

WATER MANAGEMENT &
CONSERVATION PLAN

FOR
BEAVER CITY CORPORATION
BEAVER, UT 84713

Adopted January 26, 2010

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WATER MANAGEMENT & CONSERVATION PLAN

INTRODUCTION

In response to the rapid growth occurring throughout the state of Utah, Beaver City citizens and leaders are becoming concerned for the future cost and availability of the water supply. A similar concern has been demonstrated by the state legislature in the Water Conservation Plan Act (House Bill 71) passed and revised in the 2004 legislative session (Section 73-10-32 Utah Code Annotated). This water conservation plan is written to address how water conservation programs and practices will play an important role in meeting our future water needs as well as address the concerns of leaders and citizens of both Beaver City and the state of Utah.

DESCRIPTION OF BEAVER CITY AND ITS WATER SYSTEMS

Beaver is an incorporated city located on the East side of Beaver County, in south-central Utah. It was established in 1856 and incorporated on 10 January 1867. As typical for many early settlements, drinking water was provided by irrigation ditches. The first culinary water piping was installed as the city grew. Water was still collected from the irrigation stream to fill the first water tank for some time. Improvements have been ongoing since then.

Beaver City has two water systems, a culinary and a secondary irrigation water system.

Beaver City's 2009 population was approximately 2,900. It is projected that the population will increase by an estimated 2.70% per year for a projected population of 4,983 persons for the year 2030. Currently the culinary water system has 1,465 connections; 1,229 residential connections, 170 commercial, 17 institutional, 2 industrial, and 46 agricultural. Approximately 160 of the connections are outside the city boundaries. It is estimated that there will be approximately 3,851 equivalent residential connections by the year 2030. The City Council has adopted an annexation plan that states that to receive City water service, the property must be annexed, or have special circumstances that justify water service out of the city.

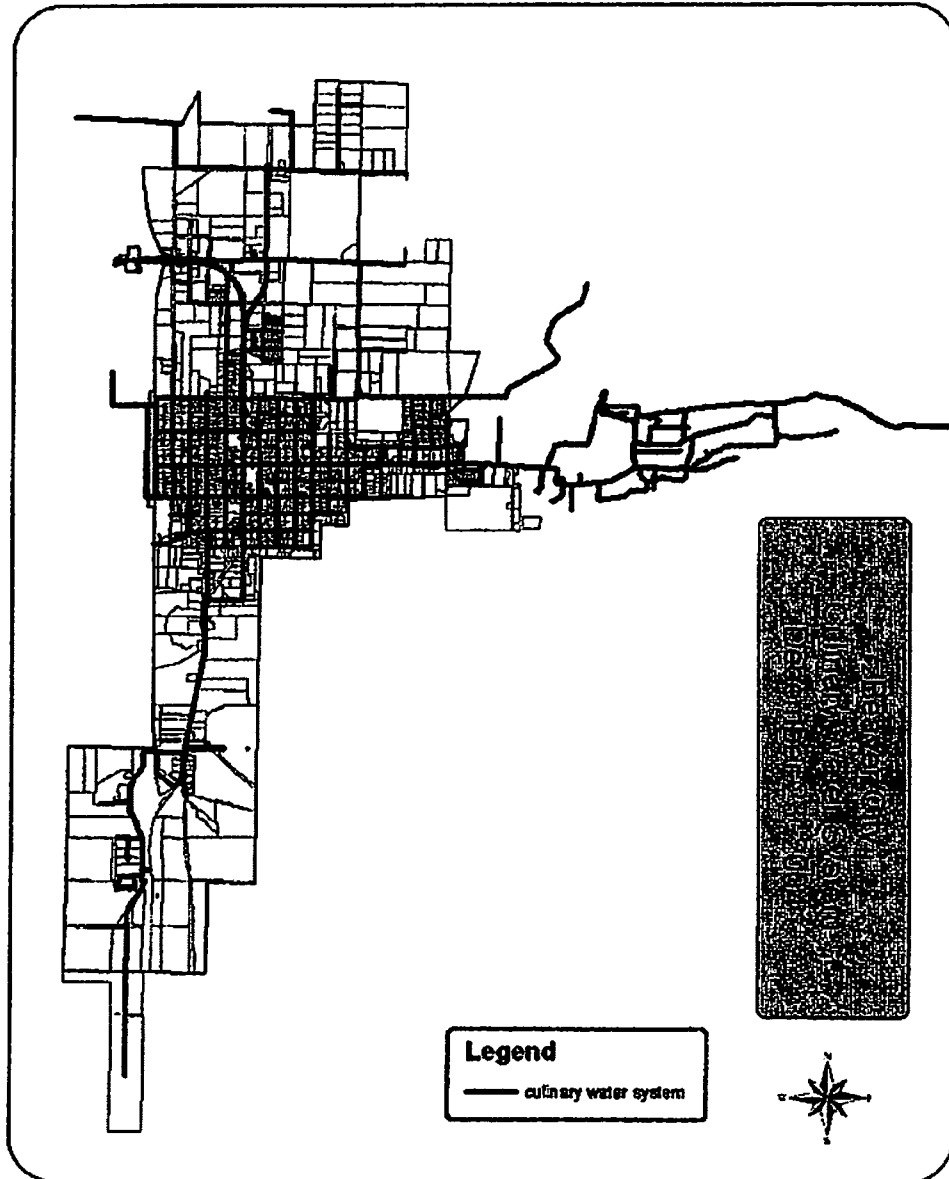
The secondary water system has a water right from the Beaver River to water about 332 acres, and an additional 52 acres at the golf course. An additional amount available from the Bakers Canyon water rights has the potential to water about 110 acres. There are currently 980 existing connections served by the Beaver City Irrigation System that use the secondary water irrigation system for their outdoor use. Water rights in other irrigation systems and companies also provide additional acreage that may be irrigated. The City has yet to prove-up on the change application for the Beaver River water and the water rights from Bakers Canyon. In reviewing the total acreage currently being watered puts the acreage at about 310 total acres, with the rest being held for future growth and development.

The goal of Beaver City is to provide a clean, safe water supply and a dependable delivery system and to keep the water system development ahead of growth.

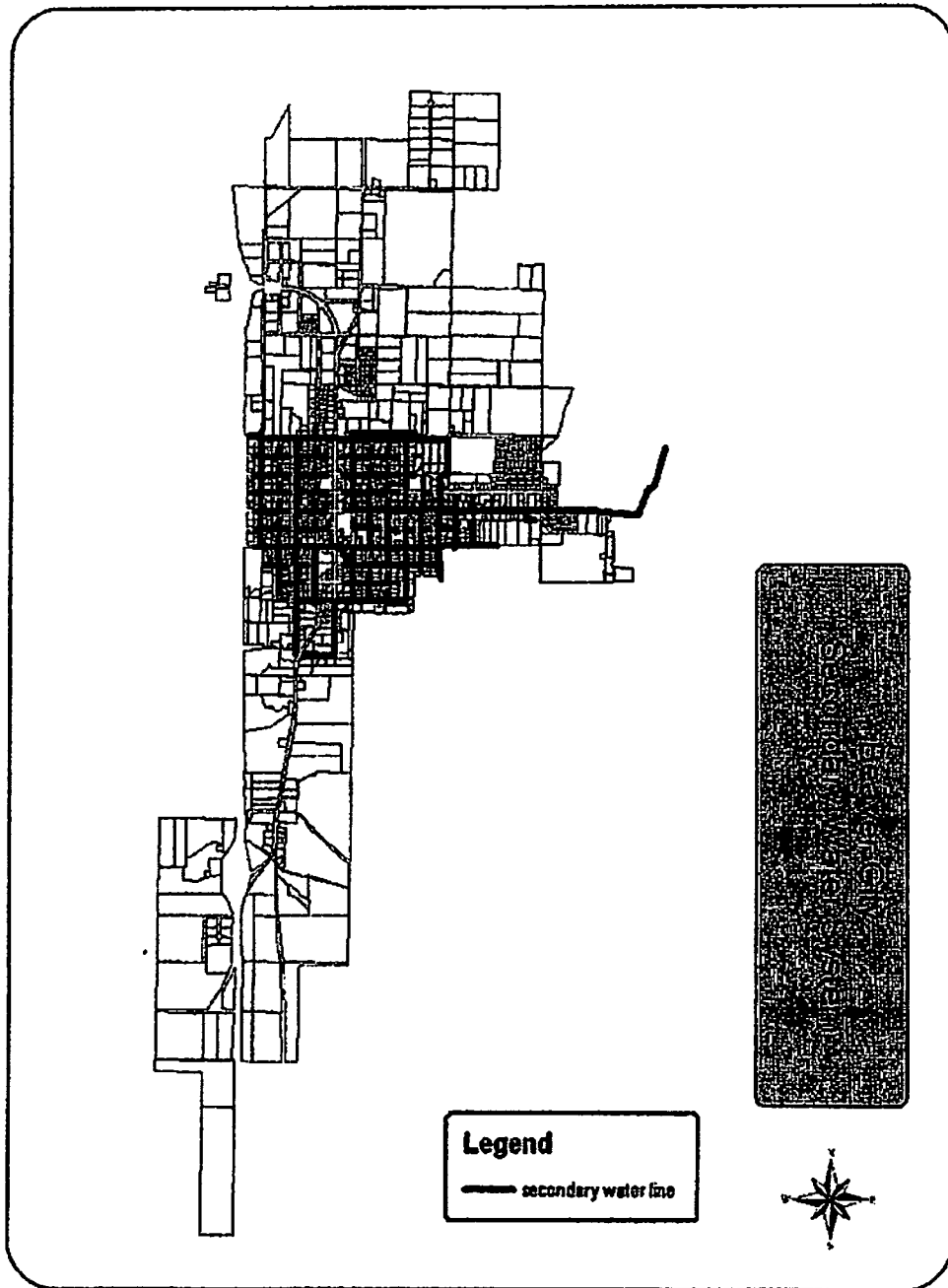
The City culinary water system has had major improvements during the last 10-year period. During that time a new well, three water tanks, and new supply and distribution lines have been constructed. Those improvements have created two new pressure zones and have insured that

both the North and South ends of the city have a good water supply and no drops in water pressure when the demand is high, plus providing improved fire protection.

BEAVER CITY CULINARY WATER SYSTEM MAP



SECONDARY WATER SYSTEM MAP



INVENTORY OF WATER RIGHTS

Table 1

<u>Name/Right or application number</u>	<u>Source</u>	<u>Type or Use</u>	<u>Amount</u>	<u>Action Due</u>
Beaver River 77-191 a15424 see claims 77-4,37,177,196,407	Beaver River Apr 1-Oct 31	Irrigation of 331.86 acres	16.2 cfs	Extension Filed
Beaver River 77-191 a15424	Beaver River Apr 1-Oct 31	Irrigation of 52.3 acres at golf course	1.03 cfs or 209.2 ac-ft or 52.3 acres	
Bankers Canyon 77-1370 application a16984	Springs or South Fork flow Jan 1-Dec 31	Culinary or irrigation. 13 springs collected about 41% of the right for culinary use, balance used for irrigation	2cfs or 1448.03 ac-ft	Extension Filed
a26637a 77-1777	Well from Black & Williams	Apr 1-Oct 31 Watering of .75 acres	3 acre-feet	Change application - needs to be filed
77-52 a20591 (Includes multiple water rights)	Wells	Changed from irrigation to municipal	1315.59 acre-feet 77-52—31.39 af 77-63—470 af 77-68—60 af 77-1656—500 af 77-59 (a18617)- 54.20 af	Extension Filed
77-1656 (see 77- 52, included there)	Wells	Jan 1-Dec 31	500 acre-ft reduced to 350 acre-feet	
77-1655	Hydro generation #3	In-stream flow restrictions apply	25.7	Extension Filed
77-68 See 63, 68, 52 also see 77-52 (included there)	Wells	Jan 1-Dec 31 limited to equivalent to the irrigation of 65 acres	260 acre ft	

77-4	Kent's Lake Storage	Storage from Apr 1-Jun 30 inclusive	200 acre-feet	
77-95 a27079	Gerald Hackwell	Well irrigation 4/1-10/31	13 ac-ft or 3.25 acres	Change application - needs to be filed
77-1661 a13993 (see 77-1661 below)		Restaurant 1/1-12/31	2 ac-ft	Change application - needs to be filed
77-59 a18617 see also 77-52 (included there)		Wells	.0789 cfs 54.2 ac-ft	
77-1661 (2 ac-ft), 1777 (3 ac-ft), 1778 (25 ac-ft) a21418		Municipal wells	30 ac-ft 7.5 acres	10/31/2005
77-60 a21720	Todd Bradshaw		50 ac-ft 12.5 acres	Change application - needs to be filed

CULINARY WATER SYSTEM

Beaver City obtains its culinary water from 13 springs and two wells. The springs are all located in Bakers Canyon about 5 miles east of the city. The springs produce about 46 acre-feet annually. A 250,000 gallon concrete water tank located in Bakers Canyon is kept full by an altitude valve and an 8" ductile iron water line delivers the remaining water to the city.

The "Head House" well located north of the golf course is 585 feet deep and currently produces about 900 gallons per minute with a 125-hp pump.

The "North Creek" well produces about 400 gallons per minute and is stored in a 1,000,000 gallon water tank. With the construction of the North Creek well and tank, a new pressure zone has been created with pressures of about 165 psi. This pressure zone is separated from the rest of the city by five pressure reducing valves. Services that connect to this pressure zone all are fitted with individual pressure reducing valves.

The "Center Street" well has been removed from the culinary water system, and is used for secondary water resource only.

The city has five water tanks. The Bakers Canyon tank supplies a fire flow source for the area serviced outside the city limits in an area known as the "Grove." This tank will also supply water to the city if pressures drop below 20 psi in the lower system. Two water tanks are located next to the "Head House" well. One tank is 1,000,000 gallons and the second 200,000 gallons. The fourth tank is the 1,000,000 North Creek tank. The fifth tank is the Jackson Co. Hill Tank, with a capacity of 500,000 gallons.

The distribution system continues from the main supply line to a system of 16" down to 1" supply lines. Most of the system is a 6" grid work of ductile iron pipe. The system has been upgraded and replaced during the last 15 years and is in excellent condition, except some smaller 1-2" service lines.

SECONDARY WATER SYSTEM

Beaver City installed a secondary water system that was in full use by the summer of 1991. Water use for 2003 was about 1775 ac-ft. The peak daily use occurs in July and August, the peak of the irrigation season, and results in a daily peak of 6-7 cfs of water. Beaver City has a water right of 16.2 cfs from the Beaver River, if available, which amounts to 7,185 ac-ft. The water right from Bakers Canyon that has been available for use in the irrigation system provides an additional 443 ac-ft.

During the past five years of drought, and especially the last three years, Beaver City has used several different approaches to insuring that the best management of water resources was done. It has been an experiment to see what plan worked best. During each of the years, watering during the daytime hours of 9:00 A.M. to 6:00 P.M. has been curtailed. Other methods implied have included dividing the city into zones and allowing watering only every third day; another plan, used in the summer of 2004 allow people to pick their own days to water, but encouraged them to conserve water. For the last three summers, outside watering between the hours of 9:00 a.m. and 6:00 p.m. has been Beaver City's policy. After evaluation of water consumption, it appears that limiting daytime watering and encouraging water conservation works just as well, or better, than limiting watering days.

WATER PROBLEMS

The following problems have been identified in the conservation and management of Beaver City's water resources:

- Citizens lack information and understanding of landscaping water requirements and efficient water-use habits and practices: Very few residents know how much water is required to maintain healthy landscaped areas and how to consistently use water efficiently indoors. Most citizens' irrigation and indoor practices are based on convenience rather than plant needs and water supply considerations.
- Our City families have landscapes with large areas of grass and other water intensive landscaping. This irrigation need usually creates a water use peak in July straining the existing water delivery system and necessitating constant upgrades to main delivery lines and reservoir capacities.
- Water from the secondary system is un-metered and therefore there is no consideration by a few users as to the amount of water they use.
- The opportunity exists to prepare a new generation of wise-water users. This can be assisted with a strong sustained water education program in the public and private schools.

- Beaver city could develop an “acceptable plants list” that recommends water thrifty plants that do not have intrusive root systems, and may improve landscape quality and appearance. Landscaping along existing and future roads in the city could be more easily maintained if low water-use shrubs and mulches were used instead of Kentucky blue grass. All this will help solve the last problem identified by reducing peak demands and the need for expensive water system upgrades.

WATER CONSERVATION GOALS

In pursuit of solutions to the problems identified previously, and in light of the variety of conservation measures available to solve these problems, the following goals have been identified:

GOAL #1

Reduce the city’s per capita water use rate by at least 15 percent in five years.

GOAL #2

Maintain a financially viable water system. The water pricing system should encourage customers to reduce use without creating a revenue shortfall.

GOAL #3

Maintain or improve the appearance of street landscapes, open spaces and yards. Improved irrigation practices and water efficient landscapes can enhance the beauty of the city. Annual surveys of citizen attitudes will measure satisfaction, or lack thereof, with landscapes on city-owned properties and rights-of-way.

CURRENT CONSERVATION PRACTICES

In order to solve the problems identified above and take advantage of the many associated opportunities, specific water conservation measures must be identified and evaluated. Beaver City has already implemented several water conservation measures; these, along with additional measures that will effectively solve Beaver City’s water problems, are discussed below.

Beaver City’s current water conservation program is directed primarily at managing water shortages and providing useful material to assist residents to use water more efficiently. Current measures include a water conservation contingency plan, water education program for outdoor and indoor water use, and a conservation oriented water rate structure.

WATER CONSERVATION CONTINGENCY PLAN

The Beaver City Irrigation Committee made the following recommendations for secondary water usage:

- A. Where there is adequate water from the Beaver River -
 1. Make no mandates or restrictions
- B. When water flows are low –
 1. Restrict watering during the hours of 9:00 A.M. to 6:00 P.M.
- C. When water flows are not adequate to meet the demands –
 1. Restrict watering during the hours of 9:00 A.M. to 6:00 P.M.
 2. Pumping of wells to supplement river flows
 3. Restrict number of days water is available.

ANNUAL REVIEW OF SNOW PACK

The Irrigation Committee is to review the water situation in March of each year to assess the snow pack and to determine what action might be needed for the coming irrigation season.

WATER EDUCATION PROGRAM

The following information on efficient outdoor and indoor water use is available to the citizens of our city, through the city and county libraries, and is occasionally disseminated with the water bill.

Outdoor Water Use:

- Water landscape only as much as required by the type of landscape, and the specific weather patterns of your area, including cutting back on watering times in the spring and fall.
- Do not water on hot, sunny, and/or windy days. You may actually end up doing more harm than good to your landscape, as well as wasting a significant amount of water.
- Sweep sidewalks and driveways instead of using the hose to clean them off.
- Wash your car from a bucket of soapy (biodegradable) water and rinse while parked on or near the grass or landscape so that all the water running off goes to beneficial use instead of running down the gutter to waste.
- Check for and repair leaks in all pipes, hoses, faucets, couplings, valves, etc. Verify there are no leaks by turning everything off and checking your water meter to see if it is still running. Some underground leaks may not be visible due to draining off into storm drains, ditches, or traveling outside your property.
- Use mulch around trees and shrubs, as well as in your garden to retain as much moisture as possible. Areas with drip systems will use much less water, particularly during hot, dry, and windy conditions.
- Keep your lawn well trimmed and all other landscaped areas free of weeds to reduce overall water needs of your yard.

Indoor Water Use:

- About two-thirds of the total water used in a household is used in the bathroom. Concentrate on reducing your bathroom use.
- Do not use your toilet as a wastebasket. Put all tissues, wrappers, diapers, cigarette butts, etc. in the trash can.
- Check the toilet for leaks. Is the water level too high? Put a few drops of food coloring in the tank. If the bowl of water becomes colored without flushing, there is a leak.
- If you do not have a low volume flush toilet, put a plastic bottle full of sand and water to reduce the amount of water used per flush. However, be careful not to over conserve to the point of having to flush twice to make the toilet work. Also, be sure the containers used do not interfere with the flushing mechanism.
- Take short showers with the water turned up only as much as necessary. Turn the shower off while soaping up or shampooing. Install low flow showerheads and/or other flow restriction devices.
- Do not let the water run while shaving or brushing your teeth. Fill the sink or a glass instead.

- When doing laundry, make sure you always wash a full load or adjust the water level appropriately if your machine will do so. Most machines use 40 gallons or more for each load, whether it is two socks or a week's worth of clothes.
- Repair any leak within the household. Even a minor slow drip can waste up to 15 to 20 gallons of water a day.
- Know where your main shutoff valve is and make sure that it works. Shutting the water off yourself when a pipe breaks or a leak occurs will not only save water, but also eliminate or minimize damage to your personal property.
- Keep a jar of water in the refrigerator for a cold drink instead of running water from the tap until it gets cold. You are putting several glasses of water down the drain for one cold drink.
- Plug the sink when rinsing vegetables, dishes, or anything else; use only a sink full of water instead of continually running water down the drain.

FUNDING & BUDGET

The budget for the water department, including both culinary and secondary water, is \$703,025 for the current fiscal year. Water fund reserves have decreased the past three years. Because of this, the city Council increased water rates on both culinary and secondary water, effective June 24, 2008.

A new employee has been added, bringing the total employees working in the water and sewer departments to three. The expense of this new employee is shared between the water and sewer departments.

Operation and Maintenance of the systems have a budget of \$90,000 and capital improvements have a budget of \$86,000.

POPULATION PROJECTIONS

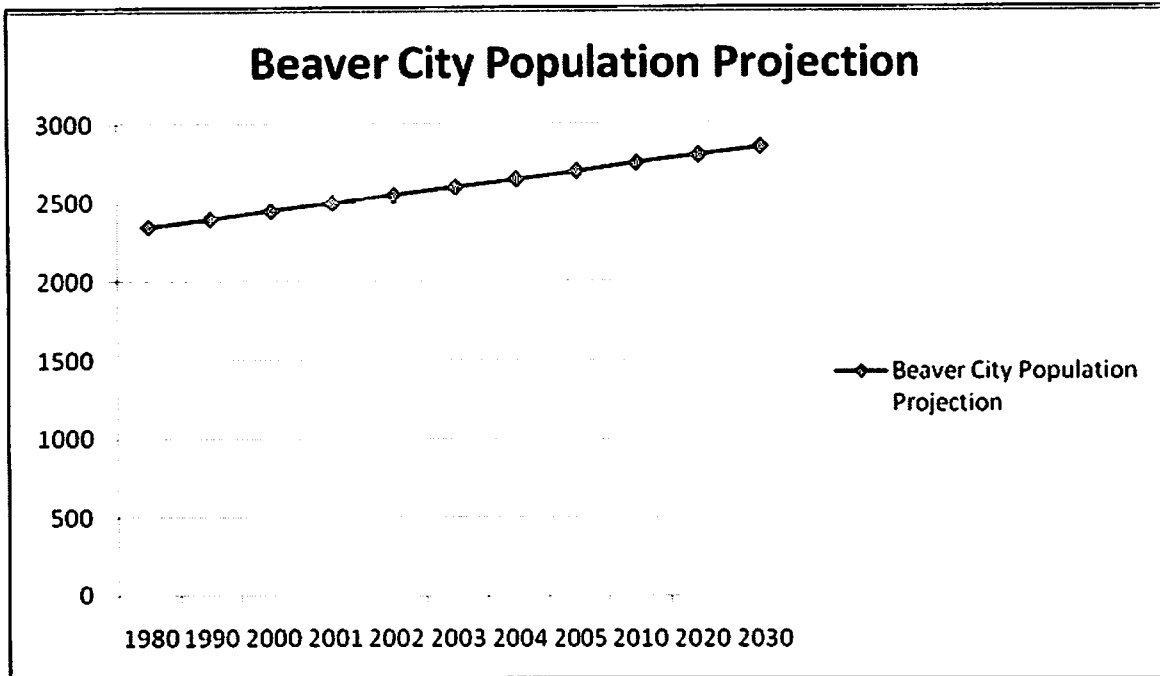
To model Beaver City's culinary water system, the historical and projected population growth was analyzed. Future population projections were obtained from the Utah State Office of Planning and Budget. Present growth gives validity to the projections obtained. With the population projections, areas of potential development were identified and used to model the system.

POPULATION TRENDS

The average 10 year growth rate from 1970 to 1980 was 23.33%. Between 1980 and 1990 the 10-year growth rate averaged 11.5%. Between 1990 and 2000 the growth rate was 2% per year or 10 % in the 10-year period. According to the Utah State Governor's Office of Planning and Budgeting, the anticipated growth rate for Beaver City is approximately 2.23% per year over the next 40 years.

Table 2 shows Beaver's historical and projected population from the years 1970 to 2020. *Does NOT include serviced population outside City Limits.*

Table 2



By analyzing the population projections and the current water system components, capacities and future needs can be determined. The system components, water rights, production capacity, storage capacity and delivery capacity were each analyzed.

WATER RIGHTS USAGE

Table 3 shows the source of various city water rights, the amount of available water and the usage and percentage of use of each of the sources.

Table 3

Source	Gallons of water produced	Water Right/gallons available	Percentage of water rights used
SPRINGS			
Springs located in Bakers Canyon	298.73 ac-ft from springs	(2cfs-springs or surface) 1448.03 ac-ft or 935,821,244 gallons	41% The balance of the water right was used in the irrigation system
UNDERGROUND WELLS			
Head-house Well	101,989,000 (157.8 ac-ft)	Total underground rights 1387.59 ac-ft or 896,760,564 gallons	
North Creek Well	73,682,600 (114 ac-ft)		
Total underground use	173.8 ac-ft or 175,671,600 gal.		

WATER USAGE CULINARY SYSTEM

Based on the total 2003 underground culinary water usage of 175,671,600 gallons, 19.58% of the City's underground water rights are being used. Water rights, based on projected usage should allow for approximately 1,500 future service units. Beaver City has adopted impact fees, of which a portion is for water rights and will continue to acquire additional water rights with those funds to insure that there are always sufficient water rights available. Beaver City's secondary water system has an adjudicated use area of 331 acres and the City is now in the process of obtaining proof on the right. This area limitation will necessitate that either new growth will have to use culinary water for irrigation, or additional water rights will need to be supplied or acquired. Current policy allows for either the payment of impact fees or dedication of water to the city as a condition of development.

SECONDARY-IRRIGATION SYSTEM

During the summer irrigation season, April 1-October 31, a period of 213 days, there is about 443.52 ac-ft of water available from Bakers Canyon that can be discharged from the Beaver River and used by Beaver City in the irrigation system. This water will provide for the irrigation of 110.88 acres. This is assuming that the creek in Bakers Canyon is following 1-cfs during that period and the water is available.

WATER CONSERVATION METHODS

Beaver City has adopted a revised water rate schedule (effective June 24, 2008) designed to encourage water conservation. The base rate for 10,000 gallons is \$23.00 per month and the rate for the next 27,000 gallons is \$.40 per thousand; for the next 27,000 gallons is \$.79 per thousand; for the next 27,000 gallons is \$1.19; and for anything above 91,001 gallons, the rate is \$1.58 per thousand gallons.

Outside the City boundaries, the base rate for 10,000 gallons is \$35.00 per month and the rate for the next 27,000 gallons is \$.40 per thousand; for the next 27,000 gallons is \$.79 per thousand; for the next 27,000 gallons is \$1.19; and for over 91,001 gallons, the rate is \$1.58 per thousand gallons.

The City has an aggressive policy for system maintenance and is actively trying to eliminate leakage and water loss. Watering with the culinary system is not allowed in any area that has secondary water, thus preserving precious drinking water and reducing the cost of production.

IMPACT FEES

Impact fees will provide funds to pay for the water projects and the amount of those fees should be addressed regularly. Developing new sources, building new tanks and water lines continues to be the main source of developing future infrastructure needs. Development should be required to bring water rights with them to facilitate growth although currently they have the option of paying for that water through impact fees. There are only a limited number of water rights available in the valley and just having the money to buy will not always assure that they can be purchased.

The environmental impacts of the needed improvements will be relatively small, other than the fact that there is a limit to the total water available in the valley. Growth and development must pay their way, and should not be allowed if the resources are not available.

Water development plans are generated from a variety of sources. Participation from citizens has been and still is part of the development plan and is anticipated that it will continue to be a major part of any future development. Input from regulating agencies, engineering firms, government agencies and other water distribution entities and communities are always welcome and sought after. Since current projects will meet the demand for the next 25-30 years, it seems advisable that regular evaluation of the system and its needs would provide the required public input to insure proper development as it is needed.

It is anticipated that at least every year, impact fees, growth rates and costs need to be evaluated to stay current with needs, both immediate and future. Changed in administration will also bring changes and reevaluation of this plan.

SOURCE PROTECTION PLANS

The water from both the springs and wells serving Beaver City is from deep underground sources, in remote, protected areas. For these reasons it is unlikely that any contamination of the water sources will occur. The water source protection plan has been submitted for all of Beaver City's sources of water. The delineation report for the protection plan has been completed. Beaver City has implement measures to protect the delineation zones. The delineation zones for the springs and wells all project onto both Forest Service or BLM lands and agreements with those agencies are in place to protect the sources.

EMERGENCY SITUATIONS

The major potential for emergency situations is from pipe breaks and reservoir cracking. Pipe breaks may occur for a number of reasons, the most likely being an earthquake. In such a situation, the only recourse is to close off the broken section with an adequate valving system, which is in place for the current system and will be upgraded as the system improvements are installed. Damage from such events will have to be dealt with when they occur. Provision is made for such damage mitigation through city and other community entities.

Reservoir breaks due to earthquakes could be very severe. Water from the Baker's Canyon tank would do some eroding before reaching the Beaver River but would do no damage to structures or threaten any lives. The Head House tank may have the potential of damaging structures and cause serious erosion and washing. No lives should be threatened. The new tanks, on the North Creek Hill and Jackson County Hill would, if damaged, would cause erosion, but little structure damage. It is hoped that sound engineering principles have been used in the design of the tanks and that a complete failure would not occur and that only a small slow discharge would occur.

Electrical system outages would create a problem if more than 24 hours in duration. Immediate conservation measures, together with the water from Baker's Canyon would be sufficient to cover emergency needs and supply a minimal amount of water for a long period.

APPENDIX A
WATER MANAGEMENT AND CONSERVATION PLAN ORDINANCE

WATER MANAGEMENT AND CONSERVATION PLAN
Beaver City, Utah
A Municipal Corporation

ORDINANCE NO. 1-26-2010 §

AN ORDINANCE AMENDING PROVISION OF THE BEAVER CITY MUNICIPAL CODE PERTAINING TO THE ADOPTION OF A WATER MANAGEMENT AND CONSERVATION PLAN.

Section 1. Preamble

- A. WHEREAS, Beaver City operates a culinary water system; and
- B. WHEREAS, the City Council understands the pressing need to use water in a more efficient manner to allow for future sustained growth of the community;

Section 2. Ordaining Clause

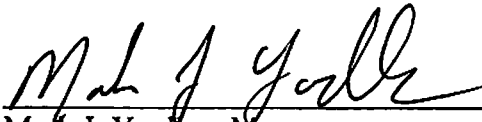
NOW, THEREFORE, IT IS ORDAINED BY THE CITY COUNCIL OF BEAVER CITY, UTAH:

To adopt the attached Water Management and Conservation Plan as prepared. This plan reflects the existing rate schedules and conservation practices as presently included in the Beaver City Codes.

Section 3. Water Management and Conservation Plan

The water management and conservation plan of Beaver City, adopted on the 19th day of January, 2005, and revised on this 26th day of January, 2010, is hereby readopted. The plan will be amended no less than every five years and will continue to play a vital role in the future development of Beaver City, Utah.

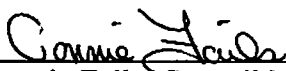
Signed:



Mark J. Yardley, Mayor



Chris Smith, Council Member



Connie Fails, Council Member



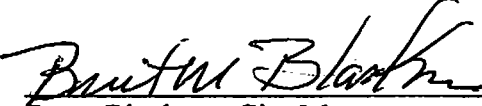
Craig Wright, Council Member



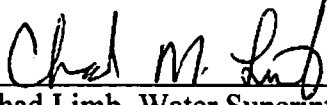
Gary Brown, Council Member



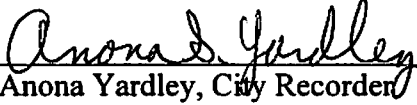
Lynn Harris, Council Member



Brent Blackner, City Manager



Chad Limb, Water Superintendent



Anona Yardley, City Recorder