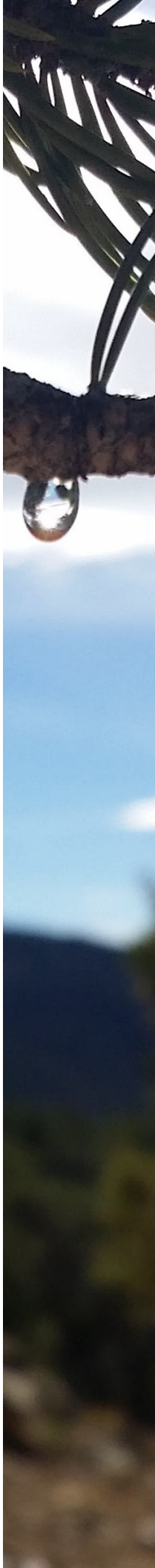
Existing System

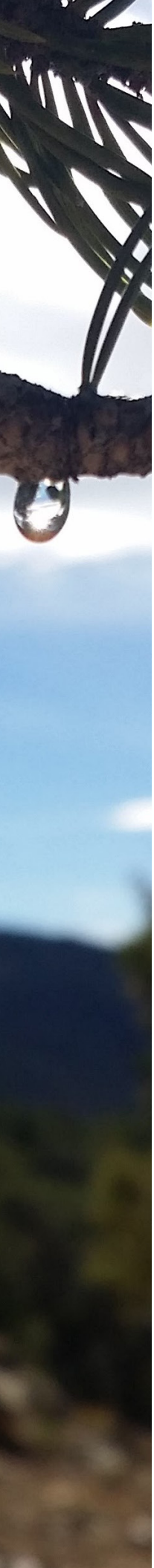
CICWCD's existing water delivery system is functioning and currently delivers quality culinary water to all of its 1,221 connections (1,217 single connections and 4 wholesale/bulk-water connections). Out of the total 1,221 connections, 1,207 are residential connections. The existing system functions and serves all connections with pressures in accordance with state requirements.

CICWCD currently owns 2,390 acre-feet of water rights and an additional 30,000 acre-feet for recharge in the Cedar Valley. They own 85 acre-feet in Basin 81 and 320 acre-feet in Basin 71, totaling 405 acre-feet. In 2019, the courts decreed that the District would be granted 15,000 acre-feet in Pine Valley & 11,275 acre-feet in Wah Wah Valley, totaling 26,275 acre-feet. Currently, based on 2019 usage, the District is using almost 526 acre-feet of water annually (492.47 acre-feet in central system; 25.64 acre-feet for Chekshani Cliffs; and 7.89 acre-feet for Cedar Highlands), with a total of 1,221 connections (1,345 ERCs in central system; 64 ERCs in Chekshani Cliffs; 88 ERCs in Cedar Highlands) on the system. CICWCD does not need to purchase additional water rights to meet current use. See *Water Rights Section* for more information.

CICWCD has sufficient storage capacity to meet existing needs; however, to meet future needs additional storage capacity is needed. The total required storage is 1.13 million gallons. The District currently has 2.70 million gallons of storage (2.18 million gallons at the central system; 0.32 million gallons at Cedar Highlands; 0.20 million gallons at Chekshani Cliffs). The procedure for calculating storage requirements will be discussed in the *State Requirements Section*.

The state water source requirement requires that a water system be able to produce the required amount of water. This required amount of water is based on indoor and outdoor use. Currently the District exceeds the state water source requirement by 424 gallons per minute (gpm) for the central system; 94 gpm for Chekshani Cliffs; and 27 gpm for Cedar Highlands. No additional sources need to be developed in order to meet this requirement; however, as growth continues CICWCD should investigate new sources for the central system. The *State Requirements Section* discusses the procedure for calculating source requirements.





Water Conservation

The state of Utah has a goal of reducing the total per capita usage of the Lower Colorado River North Region to 231 gpd per capita by 2030—a 19% reduction from the 2015 regional baseline. The total current use per capita of the CICWCD and key stakeholders[1] is 262 gpd per capita (indoor and outdoor use). To meet the state goal, CICWCD will need to reduce per capita usage to 163 gallons/day. In order to reduce per capita water use in the future, the District must institute strict outdoor conservation practices. This can be accomplished through education, rebates, new technology, and a tiered rate structure that charges a premium for large water users.

Water Advisory Committee

In 2018, the CICWCD Board of Directors created the Water Advisory Committee. The committee included various professionals and leaders from the community. Throughout their time on the committee, the members were presented with information about various water topics and issues in the Cedar City Valley. In 2020, the committee created a report[2] giving recommendations to the CICWCD Board of Directors. Below is a summary of those recommendations:

- The District should continue to increase water education among the community.
- The District should continue to promote both residential and agricultural water conservation.
- The District should continue to maintain and create recharge projects in the valley.
- The District should continue to prepare for the Pine Valley Water Conservation Project to import water into Cedar Valley.
- The District should continue to improve positive relationships with key stakeholders, community members, and federal/state entities.
- The District should help the valley prepare for the Groundwater Management Plan that has been proposed by the Utah Division of Water Rights (DWRi).
- The District should keep an "open-mind" when considering new ideas and techniques.

The recommendations given by the Water Advisory Committee can be compared to other studies done in coordination with CICWCD. Such as, the 2014 UGS Report[3] that gave four recommendations:

1. Increase Overall Water Resources
2. Increase Recharge to the Aquifer
3. Disperse High-Discharge Wells
4. Reduce Groundwater Withdrawals

In 2015, the CICWCD also solicited water development project ideas from the public and other professionals. All submitted projects were reviewed by an independent expert panel consisting of Philip Gardner, USGS; Hugh Hurlow, UGS; Russel Hadley, Water Resources; Kerry Carpenter, Water Rights; Dan Aubrey, Water Resources; and Russell Barrus, Water Resources. The Panel Ranked these three projects as the highest priority:

1. Import Water from Other Basins
2. Aquifer Recharge Projects
3. Aquifer Balance Projects

From the Recommendations given by these three sources, the CICWCD has adopted a three-tier approach to the water issues in the Cedar City Valley. This approach is:

1. Conserve
2. Recharge
3. Import

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1 Key Stakeholders include: Cedar City, Enoch City, & Kanarraville Town. (Reference Financial Business Plan & Water Needs Assessment - Carollo Engineers)

2 Water Advisory Committee: Report of Recommendation for the CICWCD Board of Directors – June 2020

3 UGS Investigation of Land Subsidence and Earth Fissures in Cedar Valley, Iron County, Utah - 2014

Water Rate Study

A water rate study was performed using actual water usage data provided by the District and covering the time frame from April 2018 – April 2019. It was found that the monthly average single user connection in the District used on average around 10,158 gallons per month. Based on the current water rate structure the average monthly water bill from April 2018 – April 2019 for all users in the District was $41.56.

The current water rate structure was analyzed according to its effectiveness in promoting water conservation and also the effectiveness of providing revenue for the system to stay self-sustaining and operational. Proposed water rate structures were determined to promote water conservation and to be in accordance with the Utah Division of Drinking Water's "Maximum Affordable Water Bill."

Impact Fee Study

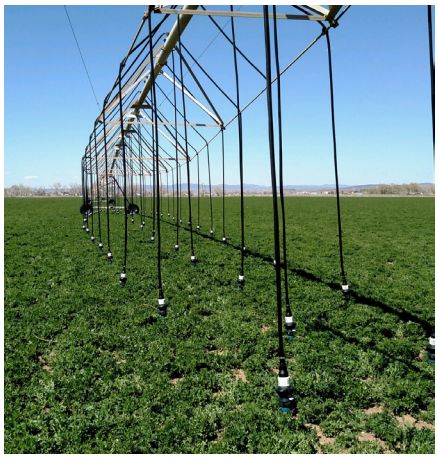
The current impact fee for new users within CICWCD is $3,500 per connection. The impact fee is required to pay for the impact caused by new connections to the existing system. An impact fee study was performed to determine whether this amount was sufficient to cover the impact caused by new connections.

This study will identify growth trends and capacities within CICWCD boundary area and development activity with the intent to determine impacts and additional consumption on the existing water system. CICWCD will determine necessary improvements and expansions necessary to provide development activity with the same level of service as currently provided. New development impacts were analyzed to show reasonable relation to existing level of service and anticipated changes necessary for improvement and expansion on the existing system. Estimates will determine the essential proportionate shares for costs that will be recouped and impacts on the system regarding development activity on the existing system.

For the District, the allowable impact fee is $25,593.83 for connection to the water system. It is recommended that the impact fee of $3,500 should be increased for future water connections to the system. Reference *Statutory Impact Fee Study Section*.

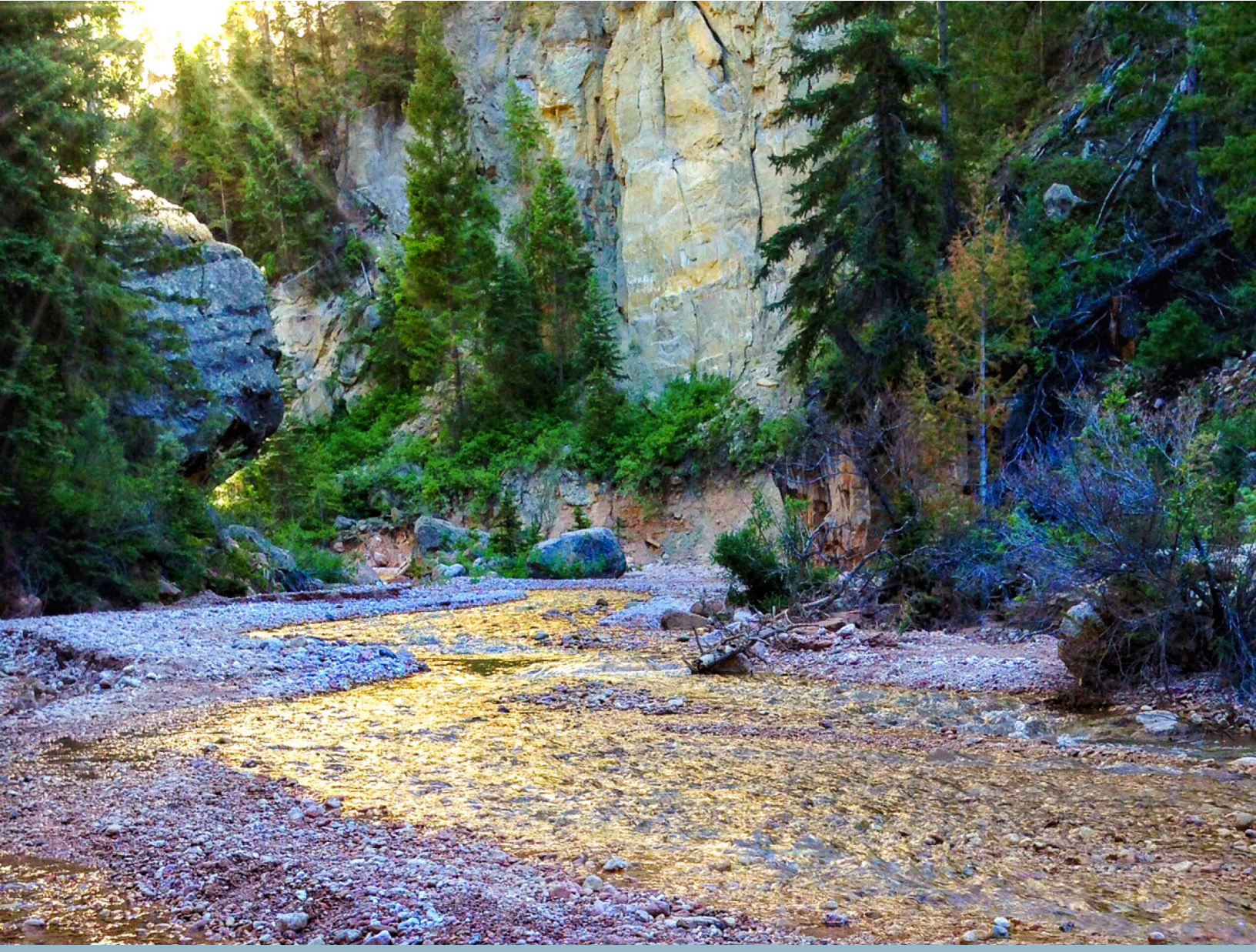
A low interest loan can be obtained to pay for required future upgrades. Loans and improvements should be made in accordance with actual population growth. This will assure that there are sufficient impact fees to be used for loan repayment.

CONSERVE



RECHARGE

IMPORT



Project Overview

PROJECT OVERVIEW

In cooperation with the Central Iron County Water Conservancy District (CICWCD), Ensign Engineering was tasked to evaluate the public water system, including supply, storage, and distribution as well as how CICWCD's system integrates with Cedar City and Enoch City. Based on the information and analysis of the system, Ensign Engineering prepared this Water Master Plan Report. The use of this water master plan will provide CICWCD the necessary information for upgrading and improving the existing water system and help CICWCD plan and budget for future growth and expansion as more demand is placed on the water system.

Growth within the CICWCD boundary has been consistent the past thirty years. The system currently serves roughly 4,860 individuals. The 2012 Governor's Office of Management and Budget also projects a growth rate of 2.42% for the next 50 years.

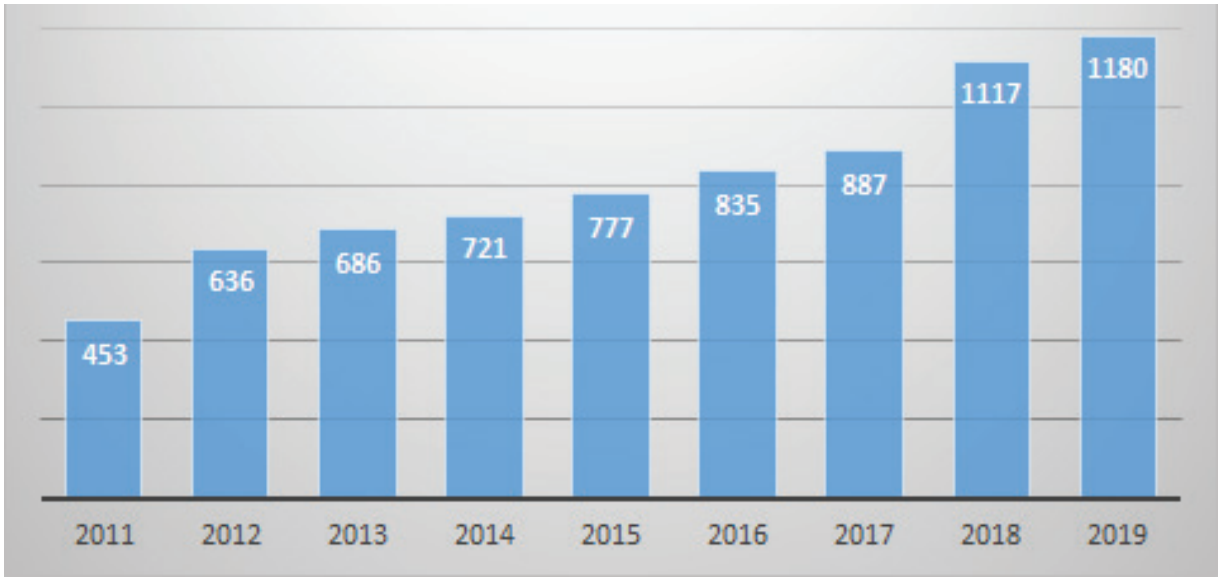
This water master plan will also discuss water management options that will encourage conservation within CICWCD (the State conservation plan requires a 25% reduction in use by 2025), in addition to analyzing the existing water system. Furthermore, this water master plan will discuss ways to better utilize the sources supplying the existing water system as well as solutions that promote sustainable design for future projects.

The Central Iron County Water Conservancy District is located in Iron County in the State of Utah as shown in *Figure 2 CICWCD Boundary.* CICWCD's service area consists of approximately 1,406 square miles of land with an average elevation of 5,846 ft. The current service area consists of 1,207 residential connections and 4 wholesale/bulk-water connections. *Figure 3 CICWCD Subdivsions* shows subdivisions served.

> Did you know? Cedar Valley is expected to grow at a rate of 2.42% for the next 50 years.

This master plan document makes recommendations for protecting and implementing plans to recover and reestablish the underlying aquifer and needed system improvements to remedy any current deficiencies and provide options to integrate connections with Cedar City and Enoch City. Ensign Engineering determined the demands exerted by future population growth. A Water Master Plan was created to address those portions of the system which are inadequate. The master plan identifies those portions which do not meet the current state regulations. Cost estimates for these recommended

Figure 1 CICWCD Historical Connections



improvements were developed. These studies will be used to assist CICWCD in planning and generating revenue to fund future system improvements.

Ensign Engineering, with assistance from CICWCD staff, began the master planning study by collecting all pertinent data required to develop the base map and water system model. Base map creation is essential in model development and in understanding the current water system. The base map development also creates a method to digitally store the water system data in a GIS database. Utilization of GIS allows for a "living" record of information for the water system. Future analyses are expedited since all data will be stored in the database.

The majority of the data collected for this study was obtained from available City and County records.

Descriptions of the data collected for the study are summarized in the following list:

- Population data (U.S. Census Bureau website)

- Population projection (Utah Governor's office website)

- Water use data (obtained from CICWCD billing records)

- Water system details (obtained from as-built drawings and survey points collected for this study)
    - o Locations of pipes
    - o Slope of each pipe segment
    - o Length of each pipe
    - o Beginning and ending elevations

- Storage Tank details (obtained from as-built drawings)

- Water valve, fire hydrant, PRV, booster station, and water meter locations (survey points collected for this study)

- Aerial map (obtained from the Utah Automated Geographic Reference Center (AGRC))

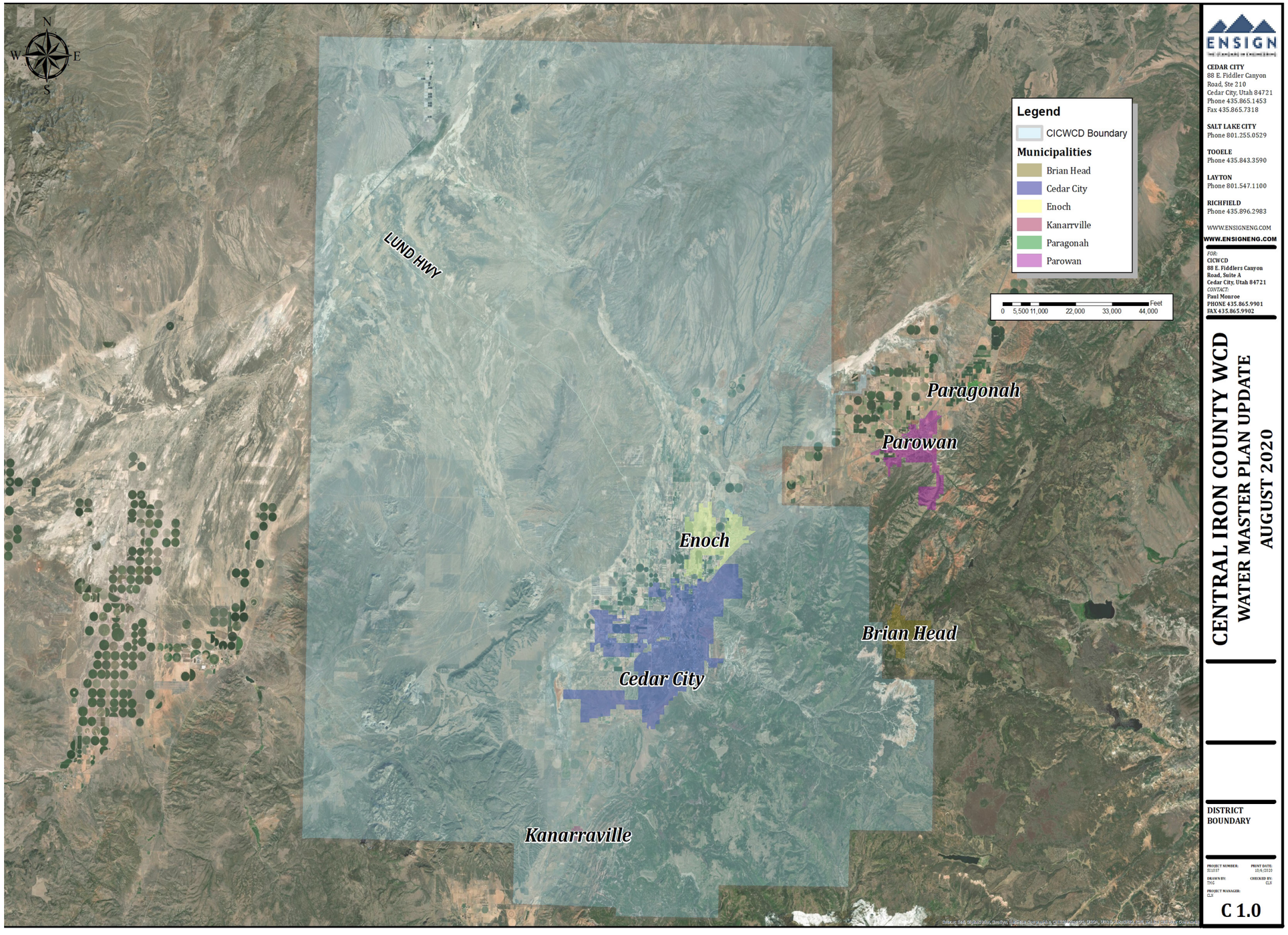
- Current water rates

- Water source data (obtained from the Utah Division of Water Rights and District records)

- Land use data (obtained from the Utah Automated Geographic Reference Center (AGRC))

Aerial images were collected for CICWCD from the AGRC website. The pipes and tanks for the District water system were digitized for the map and shown in their correct locations. A map was created in AutoCAD and was imported into a GIS database. The GIS database was further expanded to contain the attributes of the system.

Figure 2 CICWCD Boundary



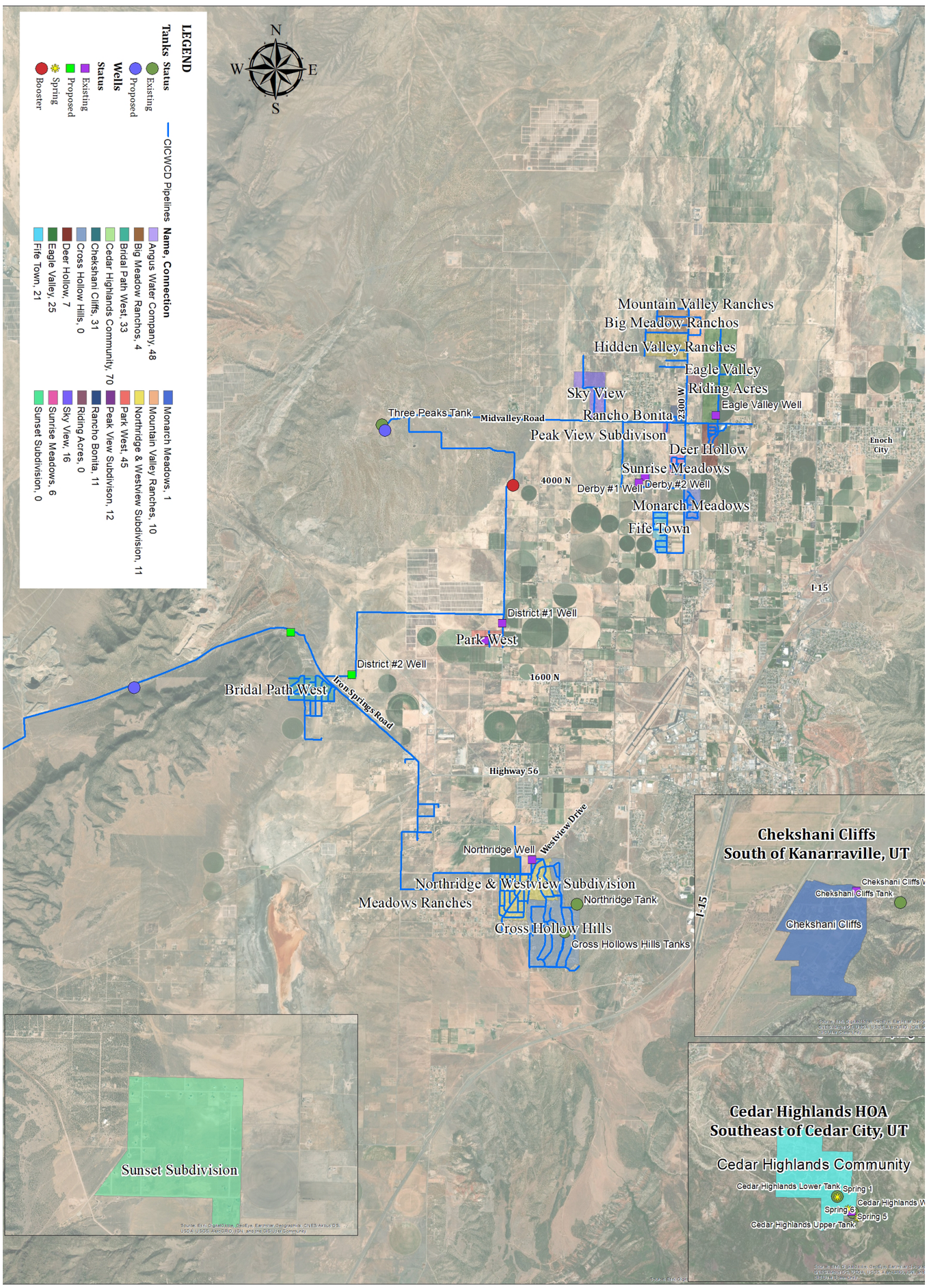


Figure 3 CICWCD Subdivisions

TITLE: CENTRAL IRON COUNTY WATER CONSERVANCY DISTRICT

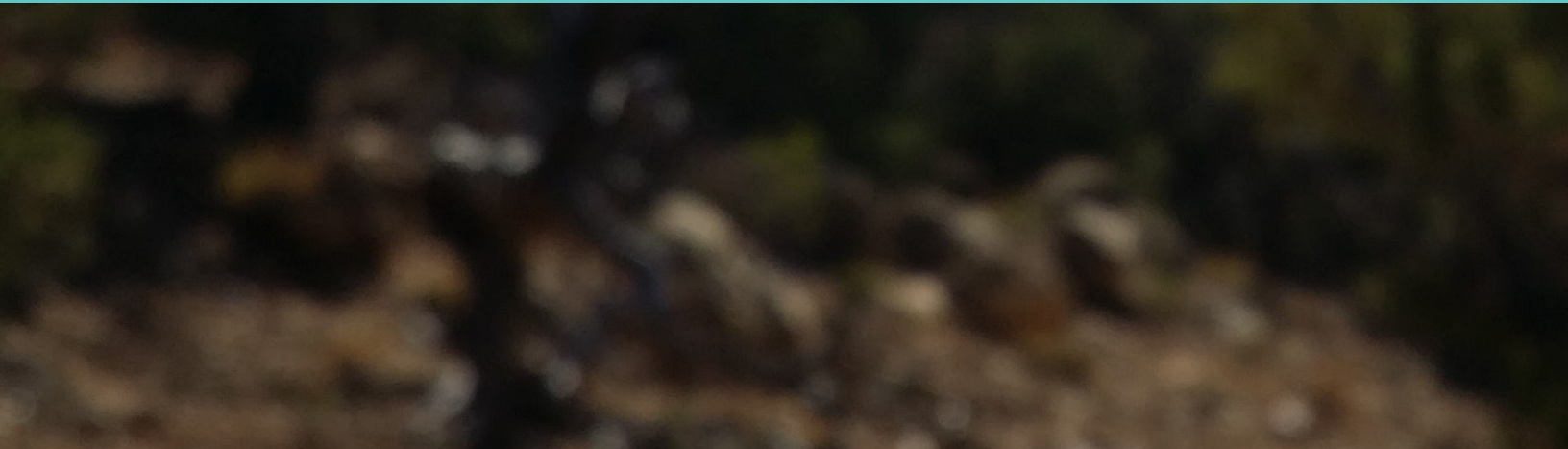
SUB TITLE: DISTRICT SUBDIVISIONS

SUBMITTAL DATE: AUGUST 2020

ENSIGN

CENTRAL IRON COUNTY WATER CONSERVANCY DISTRICT

State Requirements



STATE REQUIREMENTS

There are three main state requirements [1] that must be considered when evaluating a system for compliance. The first requirement is source, which considers water rights and well capacity. Second is storage, which considers water tank capacity and the third requirement is the distribution system, which considers the pipe size capacity. It is essential that all three requirements are satisfied to meet state requirements. This section of the master plan will examine each requirement individually.

Source Sizing

In order to have adequate source sizing, a system must have the capacity to deliver on the day of the highest water consumption (peak day demand) and have sufficient water rights to supply water (average yearly demand). First, this report will look at the capacity to deliver water under peak day demand and the required water rights for the average yearly demand.

Peak Day Demand

The state requires that a minimum of 800 gallons per day per Equivalent Residential Connection[2] (gpd/ERC) be used in determining indoor peak day demand for indoor use. If there is a high confidence that less water is used and proof through past usage data, this water can be reduced. Currently CICWCD has 1,497 ERCs consisting mainly of single-family homes (1,345 in central system; 64 in Chekshani Cliffs; and 88 in Cedar Highlands). There are 4 wholesale/bulk connections each assigned ERCs based on their monthly usage comparison to residential connections. CICWCD water system must be able to provide 1,197,600 gallons per day or 832 gallons per minute (gpm) (747 gpm for the central system; 36 gpm for Chekshani Cliffs; 49 gpm for Cedar Highlands).

Based on the Irrigated Crop Consumptive Use Zones and Normal Annual Effective Precipitation Map, the state requires 3.39 gpm per irrigated acre in the Cedar Basin for outdoor use. To determine the total number acres irrigated, it was assumed that there were 0.1 irrigated acres per ERC. The total number of irrigated acres per ERC calculated in CICWCD is for a total state outdoor requirement of 478 gpm (456 gpm for central system and 22 gpm for Chekshani Cliffs).

To meet the requirement for source (summing indoor and outdoor use requirements), CICWCD must be able to deliver 1,310 gpm to the system from its well and springs. Reference *Table 1 Peak Day Demand* for indoor and outdoor peak day requirements.

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1 State of Utah Drinking water system requirements are found in the Administrative Rules R309-510.

2 One Equivalent Residential Connection (ERC) refers to the amount of water used in a typical residence for both indoor and outdoor use. Each connection in a system is assigned a number of ERCs based on the amount of water that is used. A typical residence connection will be assigned one ERC. A connection that uses more than a typical residence (such as a laundromat) will be assigned more than one ERC. A connection that uses less than a typical residence (such as a District home) will be assigned less than one ERC.

Table 1 Peak Day Demand

Central System	
Indoor Peak Day Demand	800 gpd
ERCs	1,345
TOTAL INDOOR	**747 gpm**
Outdoor Peak Day Demand	3.39 gpm/irrigated acre
Irrigated Acres	134.5 acres
TOTAL OUTDOOR	**456 gpm**
TOTAL DEMAND	**1,205 gpm**

Chekshani Cliffs	
Indoor Peak Day Demand	800 gpd
ERCs	64
TOTAL INDOOR	**36 gpm**
Outdoor Peak Day Demand	3.39 gpm/irrigated acre
Irrigated Acres	6.4 acres
TOTAL OUTDOOR	**22 gpm**
TOTAL DEMAND	**58 gpm**

Cedar Highlands	
Indoor Peak Day Demand	800 gpd
ERCs	88
TOTAL INDOOR	**49 gpm**
TOTAL DEMAND	**49 gpm**

TOTAL COMBINED DEMAND	**1,310 gpm**

Average Yearly Demand

The State requires a minimum of 0.45 acre-feet per year of water rights per ERC for indoor use. Using 1,497 ERCs, CICWCD needs a minimum of 674 acre-feet per year of water rights for indoor use (605 acre-feet for the central system; 29 acre-feet for Chekshani Cliffs; and 40 acre-feet for Cedar Highlands).

For outdoor use, the State requires 1.66 acre-feet per irrigated acre of water rights. Using 374 irrigated acres, the minimum required outdoor average yearly demand is 622 acre-feet per year (558 acre-feet per year for the central system; 27 acre-feet per year for Chekshani Cliffs; and 37 acre-feet per year for Cedar Highlands).

The minimum of required water rights to meet the state's requirement is 1,296 acre-feet per year (1,163 acre-feet for the central system; 56 acre-feet for Chekshani Cliffs; and 77 acre-feet for Cedar Highlands). Reference *Table 2 Average Yearly Demand.*

Table 2 Average Yearly Demand

Central System	
Indoor Yearly Demand	0.45 acre-feet
ERCs	1345
TOTAL INDOOR	**605 acre-feet**
Outdoor Yearly Demand	1.66 acre-feet
Irrigated Acres	134.5
TOTAL OUTDOOR	**223 acre-feet**
TOTAL DEMAND	**828 acre-feet**

Chekshani Cliffs	
Indoor Yearly Demand	0.45 acre-feet
ERCs	64
TOTAL INDOOR	**29 acre-feet**
Outdoor Yearly Demand	1.66 acre-feet
Irrigated Acres	6.4
TOTAL OUTDOOR	**11 acre-feet**
TOTAL DEMAND	**40 acre-feet**

Cedar Highlands	
Indoor Yearly Demand	0.45 acre-feet
ERCs	88
TOTAL DEMAND	**40 acre-feet**

TOTAL COMBINED DEMAND	**908 acre-feet**

Storage and Sizing

For adequate storage sizing, the storage should be sized according to the local fire authority. CICWCD contracts with Cedar City Fire Department to provide fire service. The Cedar City Fire Department requires fire flows for a minimum of 2 hours during peak day demand. This will allow adequate storage if a fire occurs during peak day demand.

The minimum state storage requirement is 1,000 gpm for 60 minutes for a total of 60,000 gallons. The state requires peak day demand storage of 400 gallons per ERC for indoor use and 2,528 gallons per irrigated acre for outdoor use in addition to the fire storage. Storage required for indoor use in CICWCD is 598,800 gallons and outdoor use storage required is 356,195 gallons. The total storage required for indoor use, outdoor use and fire flow requirements is 954,995 gallons (878,016 gallons for the Central System; 41,779 gallons for Chekshani Cliffs; and 35,200 gallons for Cedar Highlands).

Summing the fire flows for peak day demand gives a total storage requirement of 1,134,995 gallons (938,016 gallons for the central system; 101,779 gallons for Chekshani Cliffs; and 95,200 gallons for Cedar Highlands). Reference *Table 3 Storage Requirements*.

Table 3 Storage Requirements

Central System	
Fire Flow	1,000 gpm
Duration	60 minutes
FIRE FLOW STORAGE	**60,000 gallons**
Indoor Peak Day Storage	400 gallons
ERCs	1345
Outdoor Peak Day Storage	2,528 gallons
Irrigated Acres	134.5 acres
PEAK DAY STORAGE	**878,016 gallons**
TOTAL REQUIRED STORAGE	**938,016 gallons**

Chekshani Cliffs	
Fire Flow	1,000 gpm
Duration	60 minutes
FIRE FLOW STORAGE	**60,000 gallons**
Indoor Peak Day Storage	400 gallons
ERCs	64
Outdoor Peak Day Storage	2,528 gallons
Irrigated Acres	6.4 acres
PEAK DAY STORAGE	**41,779 gallons**
TOTAL REQUIRED STORAGE	**101,779 gallons**

Cedar Highlands	
Fire Flow	1,000 gpm
Duration	60 minutes
FIRE FLOW STORAGE	**60,000 gallons**
Indoor Peak Day Storage	400 gallons
ERCs	88
PEAK DAY STORAGE	**35,200 gallons**
TOTAL REQUIRED STORAGE	**95,200 gallons**

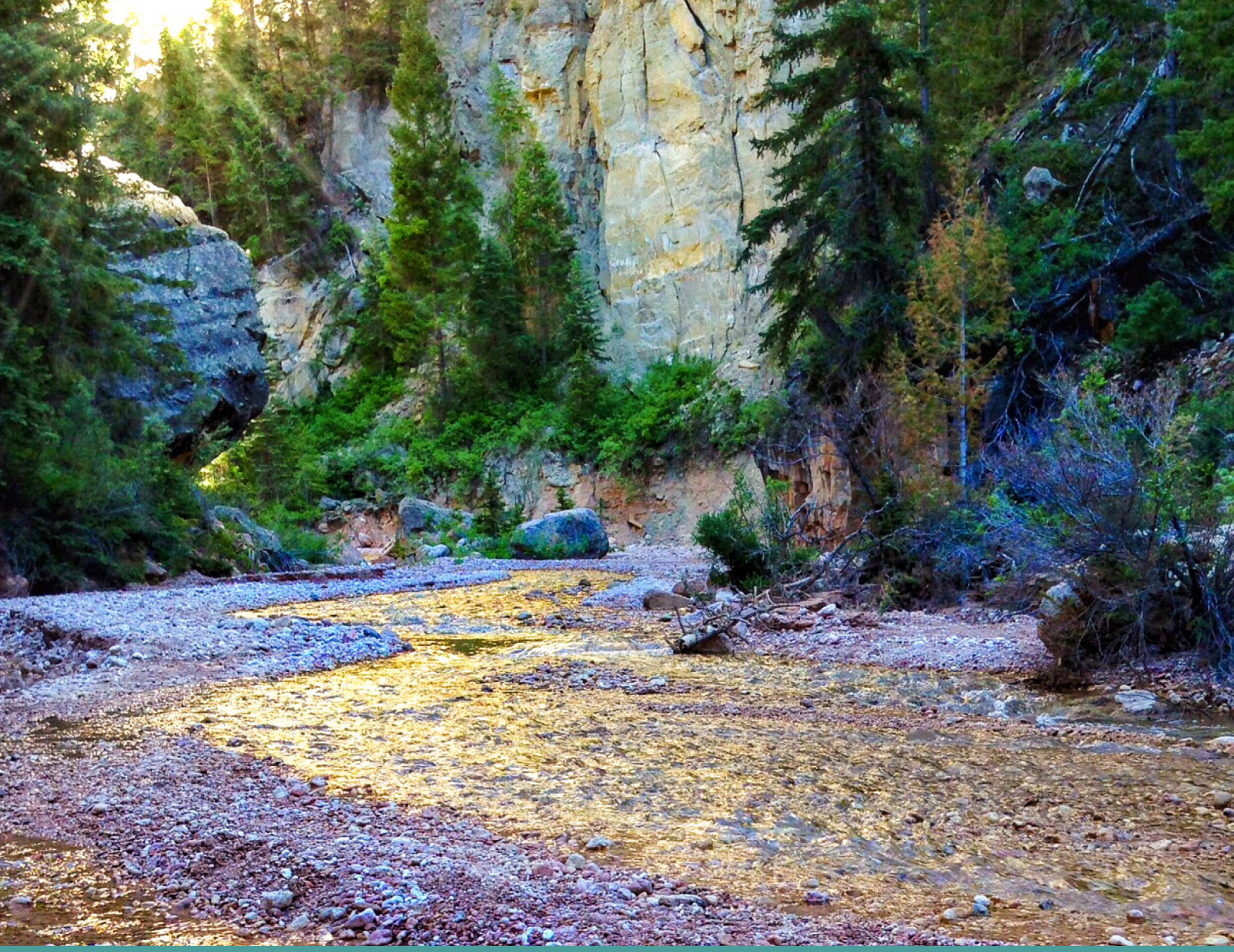
TOTAL COMBINED STORAGE	**1,134,995 gallons**

Distribution and Sizing

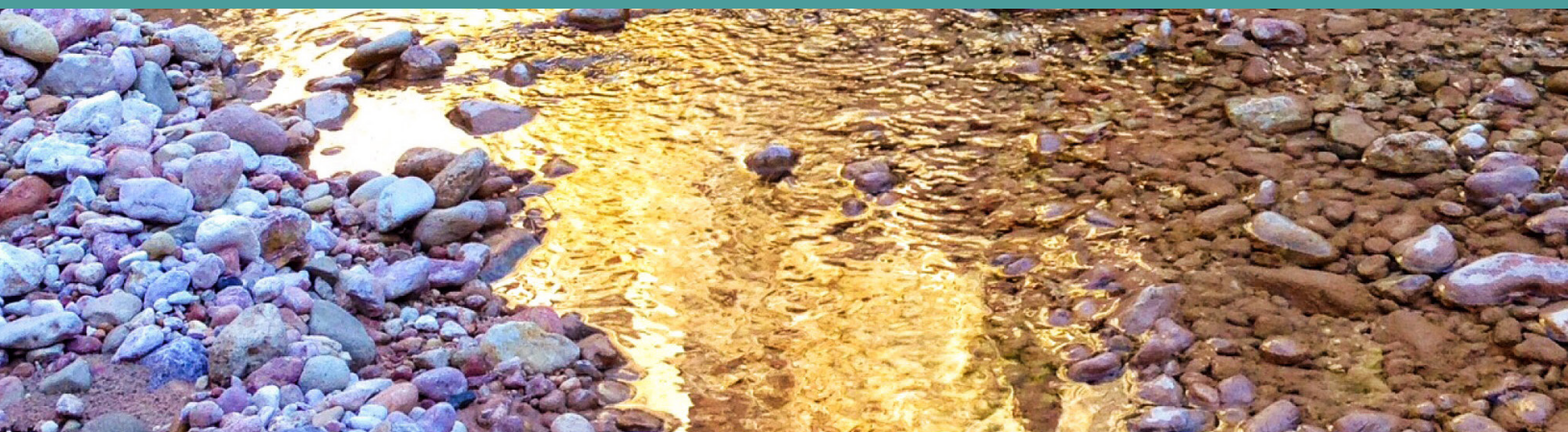
The distribution system must be sized to meet three requirements. First, the system must be able to deliver fire flows (1,000 gpm) at a minimum pressure of 20 pounds per square inch (psi) during peak day demand throughout the system. Second, the system must be able to deliver the estimated peak instantaneous demand at a pressure of 30 psi. This is an estimate of the maximum amount of water that will be used in the system at one time. The peak instantaneous demand is 1.5 times the peak day demand for large systems for indoor use and two times peak day demand for outdoor use. Third, the system must be able to deliver peak day demand at a pressure of at least 40 psi. Reference *Table 4 Utah State Pressure Requirements*.

Table 4 Utah State Pressure Requiements

Peak Day Pressure	40 psi
Peak Instantaneous Pressure	30 psi
Fire Flow Pressure	20 psi
Fire Flow Required	1,000 gpm



Existing System



EXISTING SYSTEM

Three existing conditions of CICWCD's water system are attended to in this section. The first condition will be source. This will consider water rights, well capacity and spring capacities. The second is storage which considers water tank capacity, and the third is the distribution system regarding pipe sizing capacity. Maps showing the existing system are shown in *Figure 4 CICWCD Tanks, Wells, and Waterline Locations* and *Figure 5 Water Valve and Fire Hydrant Locations.*

Infrastructure of Existing System

The existing infrastructure utilized by the District is in good working condition. Most of the infrastructure was constructed within the past 15 years and has been properly maintained. The remaining infrastructure is in working condition but was installed prior to the District providing service. Some of these lines are undersized, poorly constructed, or have not been properly maintained.

With CICWCD taking the charge to help supply clean and sanitary drinking water to the population within the District boundary, CICWCD takes into consideration the importance of utilizing tax money to incorporate private systems. An analysis is completed prior to joining more customers and infrastructure to ensure that no additional burden will be placed on existing taxpayers and customers. In fact, CICWCD is careful to add systems only if they will generate revenue as to pay their own way.

CICWCD is currently working with Cedar City and Enoch City to create inter-local agreements to provide and share water service. Projects are planned for future connection points between CICWCD and Cedar City and Enoch City. CICWCD has infrastructure that connects the north and south ends of the valley with large transmission lines. These water lines are within reasonable distance to provide multiple connection points for Cedar City and Enoch.

Central System

Peak Day Demand

CICWCD Central System has seven wells to meet the peak day demand requirement. *Table 5 Existing Central System Source Capacities* shows each well with its source capacity within the Central System. Source capacities were given by the current water operator. *Figure 4 CICWCD Tanks, Wells, and Waterline Locations* shows the locations of the springs and wells. The total capacity of the wells is 2,001 gpm which is greater than the state requirement of 1,203 gpm (Reference *State Requirements Section*). The current sources are adequate to meet the existing demand.

Average Yearly Demand

CICWCD Central System owns (in conjunction with Cedar Highlands) 2,390 acre-feet of water rights that are available to meet the average yearly demand requirement. The state requires 1,163 acre-feet per year of water for the Central System. The existing water rights are sufficient to meet the state requirement. CICWCD's water rights are further discussed in the *Water Rights Section*.

Existing Storage

The CICWCD Central System currently has 5 tanks for storage. Three Peaks Tank is located at an elevation of 5,860, Bridal Path West Tank is located at 5,665, North Ridge Tank is at 5,910, Cross Hollow North and South are both at 5,966 feet. *Table 6 Central System Tank Capacities* shows the storage capacity of each reservoir and *Figure 4 CICWCD Tanks, Wells, and Waterline Locations* shows their locations. The total reservoir capacity is 2.18 million gallons. This is more than the required storage capacity of 0.94 million gallons.

Existing Distribution System

Figure 4 CICWCD Tanks, Wells, and Waterline Locations shows the existing distribution system. The central system consists of approximately 67,985 feet of six-inch pipe; 141,398 feet of eight-inch pipe; 18,441 feet of ten-inch pipe; 88,734 feet of twelve-inch pipe; 85,890 feet of eighteen-inch pipe; and 22,153 feet of twenty-four-inch pipe. Multiple subdivisions' pipeline infrastructure was replaced as well as improvements and construction to distribution wells and pump stations.

The Central System is supplied by seven wells and five tanks. This area has the capacity to supply water from any of the wells at any time and any of the tanks.

There are currently three pressure zones in the Central System, and the results will be discussed in greater detail under Water Conservation Section.

Table 5 Existing Central System Source Capacities

Source	Capacity
Northridge Well	153 gpm
Derby #1	290 gpm
Derby #2	155 gpm
Eagle Valley	170 gpm
District #2	500 gpm
West Slope	373 gpm
Park West	360 gpm
Total Available	**2,001 gpm**
Total Required	**1,203 gpm**

Table 6 Central System Tank Capacities

Tank	Volume (MG)
3 Peaks	1.00
Bridal Path West	0.23
Northridge	0.50
Cross Hollow North	0.34
Cross Hollow South	0.11
Total Available	**2.18**
Total Required	**0.94**

Chekshani Cliffs System

Peak Day Demand

CICWCD serves the Chekshani Cliffs community. The Chekshani Cliffs water system has one well to meet the peak day demand requirement. *Table 7 Existing Chekshani Source Capacities* shows each well with its source capacity within the Chekshani Cliffs water system. Source capacities were given by the current water operator. *Figure 4 CICWCD Tanks, Wells, and Waterline Locations* shows the location of the well. The total capacity of the well is 160 gpm which is greater than the state requirement of 58 gpm *(Reference State Requirements Section)*. The current source is adequate to meet the existing demand.

Table 7 Existing Chekshani Source Capacities

Source	Capacity
Chekshani Cliffs	160 gpm
Total Available	**160 gpm**
Total Required	**58 gpm**

Average Yearly Demand

CICWCD Chekshani Cliffs water system owns 85 acre-feet of water rights that are available to meet the average yearly demand requirement. The state requires 40 acre-feet per year of water for Chekshani Cliffs. The existing water rights are sufficient to meet the state requirement. CICWCD's water rights are further discussed in Water Rights Section.

Table 8 Existing Chekshani Tank Capacities

Tank	Volume (MG)
Chekshani Cliffs	**0.20**
Total Available	**0.20**
Total Required	**0.102**

Existing Storage

The CICWCD Chekshani Cliffs water system currently has 1 tank for storage. Chekshani Cliffs tank is located at an elevation of 5,960 feet. *Table 8 Existing Chekshani Tank Capacities* shows the storage capacity of each reservoir and *Figure 4 CICWCD Tanks, Wells, and Waterline Locations* shows their locations. The total reservoir capacity is 0.20 million gallons. This is more than the required storage capacity of 0.102 million gallons.

Existing Distribution System

Figure 4 CICWCD Tanks, Wells, and Waterline Locations shows the existing distribution system for the Chekshani Cliffs water system. Chekshani Cliffs consists of 14,335 feet of eight-inch pipe and 1,327 feet of ten-inch pipe.

Chekshani Cliffs is supplied by one well and has one tank for storage.

There is currently one pressure zone in Chekshani Cliffs. A hydraulic analysis was performed of the existing system and the results will be discussed in greater detail under *Water Conservation Section*.

Cedar Highlands System

Peak Day Demand

CICWCD serves the Cedar Highlands HOA. The CICWCD Cedar Highlands water system has one well and three springs to meet the peak day demand requirement. *Table 9 Cedar Highlands Existing Source Capacities* shows the well and springs with their source capacity within the Cedar Highlands water system. Source capacities were given by the current water operator. *Figure 4 CICWCD Tanks, Wells, and Waterline Locations* shows the location of the well and springs. The total capacity of the springs and wells is 74 gpm which is greater than the state requirement of 49 gpm (reference *State Requirements Section*). The current source is adequate to meet the existing demand.

Average Yearly Demand

CICWCD Cedar Highlands water system owns (in conjunction with the Central System) 2,390 acre-feet of water rights that are available to meet the average yearly demand requirement. The state requires 40 acre-feet per year of water for Cedar Highlands. The existing water rights are sufficient to meet the state requirement. CICWCD's water rights are further discussed in the *Water Rights Section*.

Existing Storage

CICWCD Cedar Highlands water system currently has 2 tanks for storage. Cedar Highlands tanks are located at an elevation of 8,144 feet for the Upper Tank and 7,929 feet for the Lower Tank. *Table 10 Cedar Highlands Tank Capacities* shows the storage capacity of each reservoir and *Figure 4 CICWCD Tanks, Wells, and Waterline Locations* shows their locations for the Cedar Highlands water system. The total reservoir capacity is 0.32 million gallons. This is more than the required storage capacity of 0.095 million gallons.

Existing Distribution System

Figure 4 CICWCD Tanks, Wells, and Waterline Locations shows the existing distribution system for the Cedar Highlands water system. Cedar Highlands consists of 3,620 feet of four-inch pipe, 26,677 feet of six-inch pipe; 69 feet of eight-inch pipe; and 400 feet of ten-inch pipe.

Cedar Highlands is supplied by one well, three springs and has two tanks for storage.

There are currently two pressure zones in Cedar Highlands. A hydraulic analysis was performed of the existing system and the results will be discussed in greater detail under *Water Conservation Section*.

Table 9 Existing Cedar Highlands Source Capacities

Source	Capacity
Cedar Highlands Well	60 gpm
Cedar Highlands Springs #7-9	10 gpm
Cedar Highlands Springs #1	4 gpm
Total Available	**74 gpm**
Total Required	**49 gpm**

Table 10 Existing Cedar Highlands Tank Capacities

Tank	Volume (MG)
Cedar Highlands Upper	**0.16**
Cedar Highlands Lower	**0.16**
Total Available	**0.32**

Figure 4 CICWCD Tanks, Wells, and Waterline Locations

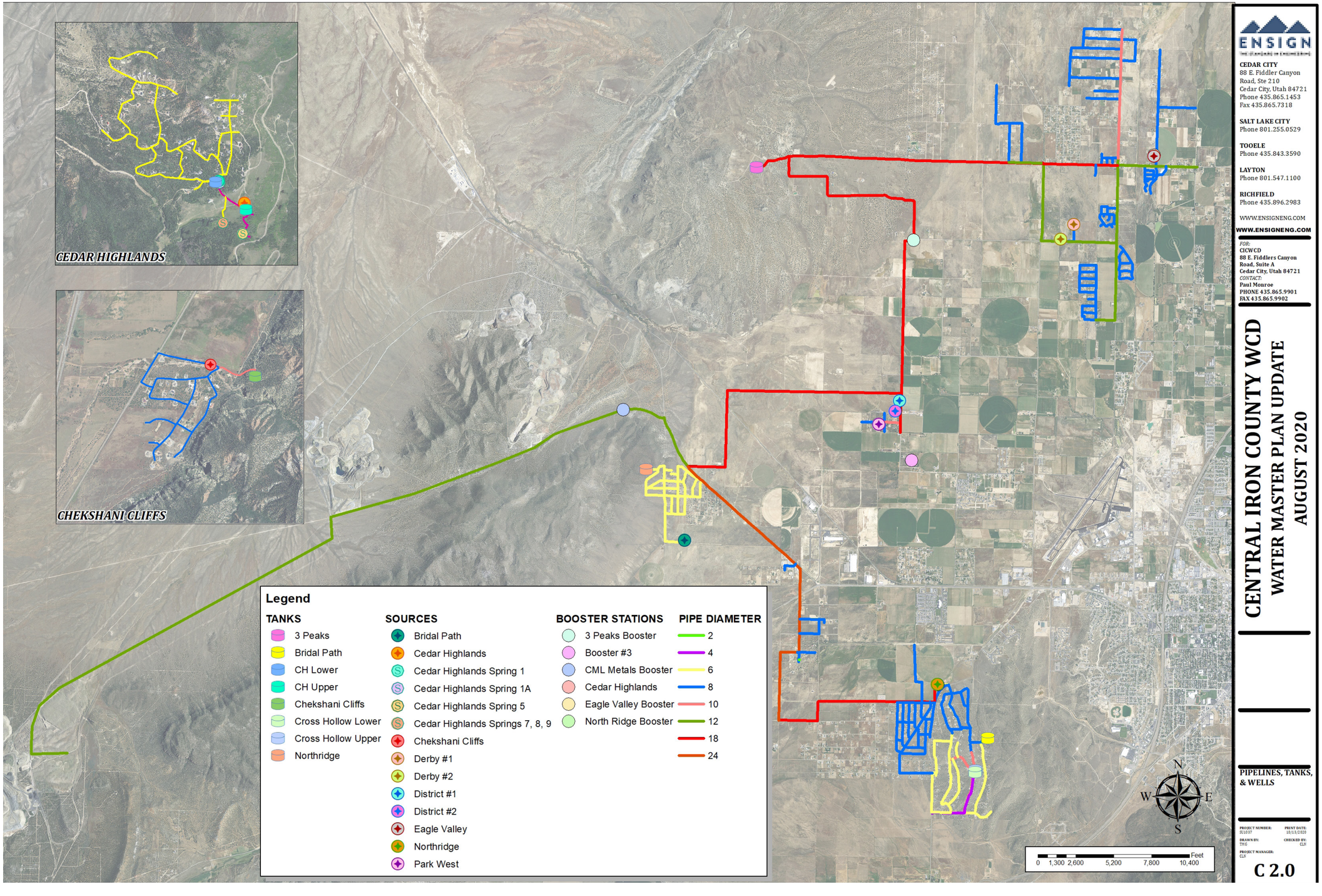
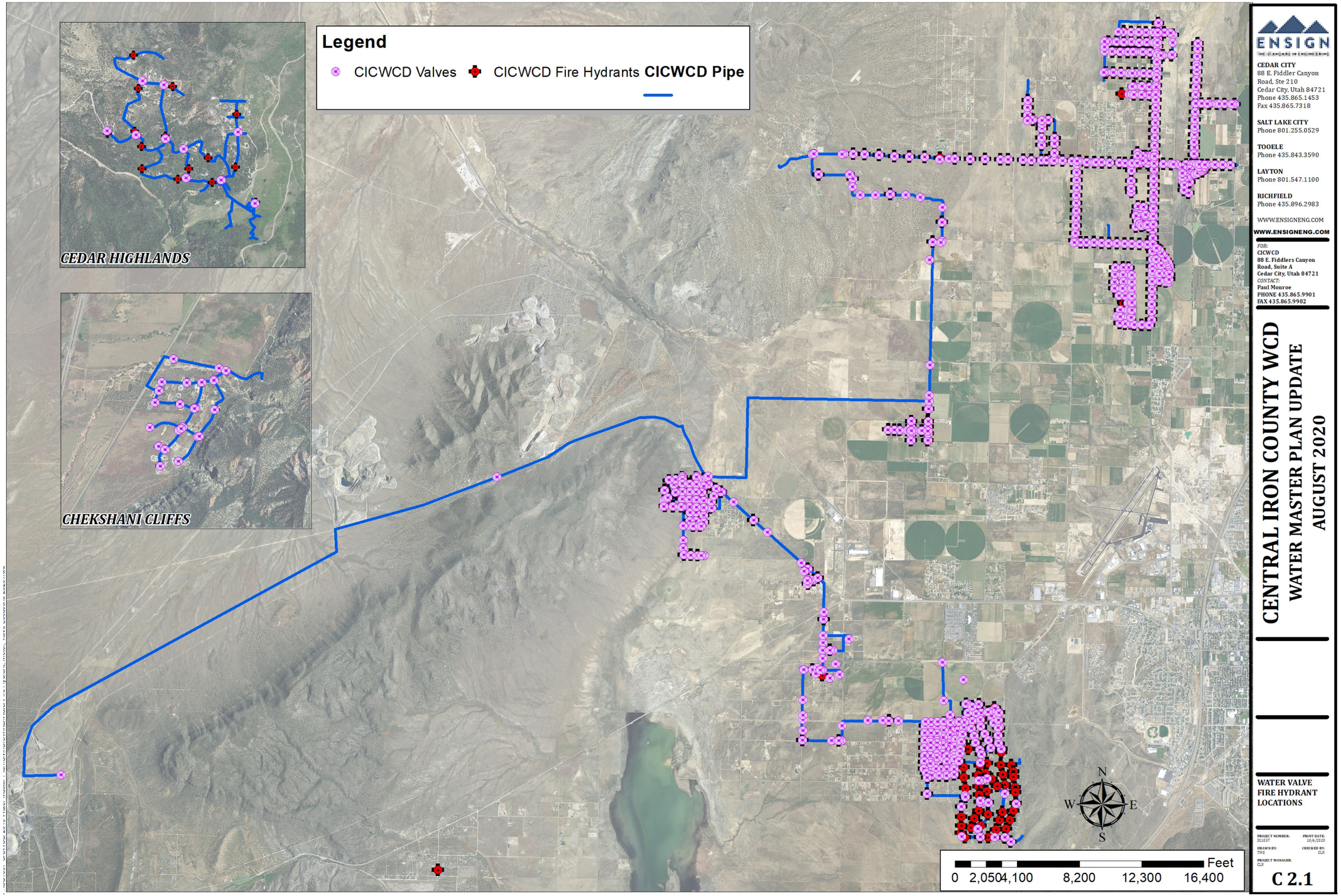
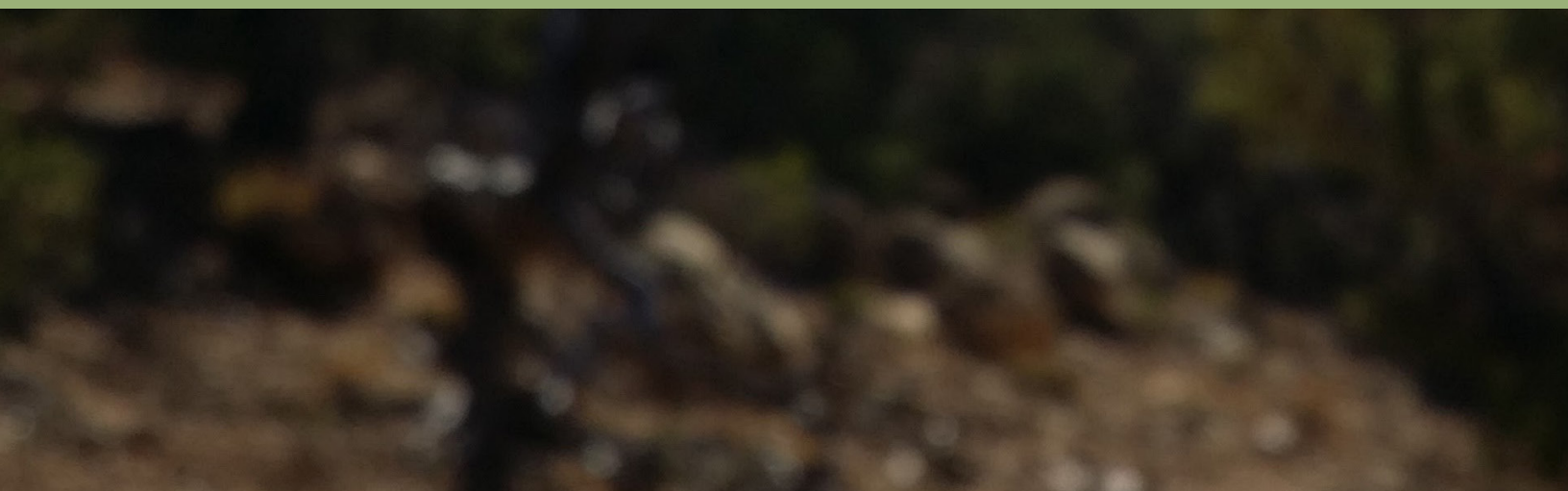


Figure 5 Water Valve and Fire Hydrant Locations



Water Rights



WATER RIGHTS

Methods

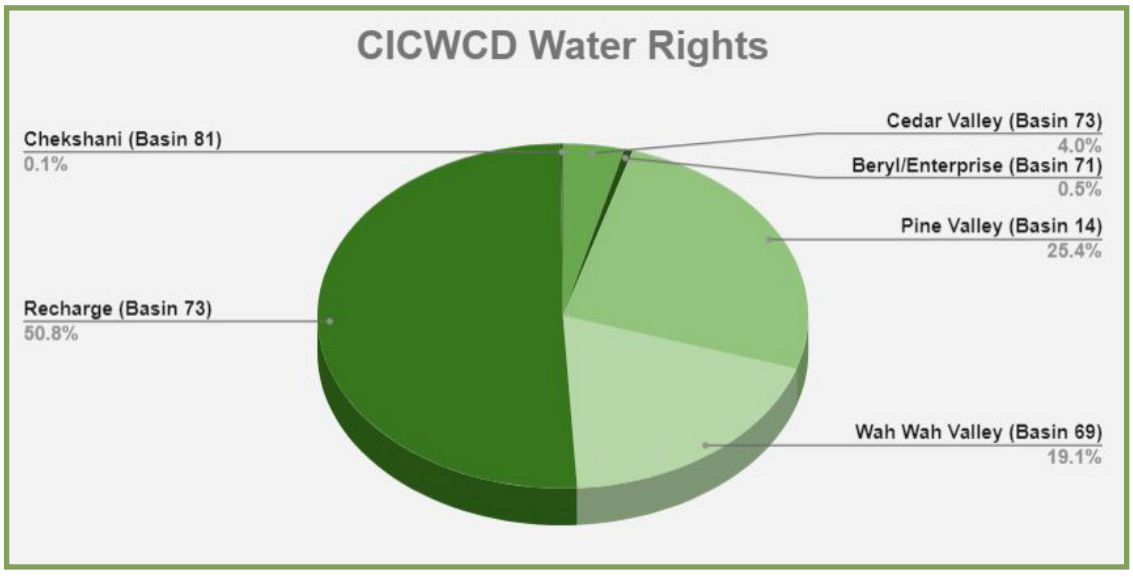
The water rights research began by searching the Utah State Division of Water Rights web page for Central Iron County Water Conservancy District. This resulted in a list of the water rights owned by the District. The list contains water right numbers, the total annual volume allotted to the water right and for what use the water right was given. Each of the water rights currently owned was closely researched during acquisition to determine adequacy of the District's allocated water amounts.

> Did you know? The Cedar Valley Aquifer annual safe yield is 21,000 acre-feet, but the withdrawal is 28,000 acre-feet per year.

Current Water Rights

CICWCD currently owns 2,390 acre-feet of water rights and an additional 30,000 acre-feet for recharge in the Cedar Valley (Basin 73). They own 85 acre-feet in Chekshani (Basin 81) and 320 acre-feet in Beryl/Enterprise (Basin 71). In 2019, the court decreed 15,000 acre-feet in Pine Valley (Basin 14) & 11,275 acre-feet in Wah Wah Valley (Basin 69), totaling 26,275 acre-feet. Reference *Figure 6 CICWCD Water Rights*.

Figure 6 CICWCD Water Rights



Water Right Dedication Policy

One acre-foot of water is insufficient to satisfy the state's water requirements for lots larger than ½ acre. *Table 11 State Requirements* shows the state's water right requirements for different lot sizes. For each of the lot sizes, the indoor use requirement remains the same. The required volume for outdoor irrigation increases as the availability of land to be irrigated increases. A user on a larger lot will likely use more water than one acre-foot of water. Water right dedications should be correlated to the possible amount of water that will be used, based on the size of the lot. Otherwise, users in the District may use more water than the District has available.

All water rights have a depletion amount. Depletion is the amount of water that can be consumed from a water right. The depletion amount depends on the use of the water. Uses like stock watering have 100% depletion and uses like irrigation have around a 50% depletion amount. [1] The depletion amount for municipal use water varies. In the past, water companies and municipalities have been able to convert irrigation water to municipal use by specifying that the depletion amount of the municipal right will remain the same as the depletion for the irrigation.

Table 11 State Requirements

Lot Size (acres)	5	2	1	0.5
Irrigated Acreage (acres)	4	1.6	0.8	0.4
Outdoor Use (AF)	6.64	2.66	1.33	0.66
Indoor Use (AF)	0.45	0.45	0.45	0.45
Total Required Water Right	7.09	3.11	1.78	1.11

CICWCD Water Right Exchange Policy

In June of 2018, the CICWCD Board passed a resolution, Resolution No. 2018-6-21-01 Water Right Exchange Rates, to adjust and increase the water rate structure. The new water rate structure will increase revenue as well as promote water conservation for high water users. Prior to the resolution, developers were required to bring in 1 acre-feet of water rights when connecting to the water system. Now, developers have an additional option: to bring in 0.8, 0.7, or 0.6 acre-feet in exchange for an adjusted conservation billing rate. This new conservation rate structure promotes water conservation by restricting the lawn size within the Subdvision's Codes, Covenants & Restrictions. *Table 13 Conservation Rate Structure* shows the water rate structure that was passed in 2018. The price per 1,000 gallons is the same for each rate; what varies is the number of gallons each level includes. Reference *Conservation Section.*

1 The remainder of the water right is assumed to return to the aquifer.

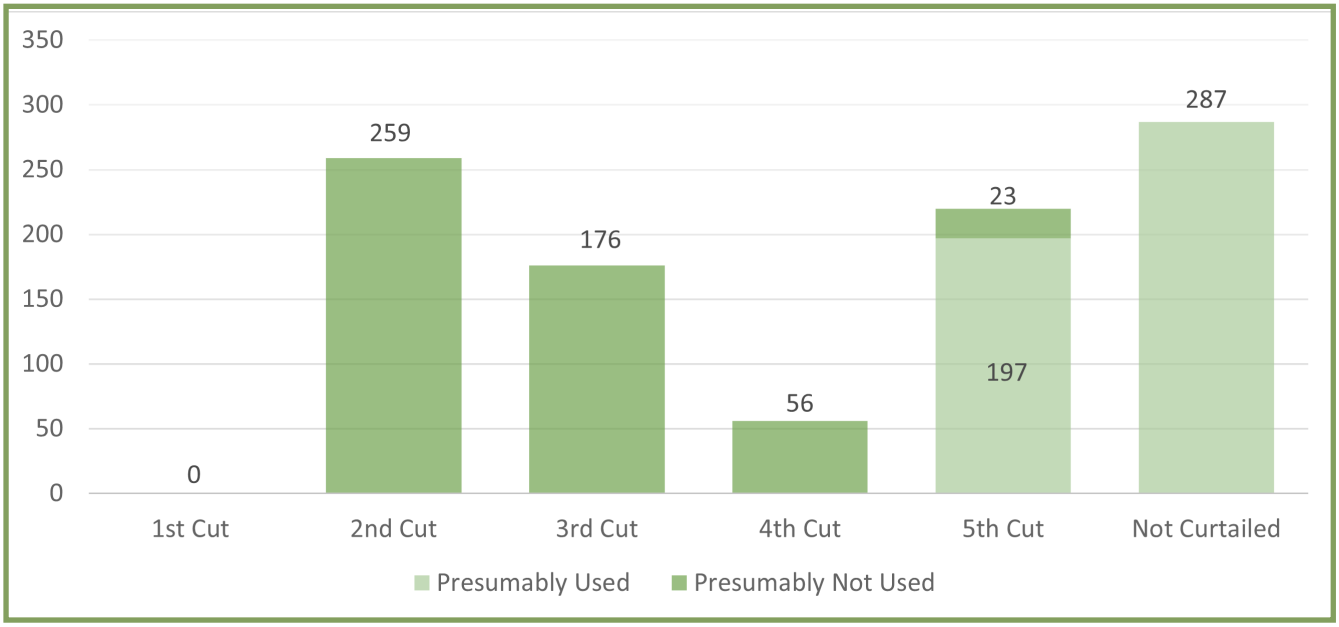
DWRi Proposed Groundwater Management Plan

The Utah Division of Water Rights (DWRi) is currently in the review process for their proposed Groundwater Management Plan (GMP) for the Cedar City Valley. The GMP was spurred by the mining and over-drafting of the aquifer, if approved would gradually reduce (in 15 or 10-year increments) the water rights in the valley to safe yield of 21,000 acre-feet. Reference *Table 12 Proposed GMP Water Right Priority Regulation Schedule*. Based on water right estimates and calculations the water rights junior to 1934 will be unavailable for use. According to this proposed plan, the CICWCD would not have water rights curtailed until the 2nd cut in 2050. Reference *Figure 7 CICWCD Water Right Depletion under Proposed GMP*.

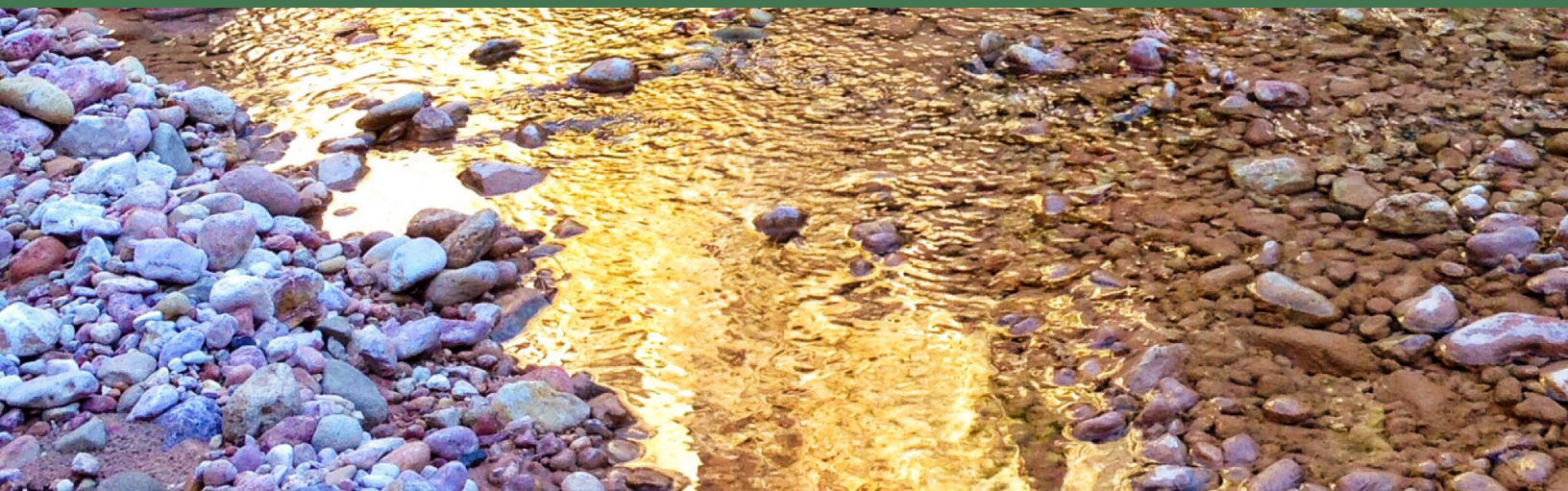
Table 12 Proposed GMP Water Right Priority Regulation Schedule

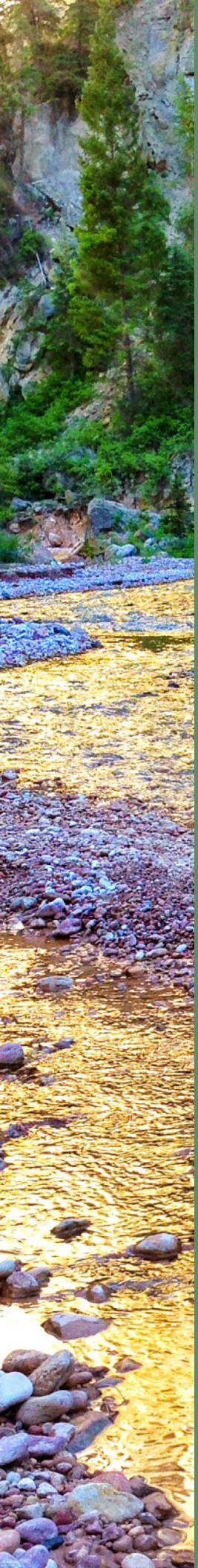
Phase	Target Date	Priority Dates Regulated Through	Acre-Feet Reduction in Estimated Depletion	Cumulative Acre-Feet Reduction in Depletion	Remaining Depletion (acre-feet)
1	January 1, 2035	December 31, 1957	5,434	5,434	45,530
2	January 1, 2050	December 31, 1954	7,330	12,764	38,200
3	January 1, 2060	December 31, 1951	8,814	21,578	29,386
4	January 1, 2070	December 31, 1935	6,761	28,339	22,625
5	January 1, 2080	July 25, 1934	1,518	29,857	21,107

Figure 7 CICWCD Water Right Depletion Under Proposed GMP



Water Conservation





WATER CONSERVATION

Introduction

The Utah legislature revised a bill in 2019 requiring water agencies with more than 500 service connections to submit a water conservation plan to the Utah Division of Water Resources. The plans are to be updated every five years. This water conservation plan is prepared to meet the Utah Board of Water Resources requirements and to address the goals of the Central Iron County Water Conservancy District (CICWCD). Water conservation is a key element to provide for CICWCD's future water needs. Conservation can delay the need for expensive water projects, preserve the environment, and save taxpayers money.

The District's water consumption was divided into residential connections and bulk connections. In the year 2019, the total residential usage for the District was 149,859,584 gallons and the District used 7,905,000 gallons for 2 wholesale/bulk-water connections. On average, the existing water system delivers 312 gallons per day (gpd) per residential connection and the average per person usage is 86 gpd per person.[1] The District and Key Stakeholders deliver an average 262 gallons per capita per day (gpcd).[2] This amount exceeds the states average in 2015 of 240 gpcd by 22 gpcd. Water consumption in Cedar Valley has reduced by 18% since 1995.

The purpose of this plan is to present a planning document for the District, which will guide its water conservation activities for the future to meet the State's Regional Water Conservation goals of 19% consumption reduction by 2030, 24% reduction by 2040, and 28% reduction by 2065 for the Lower Colorado River North Region.[3] Water conservation will benefit the District, the users, and the environment. The possible benefits include:

- Improved water service and more effective use of available water supply.
- Reduced Operation and Maintenance (O & M) costs, including lowering pumping costs.
- Development of additional water supply capabilities and diminished groundwater overdraft.
- Postponed need for new or expanded water supplies and infrastructure.
- Reduced impact of drought.
- Reduced indoor water use translates into reduced wastewater flow, which results in reduces O & M costs of Wastewater treatment facilities.
- Investigate water re-use options.

It is important to mention here that conservation can suppress water sales and lower water revenues. The revenue loss impacts can be mitigated by periodic rate adjustments if reduction occurs slowly. These adjustments would be handled similarly to operating cost increases and can be integrated into financial planning.

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1 This value is calculated from residential connections only.
2 See Financial Business Plan & Water Needs Assessment - Carollo Engineers, Inc.
3 See Utah's Regional M&I Water Conservation Goals: November 2019

Description of CICWCD Water System

CICWCD's existing water delivery system is functioning and currently delivers quality culinary water to all of its 1,221 connections (1,217 single connections and 4 wholesale/ bulk-water connections; 4,860 people). The existing system functions and serves all connections with pressures in accordance with state requirements.

CICWCD currently owns 2,390 acre-feet of water rights and an additional 30,000 acre-feet for recharge in the Cedar Valley (Basin 73). They own 85 acre-feet in Chekshani (Basin 81) and 320 acre-feet in Beryl/Enterprise (Basin 71). In 2019, the court decreed 15,000 acre-feet in Pine Valley (Basin 14) & 11,275 acre-feet in Wah Wah Valley (Basin 69), totaling 26,275 acre-feet. Reference *Figure 6 CICWCD Water Rights*.

Currently, based on 2019 usage, the District is using almost 459.91 acre-feet of residential water annually (431.76 acre-feet in central system; 20.40 acre-feet for Chekshani Cliffs; and 7.75 acre-feet for Cedar Highlands), with a total of 1,497 Equivalent Residential Connections or ERCs (1,345 ERCs in central system; 64 ERCs in Chekshani Cliffs; 88 ERCs in Cedar Highlands) on the system.

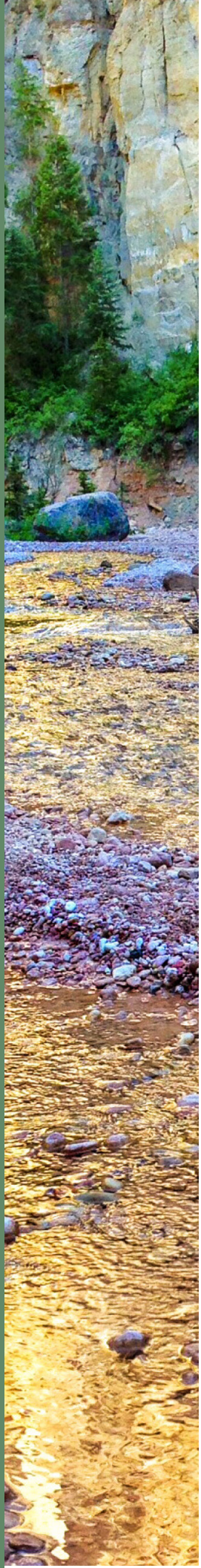
The state water source requirement is that a water system be able to produce enough water for indoor and outdoor use. Currently the District exceeds the state water source requirement by 424 gallons per minute (gpm) for the central system; 94 gpm for Chekshani Cliffs; and 27 gpm for Cedar Highlands. No additional sources need to be developed in order to meet this requirement but as growth continues, and the development of the mine increases, the CICWCD should investigate new sources for the central system.

> Did you know? Iron County's GPCD is 223, which is the 3rd lowest county water usage in the State.

The CICWCD water system has four springs and seven culinary wells to meet the peak day demand requirement. Reference *Existing System Section* which shows each well and spring with its source capacity. Source capacities were given by the current water operator. The total capacity of the springs and wells are 2,235 gpm.

Population within the CICWCD boundary experiences an average of 10.1% growth annually. Implementing the existing 1,207 residential connections with a 10.1% growth rate, by the year 2050 CICWCD will have an estimated 23,598 residential connections. This growth will require the District to increases source capacity for indoor usage to 13,110 gpm and 19,999 gpm for irrigation use totaling 33,109 gpm. [1] Goals and practices to reduce this amount will be discussed in this section.

1 This total amount does not take in any estimates for bulk connections.



Water Conservation Initiatives

Water usage within the CICWCD is primarily outdoors in the spring, summer and fall periods. Water conservation efforts by the CICWCD are therefore primarily focused on reductions in outdoor water usage. There are four different groups of water users (agriculture, public entities, businesses and residential) that use water outdoors and require different efforts to encourage reductions in water usage. CICWCD will focus its water conservation efforts on the last three groups in the order of their outdoor water usage starting with public entities and work down to individual residential users.

The majority of water, approximately 75%, used within CICWCD's service area is used for agriculture. Agricultural water users are not directly controlled by nor obtain their water from CICWCD. They use the majority of surface water within CICWCD in addition to pump water from the same aquifer that supplies water to the other three groups identified above. Current state laws governing agricultural water rights have no incentives to promote water conservation by agriculture. The CICWCD will continue to work with state extension offices to educate and encourage responsible water usage by agricultural users but has no direct control over this water usage. As the role of agriculture within CICWCD diminishes due to land acquisition for non-agricultural use, CICWCD will have more impact and ability to control water usage for these new non-agricultural uses via water prices and usage regulations.

The most effective method of promoting water conservation for individual residential users is a combination of water cost and education on water conservation measures. CICWCD encourages water conservation by using a tiered rate structure that makes water more expensive as more water is used by the consumer. The municipal water systems use this same type of tiered system. Rates must be adjusted as needed to ensure they reflect the actual cost of water delivery and system upkeep. CICWCD should educate the public on best practices for the effective use of our limited water resources. Continual education programs supported by CICWCD are in place to increase awareness of the importance of water conservation and educate the public on best practices for the effective use of our limited water resources. CICWCD urges the community to remove turf, install water efficient appliances, and participate in water conservation programs.

CICWCD has purchased modern irrigation controller for two parks within Cedar City and one in the Iron County School District at Three Peaks Elementary School. Water audits were conducted after the new controller were installed and CICWCD will compare water usage before and after to demonstrate to Cedar City and the Iron County School District how these improvements will pay back their investment in new controllers in a short period of time as well as save water in the future. Usage data for before and after the controllers are implemented is available for comparison from the Utah State University (USU) Iron County Extension. The District has also

encouraged the public entities to certify their key outdoor maintenance personnel under the Qualified Water Efficient Landscaper (QWEL) program. This program trains personnel to effectively design water application programs and monitor their use in outdoor applications.

Businesses require a slightly different approach for water conservation as a tenant, landlord and a landscape company could all be involved in the outdoor water usage at a particular business. The CICWCD intends to formulate programs to reach out to business tenant and landlords to encourage their active participation in the outdoor water use in their business or property. Free water audits can serve as a catalyst for discussions on wasted water, public image, and more efficient outdoor irrigation programs. Recommendation to use landscape maintenance companies that have certified Qualified Water Efficient Landscaper (QWEL) personnel will be made to these users and well as encouragement for local landscape companies to have staff personnel certified under the QWEL Program. Recommendations for upgrading to current state of the art irrigation controllers will be made where appropriate. CICWCD will investigate the feasibility of funding a rebate program to encourage this upgrade to more efficient irrigation controllers.

Water conservation is an ongoing effort and CICWCD will continue the above programs and add new ones as the need arises and new information is made available. Additional areas that can be explored include: encouragement to municipalities to ensure their building codes reflect water conservation ideals, turf maintenance programs that promote water efficiency, promotion of xeriscape landscaping for both new construction and remodeling, secondary water programs and other ideas to reuse water.

Residential Conservation Goals

The District can reduce per capita consumption by promoting and expanding water conservation. Currently there are many homes that do not have landscaping, but as landscaping is added water consumption per capita will increase substantially. As conservation goals and standards are integrated within the District, increase in per capita consumption can be avoided.

The State of Utah has proposed a goal to reduce the per capita water demand of the public systems throughout specific regions. The CICWCD service boundary is within the Lower Colorado River North region. The goals proposed by the state are: 19% reduction by 2030, 24% reduction by 2040, and 28% reduction by 2065.[1] To achieve this CICWCD proposes several conservation goals:

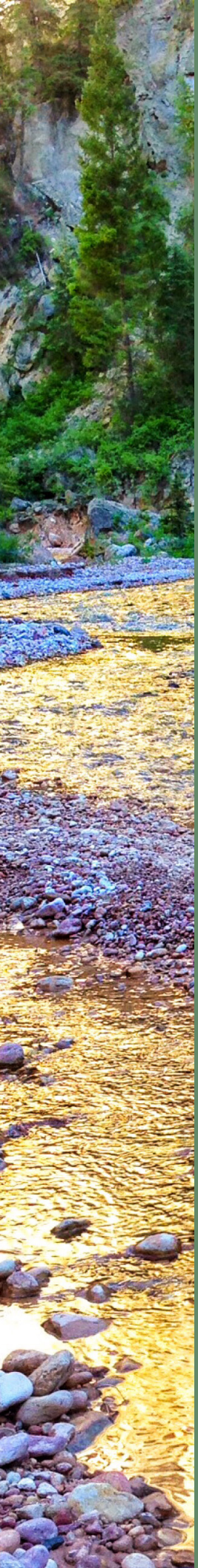
1. Reduce current consumption to 231 gpd per capita by the year 2030—a 19% reduction from the 2015 baseline. Water use in the District will increase as more residents add landscaping to their yard and as more commercial and industrial users connect to the system. CICWCD will have to introduce strict outdoor conservation measures and education to meet the states goals in the future.

2. Maintain a financially viable water system by adopting a conservation-oriented rate structure. A conservation-oriented rate structure will have the largest effect on conservation because as greater water usage becomes more expensive it encourages users to be conscientious of their use.

3. Promote xeriscaping or Localscaping for landscapes, open spaces and yards: Improved irrigation practices and water efficient landscaping can enhance the appearance of the District.

CICWCD has implemented processes to achieve the State's consumption reduction goals. These include but are not limited to water rate structure adjustments, the formation of a conservation advisory board that includes many volunteers from the surrounding communities, and community outreach and training.

1 See Utah's Regional M&I Water Conservation Goals: November 2019



Water Conservation Process

Water Rate Structure

In June of 2018, the CICWCD Board passed a resolution, Resolution No. 2018-6-21-01 Water Right Exchange Rates, to adjust and increase the water rate structure. The new water rate structure will increase revenue as well as promote water conservation for high water users. Prior to the resolution, developers were required to bring in 1 acre-feet of water rights when connecting to the water system. Now, developers have an additional option: to bring in 0.8, 0.7, or 0.6 acre-feet in exchange for an adjusted conservation billing rate. This new conservation rate structure promotes water conservation by restricting the lawn size within the Subdvision's Codes, Covenenants & Restrictions. *Table 13 Conservation Rate Structure* shows the water rate structure that was passed in 2018. The price per 1,000 gallons is the same for each rate; what varies is the number of gallons each level includes.

Table 13 Conservation Rate Structure

			Conservation Rate		
		Standard	0.8 acre-feet	0.7 acre-feet	0.6 acre-feet
	Rate	Gallons Included per Month	Gallons Included per Month	Gallons Included per Month	Gallons Included per Month
Base Rate	$31.00	No Water	No Water	No Water	No Water
Level 1	$0.78/1,000 gallons	0~12,000	0~9,600	0~8,400	0~7,000
Level 2	$0.94/1,000 gallons	12,001-20,000	9,601-16,000	8,401-14,000	7,001-12,000
Level 3	$1.65/1,000 gallons	20,001-30,000	16,001-24,000	14,001-21,000	12,001-18,000
Level 4	$2.78/1,000 gallons	30,001-60,000	24,001-48,000	21,001-42,000	18,001-36,000
Level 5	$3.09/1,000 gallons	60,001-100,000	48,001-80,000	42,001-70,000	36,001-60,000
Level 6	$4.12/1,000 gallons	100,001+	80,001+	70,001+	60,001+
			Conservation Rate Lawn Restrictions (not to exceed)		
			3,500 sq. ft.	2,500 sq. ft.	1,500 sq. ft.

Water Meter Reading and Billing

All individual water connections are metered. CICWCD currently reads meters monthly and bills monthly to customers.

CICWCD Water Conservation Advisory Committee

In 2014, the CICWCD Board created a Water Conservation Advisory Committee. The mission of this board is to promote and educate the public about water conservation initiatives. The advisory board includes members in the community who have interests in conservation, staff of the school district and local municipalities, and local experts on water conservation.

Artificial Recharge Projects

Artificial recharge is the process of spreading or impounding water on the land to increase the infiltration through the soil and percolation to the aquifer. The process Recharge is used to manage excess runoff-water, prevent flooding and downstream erosion, and improve water quality. The District has been involved in many recharge projects including: Quichapa Recharge, Western Rock Recharge, Schmidt Pit Recharge, Airport Recharge, Horse Alley Recharge, and Enoch Graben Recharge. The recharge amounts are metered and live flow data can be found on the District website: cicwcd.org.

Quichapa Recharge Project

The Quichapa Recharge Project is one of the most complex of the recharge facilities in Cedar Valley. In 2017, the District, in conjunction with Cedar City, Iron County, and local property owners, broke ground on this project. The water is first diverted from coal creek into a settling area which feeds into the "lazy river". The "lazy river" was designed so that the dirt and other substances in the water can settle and not be taken downstream. After, it moves through the lazy river, it is pumped to a settling basin where it is able to seep into the ground, or it can be diverted to an agricultural operation and used for irrigation.

Western Rock Recharge

Many of the recharge projects are located in old gravel pits. The old Western Rock gravel pit is one of the largest of the gravel pits in the Cedar Valley. During the high spring runoff of 2019, it is estimated that 6,000 acre-feet was added to the aquifer at Western Rock.

Schmidt Pit Recharge

The Schmidt Pit is also an old gravel pit located near the Western Rock Pit. A diversion structure and monitoring system was installed in 2018 to divert water during winter run off. The Schmidt Pit is the primary recharge location during the winter.

Airport Recharge Facility

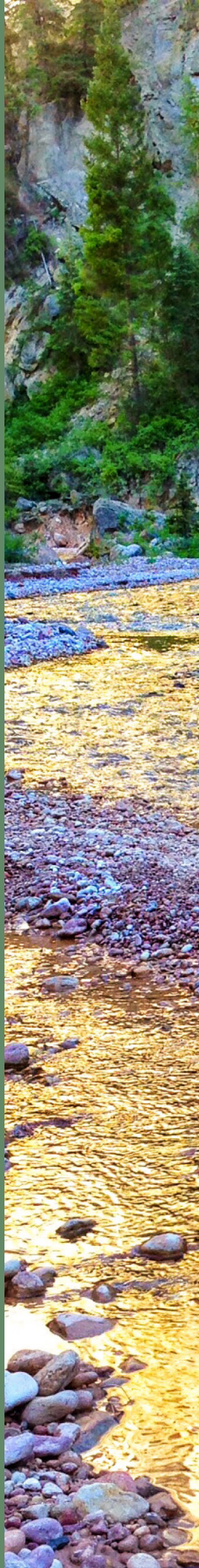
Cedar City is the creator of the Airport Recharge Facility. Throughout the years, thousands of acre-feet of water have been added into the Airport Recharge Facility. The recharge pit covers approximately 5 acres of land within the Cedar City Regional Airport.

Horse Alley Recharge

CICWCD in cooperation with Cedar City utilized an area where fill was taken to make improvements to the airport runway. It is estimated to cover approximately 3 acres of land and up to 6 feet deep. A discharge was constructed to allow excess water to pass through and continue to irrigators and other recharge projects.

Enoch Graben Recharge

The area of recharge is where springs used to flow. The springs have dried up due to ground water pumping of the aquifer. This project was made possible with the help of the Worth Grimshaw Family and Enoch City



Areas of Concentration

1.Explore ideas to encourage water conservation within the agricultural community.

   a. In 2018, the CICWCD received a grant from the Legislature to assist in the retrofitting of Agricultural Producer's Center Pivot System to water efficient LEPA/LESA spray application nozzles. Through this grant, approximately 2,000 acres of farmland was converted to water efficient irrigation systems.

2. Provide awareness to the community that the Utah Division of Water Rights has proposed a draft Groundwater Management Plan that will gradually reduce water rights in the Cedar City Valley to safe yield of 21,000 acre-feet.

3. Help Cedar City and Enoch construct a reuse system for the WasteWater Treatment Plant.

4. Contact large non-agricultural outdoor water users (Cedar City, Enoch City, Southern Utah University, Iron County School District, and churches) to determine what water conservation activities are in place and what improvements can be made.

   a. Review city ordinances on landscape requirements and suggest changes as necessary to promote water conservation.

5. Involve the community by holding annual water events. These will preferably be sponsored events where CICWCD will educate and promote water conservation within the community.

   a. CICWCD holds an annual community Water Festival to promote water conservation and educate the community on the importance of water.

   b. CICWCD has implemented an annual Fourth Grade Water Fair for students in the Iron County School District in coordination with the USU Extension Office.

6. Promote water-wise landscaping methods, such as xeriscaping and Localscapes.

   a. The CICWCD became a Localscapes partner in September 2019 and began holding yearly classes for the community in March 2020.

7. Expand promotion of programs such as Utah's Choice, Water Wise Plants, Slow the Flow, Utah Water Savers and WaterSense. CICWCD should also promote, research, and evaluate successful water conservation programs that have been implemented in other western communities.

   a. Utah Water Savers currently provides rebates in the Cedar Valley area for Smart Irrigation Controllers and WaterSense Toilet replacements.

   b. Work with local nurseries and garden centers to promote the Water Wise Plants program and plants that are adapted for our area and climate zone.

8. Construct an Outdoor Irrigation Usage Audit form to assist users in quantifying the existing system configuration and areas that can be improved for water conservation.

   a. CICWCD currently partners with Utah State University Extension to conduct lawn irrigation system water checks for Iron County residents.

9. Contact the Iron County Home Builders Association to determine their policies and guidance to contractors on water conservation programs in new construction homes and provide training and assistance in formulation of a strong water conservation policy for new construction homes.

    a. Promote the use of the CICWCD Water Right Exchange Rates which restricts lawn sizes.

10. Apply for Department of the Interior Bureau of Reclamation matching Grants under the WaterSmart program:

    a. Water and Energy Efficiency Grants – For projects that save water, improve energy efficiency, address endangered species and other environmental issues, and facilitate transfers to new uses.

    b. Title XVI – Water Reclamation & Reuse Program - Title XVI of P.L. 102-575, as amended (Title XVI), provides authority for Reclamation's water recycling and reuse program, titled "Title XVI." Through the Title XVI program, Reclamation identifies and investigates opportunities to reclaim and reuse wastewaters and naturally impaired ground and surface water in the 17 Western States and Hawaii. Title XVI is budgeted for by Reclamation's regional offices and includes funding for planning studies and the construction of water recycling projects, on a project specific basis, in partnership with local governmental entities.

    c. System Optimization Review Grants – A System Optimization Review is a broad look at system-wide efficiency focused on improving efficiency and operations of a water delivery system, water district, or water basin. The Review results in a plan of action that focuses on improving efficiency and operations on a regional and basin perspective.

    d. Advanced Water Treatment and Pilot and Demonstration Project Grants – For pilot and demonstration projects that address the technical, economic, and environmental viability of treating and using brackish groundwater, seawater, impaired waters, or otherwise creating new water supplies within a specific locale.

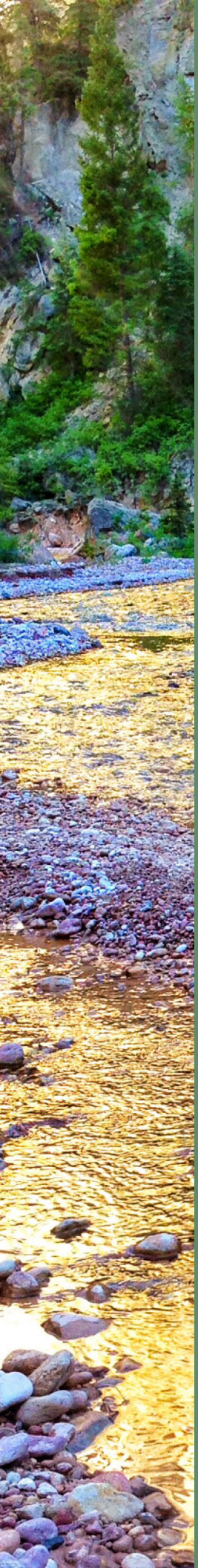
    e. Basin Studies - Basin Studies addresses basin-wide efforts to evaluate and address the impacts of climate change. Funding is available for comprehensive water studies that define options for meeting future water demands in river basins in the western United States where imbalances in water supply and demand exist or are projected.

11. Improve CICWCD web page on Water Conservation.

12. Development of Consumer information and rebate programs to promote outdoor water conservation.

    a. Landscape Irrigation Certification Rebates – rebates to cover part of the certification cost for landscape Irrigation through the Irrigation Association (IA):

        i. Certified Irrigation Contractor - install, maintain, and repair irrigation systems.



ii. Certified Irrigation Designer - establish specifications and design drawings for irrigation projects. IA certifies irrigation designers in six specialties. Landscape/turf specialties include commercial, golf course and residential irrigation; agriculture specialties include sprinkler, surface, and drip-micro irrigation.

iii. Certified Landscape Irrigation Auditor - gather irrigation water-use data and test landscape irrigation systems.

iv. Certified Landscape Water Manager - evaluate, operate, manage, and improve landscape irrigation systems to achieve the highest level of water conservation possible.

v. Qualified Water Efficient Landscaper (QWEL) - The Qualified Water-Efficient Landscaper (QWEL) program provides twenty hours of educational materials designed to provide a better understanding of landscape water management for the landscape industry.

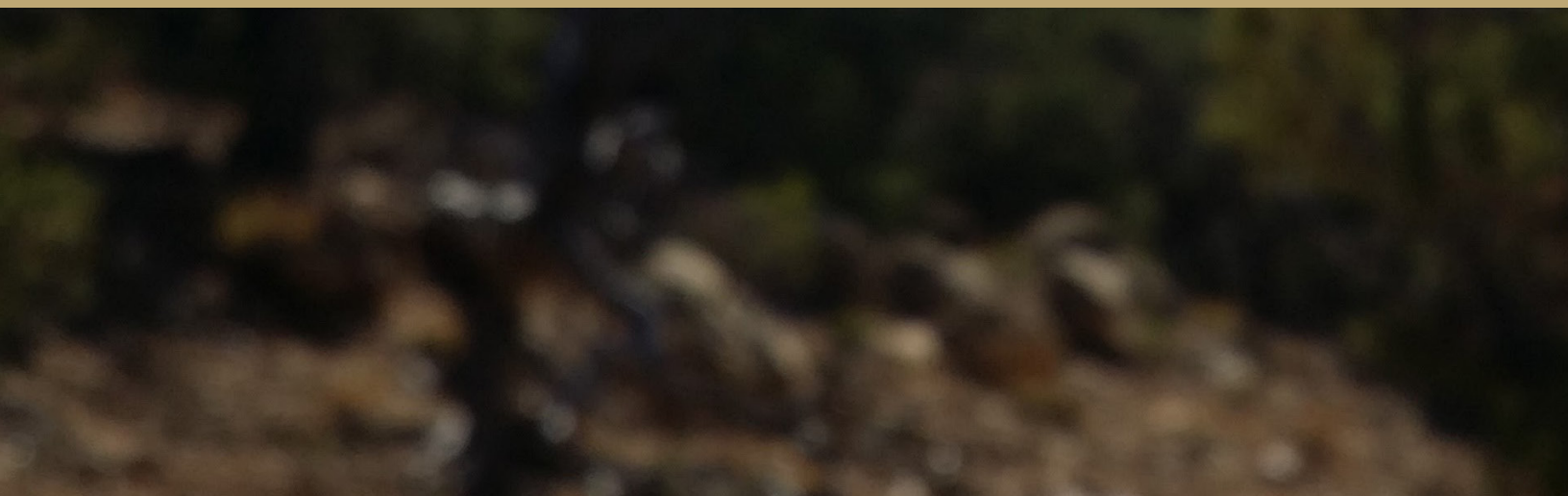
13. Explore ideas for water reuse and recycling such as Rainwater Harvesting.

Linking With Useful Internet Sites

CICWCD created a website that is used for posting monthly District-wide water consumption, recommended lawn-watering rates and times, and other water conservation-related information. The District's website will display links to the following useful sites, which District residents could visit to learn about different strategies for water conservation.

- (http://www.conservewater.utah.gov): Utah Division of Water Resources site.
- (www.watereducation.utah.gov/): Sites for Water Conservation for Kids
- (http://www.awra.org): The American Water Resources District is an excellent source of water-related information and literature.
- (http://www.waterlink.co.uk): British website for scrutinizing every detail of water consumption, and water auditing.
- (http://extension.usu.edu/): There are drought resistant and water conserving plants listed on this website.
- (http://www.epa.gov/watersense): How to Conserve Water and Use It Effectively (EPA).
- (https://localscapes.com/): Utah website introducing Localscapes lawn care.
- (https://slowtheflow.org): How to conserve water.
- (https://utahwatersaver.com): Website for water rebate programs for Utah.
- (https://cwel.usu.edu/irrigation): Center for water-efficient landscaping website.

Existing Distribution System Water Model



EXISTING DISTRIBUTION SYSTEM WATER MODEL

Existing System Hydraulic Model

The distribution system computer model was developed in Haestad Methods WaterCAD which allowed the system to be graphically input into the program. Once the water system pipes, wells and storage tanks were in the model, the attributes of each individual component were entered. The details included pipe material, length of pipes, elevation of the ends of each pipe, slope of each pipe, and storage tank location, size, and elevation. CICWCD's water system was analyzed using the Hazen-Williams method. This method allowed for the head loss (friction loss) for each pipe, valve, and fitting to be calculated, and is a commonly used method for water system master planning. Once the model was fully developed, the existing system was then analyzed to determine the current system performance, and assess problem areas and potential weaknesses in the distribution system.

Model Calibration

Ensign Engineering coordinated with the District while conducting pressure tests at fire hydrants throughout the District to calibrate the model. The values found in the model for these locations were within 5% of the actual pressure tests, which was sufficient to be able to give an adequate level of confidence in the computer model.

Existing System Model Results

Three different scenarios were run in the model: first, peak day demand; second, fire flow; and third, peak instantaneous demand. To add these demands to the system, nodes were inserted at valve and fire hydrant locations and elevations and assigned ERCs. Peak day demand includes flows for both indoor and outdoor use and models how the system functions during the summer. The water system will function at or below peak day demand 80% of the time. Peak instantaneous demand is the highest water demand that the system will see during a year. Fire flows assume a fire occurs during peak day demand use. The design of a water distribution system is controlled by either peak instantaneous demand or fire flows. A map of the existing system is shown in *Figure 4 CICWCD Tanks, Wells, and Waterline Locations*.

The first scenario was peak day demand. Peak day demand shows the pressures in the system that would occur for water demands during a peak day. Flows for the peak day demand are in gallons per day and match the state demand requirements (Reference *State Requirements Section*). The resulting pressure from the peak day demand scenario is show in *Figure 8 Peak Day Demand*. For peak day demand, the majority of the pressures in the system are in the acceptable range of 40 to 120 psi.

The second scenario was for fire flows. Cedar City Fire Department requires a minimum flow of 1,000 gpm at minimum pressure of 20 psi during a peak day demand. *Figure 9 Peak Instantaneous Demand* shows the nodes that were and were not able to deliver required fire flows. These problem areas include the most of the southern zone, the newer developed in the northern zone, and the connections serviced outside of the District boundary.

The third scenario was for peak instantaneous demand. The peak instantaneous demand is in gallons per minute and is 1.5 times the peak day demand for indoor use and 2 times peak day demand for outdoor use. The resulting pressure from the peak instantaneous demand scenario is show in *Figure 9 Peak Instantaneous Demand*. In this scenario all pressures exceeded the minimum pressure constraint of 30 psi.

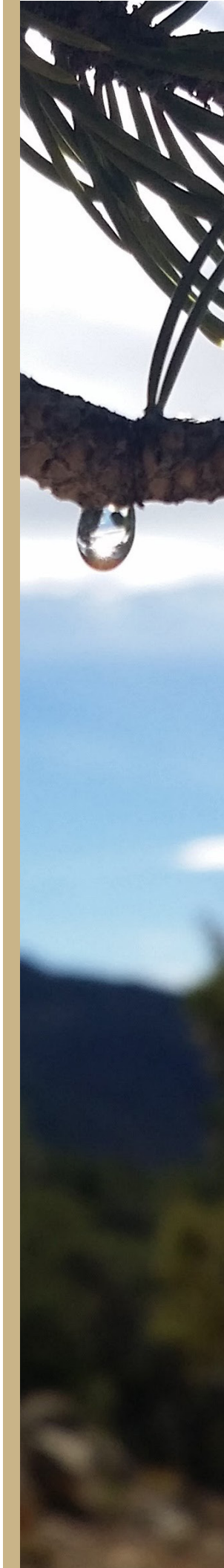
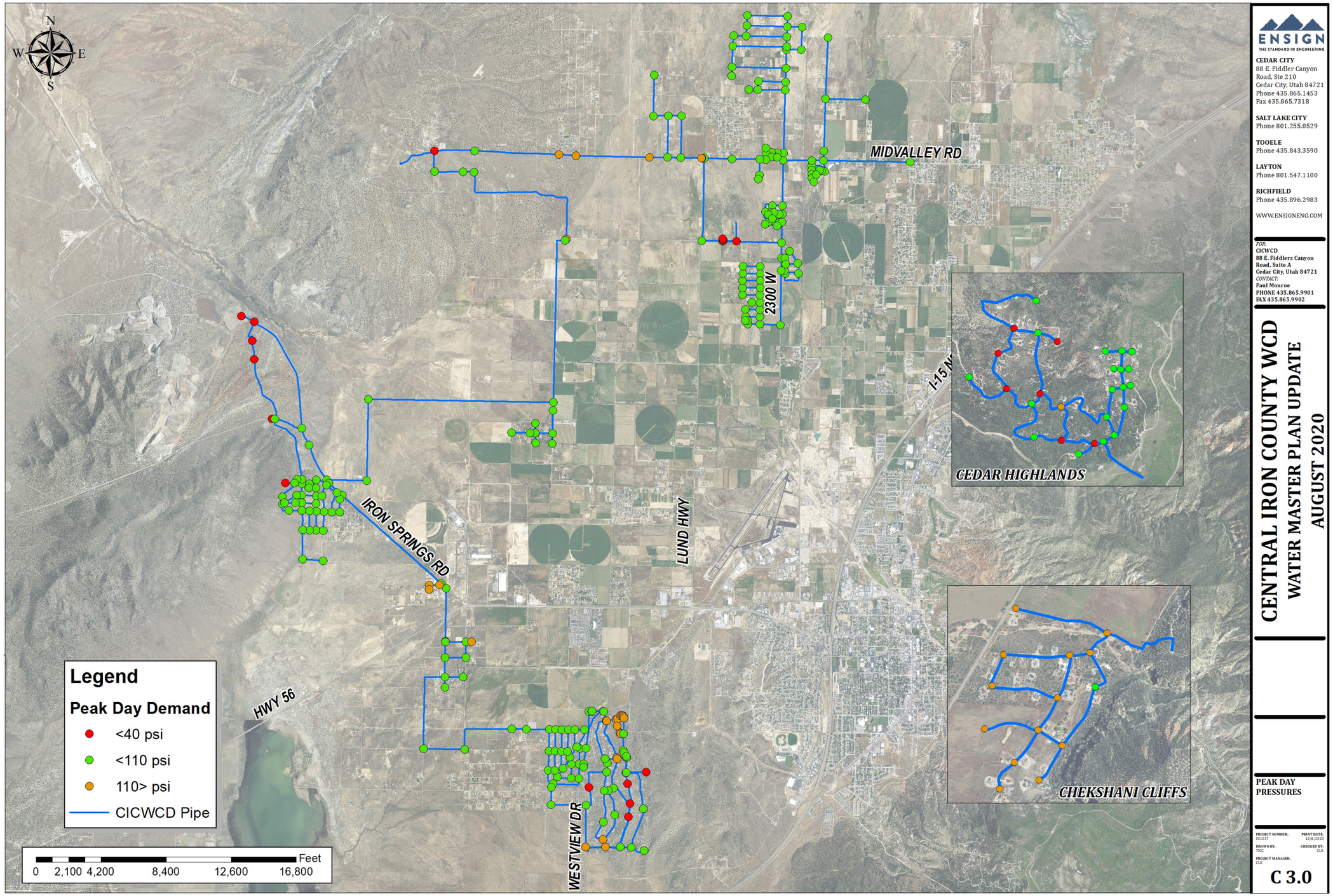


Figure 8 Peak Day Demand



ENSIGN
THE STANDARD IN ENGINEERING

CEDAR CITY
88 E. Fiddler Canyon Road, Ste 210
Cedar City, Utah 84721
Phone 435.865.1453
Fax 435.865.7318

SALT LAKE CITY
Phone 801.255.0529

TOOELE
Phone 435.843.3590

LAYTON
Phone 801.547.1100

RICHFIELD
Phone 435.896.2983

WWW.ENSIGNENG.COM

FOR:
CICWCD
88 E. Fiddlers Canyon Road, Suite A
Cedar City, Utah 84721
CONTACT:
Paul Monroe
PHONE 435.865.9901
FAX 435.865.9902

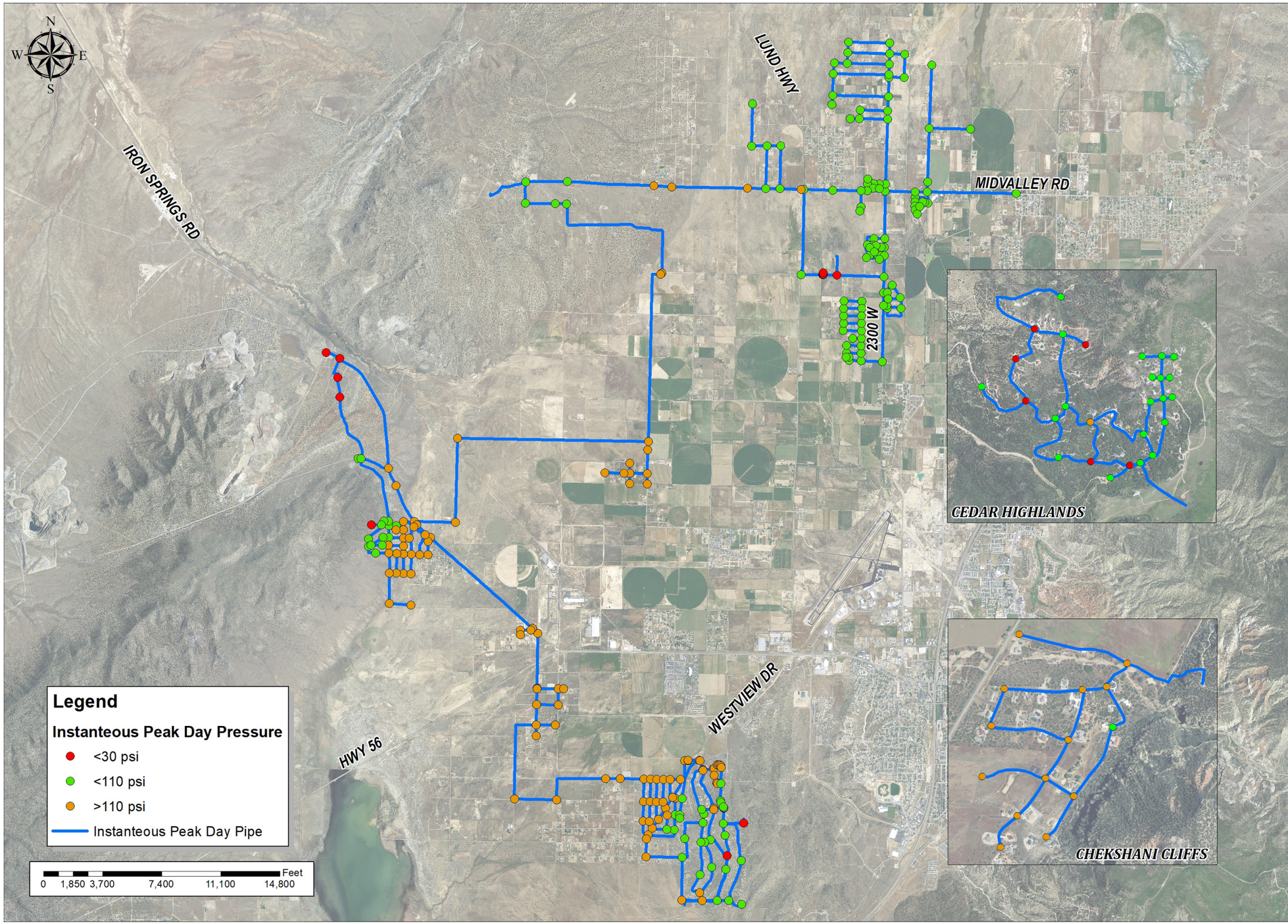
CENTRAL IRON COUNTY WCD
WATER MASTER PLAN UPDATE
AUGUST 2020

PEAK DAY PRESSURES

PROJECT NUMBER: SU1037 | PRINT DATE: 10/6/2020
DRAWN BY: TYG | CHECKED BY: CLN
PROJECT MANAGER: CLN

C 3.0

Figure 9 Peak Instantaneous Demand



ENSIGN
THE STANDARD IN ENGINEERING
CEDAR CITY
88 E. Fiddler Canyon Road, Ste 210
Cedar City, Utah 84721
Phone 435.865.1453
Fax 435.865.7318
SALT LAKE CITY
Phone 801.255.0529
TOOELE
Phone 435.843.3590
LAYTON
Phone 801.547.1100
RICHFIELD
Phone 435.896.2983
WWW.ENSIGNENG.COM

FOR:
CICWCD
88 E. Fiddlers Canyon Road, Suite A
Cedar City, Utah 84721
CONTACT:
Paul Monroe
PHONE 435.865.9901
FAX 435.865.9902

CENTRAL IRON COUNTY WCD
WATER MASTER PLAN UPDATE
AUGUST 2020

PEAK INSTANTANEOUS PRESSURES

PROJECT NUMBER: 311037
PRINT DATE: 10/6/2020
DRAWN BY: TYG
CHECKED BY: CLN
PROJECT MANAGER: CLN

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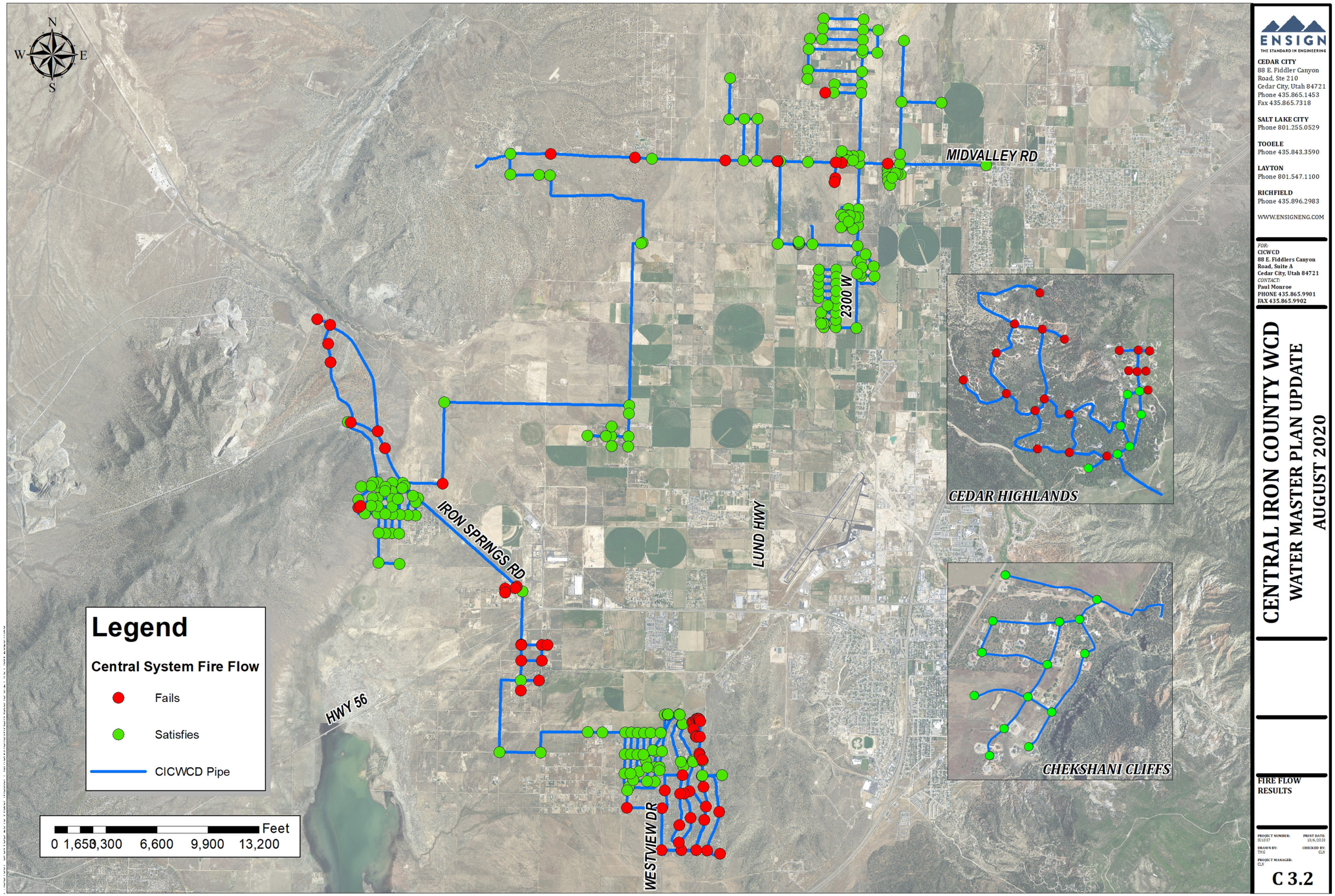
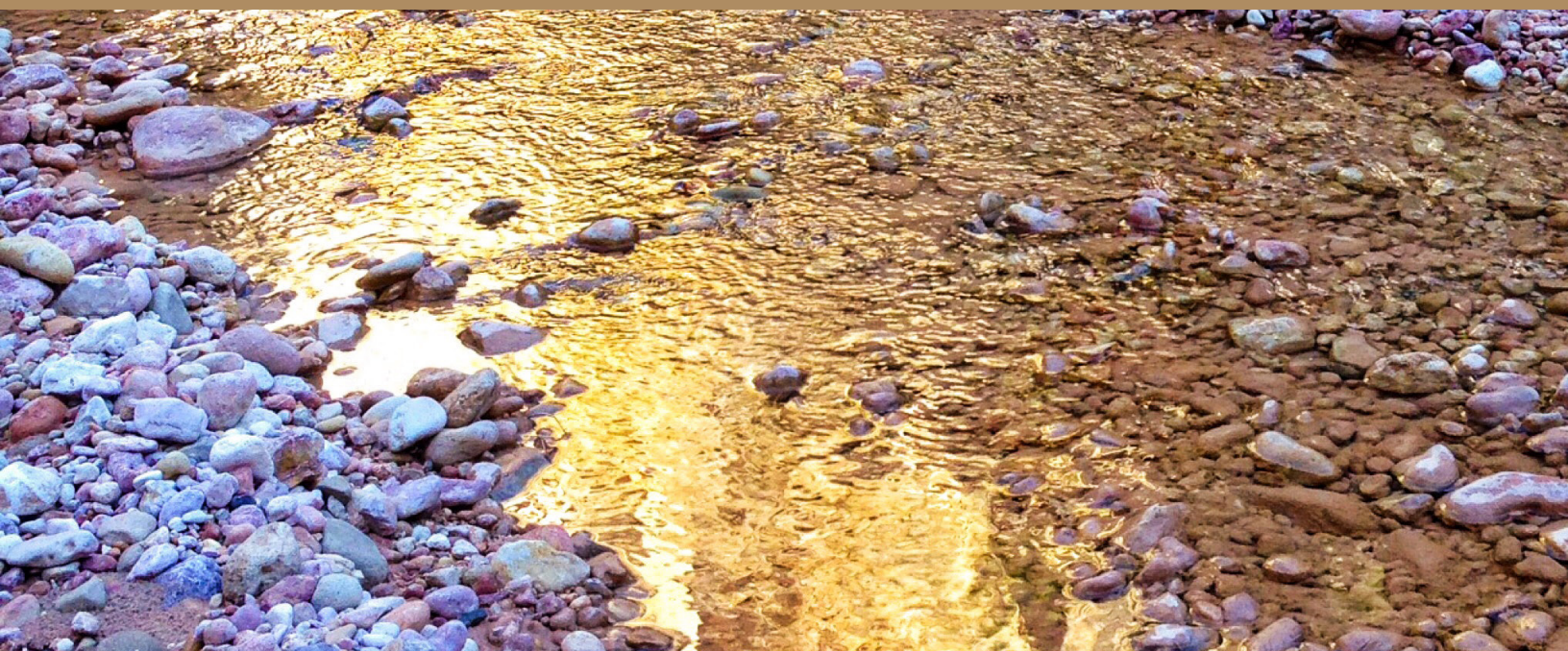
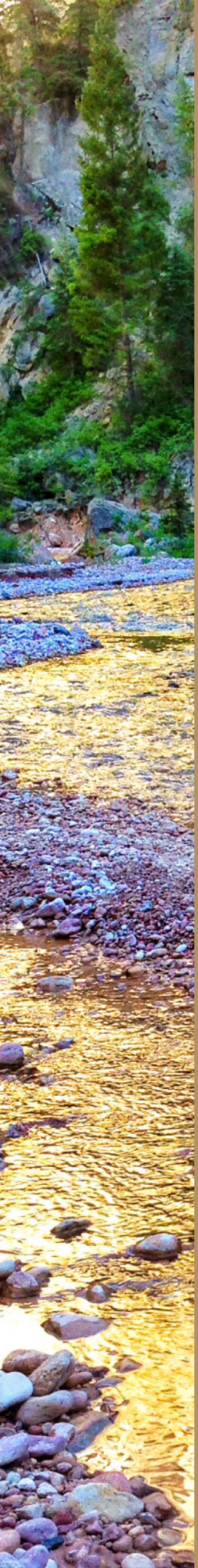
Figure 10 Fire Flow Results



Future Outlook



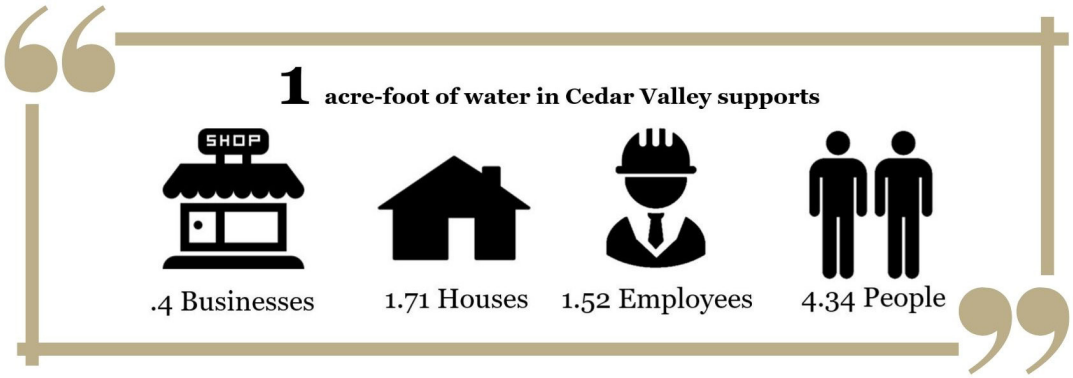


FUTURE OUTLOOK

Background

According to the DWRi estimates, Cedar Valley is using approximately 28,000 acre-feet per year (AFY). However, the safe yield of water in the valley is approximately 21,000 AFY. This results in a 7,000 AFY deficit. Additionally, there are over 50,000 AFY of approved water rights in the basin.

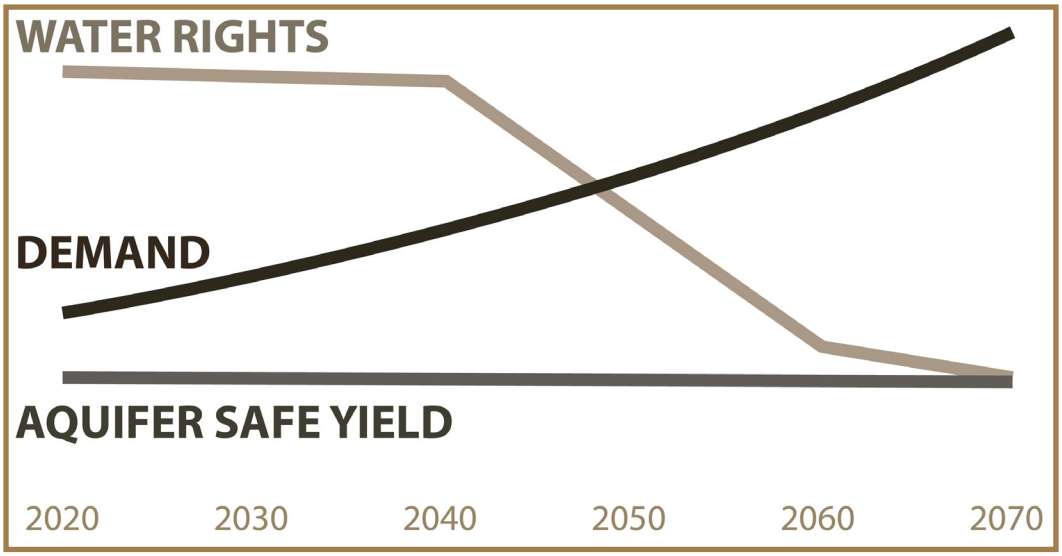
The DWRi is currently in the review process for their proposed Groundwater Management Plan (GMP) for the Cedar City Valley. The GMP was spurred by the mining and overdrafting of the aquifer, and if approved would gradually reduce water rights in the valley to safe yield of 21,000 AFY. Based on water right estimates and calculations the water rights junior to 1934 will be unavailable for use. Reference *Water Right Section.*



Current Trends

Current trends in Cedar Valley show that population is growing at a high rate, but water levels are slowly lowering. *Figure 11 Cedar Valley Water Supply vs. Demand* shows the water trends in relation to demand and water rights that will potentially be curtailed the DWRi Groundwater Management Plan.

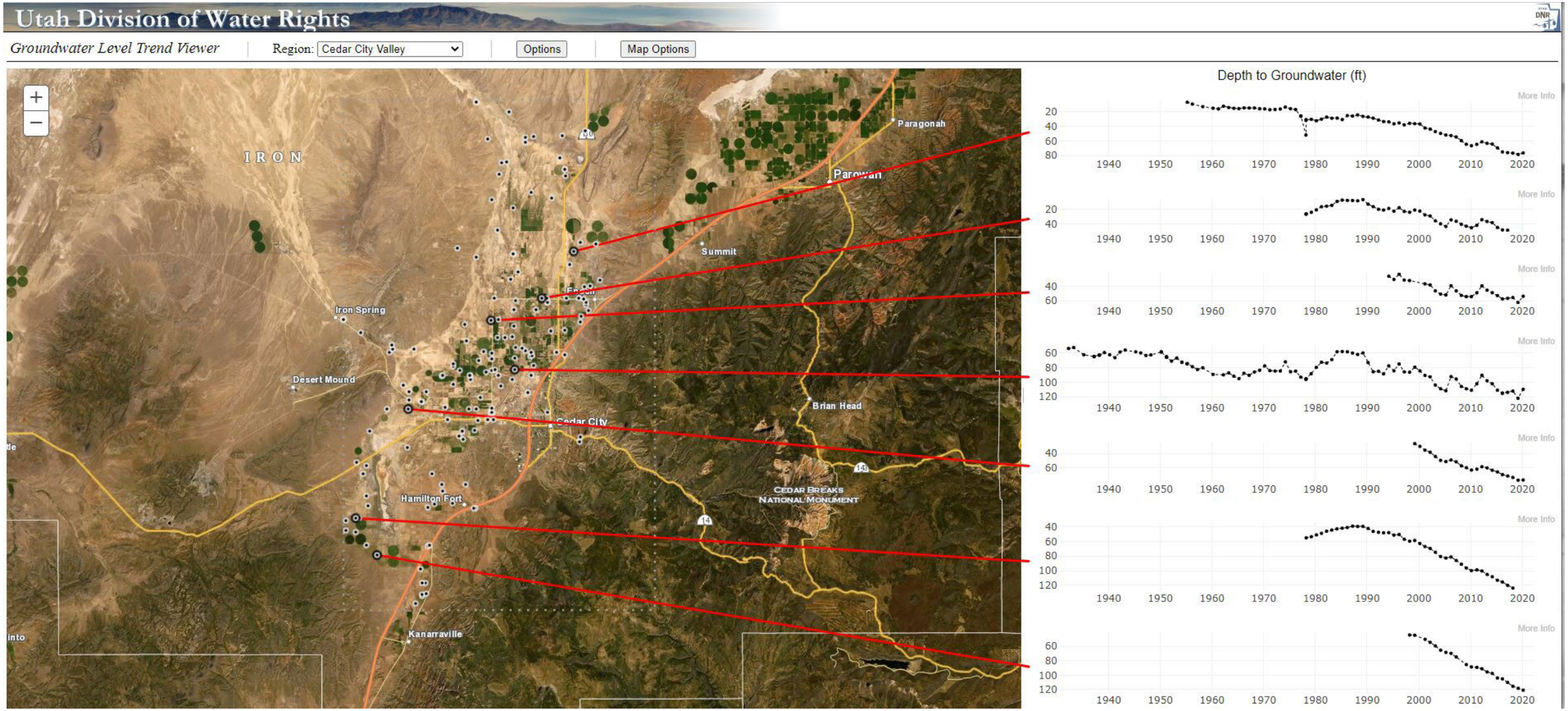
Figure 11 Cedar Valley Water Supply vs. Demand



The greatest amount of discharge from the aquifer occurs through well withdrawals that supply municipal and agricultural use. Following well withdrawals (greatest to least) are evapotranspiration and subsurface outflow. Overall recharge of the Cedar Valley occurs through the following (greatest to least): seepage from stream, canals, and surface water irrigation, mountain precipitation seepage, and inflow from Parowan, Utah.[1] *Figure 12 Groundwater Level Trend* is taken from the DWRi website and shows the declining of wells throughout the Cedar Valley.

1 Utah Division of Drinking Water

Figure 12 Groundwater Level Trend



The Water Needs Assessment[1] for the Cedar Valley was created to show population projections and water demands out to the year 2070. Estimates are based on the 2012 projections from the Governor's Office of Management and Budget. Budget estimates are only projected to 2060 so to reach the 2070 numbers were interpolated to extend to that date. Currently there are an estimated 43,665 people within CICWCD service area. Projections estimate that by the year 2070 there will be 143,100 people within the service area. Population projections will continue to be monitored and updated as they tie directly to water use and consumption

Figure 13 Iron County Population Projections and Water Usage

POPULATION												
	Historical (past 5 years)						Projected						
	2014	2015	2016	2017	2018		2020	2030	2040	2050	2060	2070	Notes
CICWCD Total County Service Area	2,200	1,910	1,700	3,095	4,545		52,890	66,454	80,744	98,074	118,466	143,098	Historical pop. per CICWCD Water Reports; Projections at 92.7% of GOMB 2012 Iron County pop. projection; 2050-2060 growth % used to estimate 2070. Note: Univ Utah 2017 forecasts a much lower County pop. (e.g., 89,599 total Iron County in 2065), but no City-level info in that projection.
CICWCD % of Service Area Connected							60%	70%	80%	90%	100%	100%	Estimates per District / Ensign (Sep. 2019).
CICWCD Retail Customers	2,200	1,910	1,700	3,095	4,545		5,642	7,890	10,009	12,213	14,048	13,788	CICWCD Total County Service Area minus Cedar City, Enoch City, and Kanarraville (mult. by % connected).
Cedar City	29,162	29,483	30,184	31,223	31,806		35,666	44,812	54,448	66,135	79,886	96,496	Historical pop. Per Cedar City Water Report 2018; GOMB 2012 City pop. projections through 2060; 2050-2060 growth % used to estimate 2070.
Enoch City	6,086	6,237	6,539	6,756	6,959		7,382	9,921	13,334	17,919	24,082	32,364	Projections through 2050 per Enoch City Impact Fee Plan 2018; 2060 and 2070 extrapolated at 3% growth/year.
Kanarraville	355	355	355	355	355		439	450	450	450	450	450	Current census estimate used for historical. GOMB 2012 projections through 2020; 2030+ assumed constant at 450 per Town "no additional annexation" policy.
TOTAL SERVICE AREA POP.	**37,803**	**37,985**	**38,778**	**41,429**	**43,665**		**49,129**	**63,073**	**78,241**	**96,717**	**118,466**	**143,098**	

The population model *(Reference Figure 14 Growth Projections)* demonstrates the potential growth of the Cedar Valley Aquifer area. Figure 20 & 21 are more models of the anticipated water usage and shortages that could occur due in part to the growing population and the possibility of the ground water management plan implemented by the State Engineer. *Figure 15 and 16* demonstrate the drawdown and anticipated water shortages due in part to the overallocation of water rights in the valley and the usage from the potential growth of population that is forecasted to happen. The future needs of the community as well as keeping the agricultural industry supplied with water is the goal of CICWCD and its major stakeholders. *Figure 11, 14, 15, and 16* were taken from the Financial Business Plan & Water Needs Assessment.

1 Pine Valley Water Supply & Conservation Project: Financial Business Plan & Water Needs Assessment – Carollo
Engineers, Inc. – June 2020

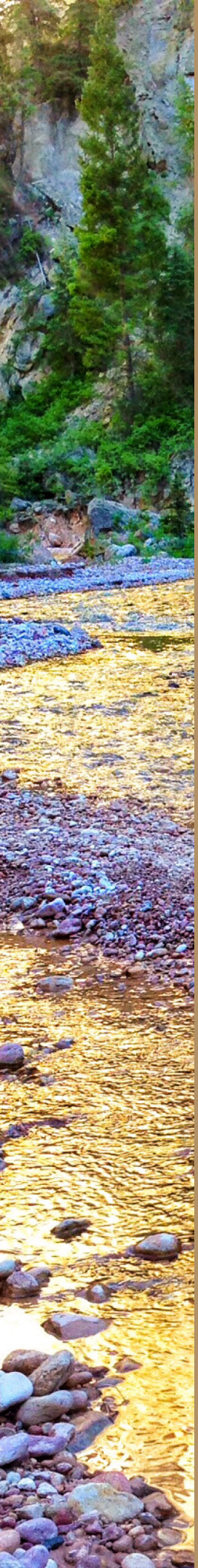


Figure 14 Growth Projections

Table 2.1 Historical Service Area Population

	2014	2015	2016	2017	2018
CICWCD Retail[1]	2,200	1,910	1,700	3,095	4,545
Cedar City[2]	29,162	29,483	30,184	31,223	31,806
Enoch City[3]	6,086	6,237	6,539	6,756	6,959
Kanarraville[4]	355	355	355	355	355
Total Service Area[5]	**37,803**	**37,985**	**38,778**	**41,429**	**43,665**

Notes:
(1) Source: CICWCD annual water reports.
(2) Source: Cedar City 2018 water report.
(3) Source: Enoch City water reports and Enoch City 2018 Impact Fee Plan.
(4) Source: 2010 United States Census Bureau estimate.
(5) Sum of rows may not equal total shown due to rounding of decimals.

Table 2.2 Projected Service Area Population

	2020	2030	2040	2050	2060	2070
CICWCD Total County Service Area[1]	52,890	66,454	80,744	98,074	118,466	143,098
CICWCD % of Service Area Connected[2]	60%	70%	80%	90%	95%	100%
CICWCD Retail[3]	5,642	7,890	10,009	12,213	13,346	13,788
Cedar City[4]	35,666	44,812	54,448	66,135	79,886	96,496
Enoch City[5]	7,382	9,921	13,334	17,919	24,082	32,364
Kanarraville[6]	439	450	450	450	450	450
Total Service Area[7]	**49,129**	**63,073**	**78,241**	**96,717**	**117,764**	**143,098**

Notes:
(1) Estimated as 92.7 percent of total Iron County population, based on CICWCD estimates of potential future service area (including retail and wholesale supply). Iron County population projections per Utah Governor's Office of Management and Budget (GOMB, 2012).
(2) Percent of total CICWCD potential retail service area that will be connected to the CICWCD system in the year indicated. Estimates provided by CICWCD and Ensign Engineering staff, October 2019.
(3) CICWCD total county service area at estimated percent connected, minus the population of the CICWCD's potential wholesale customers (Cedar City, Enoch City, and Kanarraville).
(4) Projections through 2060 per GOMB (2012); 2050-2060 growth percent used to estimate 2070 population.
(5) Projections through 2050 per Enoch City 2018 Impact Fee Plan; 2060 and 2070 populations extrapolated from 2050 at assumed 3 percent annual growth per Enoch City staff.
(6) Projections through 2020 per GOMB (2012). Population in 2030 and beyond was assumed constant at 450 per Kanarraville policy of ceasing further annexations.
(7) Total population that could potentially be served by the PVWS, including CICWCD direct retail customers and wholesale deliveries to Cedar City, Enoch City, and Kanarraville. Sum of rows may not equal total shown due to rounding of decimals.

Figure 15 Projected Supply Surplus or Shortage

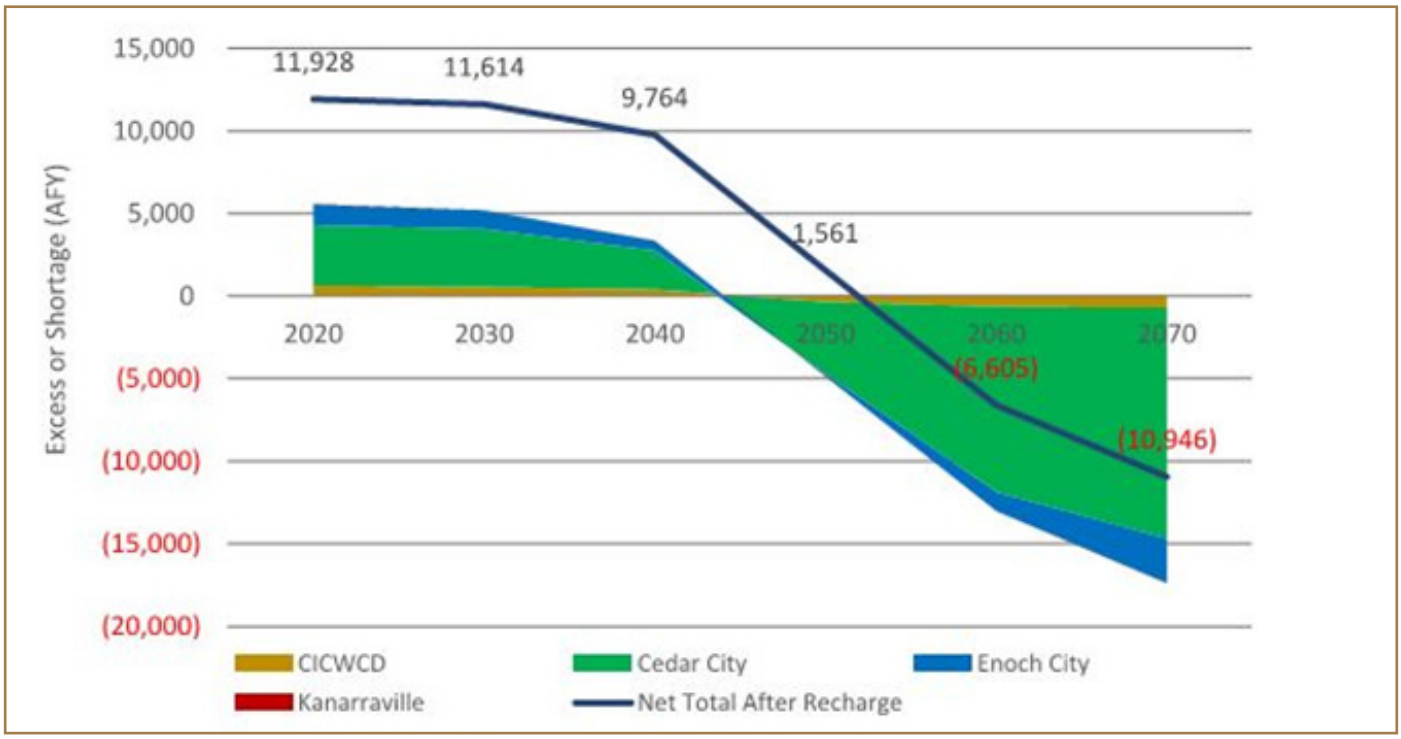
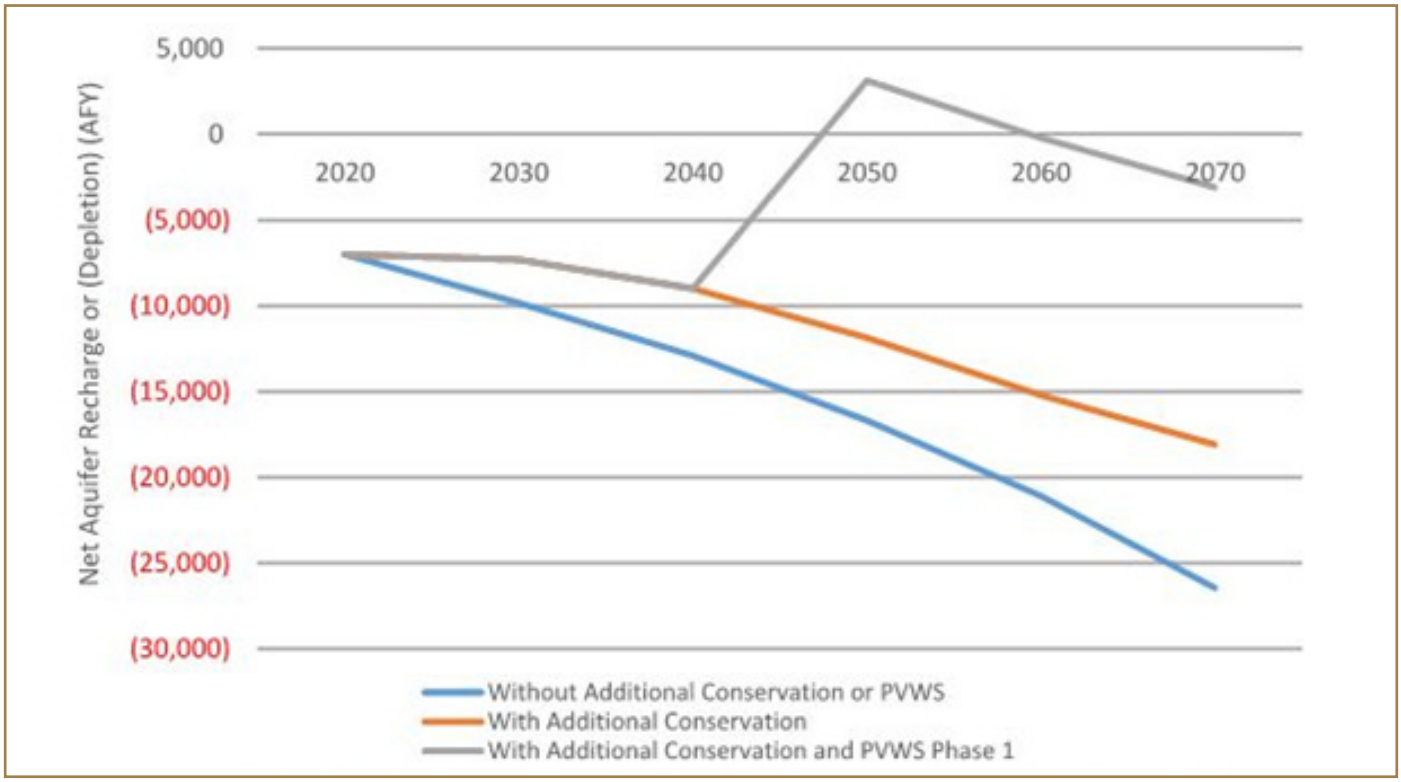
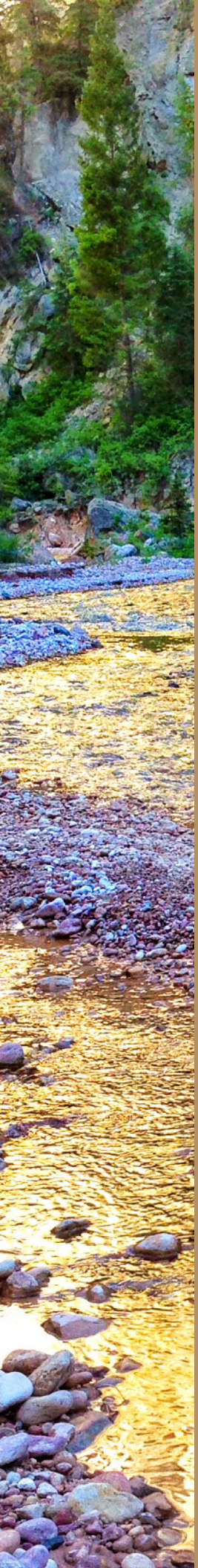


Figure 16 Water Supply Impacts: Recharge, Conservation, & PVWS





Current Priorities

CICWCD is legislatively mandated to provide water to the community within its boundaries for the next 50 years. Their slogan is "Conserving and Developing Water Today, Providing for Tomorrow." CICWCD is committed to providing safe and sufficient drinking water now and in the future to its customers and major stakeholders throughout the Cedar Valley Aquifer. To do this the District has adopted a 3-part approach which is Recharge, Conservation, and Importing.

Proposed Projects to Address Priorities

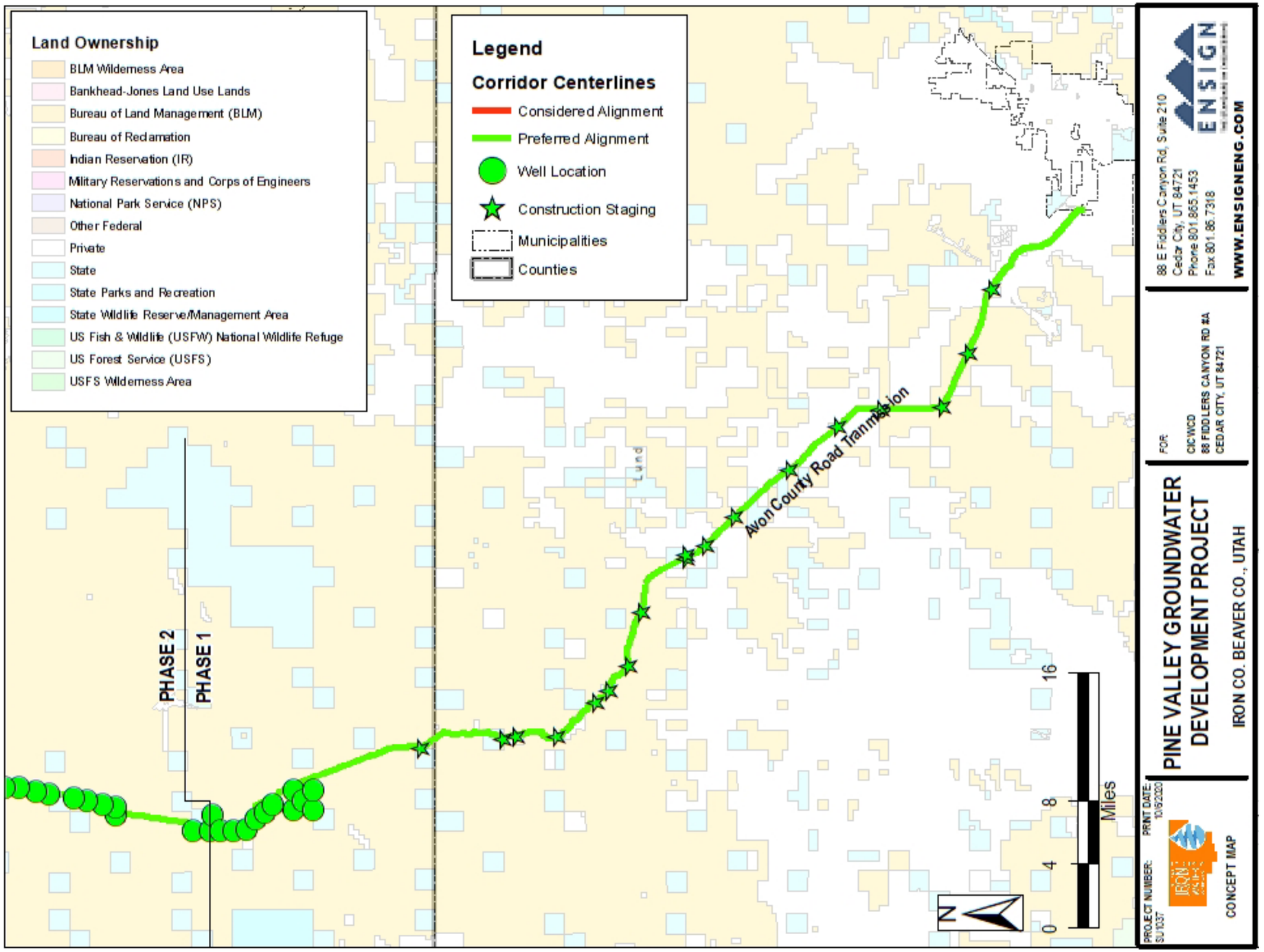
Pine Valley Water Supply & Conservation Project

The CICWCD is proactively taking actions to address the anticipated water supply shortfall that is occurring in the Cedar Valley. The largest project the CICWCD is doing to accomplish this is preparing for the Pine Valley Water Supply and Conservation Project. *Figure 17 BLM Corridors* shows the proposed pipeline alignment of the Pine Valley Water Supply & Conservation Project.

In 2020, Carollo Engineers, Inc. was hired to create the Pine Valley Water Supply & Conservation Project: Financial Business Plan & Water Needs Assessment. Throughout the report drafted by Carollo, it gives information regarding the Pine Valley Water Supply project, local Recharge Projects, and other efforts made by CICWCD and its major stake holders to help Iron County and the Cedar Valley Aquifer conserve water for its future. The report details a variety of projects anywhere from not doing anything to transporting water from one aquifer to another, and the Financial Business Plan outlines how to accomplish those projects, or at least provides a starting point of how each project could come to fruition.

The Financial Business Plan and Water Needs Assessment is an element toward making the CICWCD's vision a reality. The Pine Valley Water Supply project is envisioned as a regional project that can supply water to the vast majority of Iron County. The report outlines analyses conducted to assess the amount and timing of water needed to avoid a future supply gap and the financial implications of implementing the project via cost sharing and outside funding opportunities. The business plan demonstrates how the project could be financed and funded through a variety of different options.

Figure 17 BLM Corridors



Recharge Facilities

Since 2017, CICWCD has implemented multiple successful recharge projects within the Cedar Valley. These projects were completed with the coordination and cooperation of Iron County, Cedar City, and Enoch City along with other private individuals. These recharge areas include gravel pits, historic spring areas, and constructed basins. It is estimated that these recharge areas could cumulatively recharge approximately 6,400 acre feet per year if water is available. *(See Water Conservation Section for more information on Recharge Facilities in Cedar Valley.)*

One of the most complex recharge systems is the Quichipa Recharge Project. CICWCD, with support of Cedar City and Iron County, constructed a diversion structure using grant funds from the Utah Conservation Committee, a canal from the structure to settling ponds, piping, and a recharge pit near Lake Quichipa. Water captured in the system is run through the "system" to drop sediment and clean the water for infiltration. The system has capacity to recharge flows up to 5 cfs. Future plans include expanding the recharge basin to have a greater footprint which will increase recharge capacity.

The District is currently in the process of expanding the Quichipa Recharge Project by creating the Quichipa Lake Water Optimization Project. For this project, a large dyke will be constructed in the middle of Quichipa Lake. Water will then be diverted to either the south end or north end of the lake depending on water quality. The Northern side of the lake will receive cleaner water, which will then settle and be pumped to agricultural fields. This will allow for agricultural producers to reduce the water being pumped from the declining aquifer, and use water that would have previously been wasted by flowing into the terminus Quichipa Lake. Reference *Figure 18 Quichipa Liake Optimization Project*.

The District should continue to expand and create recharge projects within the Cedar Valley so that all available water can be utilized.

Reuse of Wastewater Treatment Plant Effluent Water

The CICWCD is currently working with Cedar City and Enoch to prepare for the construction of a Wastewater Reuse Project. This project would transport treated effluent water from the Wastewater Treatment Plant and transport it to agricultural fields in Enoch Graben of Cedar Valley. This area of Cedar Valley has seen much decline in the aquifer that has shown at the surface through ground subsidence and fissures. By transporting effluent water to the Enoch Graben agricultural fields, agricultural producers will be able to idle their wells which will reduce the pumping of the declining aquifer. Reference *Figure 19 Wastewater Treatment Plant Reuse Project*.

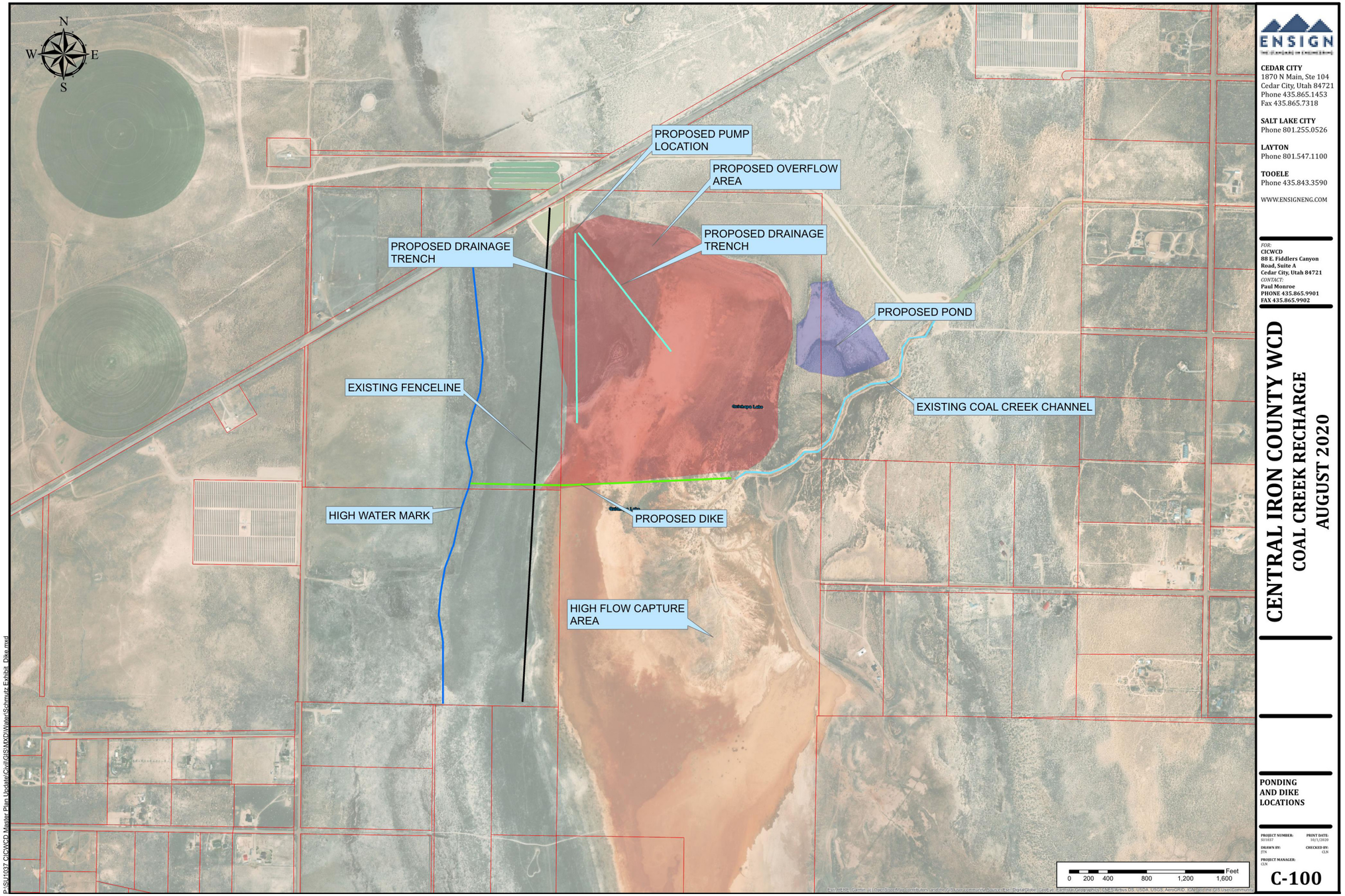
Conservation Projects

The District participates in many conservation projects throughout the valley. Some of those projects include the latest cutting edge technology, including (but are not limited to) retrofitting agricultural pivot systems, installing smart irrigation controllers at schools, installing water efficient irrigation systems in parks, providing water wise landscaping classes, promoting water saving products & practices, etc. See Conservation Section for more information.

Coal Creek Channel Widening

Ensign Engineering and CICWCD are working closely with the irrigation companies to determine the best solution to preserve excess water and high flows from Coal Creek and utilize them for irrigation and ground water recharge. Some of these options include creating detention ponds higher in the channel to slow the flow and reduce sediment loads as the water approaches irrigation fields. *Reference Figure 20 Upper Coal Creek Channel Widening, Figure 21 Lower Coal Creek Channel Widening, and Figure 22 Settling Basins.*

Figure 18 Quichipa Lake Water Optimization Project



ENSIGN
THE ENGINEERS OF ENGINEERING

CEDAR CITY
1870 N Main, Ste 104
Cedar City, Utah 84721
Phone 435.865.1453
Fax 435.865.7318

SALT LAKE CITY
Phone 801.255.0526

LAYTON
Phone 801.547.1100

TOOELE
Phone 435.843.3590

WWW.ENSIGNENG.COM

FOR:
CICWCD
88 E. Fiddlers Canyon Road, Suite A
Cedar City, Utah 84721
CONTACT:
Paul Monroe
PHONE 435.865.9901
FAX 435.865.9902

CENTRAL IRON COUNTY WCD
COAL CREEK RECHARGE
AUGUST 2020

PONDING AND DIKE LOCATIONS

PROJECT NUMBER: SU1037
PRINT DATE: 10/1/2020
DRAWN BY: JTN
CHECKED BY: CLN
PROJECT MANAGER: CLN

C-100

Figure 19 Wastewater Treatment Plant Reuse Project

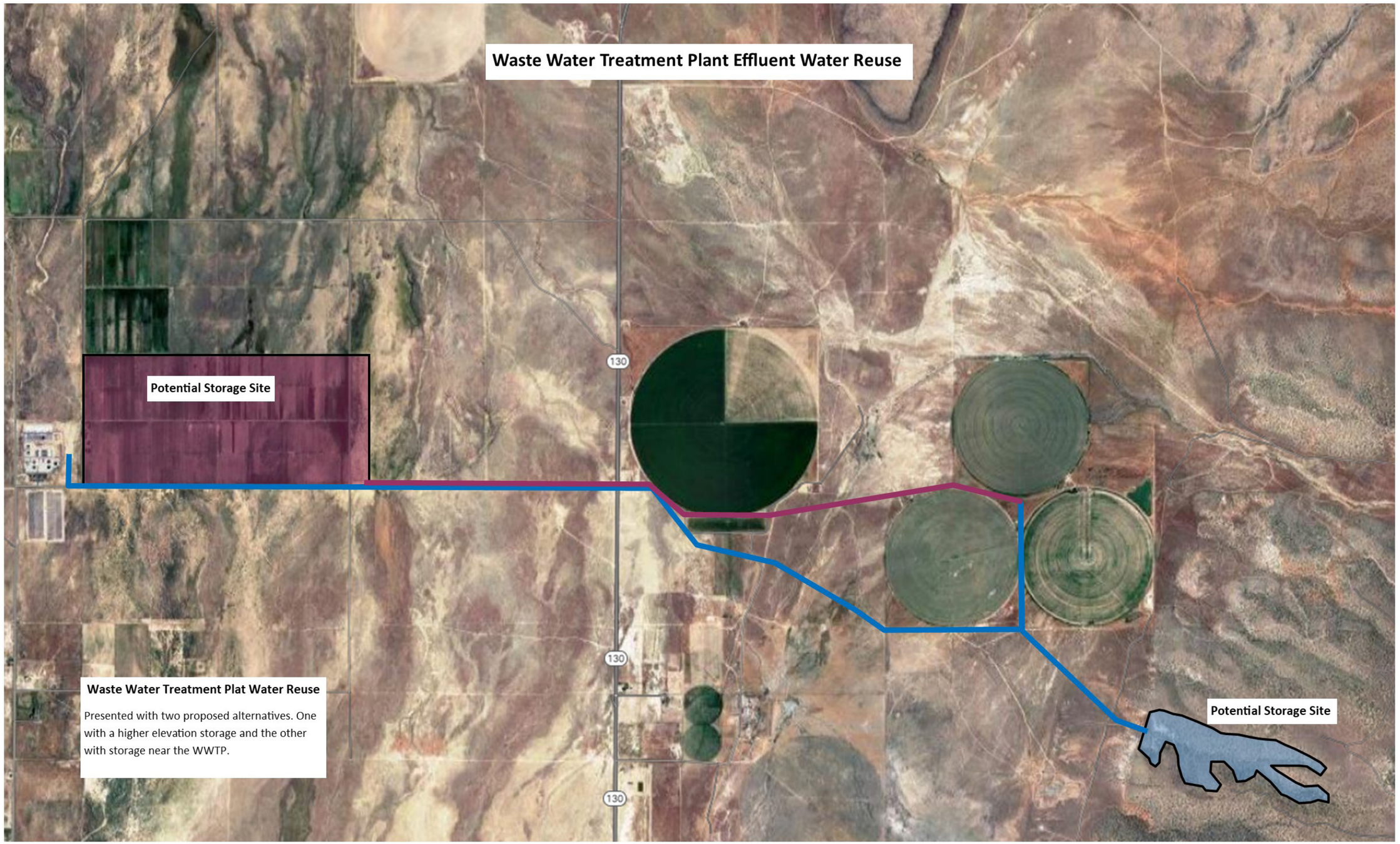
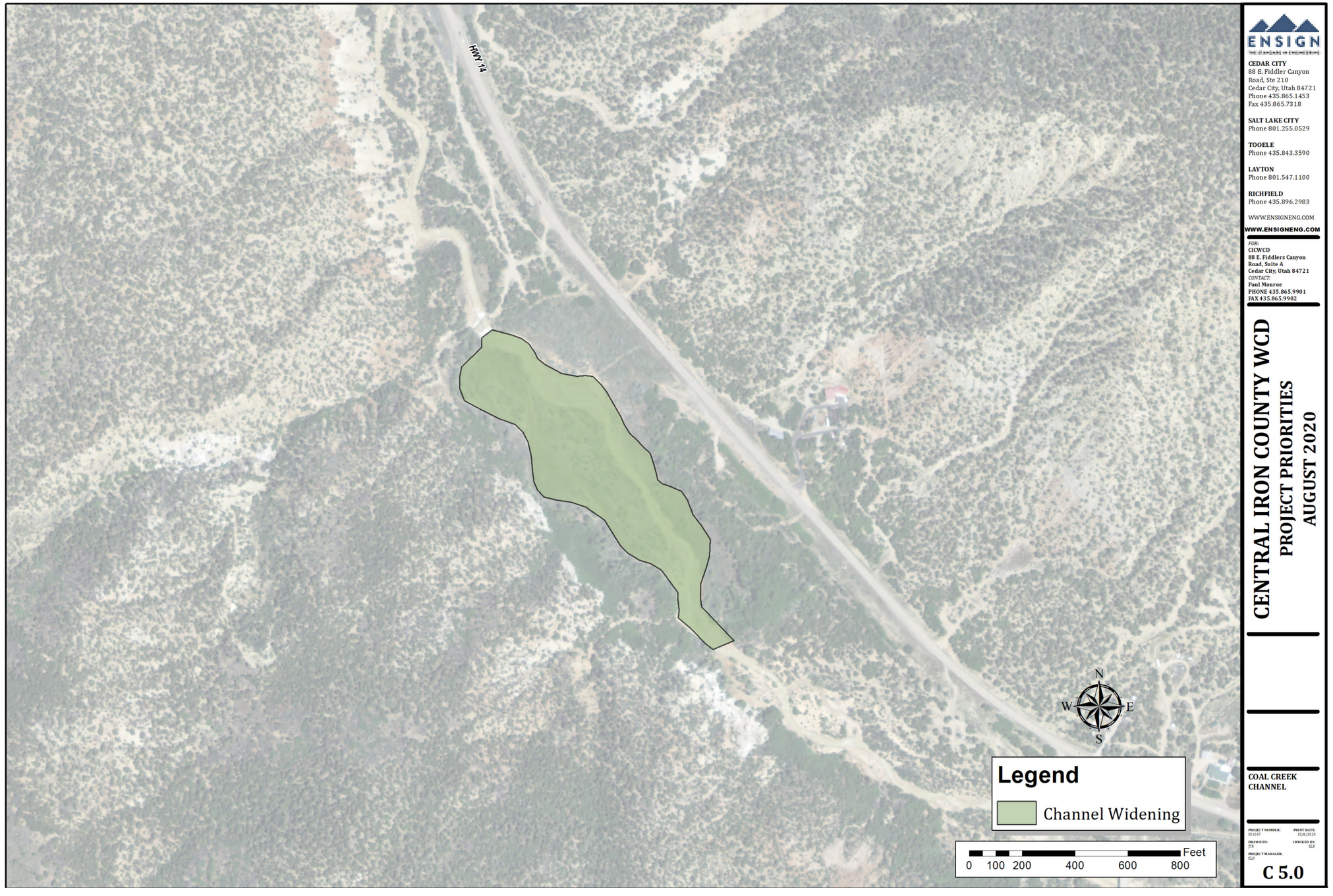


Figure 20 Upper Coal Creek Channel Widening



ENSIGN
CEDAR CITY
88 E. Fiddler Canyon Road, Ste 210
Cedar City, Utah 84721
Phone 435.865.1453
Fax 435.865.7318

SALT LAKE CITY
Phone 801.255.0529

TOOELE
Phone 435.843.3590

LAYTON
Phone 801.547.1100

RICHFIELD
Phone 435.896.2983

WWW.ENSIGNENG.COM
WWW.ENSIGNENG.COM

FOR:
CICWCD
88 E. Fiddlers Canyon Road, Suite A
Cedar City, Utah 84721
CONTACT:
Paul Monroe
PHONE 435.865.9901
FAX 435.865.9902

CENTRAL IRON COUNTY WCD
PROJECT PRIORITIES
AUGUST 2020

COAL CREEK CHANNEL

PROJECT NUMBER: 0210137
PRINT DATE: 10/6/2020
DRAWN BY: JTH
CHECKED BY: CLH
PROJECT MANAGER: CLH

C 5.0

Figure 21 Lower Coal Creek Channel Widening

ENSIGN

CEDAR CITY
88 E. Fiddler Canyon Road, Ste 210
Cedar City, Utah 84721
Phone 435.865.1453
Fax 435.865.7318

SALT LAKE CITY
Phone 801.255.0529

TOOELE
Phone 435.843.3590

LAYTON
Phone 801.547.1100

RICHFIELD
Phone 435.896.2983

WWW.ENSIGNENG.COM

WWW.ENSIGNENG.COM

FOR:
CICWCD
88 E. Fiddlers Canyon Road, Suite A
Cedar City, Utah 84721
CONTACT:
Paul Monroe
PHONE 435.865.9901
FAX 435.865.9902

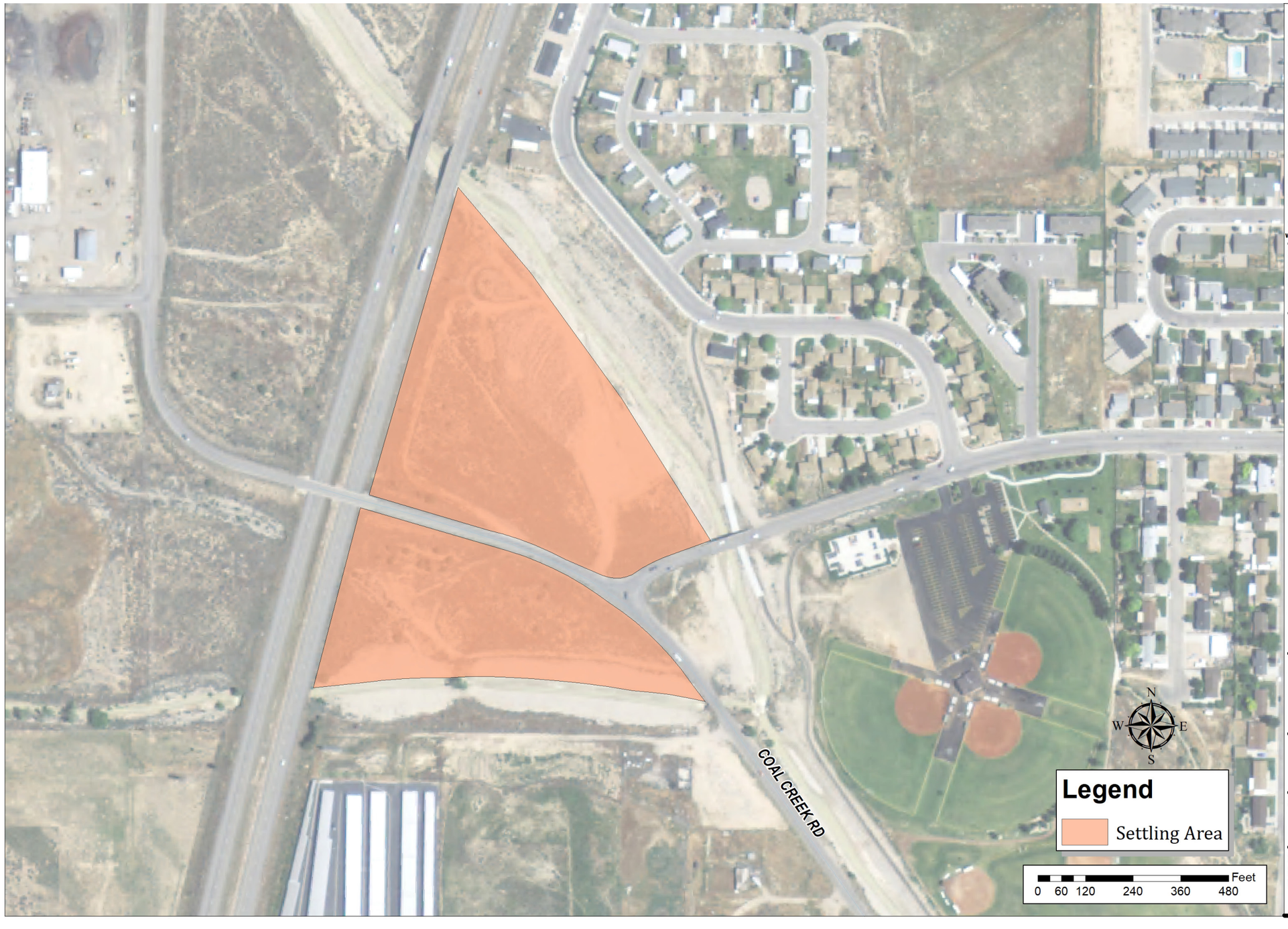
CENTRAL IRON COUNTY WCD
PROJECT PRIORITIES
AUGUST 2020

COAL CREEK CHANNEL

PROJECT NUMBER: S11037
PRINT DATE: 10/6/2020
DRAWN BY: JTS
CHECKED BY: CLS
PROJECT MANAGER: CLS

C 5.1

Figure 22 Settling Basins



ENSIGN

CEDAR CITY
88 E. Fiddler Canyon Road, Ste 210
Cedar City, Utah 84721
Phone 435.865.1453
Fax 435.865.7318

SALT LAKE CITY
Phone 801.255.0529

TOOELE
Phone 435.843.3590

LAYTON
Phone 801.547.1100

RICHFIELD
Phone 435.896.2983

WWW.ENSIGNENG.COM

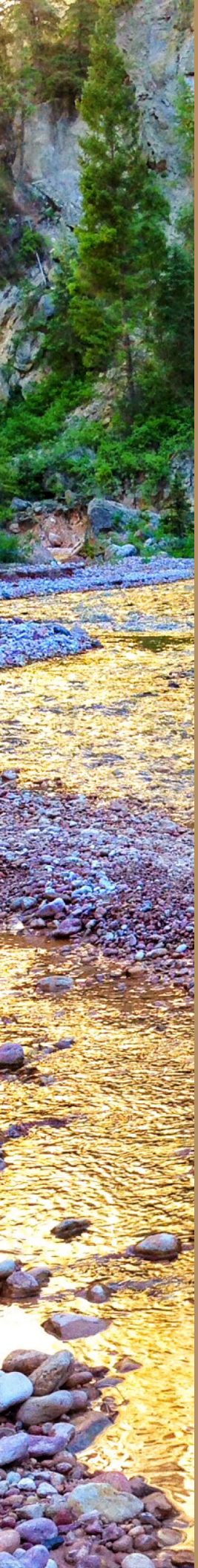
FOR:
CICWCD
88 E. Fiddlers Canyon Road, Suite A
Cedar City, Utah 84721
CONTACT:
Paul Monroe
PHONE 435.865.9901
FAX 435.865.9902

CENTRAL IRON COUNTY WCD
PROJECT PRIORITIES
AUGUST 2020

SETTLING AREAS

PROJECT NUMBER: S01037
PRINT DATE: 10/6/2020
DRAWN BY: JTS
CHECKED BY: CLS
PROJECT MANAGER: CLS

C 6.0



Dispersing High Discharge Wells

Bringing the aquifer into safe yield can also be complemented by distributing high yield wells throughout the valley. The groundwater naturally flows in a northwest direction and most of the high yield wells are located in the south end of the valley. Increasing the discharge on the north end of the aquifer will allow the south end to recover and potentially increase water levels. Where CICWCD service area is located in the north end of the valley, implementing new wells as well as coordinating service agreements with local municipalities will help balance the aquifer as well as allow more growth.

Figure 23 Water Surface Levels is from the UGS Special Study 150. This figure shows the decline in the water surface levels through the entire valley from monitoring well as early as 1939. As growth happened in the south end of the valley, pumping increased from wells near Quichipa Lake to supply Cedar City causing the greatest drop in the water levels.

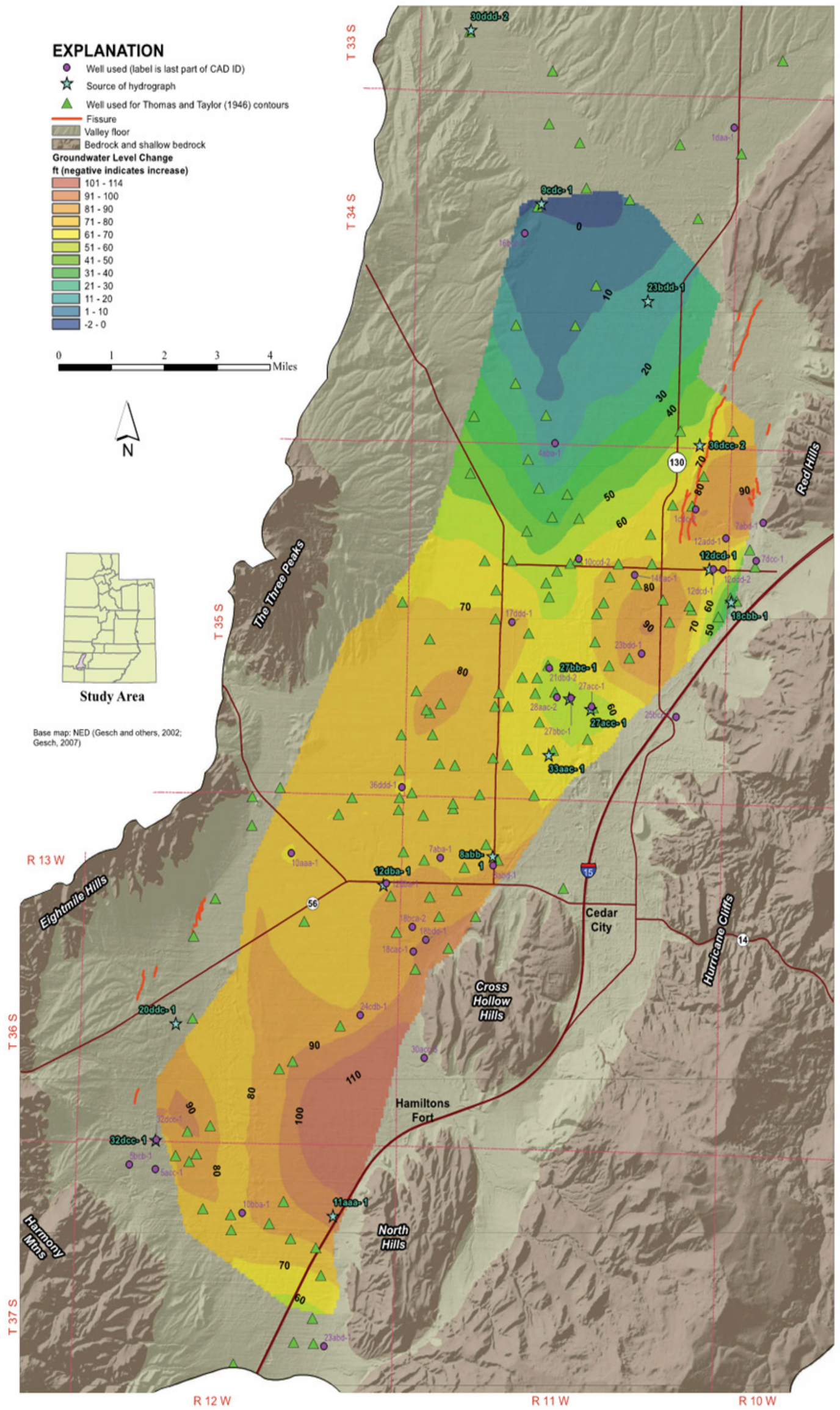
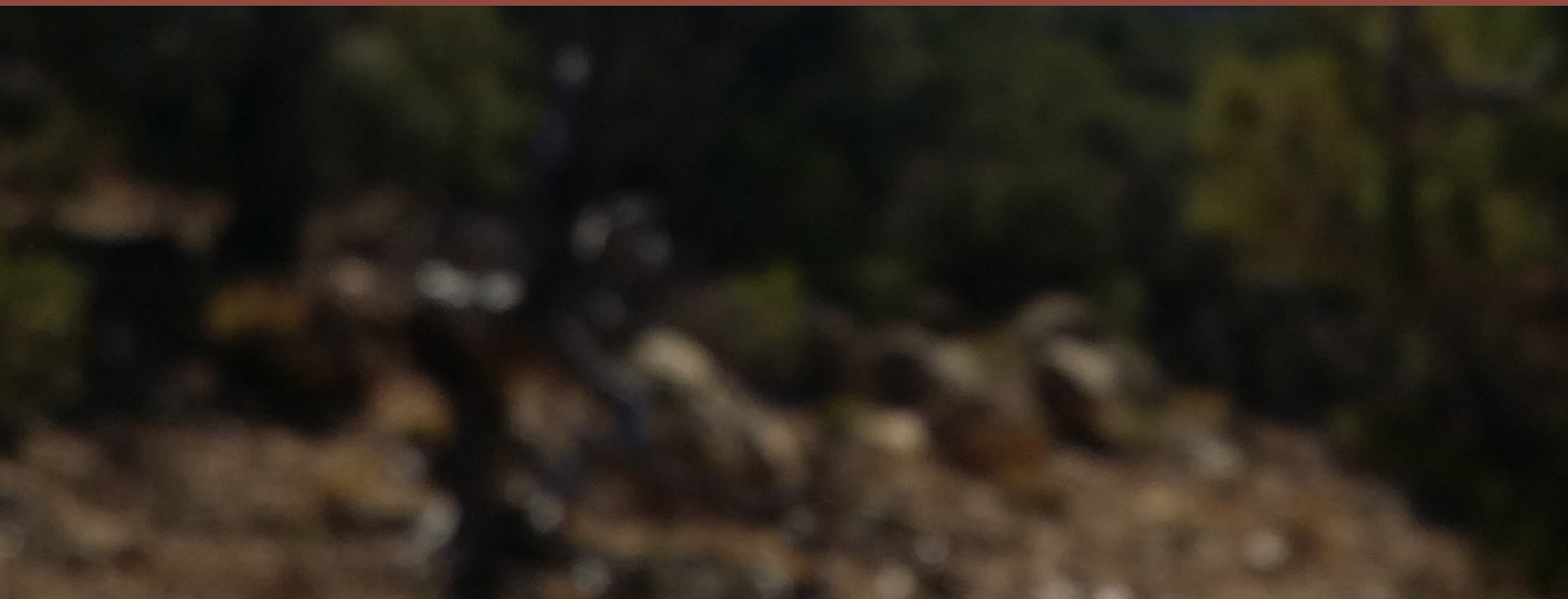


Figure 23 Water Surface Levels

Capital Facilities Projects



CAPITAL FACILITIES PROJECTS

With the growth and expansion of new subdivision within the District, CICWCD will need to expand its source capacity. The central service area of the District is served by eight wells. With the addition of the demand from the mine the District is approaching its source capacity state requirement and will need to develop another source. This would allow the district to have more redundancy and prepare for more growth. Reference *Figure 24 WECCO Well* and *Figure 25 Horse Hollow Well Field*.

The added draw and demand on the District's system by the mine are requiring more water availability that can be resolved by adding another water tank. A new tank placed in the correct location will help further balance the water system and provide more storage capacity for future growth and expansion. Reference *Figure 26 Tank Locations*.

Source & Storage Expansion Projects

CICWCD has been working with Ensign Engineering to locate the best locations and areas for future wells and tanks.

One location of a proposed project is to develop well, tank, and connect the tank and well to the existing system in the Bridal Path area. Additionally, a well near WECCO would better allow the District to service the mine that will reduce the impact of the other wells that are supplying the system. Reference *Figure 24 WECCO Well*.

A future aquifer balance project is to create a well field in the north end of the valley between Rush Lake and Mud Springs Gap. This location would help balance the declining aquifer.

CICWCD is proposing to purchase a new well, construct a wellhouse, and install transmission lines to connect it to their existing culinary water system in the Chekshani Cliffs subdivision.

The Highway 56 Booster Station proposed project is to construct a booster system to connect the CICWCD System to Cedar City.

New springs are being developed at Cedar Highlands in 2020. The project involves the redevelopment of one existing spring and the development of a new spring. At each spring site, perforated pipe was buried with gravel pack and connected to a spring collection box. The collection box will connect to existing transmission lines with 4" waterline. Perimeter fences already exist around the sites.

Cedar Highlands is in need of a new water tank. The tanks in this service area are insufficient due to the growth of the community and state-required storage. The proposed project for CICWCD is to construct a 500,000-gallon storage tank and connect it to the existing water system.

The lower zone of the central CICWCD system needs additonal storage. A new storage tank placed at the correct location would help further balance the system and provide necessary storage for the mine expansions and growth within the basin. Locations for this project have included expanding the proposed tank farm at Three Peaks, adding another tank at the Northridge site, and placing a tank at the Bridal Path site.

Planning and coordination with local public entities will need to begin prior to project beginning. CICWCD can correlate this process and begin the environmental course, preliminary engineering report, funding acquisition, and project alignments.

CICWCD continually upkeeps and maintains its system in the Cedar Valley that supplies water to its residents and customers. Two projects that CICWCD is looking to bring to realization, are the Bridal Path Projects and the Cedar Highlands project. The Bridal Path project consists of a water tank, which will sit on the hill west of Bridal Path. It will sit at such an elevation to help balance the water pressures that some users experience in the lower portion of the valley. There will be a waterline, new well, and booster station that follows along with the water tank project.

Cedar Highlands is an unincorporated community with the CICWCD service area. CICWCD is planning on constructing a new water tank in that portion of their service area as well. The need for water storage in the Cedar Valley aquifer is very necessary. These water storage projects will help serve the community now and for future populations.

Source Expansion

The construction of a new well costs vary depending on the size, depth, and location of each individual well as well as infrastructure to plumb the well into the system, construct a building, and purchase land if necessary. Reference *Table 14 Well Estimates*.

Iron Springs Well

CICWCD acquired land east of Iron Springs Road and north of Highway 56 for the purpose of drilling another well. It is anticipated that this well will support growth and maintain the level of service provided to existing customers. Construction of the well will be similar to wells constructed within the past and a similar depth.

Highway 56 Booster

A booster station will be necessary to balance the valley's water system and have capacity to serve Cedar City, CICWCD, and other small private water systems. The booster station is a key component into establishing a solid water supply from the PVWS project.

Chekshani Cliffs Well #2

Chekshani Cliffs' existing well has a history of causing corrosion on pipes and fittings within homes. The residents are aware of the situation and have agreed that a new well will need to be constructed to potentially eliminate the causes for corrosion. The area has been studied to determine the best areas that will produce groundwater that will have water quality that falls within the state requirements.

Horse Hollow Well Field

Bringing the aquifer into safe yield can also be complemented by distributing high yield wells throughout the valley. The groundwater naturally flows in a northwest direction and most of the high yield wells are located in the south end of the valley. Increasing the discharge on the north end of the aquifer will allow the south end to recover and potentially increase water levels. Where CICWCD service area is located in the north end of the valley, implementing new wells as well as coordinating service agreements with local municipalities will help balance the aquifer as well as allow more growth.

Chekshani Cliffs Treatment

Due to the existing well producing water that is high in Total Dissolvable Solids (TDS), the District reviewed proposals for a treatment system to make the water quality within state requirements. The treatment system would remove the excess TDS and other minerals that are assumed to be causing corrosion prior to entering the water system. Currently the system is not feasible.

Storage Expansion

The construction of a new storage tank relies on location. Construction of a tank includes mobilization, sitework, construction, plumbing, and pipeline infrastructure. Two of the three (Three Peaks and Northridge) proposed locations will not need as much additional pipeline infrastructure. The third, Iron Springs Tank, will require more pipeline infrastructure to connect to the existing system.

Cedar Highlands Water Tank

Cedar Highlands currently is served by 2 steel tanks that were installed when the system was constructed in the 1990s. The tanks have been properly maintained and managed to maximize the life of the tanks. Due to growth in the area and in the surrounding parcels, more storage will be required to manage the upper zone of the subdivision. A larger concrete tank would have capacity to eliminate the need for the upper tank and have large capacity for the system.

Iron Springs Tank

Storage expansion will need to be expanded as development occurs and as the PVWS project are implemented within CICWCD. As CICWCD enters into interlocal agreements and connection points with Cedar City and Enoch City. Storage will be crucial to maintain in Cedar Valley during the off-pumping time from PVWS Project. This will increase the storage capacity in the valley and provide greater capacity to utilize water from the PVWS project.

Bridal Path Tank

Currently the existing water system is run off of two tanks, one in the south end of the Valley at the Cross Hollow Hills Subdivision and Three Peaks tank on the north end of the valley. The central part of the system has an existing water tank that is substantially lower and older than the other water tanks. This tank is the limiting head that can be provided to the system. A new tank is needed to match elevations of the other tanks and a location to better suit the flows of the system. Reference *Table 15 Tank Estimates*.

Project Funding

Funding for each project can be obtained by submitting applications and/or reports to United States Department of Agriculture (USDA) and Utah State Division of Drinking Water State Revolving Fund (DDW SRF). Funds can be allocated in principle forgiveness, grants, or low interest loans. Future project cost estimates within *Table 14 Well Estimates* and *Table 15 Tank Estimates* have been calculated using only construction costs.

Table 14 Well Estimates

WECCO Well Project

Item No.	Description	Unit	Estimated Quantity	Estimated Unit Cost	Estimated Cost
1	Mobilization	L.S.	1	$ 57,500.00	$ 57,500.00
2	Well Drilling	L.S.	1	$ 230,000.00	$ 230,000.00
3	Well House	L.S.	1	$ 69,000.00	$ 69,000.00
4	Plumbing	L.S.	1	$ 40,250.00	$ 40,250.00
5	Electrical	L.S.	1	$ 51,750.00	$ 51,750.00
6	18" Transmission Pipeline	L.F.	38155	$ 69.00	$ 2,632,695.00
7	Cedar City Connection	L.S.	1	$ 172,500.00	$ 172,500.00
				Total	**$ 3,253,695.00**

Horse Hollow Well Field Project

Item No.	Description	Unit	Estimated Quantity	Estimated Unit Cost	Estimated Cost
1	Mobilization	L.S.	1	$ 115,000.00	$ 115,000.00
2	Well Drilling	L.S.	4	$ 230,000.00	$ 920,000.00
3	Well House	L.S.	4	$ 69,000.00	$ 276,000.00
4	Plumbing	L.S.	4	$ 40,250.00	$ 161,000.00
5	Electrical	L.S.	4	$ 51,750.00	$ 207,000.00
6	18" Transmission Pipeline	L.F.	30000	$ 69.00	$ 2,070,000.00
7	Cedar City Connection	L.S.	1	$ 172,500.00	$ 172,500.00
				Total	**$ 3,921,500.00**

Chekshani Well, Pipeline, and Pumphouse Project

Well Project					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Estimated Unit Cost**	**Estimated Cost**
1	Mobilization	EA.	1	$13,800.00	$13,800.00
2	8" Waterline - from Well to Pump House	L.F.	5000	$23.00	$11,500.00
3	8" 90° Bend w/ thrust block	EA.	3	$402.50	$1,207.50
4	8" Tee w/ thrust block	EA.	1	$1,150.00	$1,150.00
5	8" 45° Bend	L.S.	1	$402.50	$402.50
6	8" 22.5° Bend	L.S.	1	$402.50	$402.50
7	Construction Management	L.S.	1	$15,175.69	$15,175.69
				Total	**$43,638.19**

Table 14 Well Estimates (continued)

Iron Springs Well Project

Well Project					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Estimated Unit Cost**	**Estimated Cost**
1	Mobilization	EA.	1	$20,000.00	$23,000.00
2	Drilling of Well	L.F.	1,000	$ 149.50	$149,500.00
3	Set Well Casing	L.F.	600	$ 116.50	$69,900.00
4	Perforation	L.F.	400	$ 109.50	$43,814.00
5	Well Development (24 hours)	L.S.	1	$28,750.00	$28,750.00
6	24 Hour Pump test & Drawdown test	L.S.	1	$34,500.00	$34,500.00
7	Well Equipping	L.S.	1	$28,750.00	$28,750.00
8	Well House	L.S.	1	$138,000.00	$138,000.00
				Total	**$516,214.00**

Highway 56 Booster Station

Booster Station					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Estimated Unit Cost**	**Estimated Cost**
1	Mobilization	EA.	1	$ 28,750.00	$ 28,750.00
2	Booster Station Building	L.S.	1	$ 92,000.00	$ 92,000.00
3	Interior Plumbing	L.S.	1	$ 977,500.00	$ 977,500.00
				Total	**$1,098,250.00**

Waterline from Well to Tank					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Estimated Unit Cost**	**Estimated Cost**
1	Mobilization	EA.	1	12,650.00	$ 12,650.00
2	12-inch Waterline - Station to Existing System	L.F.	150	34.50	$ 5,175.00
3	12-inch 90° Bend w/ thrust block	EA.	4	1,725.00	$ 6,900.00
4	12-inch Tee w/ Thrust Block	EA.	2	1,725.00	$ 3,450.00
				Total	**$28,175.00**

Administration Fees					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Estimated Unit Cost**	**Estimated Cost**
1	Land Purchase	L.S.	1	$63,250.00	$63,250.00

Table 14 Well Estimates (continued)

Cedar Highlands Spring Development Project

Upper Tank Site Spring Development					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Estimated Unit Cost**	**Estimated Cost**
1	Mobilization	EA.	1	$11,500.00	$11,500.00
2	Land Use, Easements, Fees	L.S.	1	$17,250.00	$17,250.00
3	Site Survey	L.S.	1	$8,625.00	$8,625.00
4	Excavation (Assumed Depth of 15')	C.Y.	300	$23.00	$6,900.00
5	Impermeable Layer	S.F.	4000	$17.25	$69,000.00
6	Filter Fabric	S.F.	2000	$9.20	$18,400.00
7	Gravel (Assumed Depth of 13')	C.Y.	250	$34.50	$8,625.00
8	Install 4" Waterline	L.F.	325	$23.00	$7,475.00
9	Install 4" Tee	EA.	1	$1,725.00	$1,725.00
10	Install 4" 22.5° Bend	EA.	1	$1,725.00	$1,725.00
11	Re-Seed	AC.	1	$2,875.00	$2,875.00
12	Install Spring Collection Box	EA.	1	$5,750.00	$5,750.00
13	Install Junction Box	EA.	1	$4,025.00	$4,025.00
14	Install 4" Gate Valve	EA.	1	$1,725.00	$1,725.00
15	Stock Tight Fence	L.F.	400	$28.75	$11,500.00
16	Install 4" Perforated Pipe	L.F.	150	$20.70	$3,105.00
17	Contingency	L.S.	1	$28,832.80	$28,832.80
				Total	**$209,037.80**

Lower Tank Site Spring Development					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Estimated Unit Cost**	**Estimated Cost**
1	Mobilization	EA.	1	$11,500.00	$11,500.00
2	Land Use, Easements, Fees	L.S.	1	$17,250.00	$17,250.00
3	Site Survey	L.S.	1	$8,625.00	$8,625.00
4	Excavation (Assumed Depth of 15')	C.Y.	300	$23.00	$6,900.00
5	Impermeable Layer	S.F.	4000	$17.25	$69,000.00
6	Filter Fabric	S.F.	2000	$9.20	$18,400.00
7	Gravel (Assumed Depth of 13')	C.Y.	250	$34.50	$8,625.00
8	Install 4" Waterline	L.F.	75	$23.00	$7,475.00
9	Re-Seed	AC.	1	$2,875.00	$2,875.00
10	Install Spring Collection Box	EA.	1	$5,750.00	$5,750.00
11	Install Junction Box	EA.	1	$4,025.00	$4,025.00
12	Install 4" Gate Valve	EA.	1	$1,725.00	$1,725.00
13	Install 4" Perforated Pipe	L.F.	150	$20.70	$3,105.00
14	Contingency	L.S.	1	$25,520.80	$25,520.80
				Total	**$190,775.80**

Table 15 Tank Estimates

Tank Projects

Item No.	Description	Unit	Estimated Quantity	Estimated Unit Cost	Estimated Cost
1	3 Peaks 3 MG Tank	L.S.	1	$ 3,065,775.80	$ 3,065,775.80
1	North Ridge 3 MG Tank	L.S.	1	$ 3,065,775.80	$ 3,065,775.80
1	Desert Mound 3 MG Tank	L.S.	1	$ 3,065,775.80	$ 3,065,775.80
1	Cedar Highlands 200,000 Tank	L.S.	1	$782,000	$782,000
2	12" Transmission Pipeline	L.F.	8425	$ 51.75	$ 435,993.75
				Total	**$ 10,415,321.15**

Figure 24 WECCO Well

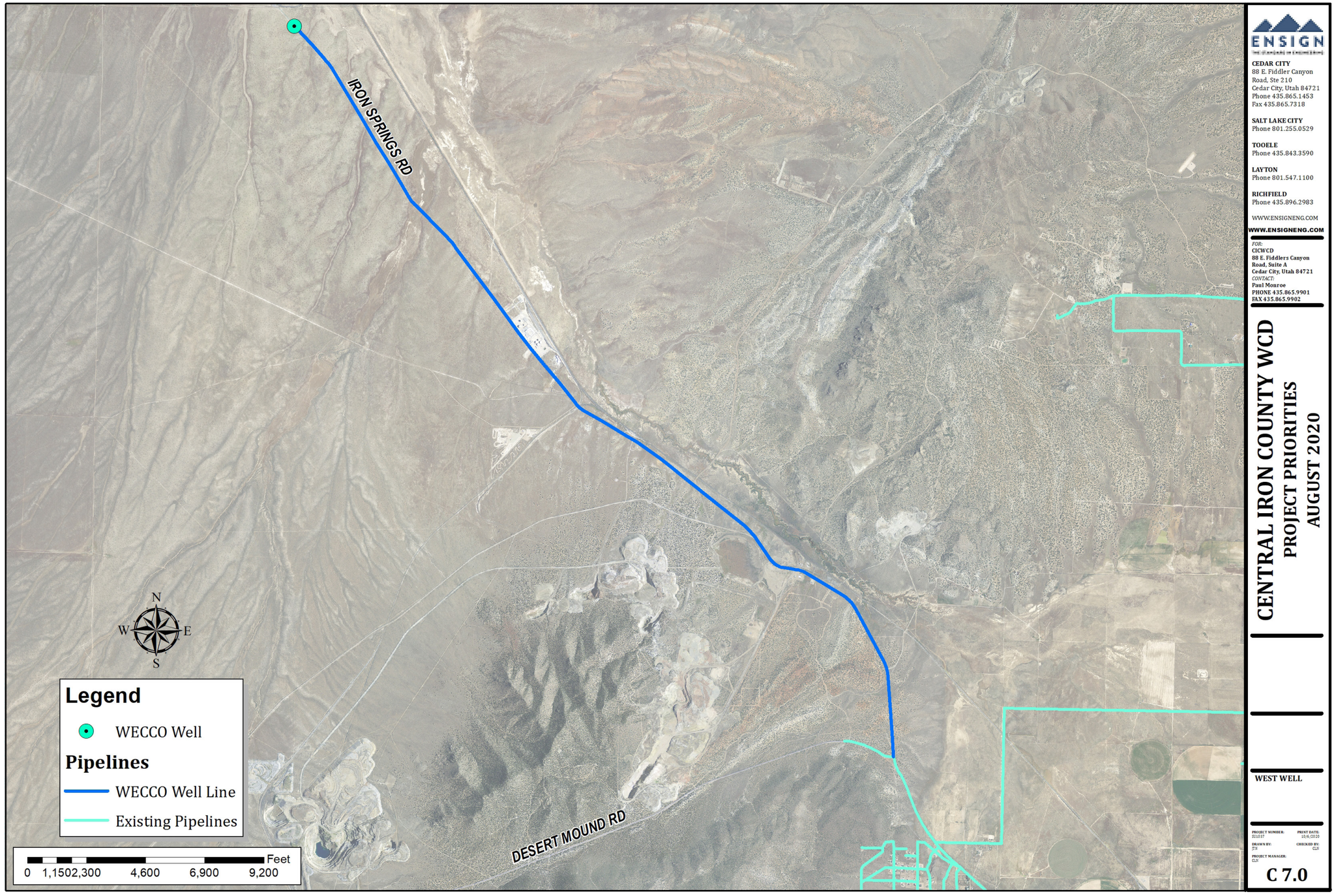


Figure 25 Horse Hollow Well Field

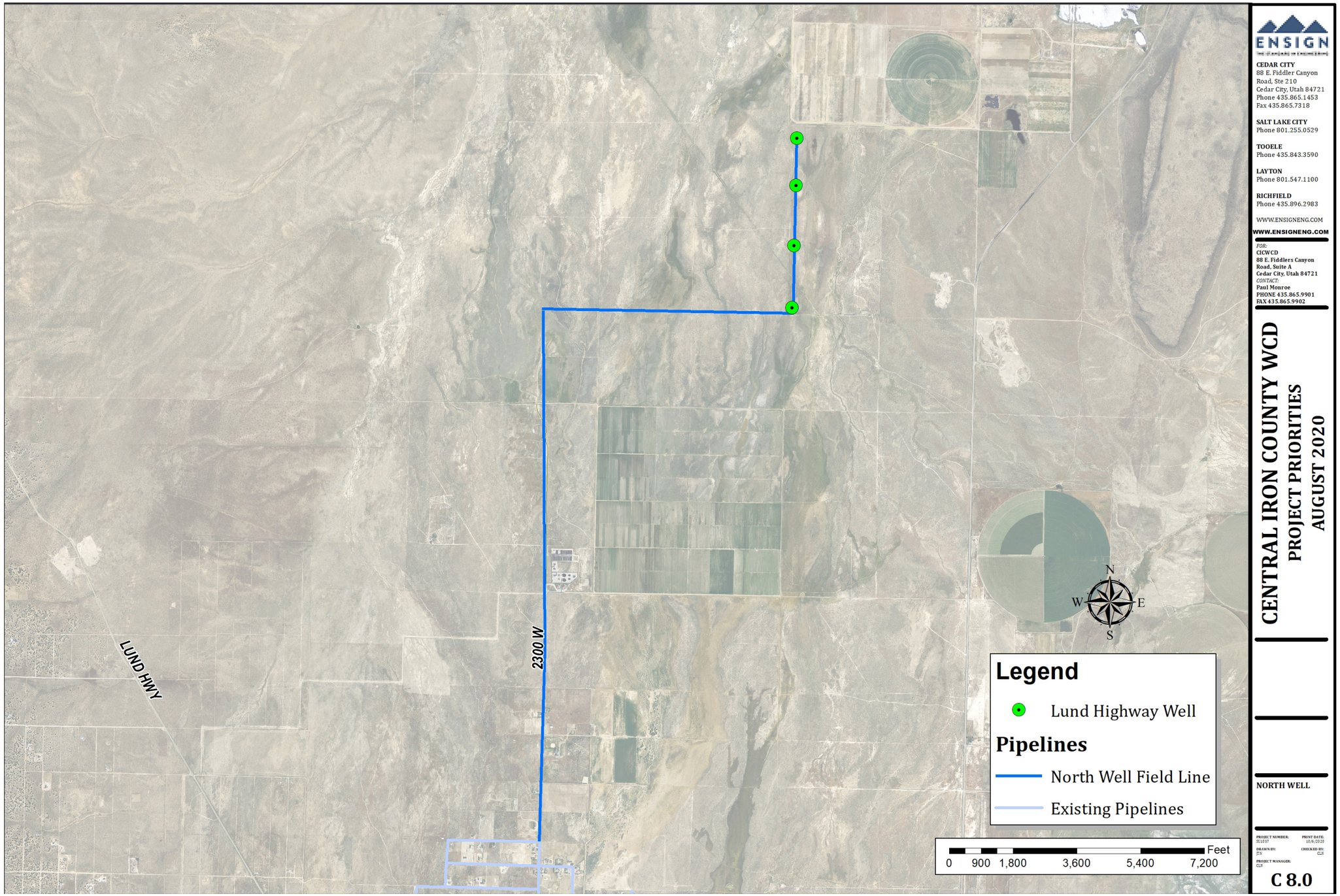


Figure 26 Tank Locations

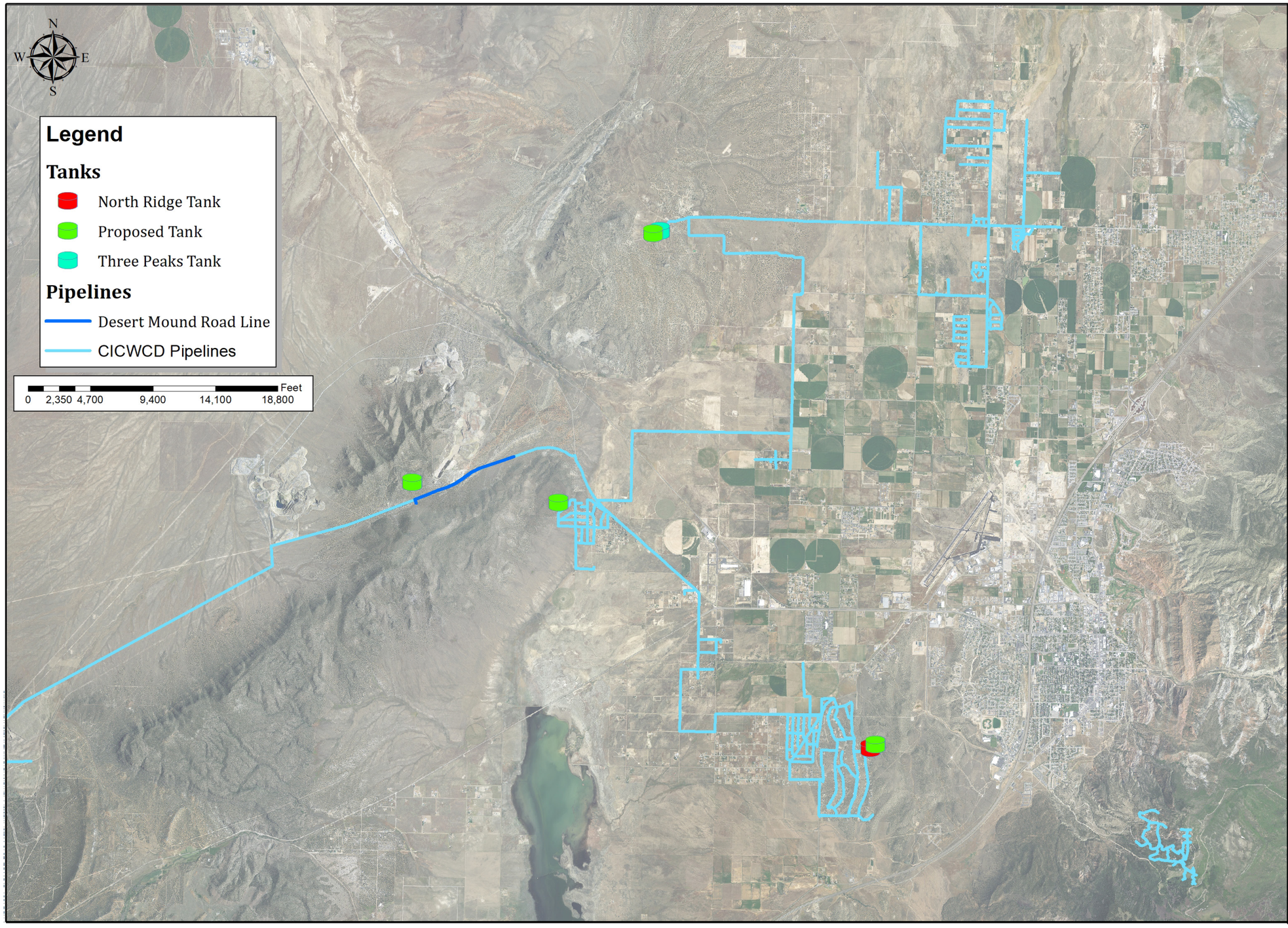


Figure 27 Cedar Highlands Springs Development Project

Figure 28 Chekshani Cliffs Well, Well House, and Pipeline

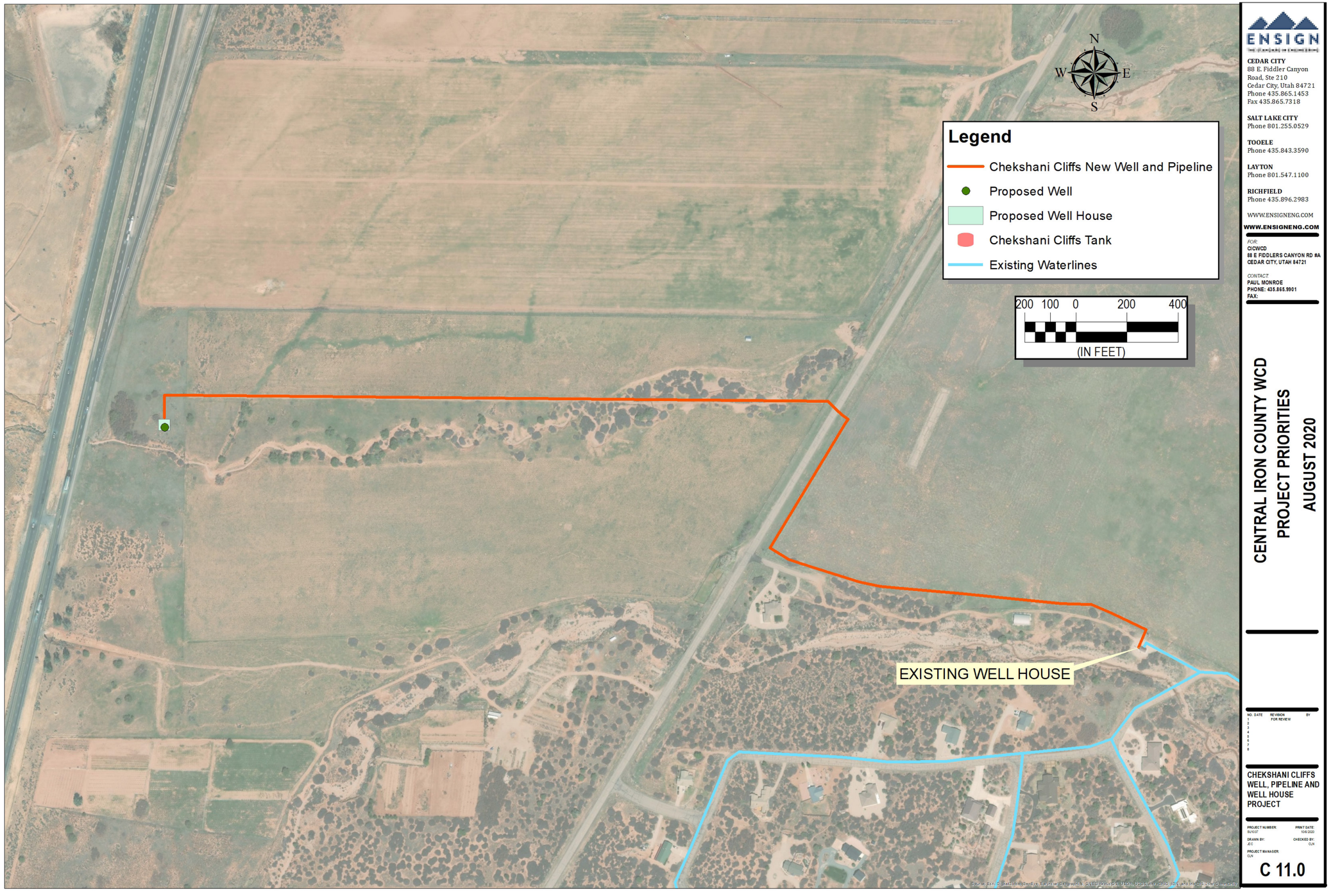
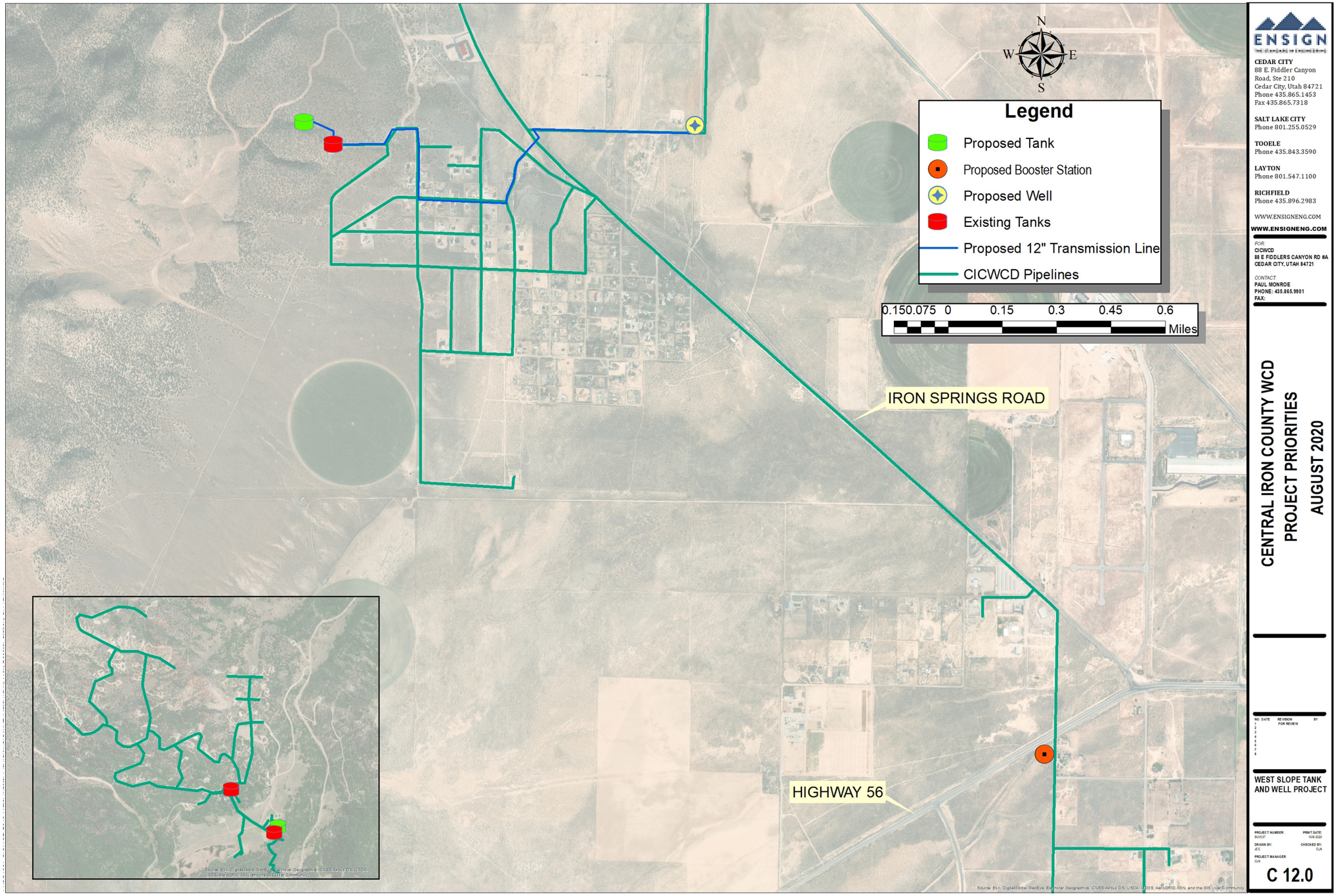
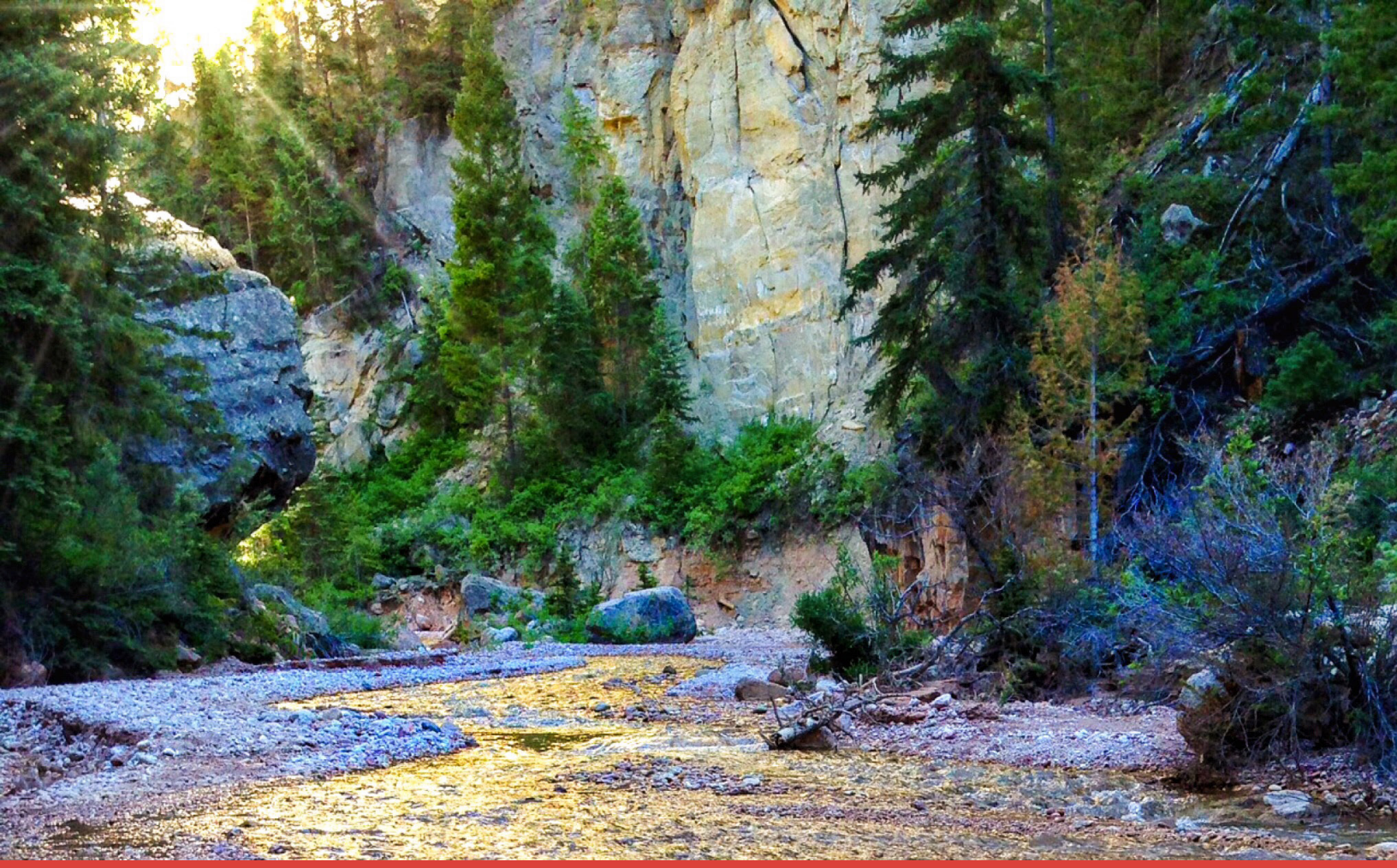


Figure 29 Tank, Booster Station and Well Project





Water Usage & Revenue - User Rates & Connection Fees

WATER USAGE & REVENUE – USER RATES & CONNECTION FEES

Purpose of Study

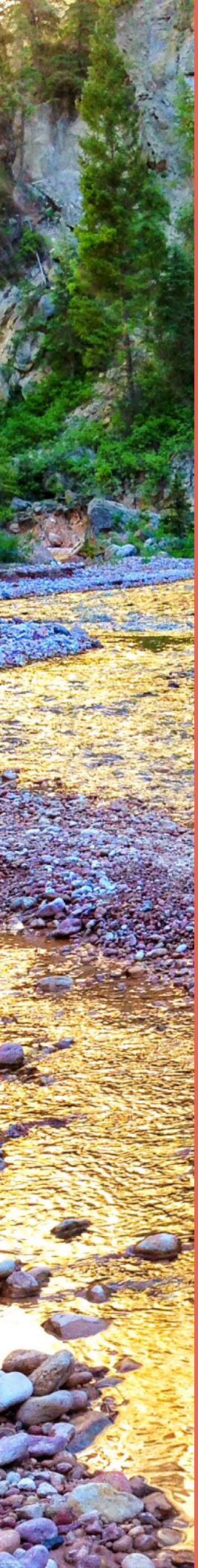
This water rate study analyzes the revenue from water user rates and recommends modifications that should be made to CICWCD's water user rates to enable the District to continue to serve water to their customers. This study projects operating expenses and debt service and determines the rates to produce operating revenues required to properly offset these expenses. Based upon the Water Master Plan Report (*see previous sections*), the District needs to plan for future capital improvements. These improvements will both increase capacity of the source, storage, and distribution facilities to support the District's growth and to repair, replace, and improve existing facilities to continue to reliably serve existing and future customers.

The AWWA Manual of Water Supply Practices M1 describes seven objectives that are common to most water utilities. CICWCD's water rate structure was analyzed according to these objectives which are listed below:

- Yielding necessary revenue in a stable and predictable manner
- Minimizing unexpected changes to customer bills
- Discouraging wasteful use and promoting justified uses
- Promoting fairness and equality
- Avoiding discrimination
- Maintaining simplicity, certainty, convenience, feasibility, and freedom from controversy
- Compliance with all applicable laws

This rate study is prepared as a part of this Water Master Plan Report but can be extracted to stand alone to satisfy State requirements. Based upon the recommended capital improvements from the master planning process, several capital improvements have been identified.

To finance these proposed projects, this study determined the indebtedness that will be incurred, and the annual operating and capacity revenues that will be required to offset projected operational and capital expenditures.



Study Assumptions

The basis of this study is the Water Master Plan. The following were assumed in order to complete this study:

Growth and Capital Improvements:

- Equivalent Residential Connections (ERCs) will be added to the system annually beginning in FY2018 as predicted by the Governor's Office of Planning and budget's population forecast.
- New accounts will contribute operational revenue for six months of the first fiscal year of their existence and for 12 months per year thereafter.
- The District's preference of financing capital projects is grants, followed by cash reserves, and finally debt.
- Currently the District reads water meters monthly and billed monthly. The following were used as bases for this study and are included in the appendix:
- Yearly budget summary dated January 2018.
- FY2018 Audit performed by Kimball & Roberts
- Water usage records from the District (April 2018 – April 2019)

Ensign researched the District's current water rate structure, and looked at various rate structures, selected and recommends a method of analysis. After research into the standard American Water Works Association (AWWA) methods of structuring a rate schedule, it was determined that the District's current rate structure format is appropriate to fit the nature and type of water users in CICWCD, and promotes water conservation at the same time. The current rate structure consists of base rate and three different tiers based on the amount of water consumption.

Disclosure Statement

Numerous assumptions were made to project future revenue, expenses, and debt for CICWCD over the length of the study period for this rate study. These assumptions were based on several documents and sources, including those listed at the beginning of the master plan.

Several factors may influence the projected revenue, expense, and debt of the District's Water Budget. These include:

- The interest rate on bond issuances.
- The actual number, type, and schedule of additional accounts during the study period.
- Unforeseen regulatory and water quality requirements.
- Abnormal weather that affects water consumption and irrigation.
- Projected expenses, such as utility, permitting, and pumping costs.
- Variation in the population projections: and the possible reaction and changing conservation practices of existing customers in response to rises in water rates.

The financial projections presented in this report, may prove inaccurate as time passes and should be reviewed in comparison to the changes in the above factors.

Description of Current Water Rates

Water usage charges for the Central Iron County Water Conservancy are based on the schedule shown in *Table 16 Water Rate Schedule*. This rate structure was most recently changed and adopted in 2018 under Resolution No. 2014-1-16 Revision 4, A Resolution Adopting and Authorizing Fees and Service Charges.

This rate structure is an increasing block rate type of structure. This type of rate structure can, when properly designed, send the appropriate conservation signals to certain customer classes if needs be.

Table 16 Water Rate Schedule

	Rate	Gallons Received
Base Rate	$31.00	No Water
1st Overage Rate	$0.78/1,000 gallons	Up to 12,000
2nd Overage Rate	$0.94/1,000 gallons	12,001-20,000
3rd Overage Rate	$1.65/1,000 gallons	20,001-30,000
4th Overage Rate	$2.78/1,000 gallons	30,001-60,000
5th Overage Rate	$3.09/1,000 gallons	60,001-100,000
6th Overage Rate	$4.12/1,000 gallons	100,001+

Monthly Bill

The average monthly bill for all residential users is $41.56.

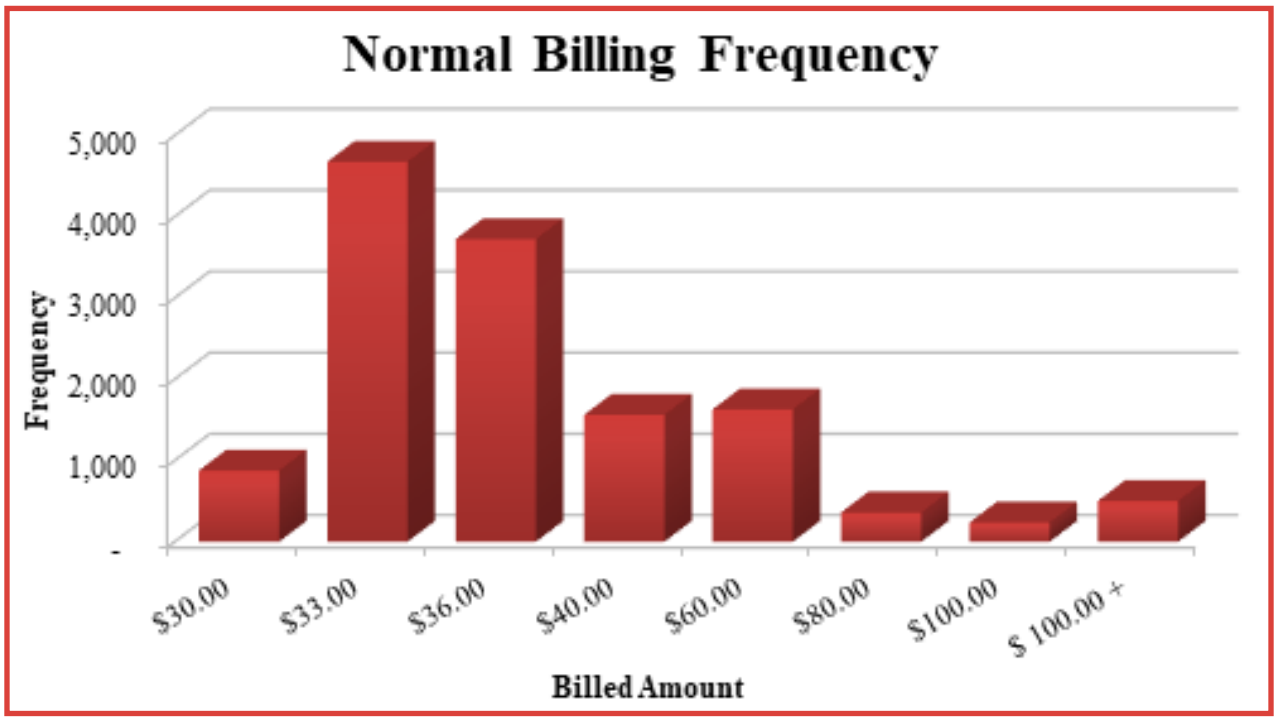
Maximum Affordable Water Bill

The Division of Drinking Water determines funding and grant eligibility based upon the State Average Water Bill and an entities average water bill compared to what the state deems to be a "maximum affordable water bill" for the water system. This is calculated as 1.75% of the local MAGI (Median Adjusted Gross Income) for the service area. The MAGI is taken from the most recent data from the Utah State Tax Commission. It was determined that:

1. The State Average Water Bill is $47.03 (1.08% of 2018 State MAGI of $48,000)
2. The MAGI during 2018 for CICWCD is $37,000.
    a. The annual "maximum affordable water bill" = 1.75% of $37,000 = $647.50.
    b. CICWCD's actual annual average water bill = $498.68.

Figure 30 Normal Billing Frequency shows the normal billing frequency.

Figure 30 Normal Billing Frequency



Water Rate Comparison

The current CICWCD water user rate schedule was compared to existing rate schedules in nearby communities in for a single-family home. The comparison includes the existing FY2018 rate. Reference *Table 17 Water Rate Comparison.*

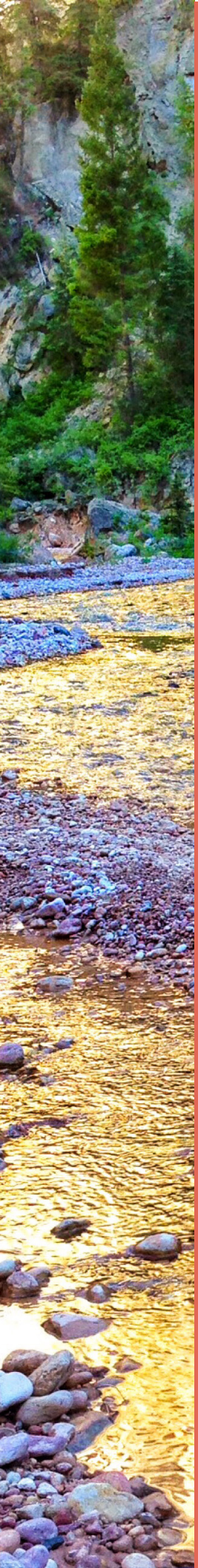


Table 17 Water Rate Comparison

Enoch City

Schedule	Gallons/Month	Charges	Revenue
Tier 1 (Base)	0 to 30,000	$29.00	$ 29.00
Tier 2	30,001 to 50,000	Tier 1 + $0.40/1,000 gal	$ 37.00
Tier 3	50,001 to 70,000	Tier 2 + $0.65/1,000 gal	$ 50.00
Tier 4	70,001 to 90,000	Tier 3 + $0.85/1,000 gal	$ 67.00
Tier 5	90,001 to 120,000	Tier 4 + $1.00/1,000 gal	$ 97.00
Tier 6	120,001 and Above	Tier 5 + $1.20/1,000 gal	-

Cedar City

Schedule	Gallons/Month	Charges	Revenue
Tier 1 (Base)		$17.00	$ 17.00
Tier 2	0 to 8,000	Tier 1 + $0.90/1,000 gal	$ 24.20
Tier 3	8,001 to 20,000	Tier 2 + $1.00/1,000 gal	$ 36.20
Tier 4	20,001 to 35,000	Tier 3 + $2.00/1,000 gal	$ 66.20
Tier 5	35,000 and Above	Tier 4 + $2.16/1,000 gal	-

Hurricane City

Schedule	Gallons/Month	Charges	Revenue
Tier 1 (Base)		$15.50	$ 15.50
Tier 2	0 to 5,000	Tier 1 + $0.89/1,000 gal	$ 19.95
Tier 3	5,001 to 10,000	Tier 2 + $0.94/1,000 gal	$ 24.65
Tier 4	10,001 to 20,000	Tier 3 + $0.99/1,000 gal	$ 34.55
Tier 5	20,001 to 30,000	Tier 4 + $1.15/1,000 gal	$ 46.05
Tier 6	30,001 to 40,000	Tier 5 + $1.31/1,000 gal	$ 59.15
Tier 7	40,001 to 60,000	Tier 6 + $1.54/1,000 gal	$ 89.95
Tier 8	60,001 and Above	Tier 7 + $1.75/1,000 gal	-

Washington City

Schedule	Gallons/Month	Charges	Revenue
Base Fee		$18.17	$ 18.17
Tier 1	0 to 5,000	Tier 1 + $1.20/1,000 gal	$ 24.17
Tier 2	5,001 to 10,000	Tier 2 + $1.32/1,000 gal	$ 30.77
Tier 3	10,001 to 15,000	Tier 3 + $1.44/1,000 gal	$ 37.97
Tier 4	15,001 to 20,000	Tier 4 + $1.56/1,000 gal	$ 45.77
Tier 5	20,001 to 25,000	Tier 5 + $1.68/1,000 gal	$ 54.16
Tier 6	25,001 to 30,000	Tier 6 + $1.80/1,000 gal	$ 64.16
Tier 7	30,001 to 35,000	Tier 7 + $1.97/1,000 gal	$ 73.01
Tier 8	35,001 to 40,000	Tier 8 + $2.14/1,000 gal	$ 83.71
Tier 9	40,001 and Above	Tier 9 + $2.31/1,000 gal	-

CICWCD

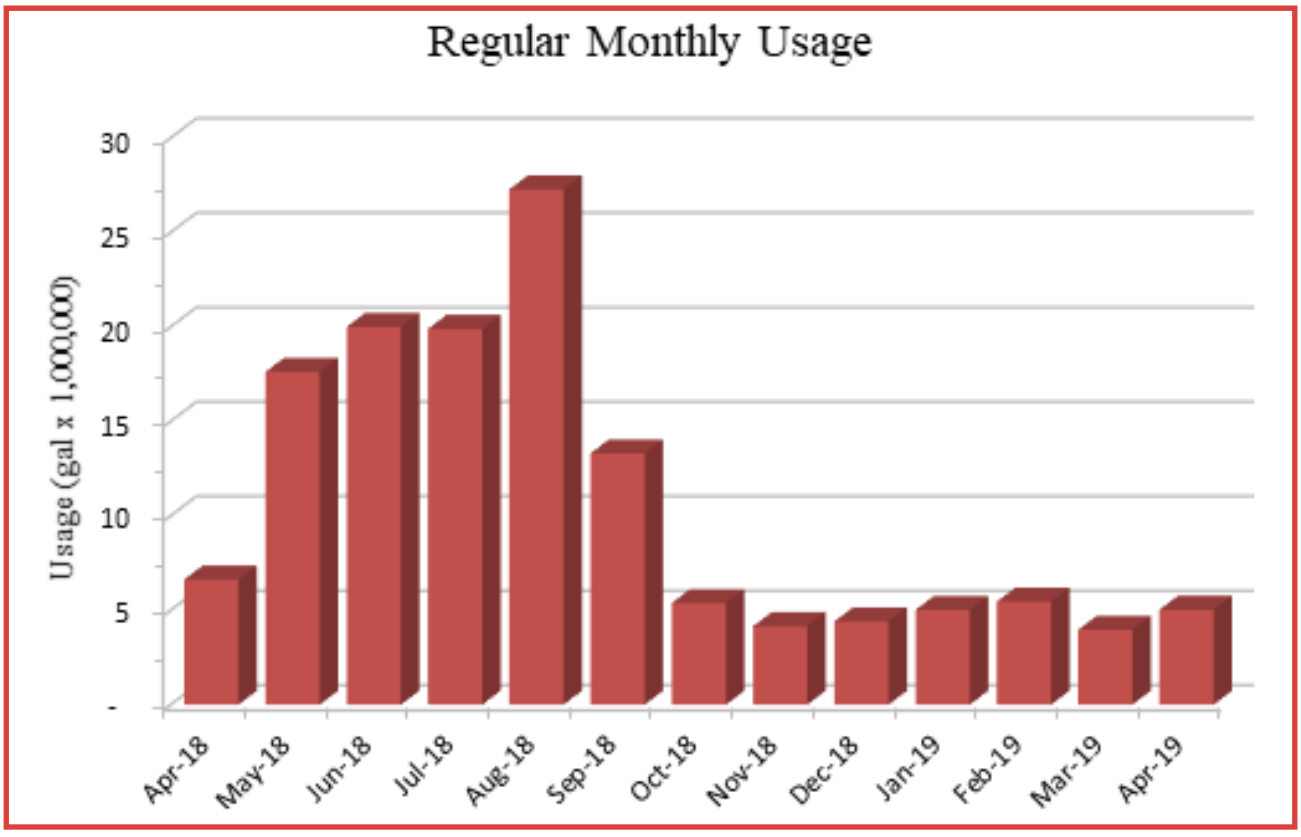
Schedule	Gallons/Month	Charges	Revenue
Tier 1 (Base)		$31.00	$ 31.00
Tier 2	0 to 12,000	Tier 1 + $0.78/1,000 gal	$ 40.36
Tier 3	12,001 to 20,000	Tier 2 + $0.94/1,000 gal	$ 47.88
Tier 4	20,001 to 30,000	Tier 3 + $1.65/1,000 gal	$ 64.38
Tier 5	30,001 to 60,000	Tier 4 + $2.78/1,000 gal	$ 147.77
Tier 6	60,001 to 100,000	Tier 5 + $3.09/1,000 gal	$ 271.37
Tier 7	101,000 +	Tier 6 + $4.12/1,000 gal	-

Current Water Usage

By using the water usage data provided for 2018-2019 water usage it was possible to quantify the usage/connection/month and to also determine the overall averages. This average water analysis was performed for all of the water users, those living inside District Background for average monthly water usage: meters read year-round.

The average monthly usage for all users is around 10,158 gallons/connection residential. The highest usage month is August of 2018 while the lowest is March of 2019. See *Figure 31 Regular Monthly Usage*.

Figure 31 Regular Monthly Usage



Connection Fee

Typically, a residential service connection involves the installation of connection facilities (including a corporation stop, service line, curb stop, and miscellaneous fittings) and customer facilities (including meter box, meter, and miscellaneous fittings). It is common practice for utilities to install equipment in the road right-of-way up to the customer's property line. This delineates a clear point of cost responsibility and establishes a level of consistency relative to the average cost of a service connection

Current Connection Fee

Central Iron County Water Conservancy District's connection fees are as follows:

¾-inch Service: $800
1-inch Service: $1,000
1.5-inch Service: $2,000
2-inch Service: $2,500

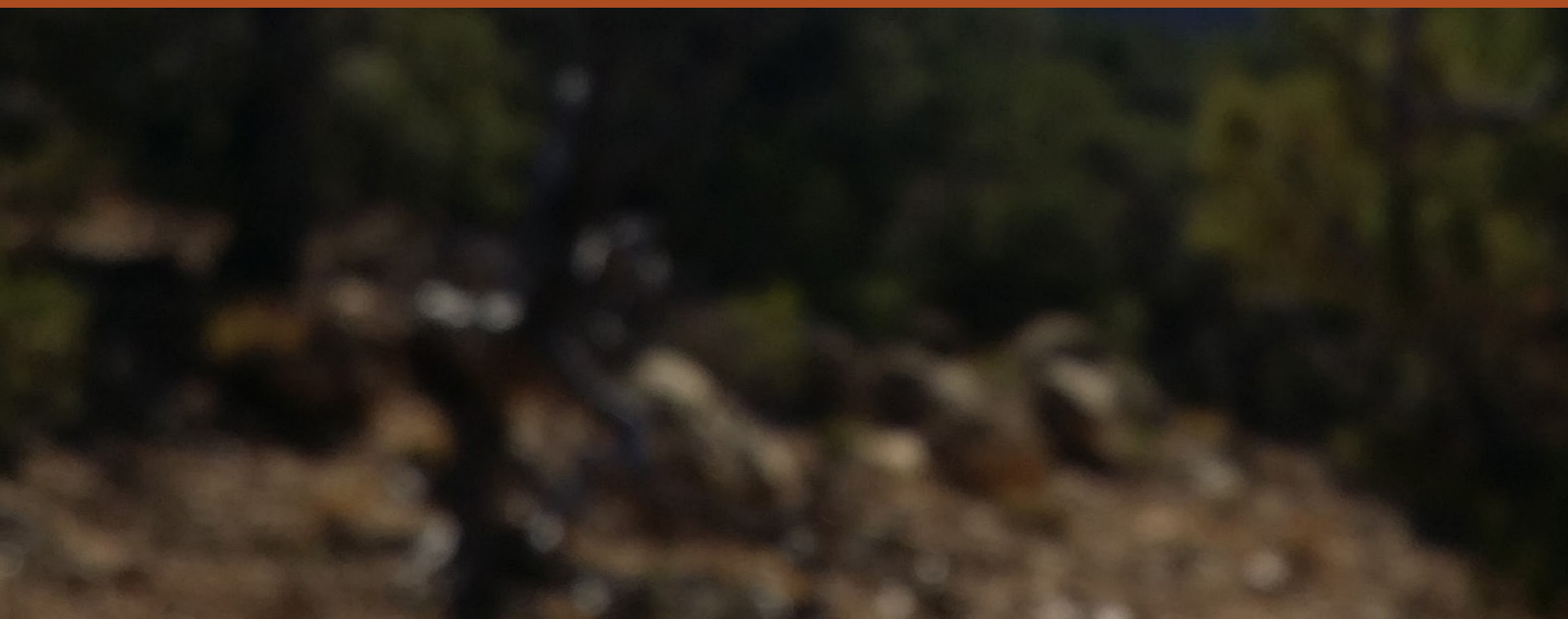
Proposed Water Rate Structure

To achieve the 1.75% of MAGI threshold within CICWCD, it is recommended that CICWCD implement the water rate structure listed in *Table 18 Proposed Rate Structure*. This structure will increase the average water bill to $46.44 a month. Furthermore, by implementing an annual 3% rate increase will allow the District to generate more revenue as growth happens to pay for the District's operating expense, provide for repairs and depreciation of works owned and operated by the District, pay the interest on bonds issued, and provide, as much as practicable, a sinking or other fund to pay the principals on bonds as they become due.

Table 18 Proposed Rate Structure

Schedule	Gallons/Month	Charges	Revenue
Tier 1 (Base)		$32.00	$ 32.00
Tier 2	0 to 12,000	Tier 1 + $0.80/1,000 gal	$ 41.60
Tier 3	12,001 to 20,000	Tier 2 + $0.97/1,000 gal	$ 49.36
Tier 4	20,001 to 30,000	Tier 3 + $1.70/1,000 gal	$ 66.36
Tier 5	30,001 to 60,000	Tier 4 + $2.86/1,000 gal	$ 152.15
Tier 6	60,001 to 100,000	Tier 5 + $3.18/1,000 gal	$ 279.35
Tier 7	101,000 +	Tier 6 + $4.38/1,000 gal	-

Statutory Impact Fee Study



STATUTORY IMPACT FEE STUDY

Introduction

The use of impact fees to finance public facilities is a concept that has already gained wide acceptance. The impact fee is frequently used as a source of capital financing in large and medium sized urban areas for system expansion. The theory, practical models, and legislation for determining growth-related costs and calculating impact-fees for new construction are well developed.

The CICWCD Water Master Plan incorporates the District's ability to facilitate future growth. These projects will be needed in order for the District to expand further and impact fees will help economically sustain these projects. The CICWCD's current impact fee is $3,500. An evaluation of this impact fee was analyzed and calculated. Recommendations were then made for future CICWCD impact fees.

Impact fees were calculated based on actual construction costs and estimates for improvements, materials, land, professional fees, and repayment for debt service charges for necessary master planned projects to maintain the existing level of service for future development.

This study discusses the framework for estimating an impact fee. It also quantifies the maximum amount that a developer or builder will be required to contribute and to pay for the costs of the proposed water system.

CICWCD has various source developments and infrastructure improvement projects. These projects include three source developments, three water storage tanks, a water supply project, and a booster station. See *Economics of Providing Service Section* for more details.

These proposed source development and infrastructure improvement projects are expected to be funded by various state and federal agencies, in addition to the water service charges and impact fees. See *Economics of Providing Service Section* for more details.

Definition of Impact Fee

According to the Utah State Legislative Code 11-36a-102, "Impact fee is a payment of money imposed upon new development activity as a condition of development approval to mitigate the impact of the new development on public infrastructure. Impact fee does not mean a tax, a special assessment, a building permit fee, and a hookup fee, a fee for project improvements, or other reasonable permit or application fee."

An impact fee is a one-time charge on new construction, typically collected at the time of building permit issuance or connection to the water or wastewater system. Impact fees are designed to ensure that new development contributes a fair share of the cost of the capital improvements needed to serve growth. The premise on which impact fees are based is that development should pay for the cost of providing the facilities necessary to accommodate growth. The costs of projects needed to support growth are financed with impact fees based on some measurement of a development's impact on future needs.

Purpose of Impact Fees

The impact fees are designed to cover the costs associated with providing new facilities in the CICWCD and to allow new users to connect to the District's water system. The broad purpose of impact fees is to protect the public health, safety, and general welfare by providing an adequate, safe, and reliable water supply. The specific purpose of the impact fees calculated in this study is to fund the construction of the proposed water source improvements and infrastructure improvement project. This report documents the data, methodology, and results of the impact fee study.

Legal Framework and Regulatory Requirement

The methods used to calculate impact fees in this study are intended to satisfy all legal requirements governing such fees, including provisions of the U. S. Constitution, and Utah State Legislative Statutes.

1**. U. S. Constitution:** Like all land use regulations, impact fees are subject to the Fifth Amendment prohibition on taking of private property for public use without compensation. Both state and federal courts have recognized the imposition of impact fees on development as a legitimate form of land use regulation, provided the fees meet standards intended to protect against regulatory takings. To comply with the Fifth Amendment, development regulations must be shown to substantially advance a legitimate governmental interest. In the case of impact fees, that interest is in the protection of public health, safety, and welfare by ensuring that development is not detrimental to the quality of essential public services.

2. Utah State Legislative Statutes: Based on the Utah Impact Fee Act, a political entity such as county, municipality, or a special district imposing impact fees must prepare a written analysis of each impact fee that:

- Identifies the impact on system improvements required by the development activity.
- Demonstrates how those impacts on system improvements are reasonably related to the development activity.
- Estimates the proportionate share of the costs of the impacts on system improvements that are reasonably related to the new development activity; and identifies how the impact fee was calculated.

Table 19 Utah State Legislative Codes

Utah State Legislative Codes	Subject
11-36a-101	Title
11-36a-102	Definitions
11-36a-201	Impact Fees
11-36a-202	Prohibitions on Impact Fees
11-36a-203	Private Entity Assessment of Impact Fees—Charges for Water Rights, Physical Infrastructure—Notice—Audit
11-36a-204	Other Names for Impact Fees
11-36a-205	Environmental Mitigation Impact Fees
11-36a-206	Prohibition of School Impact Fees
11-36a-301	Impact Fees Facilities Plan
11-36a-302	Impact Fees Facilities Plan Requirements—Limitations—School District of Charter School
11-36a-303	Impact Fee Analysis
11-36a-304	Impact Fees Analysis Requirements
11-36-305	Calculating Impact Fees
11-36a-306	Certification of Impact Fee Analysis
11-36a-401	Impact Fee Enactment
11-36a-402	Required Provisions of Impact Fee Enactment
11-36a-403	Other Provisions of Impact Fee Enactment
11-36a-501	Notice of Intent to Prepare an Impact Fee Facilities Plan
11-36a-502	Notice to Adopt or Amend and Impact Fee Facilities Plan

Table 19 Utah State Legislative Codes (continued)

11-36a-503	Notice of Preparation of an Impact Fee Analysis
11-36a-504	Notice of Intent to Adopt Impact Fee Enactment—Hearing—Protections
11-36a-601	Accounting of Impact Fees
11-36a-602	Expenditure of Impact Fees
11-36a-603	Refunds
11-36a-701	Impact Fee Challenge
11-36a-702	Time Limitations
11-36a-703	Procedures for Challenging an Impact Fee
11-36a-704	Mediation
11-36a-705	Arbitration

Based on the Utah Impact Fee Act (Utah State Legislative Code 11-36a-201), an impact fee study is a prerequisite for a capital facility plan for a political entity such as county, municipality, or a special district. The political entity may only impose impact fees on development activities when its plan for financing system improvements establishes that impact fees are necessary to achieve equitable allocation to the costs borne in the past and to be borne in the future, in comparison to the benefits already received and yet to be received. The capital facility plan should include impacts that the proposed facility may have on the affected entity.

In calculating the impact fee, the following cost items may be included (Utah Impact Fee Act, Utah State Legislative Code 11-36a-305):

- The construction contract price.
- The cost of acquiring land, improvements, materials, and fixtures.
- The planning, surveying, and engineering fees for services provided for and directly related to the construction of the system improvements; and

For a political subdivision, debt service charges, if the political subdivision might use impact fees as a revenue stream to pay the principal and interest on bonds, notes, or other obligations issued to finance the costs of the system improvements.

Water System Valuation

To calculate the cost of existing capacity of sources, storage, land, and other necessary elements for construction, actual costs of each project were estimated based on market costs and is shown in *Table 20 Water System Valuation*.

Table 20 Water System Valuation

Description	Estimated Value	Percentage
Distribution	$12,118,297.89	26%
Transmission	$7,454,622.11	16%
Sources	$14,000,000.00	30%
Booster	$1,250,000.00	3%
Storage	$3,250,000.00	7%
Land	$9,000,000.00	19%
Equipment	$300,000.00	1%
Total	$47,372,920.00	100%

System Improvements

To maintain the level of service required and shown in, the district plans to construct and acquire sources for future projects. *Table 21 Future System Improvements* shows future projects that will maintain supply and development as growth occurs within CICWCD's boundaries. The future system improvements take into consideration of source development and storage development since both are necessary for growth to maintain in compliance of the R309-510 code.

Table 21 Future System Improvements

Future System Improvements	Project Year	Additional Supply/Storage
CICWCD District Well #3	2022	1,000 gpm
North Ridge Tank	2030	2,000,000 gallons
Bridal Path Tank	2022	2,000,000 gallons
Highway 56 Booster Station	2023	-
Cedar Highlands Water Tank	2023	500,000 gallons
Chekshani Cliffs Well #2	2020	500 gpm
Chekshani Cliffs Treatment	2020	-
Pine Valley Water Supply Project	TBD	15,000 acre-feet
Horse Hollow Well Field	2030	2,000-3,000 gpm

Financing Projects

The CICWCD's current facilities provide sufficient water to existing customers to meet the established level of service. System improvements consisting of existing facilities with excess capacity have been funded by various bonds, some of which have been retired. Demand from new development will consume 100 percent of existing excess capacity and therefore will be expected to share the original costs of existing facilities proportionate to the existing excess capacity of those facilities.

New development is expected to occur within the CICWCD and to consume 100 percent of the excess capacity of the system and the majority of the capacity of future facilities. The impact fee is intended to finance the costs of all existing excess capacity and the portion of future facilities' capacity that will be consumed by future development.

As previously stated, the CICWCD anticipates federal and state grants that will contribute to the costs of system improvements. User charges and general taxes finance the operation, maintenance, repair and replacement costs of facilities rather than the construction of system improvements necessitated by growth. However, the CICWCD's Board of Trustees may determine that a set portion of the costs required to serve new development be paid by user charges and general taxes rather than by the full impact fee calculated in this analysis.

Legal Issues Related to Impact Fee Analysis Methodology

The preliminary planning to establish an impact fee includes a review of the legal authority and issues associated with capital recovery in the utility's operating environment. Legal authority may be granted through enabling legislation, ordinances, statutes regarding general law or home rule authorities, home charter, utility operation permits, utility service certifications, or judicial rulings. A primary legal issue related to impact fee is establishing a reasonable connection between the amount of impact fees and the cost associated with serving new development.

Methodology

Any one of the applicable methods described below may be used to calculate impact fees. The choice of a particular method depends primarily on the service characteristics and planning requirements for the facility type being addressed. Each method has advantages and disadvantages in a particular situation, and to some extent they are interchangeable because they all allocate facility costs in proportion to the needs created by development.

Reduced to its simplest terms, the process of calculating impact fees involves only two steps: determining the cost of development-related capital improvements and allocating those costs equitably to various types of development. In practice, however, the calculation of impact fees can become quite complicated because of the many variables involved in defining the relationship between development and the need for facilities. There are two common methods used in determining impact fees which will be described in further detail below.

Incremental Cost Method

The incremental cost method provides a method of upgrading the current system to meet future needs without major impacts on the current users. The major component of this method is determining periods of growth, growth rates, type of growth, and needed improvements to support these growths. This system of developing impact fees is recommended for growing cities or Districts that need major improvements. This allows for the current users to avoid as much impact as possible from the needed improvements. This method was not chosen for the impact fee study.

Equity (Buy-In) Method

This method assumes that all the existing users have built up equity in the system and that the impact fees are a representative of that equity. This allows for the new users to buy into the equity that the existing users have built up. The largest component to this method is determining the equity of the system. This includes determining assets, depreciation, and liabilities. Once these components are determined, the equity of the system is computed, and the impact fees can be assessed.

> Did you know? Impact fees are one-time payments used to fund the construction of public facilities needed to serve new development activity.

Equity (Buy-In) Method Chosen

This section calculates impact fees for new development on the basis of achieving equity between new and existing customers. The calculation of the impact fee in this section recognizes that each user has built up a certain amount of equity in the system and that new development is responsible to pay for that equity through impact fees. The goal of this analysis is to achieve a level of equity from new customers by collecting an impact fee representative of the average equity attributable to existing customers.

An evaluation of the system assets is shown in *Table 22 Total Assets*. The costs shown in this Table are shown in today's replacement costs. The replacement costs were derived for total amount needed to replace the entire water system. The number of ERCs is the total number of ERCs in the system. Included in this number is the number of ERCs inside and outside the system. The cost per connection is the total replacement cost divided by the number of connections currently in the system. This amount ($25,593.83) is the maximum allowable impact fee for connection to the water system. *Table 23 Impact Fee Calculation* shows the cost per ERC based on the valuation of the existing water system to maintain the existing level of service.

Table 22 Total Assets

Asset	Replacement Cost
Pipe (435,000 L.F.)	$19,573,965.00
Source (9 Wells, 2 Springs)	$5,550,000.00
Tanks (8)	$3,600,000.00
Booster Station (2)	$400,000.00
Equipment	$200,000.00
Land	$9,000,000.00
Total	**$38,313,965.00**
Number of ERC's	**1,497**
Cost per ERC	**$25,593.83**

Table 23 Impact Fee Calculation

Impact Fee Qualifying Costs	Calculated Costs
Equity Method Calculation	$47,372,920
Cost of Supply Facilities per ERC	$37,777.45

Impact Fees – Surrounding

A survey of impact fees for the surrounding communities was conducted. The results of this survey are shown in *Table 24 Impact Fee Comparison*. The average impact fee for the surrounding communities is $2,823.34. CICWCD's current water impact fee is $3,500 per ERC.

Table 24 Impact Fee Comparison

Entity	Impact Fee
Enoch City	$4,703.00
Cedar City	$2,993.70
Hurricane City	$1,508.00
Washington City	$2,412.00
CICWCD	$3,500.00
Average	**$3,023.34**

Proposed Impact Fee

Based on a water impact fee analysis it is recommended that CICWCD increase the impact fee to $5,500 and establish the following impact fee schedule as shown in *Table 25 Proposed Impact Fee Schedule*.

Connections larger than 1 ERC will be evaluated by CICWCD to determine the appropriate size of water meter and impact fee. In the event CICWCD supplies water to neighboring municipalities, private water systems or any other non-traditional connections, CICWCD will evaluate the impacts on the existing system and develop an impact fee-based percentage of infrastructure impacted. CICWCD has capacity to charge impact fees within its boundaries. It is also recommended that CICWCD institute a Cedar Valley Basin wide impact fee of $500 for the implementation of the Pine Valley Water Supply and Conservation Project. This will create a savings for the West Desert project. The savings will be implemented as needs for the West Desert Project arise.

Table 25 Proposed Impact Fee Schedule

Meter Size (inches)	ERCs	Impact Fee
¾”	1	$5,500
1”	1	$5,500
1-½”	2	$7,500
2”	3.5	$13,000
3”	8.67	$31,500
4”	12.44	$50,000
5”	16.43	$68,500
6”	20.44	$87,000
7”	24.44	$105,500
8”	>24.44	$124,000