

Water Conservation Plan



Kanab City
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I. Introduction

In response to the hot, dry summers throughout the State of Utah, our citizens and leaders are becoming concerned for the future cost and availability of water. A similar concern has been demonstrated by the state legislature in the Water Conservation plan Act (House Bill 153), passed and revised in the 1999 legislative session (Section 73-10-32 Utah Code Annotated). This water conservation plan is written to address the concerns of leaders and citizens of both our City and the State of Utah. The Water Conservation Plan for the City of Kanab is presented herein and presents goals for meeting present and future culinary water needs.

II. Background Information

A. History of Utility and Water Development

Several towns in southern Utah, including Kanab, were first settled in the 1860's and were then abandoned. These towns included Sink Valley, Skutumpah, Roundy's Station and upper Kanab. Levi Stewart and others resettled Kanab in 1870, at the request of Brigham Young. Johnson, on Johnson Creek, was settled in 1871, but eventually dwindled to a few ranching operations. Johnson Canyon is now slowly increasing in population.

The Kane County boundaries were established in their present location in 1864, by the territorial legislature. Water and its availability have played an important role in the development of Kane County. Early settlements were located near reliable sources of water, either springs or easily accessible streams. Over the years, these towns have slowly grown but have maintained their dependence on easily available water sources for both irrigation and culinary water (KCWCD, 1996).

Kanab Creek supplied the original source of water for Kanab. Several attempts to construct a dam near Three Lakes Canyon failed, however a dam was built downstream. For a time, it was necessary to haul water 1.5 miles from the creek to the town. Sand in the water had to settle out prior to use. Water was so precious that stories are told of using the same water for bathing, washing clothes, scrubbing floors and finally, watering plants.

In 1898-1899, a settling pond was constructed north of town, and water was piped to homes by means of wooden pipes. Excessive leaks in the pipes resulted in an unreliable and inadequate supply.

In 1935, a large cistern made from sandstone was constructed on the cliffs north of Kanab and a 6-inch cast iron water line was laid to the City. In 1952, the culinary water yield was increased from 165 to 200 gallons per minute by completion of a well in the north end of Three Lakes Canyon. One-half mile of 4-inch diameter pipe was installed to connect the new well to the culinary system. Although still inadequate during July and August, the well provided a steady water supply.

An additional well was completed in 1957; and in 1959, 10-inch water mains were constructed from Cave Lake Canyon to Kanab Creek Bridge along with 12-inch water mains from the bridge to the City. A third well was drilled in Cave Lake Canyon in 1964, and a chlorination structure was installed on the well.

Growth continued, and in 1973, wells # 4 and #5 were completed to provide water for the Kanab Creek Ranchos area. Three additional wells were attempted, however, the wells were dry or of insufficient water flow.

In 1975, the city purchased two 1.5-million gallon storage tanks, which were installed north of town. In 1976, two steel tanks were constructed in the Kanab Creek Ranchos areas. Wells # 9 and #10 were drilled in 1979, and in 1982, a 16-inch line was installed from Moqui Cave to the north tanks. Pressurized irrigation was completed in 1982 that currently serves about 20% of the homes in Kanab. In 1983, well # 11 was drilled and added to the system. In 1985, well # 12 was drilled. In 1986, Well # 13 was drilled, 1989 well # 14 was drilled, and well # 15 was drilled in 1993. In 1997 R-1, R-2, and R-3 were drilled but produced very little water, the wells were subsequently sold to Best Friends Animal Sanctuary along with the School Section lease. In 1999, two new one million-gallon concrete water tanks were built to replace the steel tanks in the ranchos. One tank on Standsfield Dr. and another on Vermillion Dr. West Fork well # 1 and 2 were drilled in 2000. West Fork well # 3 was drilled in 2006. In 2001, the two steel 1.5 million-gallon water tanks were re-coated to match the color of the sand stone. In 2009 drilling was completed on West Fork well # 4 and #5.

In 2011 a joint project with Kane County Water Conservancy District was completed that included installing a 24" C-905 PVC pipeline from the intersection of 300 South and 200 West to the Sand Trap near the Moqui Cave replacing the existing 10" and 12" steel lines that were originally installed in 1959 and were badly corroded. A 20" PVC C-905 pipe was then installed from that point to the Hancock Road. The project also included the installation of a 12" HDPE pipeline across Kanab Creek at 300 South to increase the capacity to the Ranchos Subdivision and a new Sand Trap and Chlorination Building near Moqui Cave.

B. Description of Utility

The City of Kanab provides its residents with culinary water and is responsible for delivery, storage, and distribution. In December 2012 Kanab had a population of 4,376 people according to city records. The service area of Kanab City is approximately 13 square miles. Today the water system has 2,009 service connections ranging in size from ¾ inch to 4 inches of which approximately 1,750 serve residences.

C. General Policy or Goals of Utility

The goal of Kanab City is "To provide the City of Kanab a plentiful supply of safe drinking water". The current system is in the process of being upgraded in order to meet that goal.

III. Existing Resources

A. Water Rights

Kanab City has an appropriated water right of 13.60 cfs (8,789,906 gallons per day) with a total of 9,857 acre-feet diversion right. All but 3.02 cfs is certificated. The water rights owned by Kanab City are summarized in Table 1.

**TABLE 1
KANAB CITY EXISTING WATER RIGHTS**

No.	Priority	Source	Flow	
			CFS	Ac-Ft*
85-28	1956	Well	0.448	324.56
85-39	1956	Well	0.885	641.15
85-55	1963	Well	1.000	724.46
85-59	1964	Well	1.810	1,311.28
85-112	1864	Springs: Trough, Big, Cave 1&2, Cold, Iron 1&2, Little, Robinson, Slab, Slide, South, Twin, Weeping, Willow, Boiling, Head 1&2, Spring 1&2	0.500	362.23
85-703	1896	City Chicken Spring	0.033	23.91
85-736	1962	Well	0.930	673.75
85-772	1977	Well	3.480	2,521.13
85-946	1962	Well	3.020	2,187.88
85-956	1962	Well	1.500	1,086.69
Total Flow			13.606	9,857.04

*Calculated from CFS.

B. Delivery System

Kanab receives water from a number of wells and springs with a total capacity of 3,765 gpm in the existing system. Springs and wells currently capable of delivering water to Kanab are summarized in Table 2.

**TABLE 2
KANAB CITY EXISTING DELIVERY CAPACITY**

Source	Yield (gpm)	Size Inches	Treatment	Comments
Cave Lake Springs	70	NA	Chlorination	8 of 22 springs are used year around
Cave Lake Well #3	(225)	NA	Chlorination	Backup to well #5, seldom used
Mace Well #2	110	12	Chlorination	
Mace Pink Well #9	350	12	Chlorination	
Chicken Canyon Well #4	110	12	Chlorination	
Cave Lakes Well #5	(575)	12	Chlorination	Sandy, seldom used
Well #12	400	10	Chlorination	
School Section Well #11	235	10	Chlorination	
Hinckley Well #13	550	10	Chlorination	
Well #14	425	10	Chlorination	
Well # 15	65	10	Chlorination	
West Fork Well # 1	250	10	Chlorination	
West Fork Well # 2	400	10	Chlorination	
West Fork Well # 3	100	12	Chlorination	
West Fork Well # 4	700	12	Chlorination	
West Fork Well # 5	(160)	12	Chlorination	Not Equipped.
Total	3087			Does not include yields in ()

The principal aquifer for Kanab culinary water is the Navajo Sandstone. The two most favorable water bearing strata are the base of the Navajo Sandstone and the base of the Lamb Point Tongue which is about 400 to 500 feet thick and separated from the Navajo proper by about 100 feet of the Tenney Canyon Tongue of the Kayenta Formation.

Saturated thickness of the Navajo Sandstone aquifer varies from 50 to 100 feet near the southern edge of the Vermillion Cliffs to more than 2000 feet in the upper Pink Cliffs area. This aquifer has been estimated to contain more than 200 million acre-feet of recoverable water, though at considerable depth in some locations.

The 1993 State Water Plan for the Kanab Creek/Virgin River Basin indicates that there is no evidence of widespread drawdown in well water levels in the Kanab Creek or Johnson Wash drainages. The potential for additional groundwater development exists in all of Western Kane County by drilling wells at favorable locations. This will need to be accomplished with care to avoid discharging more groundwater than can be recharged over time. Significant pumping of groundwater anywhere in the Kanab Creek drainage area would probably affect water levels elsewhere in the aquifer, and perhaps also in overlying and underlying aquifers (Draft Water Resources Master Plan, Phase 1 & II.)

C. Storage

Kanab City currently owns four water storage tanks with a total capacity of 5 million gallons. The tanks include:

Two - 1.5 million gallon tanks at the north end of Main Street (North Tanks)

One- 1million gallon tank at the west end of Stansfield Drive (Stansfield)

One- 1million gallon tank at the west end of Vermillion Drive (Vermillion)

D. Distribution System

The present transmission system for Kanab includes 16", 20", and 24" PVC from the Well and Spring Field and 16" and 10" ductile iron pipes from the North tanks and 8" PVC line from the West tanks. Distribution lines throughout Kanab City proper largely consist of 6", 8", and 12" PVC and cast iron lines. Refer to Sheets 1 through 5 for more detailed information.

E. Treatment

Kanab receives its culinary water from high quality groundwater sources. The water is chlorinated at sand trap/chlorination plant located near Moqui Cave.

IV. Water Budgets and Current Water Use

The following table shows the amount of water delivered into the Kanab system and the metered outflows to the end-users for the years 2004 to 2012.

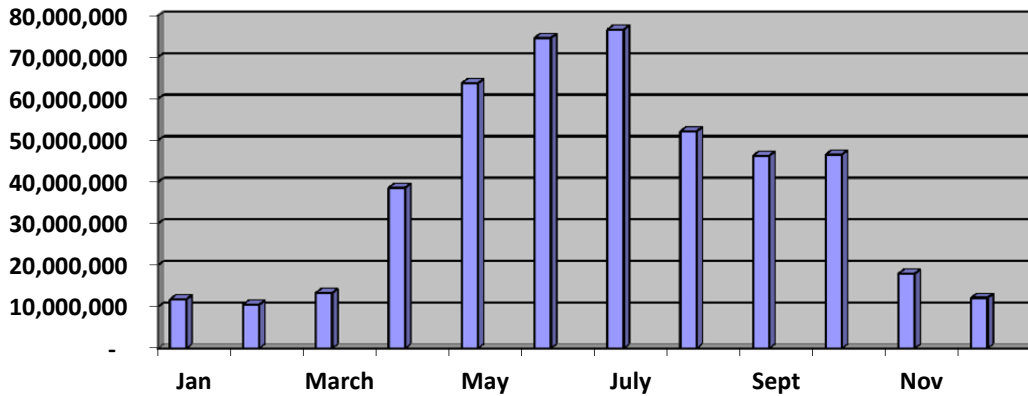
Table 3
City Water Budget-2004-2012

Year	INFLOW (AF)			OUTFLOW (AF)				% Diff.
	Wells	Springs	Total	Res	Com	Ind	Total	
2004	1603.45	38.93	1642.38	790.33	620.2	2.82	1413.35	16%
2005	1608.50	16.40	1624.90	718.29	796.51	4.29	1519.09	7%
2006	1354.18	133.08	1487.26	774.91	629.11	5.52	1409.54	6%
2007	1760.60	114.64	1875.24	819.22	962.11	3.43	1784.76	5%
2008	1438.26	67.83	1506.09	783.74	611.35	0.87	1395.96	8%
2009	1377.66	116.66	1494.32	784.50	639.10	0.89	1424.487	5%
2010	1298.66	120.82	1419.48	744.03	594.93	0.64	1339.6	6%
2011	1241.03	125.53	1366.56	691.05	565.94	0.71	1257.7	9%
2012	1276.14	149.14	1425.28	724.80	656.56	0.57	1381.93	3%

PRESENT WATER USE AND FUTURE WATER NEEDS

When all uses of culinary grade water are compared with the number of people living in Kanab in 2012, residents use 281 gallons of water per capita per day (gpcd) including parks, schools, and the golf course. This is compared to the statewide average of 260 gpcd and 184 gpcd nationally. Unmetered secondary irrigation systems provide lower quality water to about 20% of homes in Kanab. Total monthly culinary water use for 2012 is shown in Figure 1.

Figure 1



Based on Kanab City Records, there were 2025 equivalent residential units in the City of Kanab at the end of the 2012 year. An *equivalent residential unit (eru)* is a term used to equate culinary service connections to facilities such as schools, churches, and commercial facilities to those of residential consumers.

Assuming the peak day demand is equal to the average daily flow of 2,479,688 gallons (75,630,500/30.5 days) in June and July of 2012 (from Table 3), the *peak day demand* is 1,224 gpd/eru. Using the total flow for the year ending in December 2012, the *average yearly demand* is 229,347 gallons per ERU.

Future Population Estimates

The extent of the city’s expected future population growth through the year 2040 is shown in Table 4 based on the Five County Association of Governments projections published in 2005. Many factors influence this projection, and the estimates shown may vary substantially from the actual population experienced.

TABLE 4
KANAB CITY POPULATION PROJECTIONS

Year	Projected Population
2010	3,825
2020	4,831
2030	5,654
2040	6,376

Current Conservation Practices

Kanab is located on the fringes of the Mohave Desert and in the extreme southern part of the State of Utah. More water is used during the summer when it rains the least. Most of the water is used for outside irrigation. Only about 20% of the City has pressurized irrigation at this time. It is anticipated with the recent construction of the Jackson Flat Water Storage Reservoir that some of the larger users of culinary water for irrigation will be converted to irrigation and reduce the overall demands on the culinary system. The following is use data collected by Dr. Robert Hill from USU Extension. The total evapotranspiration rate for Kanab for turf grass is 28.12 inches per growing season. Using the evapotranspiration rate for Kanab the following is the calculated water usage for some typical irrigated areas:

Size	Should use no more than X gallons per season (Mar – Oct)
1/8 acre	108,752 gallons
¼ acre	217,505 gallons
½ acre	435,011 gallons
1 acre	870,022 gallons

To determine what a residential summer use is, an average of the winter (non-irrigated) months is subtracted from the average use from the totals from March-October. This provides some solid data on water usage for outdoor landscaping and irrigation.

Conclusion: Based on the projected usage using the evapotranspiration rate for Kanab most residential units are watering less than Dr. Robert Hill suggested they should with culinary water. If you take into consideration the water usage in 2012 of 94,743,000 Million Gallons used on City Parks, cemeteries, football field, baseball field, school playgrounds and the golf course and reduce it from the total water used in 2012 of 464,429,000 gallons then the current residential use is 369,686,000 gallons per year or 500 gpd per ERU for both indoor and outdoor use combined or 231 gpcd (369,686,000/4376 people). This is less than the state average of 260 gpcd and more than the 184 gpcd national average.

Kanab City set a goal of 25% water conservation in 2008 and has reached that goal, however there are several areas that could be improved upon to further reduce the water usage.

V. Culinary Water Supply/Shortage and Drought Management Program

POLICY: It shall be the policy of the City to implement the procedures and restrictions outlined herein under four stages of culinary water resource shortage that may occur in the Kanab area.

PROCEDURES AND RESPONSIBILITIES:

The City shall encourage wise use of water and conservation of all water resources on an on-going basis.

If a culinary water shortage or drought is expected, the City will implement the attached four-stage shortage of culinary water conservation management plan. The implementation will be under the approval and direction of the City Council and City Manager. The City Staff (**City department heads and City Manager**) shall meet on a **regular basis** to discuss the drought conditions and ensure all City departments are doing their part to comply, enforce and encourage the outlined water conservation measures.

The following shortage or drought indicators will be used to decide what stage or level should be implemented.

Stage 1:

- If total culinary supply (wells, or springs,) exceeds the total daily demand by only 2% to 3% (i.e.: water tanks cannot recover):
- Water resources are reduced by 2% to 3% due to equipment failure or lack of supply.

Stage 2:

- Total culinary water resources are reduced by 5% of peak capacity due to equipment failure or any other loss.
- Total culinary demand exceeds supply by 1% to 3% and Stage 1 restrictions fail to meet goal.

Stage 3:

- Total culinary water resources are reduced by 10% of peak capacity due to equipment failure or any other loss.
- Total culinary water demand exceeds supply by 5% and Stage 2 restrictions fail to meet goal.

Stage 4:

- Total culinary water resources are reduced by 25% of peak capacity due to equipment failure or any other loss
- Total culinary water demand exceeds supply by 10% and Stage 3 restrictions fail to meet goal.

MANAGEMENT PLAN

STAGE 1: Voluntary Restrictions on nonessential water use:

Estimated reduction goal - 2% to 3% of peak use

Procedure: Publish attached news release in local newspaper, on the web site, local TV station and have radio stations announce the release.

News Release:

The City of Kanab and surrounding areas are currently experiencing a shortage of water supply. The supply cannot meet the current demands. The City adopted a water shortage drought management plan on April 13, 2004. This plan involves four stages of water conservation/reduction. Due to the current conditions, the City has decided to implement Stage 1 of this plan. Stage 1 involves voluntary restrictions on non-essential water use. This stage requests that all City, County, State and Federal organizations also follow these criteria. All citizens are to conserve water wherever possible (inside and outside) and suggest the following as guidelines for water conservation efforts.

INSIDE:

- Fix dripping and leaking faucets and toilets. A leak in the toilet can waste more than 100 gallons of water a day.
- Don't let the water run while shaving. Filling the sink basin when shaving uses 1 gallon of water, letting the water run uses 5 -10 gallons.
- Don't flush the toilet unnecessarily. Water saving toilets use 1.6 gallons of water, standard toilets use 5 to 7 gallons of water each time it's flushed.
- Take shorter showers or fill bathtub only part way. Long showers waste 5 to 10 gallons of water every minute.
- Don't run the water while brushing teeth. Turning the water off while brushing your teeth can save 1.5 to 3.5 gallons of water.
- Don't run the tap to make water hot or cold.
- Keep a bottle of drinking water in the refrigerator so you don't have to run the tap to get a cool drink of water.
- Wash only full loads of dishes and laundry. A dishwasher uses approximately 25 gallons of water, a washing machine uses 30 -35 gallons of water per cycle. Install water-saving plumbing fixtures. A water saving showerhead can save 1.5 gallons of water per minute.
- Wash fruits and vegetables in a basin instead of under running water.

Outside:

- Raise your lawn mower cutting height. Longer grass needs less water.
- Don't plant any new grass or sod.
- Don't fill swimming pools. If possible, cover the swimming pool. An uncovered pool will lose 900 - 3,000 gallons of water a month to evaporation, a covered pool loses 300 - 1,000 gallons a month.
- Use mulch around shrubs and garden plants to save soil moisture.
- Don't wash cars or wash at a facility that recycles water. Washing the car with the hose running uses 100-200 gallons of water.
- Sweep sidewalks and steps rather than hosing.
- Water lawns & gardens every 3 or 4 days, to 1 inch deep. Deep watering encourages deep root growth. If the water is running off, turn off the sprinkler, let the water soak in and start watering again. A typical sprinkler system uses 20 gallons of water every minute.
- Avoid watering on windy days or midday when the evaporation rate is the highest. Water after 7:00 PM.
- Keep fire hydrants closed.
- Adjust sprinklers to not spray road or sidewalk.
- Repair leaks in hoses, pipes, faucets and connections.

If the implementation of these voluntary restrictions does not reduce the water demand enough to meet the supply, the City will have to go to Stage 2, 3 or 4 of the drought shortage of culinary water and drought management plan, which involves mandatory restrictions.

STAGE 2: Mandatory restrictions on nonessential water use:

Estimated reduction goal - 5% to 10% of peak use.

Procedure: By authority of the City Manager and the City Council, the following water conservation measures along with those of Stage 1 will be implemented.

- All parks currently on culinary water will be allowed to water every three days at a reduced level of demand.
- Residential and commercial users will be allowed to water outside areas based on odd/even concept. (If the address is even or odd will determine the day of watering.)
- Use of water for noncommercial car washing, streets washing, or driveway washing will not be allowed.
- Use of water for ornamental fountains, waterfalls, or reflection pools will not be allowed.
- During this stage the approval of any new developments will be delayed until the conservation restrictions are lifted.

Enforcement

If any person or entity violates these restrictions, citations could be issued, or the City may elect to remove the water service from the property.

STAGE 3: Mandatory restriction on all culinary water uses:

Estimated reduction goal -10% to 25% of peak use.

Procedure: authority of the City Manager and the City Council will implement the following water conservation measures:

- The use of fire hydrants for purposes other than fire protection will not be allowed for use by municipal departments, contractors and all others except as deemed necessary and approved in the interest of public health or safety by the City.
- Water use for the following non-essential uses will not be allowed:
 - Non-commercial washing of automobiles and trucks.
 - The washing of streets, driveways, and sidewalks.
 - Ornamental water use including, but not limited to fountains, artificial waterfalls and reflecting pools.
 - The use of water to fill and top off swimming pools, hot tubs etc.
- Users will be allowed 75% of use levels for the same month of the preceding year. All users will reduce demand by 25%.

Enforcement

If any person or entity violates these restrictions, citations could be issued, or the City may elect to remove the water service from the property.

The utility billing department will monitor usage by using triggers and computer alarms for notifications.

Exemptions or Variance:

1. If compliance with the non-essential use of water restrictions would result in extraordinary hardship upon a water user, the water user may apply for an exemption or variance. For purposes of this section, extraordinary hardship means a permanent damage to property or other personal or economic loss, which is substantially more severe than the sacrifices borne by other water users subject to the nonessential use of water restrictions. A person or business entity believing he suffers an extraordinary hardship and desiring to be wholly or partially exempt from the restrictions on the non-essential use of water shall submit a written

request with full documentation supporting the need for the requested relief to the City. The application shall contain information specifying:

- (a) The nature of the hardship claimed and reasons for the requested exemption or variance.
 - (b) The efforts taken by the applicant to conserve water and extent to the applicant without extraordinary hardship may reduce which water use.
2. The City shall advise the applicant of its decision regarding the application. An exemption or variance will be granted only to the extent necessary to relieve extraordinary hardship.

STAGE 4: Water rationing plan for all available culinary water resources

Estimated reduction goal - 25% to 60% of peak use.

Procedure: By the authority of the City Manager and City Council, the following water-rationing plan will be implemented:

General:

It is imperative that water customers within the City of Kanab area achieve an immediate and further reduction in the water use in order to extend existing water supplies and, at the same time, assure that sufficient water is available to preserve the public health and sanitation, and provide fire protection service. The objective of this **Local Water Rationing Plan** is to effect an immediate 25 percent reduction in water usage. Should drought conditions continue, further reductions in usage may be required. If it is necessary to implement further reductions, this Plan will be modified to reduce the levels more. It is the City Water Department's responsibility to continually monitor on-hand quantities to determine if amendments are required.

The Plan provides for equitable reductions in water usage on the part of each water customer. The success of this Plan depends on the cooperation of all water customers.

During this stage the approval of any new building permits will be delayed until the conservation restrictions are lifted.

(A) Prohibited non-essential water uses:

The following water uses are declared non-essential and will not be allowed within the City of Kanab

- The watering of lawns

- The watering of outdoor gardens, landscaped areas, trees, shrubs, and other outdoor plants, except by means of a bucket, pail, or handheld hose equipped with an automatic shut-off nozzle between the hours of 5:00 p.m. and 9:00 a.m.
- The watering of golf course fairways with culinary water.
- The non-commercial washing of automobiles and trucks.
- The washing of streets, driveways, and sidewalks.
- The serving of water in restaurants, clubs or eating-places unless specifically requested by the individual.
- Ornamental water use including, but not limited to, fountains, artificial waterfalls, and reflecting pools.
- The use of water for flushing sewers or hydrants by municipalities or any public or private individual or entity except as deemed necessary and approved in the interest of public health or safety by the City.
- The use of fire hydrants by the Fire Department for testing fire apparatus and for Fire Department drills, except as deemed necessary in the interest of public safety and specifically approved by the City.
- The use of fire hydrants by City Street Department, contractors and all others, except as necessary for firefighting or protection purposes.
- The use of water to fill and top off swimming pools, hot tubs etc.

(B) Water use restrictions for all water customers:

Customers include residential, commercial, industrial, institutional, public and all other users, with the exception of hospitals and health care facilities.

- Water customers shall reduce their water usage by a minimum of 25 percent of use levels for the same quarter of the preceding year.
- It is the primary responsibility of each water customer to meet its mandated water use reduction goal in whatever manner possible.
- The City will establish a water allotment for each water customer, based upon a required 25 percent reduction of water usage from the rate of water used by the customer in the same quarter of the preceding year or the last recorded use level if no meter readings record the rate of the customer's use in the same quarter of the preceding year.
- Each water user shall provide access to the City personnel for purposes of meter reading and monitoring of compliance with this Plan. The City shall make all reasonable efforts to contact customers to arrange for access.

(C) Water use restrictions for hospital and health care facilities:

Hospitals and health care facilities shall comply with all restrictions imposed on water customers as may be applicable to each individual institution, to the extent compliance will not endanger the health of the patients or residents of the institution. Each hospital and health care facility shall survey its water usage patterns and requirements and implement such additional conservation measures as may be possible without endangering the health of patients or residents to achieve a 25 percent reduction in the institution's water usage. The level of conservation arrived at will be recommended to the

City for billing and record. The established level that does not endanger the health of the patients will be provided to the City for record.

Enforcement:

If any person or entity violates these restrictions, citations could be issued or the City may elect to remove the water service from the property.

The utility billing department will monitor usage by using triggers and computer alarms for notification.

Exemptions or variance:

If compliance with the non-essential use of water restrictions would result in extraordinary hardship upon a water user, the water user may apply for an exemption or variance. For purposes of this section, extraordinary hardship means a permanent damage to property or other personal or economic loss, which is substantially more severe than the sacrifices borne by other water users subject to the nonessential use of water restrictions. A person or business entity believing he suffers an extraordinary hardship and desiring to be wholly or partially exempt from the restrictions on the nonessential use of water shall submit a written request with full documentation supporting the need for the requested relief to the City.

The application shall contain information specifying:

- The nature of the hardship claimed and reason for the requested exemption or variance.
- The efforts taken by the applicant to conserve water and extent to which water use may be reduced by the applicant without extraordinary hardship.
- The City shall advise the applicant of its decision regarding the application. An exemption or variance will be granted only to the extent necessary to relieve extraordinary hardship.

VI. Water Conservation Measures and Goals

A. Past Water Conservation Measures

Kanab City's water conservation measures have focused on providing an efficient culinary water system to the community. Conservation measures have included system upgrades to more effectively distribute the water available. Significant strides in conservation were achieved by pressurizing the irrigation system in 1982, however currently the pressurized irrigation system only serves about 20% of the homes.

B. Coordination Opportunities to Develop and Implement Management Conservation Measures.

In the past, Kanab City has worked closely with the Kanab Irrigation Company and the Kane County Water Conservancy District to provide efficient culinary and irrigation water to the community. Opportunities that may be available in the future include:

1. Utilizing re-use water for irrigation of large turf areas. Additional treatment of the water from the sewer lagoons could provide irrigation water for use. The existing cells that are not

currently being used could be converted to store the water for irrigation use. This would require an irrigation line extended to the lagoons in addition to a pump station. Agreements could also be put into place to store the water in the new Jackson Flat Reservoir if storage is available.

2. Expansion of the current pressurized irrigation system to include parks, schools, additional homes and the Golf Course. With the construction of the Jackson Flat Reservoir, storage may be available to convert large water users to irrigation water use. Currently the largest users of culinary water are the Kanab Golf Course, Kanab City Parks, and Kane County Schools. With the current pressurized irrigation system only serving about 20% of the homes an expansion of the irrigation system to include all new subdivisions and existing homes would decrease the demands on the culinary system. It is anticipated that as many as 80% of the homes and all of the large users could be served.

C. Public Education

Goals that should be implemented for efficient water use and conservation include:

1. Public education - Providing an aggressive public education program for youth and adults. The education program would include methods that residences can implement to minimize water use. Education could also include courses on gardening, landscaping, and farming.
2. Water Fairs – Booths could be setup at City festivities to educate the public and make them aware of conservation techniques.
3. Audits – City personnel could be trained to perform water audits for residential and commercial users to optimize their irrigation systems and homes.

D. Water Conservation Rate Schedules

Kanab City currently uses a simple water rate schedule that does not include any incentives for water conservation. The current rate schedule as of June of 2013 has a base rate of \$27.00 that includes 10,000 gallons and charges an additional \$1.10 per thousand above 10,000 gallons. An example of a tiered or conservation schedule that encourages the conservation of water is included below for Ivins City which has one of the highest cost of water and most aggressive conservation rate. The only conservation rate that is higher is that of Washington County Water Conservancy District. Revising the current rate schedule to something similar for water in Kanab would encourage water conservation.

City of Ivins

Base Monthly Fee 5/8": \$23.90

Usage

0 – 7,000 gallons \$1.01/1,000 gallons

7,001 - 15,000 gallons \$1.41/1,000 gallons

15,001 - 30,000 gallons \$1.97/1,000 gallons

30,001+ \$2.81/1,000 gallons

The Average price of water in some of the Washington County Cities is shown below. The costs are based on a usage of 40,000 gallons. Because of the high base rate in Kanab the costs of the first 10,000 gallons is average when compared to others, however the more water that is used the cheaper it is in comparison to other communities.

Hurricane Valley (Sky Ranch served by WCWCD) \$194.00

Ivins \$100.00

Santa Clara \$81.60

St. George \$61.20
Hurricane City \$56.00
Kanab \$48.80

As demonstrated above Kanab currently has one of the lowest water rates in the Southern Utah area. Instituting an aggressive conservation rate would encourage citizens to reduce water usage.

E. Future Water Conservation Programs

The following table lists programs for implementing the water conservation measures to conserve water in the city. The majority of the programs will require additional funding and would be implemented slowly as funding and water shortages dictate.

No	Measure Name	Description	Begin Year
W1	Promote Green Buildings	Staff a position to work with local Green Building associations, developers, designers, vendors to promote incorporating water efficiency into building design. Measure includes costs to recognize outstanding participants through co-sponsor award program.	
W2	Twenty Gallon Challenge	The 20-Gallon Challenge is a call for residents to reduce water use on average by 20 gallons per person, per day.	
W3	Financial Incentives for Irrigation Upgrades	For existing Single Family (SF), Multifamily (MF), and COM, customers with landscape, provide rebates towards the purchase and installation of selected types of irrigation equipment upgrade including low volume sprinkler heads, check valves, and rain sensors. Rebate is up to one-half of cost of equipment or a maximum of \$350 for residential accounts and up to \$650 for mixed use accounts and up to \$10,000 for irrigation accounts. Assume average rebate to be \$2,500 for non-Residential accounts.	
W4	New Development, Require New Landscape and Irrigation Requirements	Enforce a regulation that specifies that homes or buildings be landscaped according to Xeriscape principals, with appropriate plant selection and irrigation systems.	
W5	Smart Water Application Technologies Irrigation Controller Rebates	Provide a 50% cost-share up to \$400 for the purchase of a SMART irrigation controller. Require customer has a "Water Check" and education. Assume about 0.15% of eligible SF and 2% of Non-SF accounts take rebates per year.	
W6	Turf Removal	A \$1.50 per sf incentive is available for removing existing turf and replacing with desert landscaping or	

		synthetic turf. Maximum rebate of \$5,000. Average rebate for \$1,500 for SF accounts and \$2,500 for Non-SF accounts. The replacement of irrigated vegetation with desert landscaping or synthetic turf may significantly reduce outdoor watering needs.	
W7	Regulate Water Softeners	Eliminate one percent of pre-1999 water softeners every year. Offer a \$150 rebate for replacement of an existing time clock operated softener with a demand initiated softener. Require all new homes to have a demand initiated softener (no rebate), if a softener is installed, follow EPA WaterSense guidelines for particular types to be used.	
W8	Distribute Retrofit Kits	Provide owners of pre-1992 homes with retrofit kits that contain easy-to-install low flow showerheads, faucet aerators, and toilet tank retrofit devices. Distribute at booths.	
W9	Toilet leak Detection	Distribute leak detection tablets for homeowners to test toilets for leaks; offer advice on toilet leak repair. Continue “fix the leak week” campaign.	
W10	High Efficiency Toilet Rebates	Provide a \$150 rebate or voucher for the installation of a high efficiency toilet (HET). HET’s are defined as any toilet to flush 20% less than an Ultra-Low Flow Toilet (ULFT) and include dual flush technology. Rebate amounts would reflect the incremental purchase cost. Program length will be short as it is intended to be a market transformation measure and eventually would be stopped if 1.3 gallons per flush toilets are mandated by state or federal law.	
W11	Single Family Water Surveys	Continue outdoor water surveys, “Water Checks”, for existing single-family residential customers. Normally those with high water use are targeted and provided a customized report to the homeowner on how to save water in their home. Assume 1% of accounts surveyed per year.	
W12	MF Washer Rebate	Provide a \$400 rebate to apartment complexes (10 or more units) for efficient washing machines in buildings over a certain size that has a common laundry room. It is assumed that the rebates would remain consistent with relevant state and federal regulations (Department of Energy, Energy Star) and only offer the best available technology.	
W13	ND Require Hot Water on Demand/ Structured Plumbing Program	Incentivize all homes with rebate program to equip new homes or buildings with efficient hot water on 2020 demand systems such as structured plumbing systems. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater or to move the water heater into the	

		center of the house and/or reduce hot water waiting times by having a an on-demand pump on a recirculation line.	
W14	ND Require Multi Family Submetering on New Accounts	Require the metering of individual units in new multifamily, condos, townhouses, mobile-home parks and business centers (less than four stories and with water heater in the units). Utility administers meter read and bill program.	
W15	Garbage Disposal SF	Provide a \$100 rebate to encourage 1% of single family homeowners per year to remove garbage disposals.	
W16	New Home Award Programs	Provide annual awards to developers that are “Green Builders” and offer homes for sale that meet certain criteria such as USEPA’s new WaterSense program for new homes. This could be combined with energy efficient homes or measure W1.	
W17	Award Programs for Water Savings by Businesses	Utility would offer, organize and sponsor a series of educational workshops for homeowners in efficient landscaping and irrigation principals. Utilize guest speakers, Xeriscape demonstration gardens, incentives, such as a nursery plant coupon. Target approx. 0.5% of homes per year.	
W18	Rotating Sprinkler Nozzle Rebates	Programs like SoCal WaterSmart program offers a rebate of up to \$4 per rotating nozzle for single-family properties. Work with irrigation supply companies to promote.	
W19	Focused Water Audits for Hotels/Motels	Provide free water audits to hotels and motels. Standardize on the types of services offered to reduce costs. Included would be bathrooms, kitchens, ice machines, cooling towers, landscaping, and irrigation systems and schedules. Audit 40 of (older or high use) accounts over 10 years.	
W20	School Building Retrofit	Run a program patterned after Metropolitan Water District of Southern California’s school retrofit program wherein school receives a grant to replace fixtures and upgrade irrigation systems. Assume 10% of schools participate over 10 years.	
W21	Irrigation Water Surveys	All public and private irrigators of landscapes would be eligible for free landscape water surveys upon request. Normally those with high water use would be targeted and provided a customized report. Assume 5 % of large turf areas are surveyed per year. Three year program then repeat (3 year measure life).	
W22	Artificial Turf Sports Fields	Provide a rebate (up to \$80,000) for customer to install artificial grass on one sports field per year.	
W23	Require Irrigation Designers/Installer be	Require installation of irrigation systems that are	

	certified.	efficient and installed by trained/certified contractors. Certification to be done by Kanab City. New program starting January 20xx.	
W24	Prohibit Once through cooling, Non-recycling fountains, water wasting fixtures and practices.	Prohibit certain appliances or structures that have an obvious waste of water in new facilities, such as those listed.	
W25	Real Water Loss Reduction	Measure covers efforts to find and repair leaks in the distribution system to reduce real water loss and take other actions (such as meter replacement) to reduce apparent water losses thereby improving the system water balance. A ten year program to reduce unaccounted for water to 10 percent of production or less is proposed for this measure. Actions could include installation of data loggers and proactive leak detection; accelerated meter replacement could be done over 10 years. Leak repairs would be handled by existing crews at no extra cost. Specific goals and methods to be developed by the Utility Operations Department.	

F. Additional Water Development Plans

Along with water conservation Kanab City will need to work to acquire additional water rights for Kanab City to meet Peak Day Demands. Kanab City has adequate water sources to fulfill their needs for approximately the next 40 years, however at that time peak day demands will exceed existing water rights. Through conservation the existing water rights will continue to serve the community for many years to come, however it is prudent to provide for future generations so that growth may continue in the area. The list below indicates a few of the ways that Kanab can continue to develop and acquire new water rights or water development.

1. Look for additional well opportunities while minimizing groundwater mining. Large volumes of high quality water are stored in the groundwater aquifers, particularly in the Navajo which underlays most of western Kane County. However, recharge of the aquifer is slow and mining of the aquifer must be avoided.
2. Transfer of water rights from irrigation to culinary water. The State Engineer has stated that Kane County is closed to new appropriations of water; however, significant numbers of existing irrigation rights that are not fully utilized could be transferred to meet future culinary needs. Identification and acquisition of these unused rights will be necessary to supplement future water supply needs. In addition as development occurs in agricultural areas the irrigation water could be used for irrigation of homes and residences to reduce the demands on the culinary water system.
3. Source Diversification. Kanab City's water sources, including the springs and wells are concentrated in a relatively small geographic area and all produce water from essentially the same source. Should this source become contaminated or depleted for whatever

reason, it would present serious problems to the city. There is a need to diversify the water supply outside the present area. Kanab City has recently connected the culinary system to the Kane County Water Conservancy System in Johnson Canyon as a secondary source. Kanab City needs to continue to develop alternate backup sources for its water system.

4. A pipeline from Lake Powell to bring culinary water to Washington County has been proposed and the preliminary design and alignment have been chosen. Although the pipeline may be ten or more years in the future, it should be considered as a serious alternative to meeting future needs.

VII. Selection Of Alternatives

The future water needs of Kanab will be dependent on growth. With planned upgrades and utilization of pressure zones, the culinary water needs are adequate for the short-term future. Developing additional water sources, storage capacity and providing additional distribution will be costly and will require significant public input prior to implementation. Of the alternatives to meet future water needs outlined in **Section VII**, the following are considered the most beneficial and achievable at present.

1. Public education
2. Assessing impact fees and basing the water rate on actual usage with higher rates for increased usage.
3. Best management practices on golf courses, parks and large turf areas.
4. Preliminary studies to develop reservoir storage
5. Being aware of opportunities to obtain additional water rights, particularly conversion of irrigation to culinary rights.
6. Completing and implementing Drinking Water Source Protection Plans to minimize potential contamination of existing sources.
7. Re-use of treated water.

VIII. Periodic Evaluation

The Water Management and Conservation Plan should be reviewed by Kanab City and updated every 5 years. The review should evaluate trends and ensure that alternatives selected in **Section VII** are being implemented or progress is being made towards implementation. If the review indicates that the alternatives are not the most beneficial to meet the needs of the future, additional or new alternatives should be selected. The evaluation should provide an opportunity to reconsider the needs of the community and implement the best alternatives to meet those needs.

APPENDIX A – Water Conservation Plan Resolution

RESOLUTION NO. 1-1-2010R

A RESOLUTION ADOPTING A WATER CONSERVATION PLAN FOR KANAB CITY

WHEREAS, Kanab City is desirous of adopting a Water Conservation Plan and the City Council desires now to adopt the Water Conservation Plan for Kanab City.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF KANAB, UTAH AS FOLLOWS:

“See the attached Water Conservation Plan.”

WHEREAS, said policy regarding Water Conservation Plan has been submitted to and reviewed by the City Council of Kanab, Utah, and found to be reasonable and acceptable.

NOW THEREFORE, it is hereby resolved by the City Council of Kanab, Utah, which the Water Conservation Plan shall be in effect until further resolution. It shall be deemed, where consistent, a continuation of the prior policy. All other resolutions, ordinances, and policies in conflict herewith; either in whole or in part are hereby repealed.

DATED this 26 day of Jan, 2010.

ATTEST:

KANAB CITY:



[Signature]
CITY RECORDER

By [Signature]
MAYOR

IX. References

Capital Facilities Plan Update, Kanab City, prepared by Alpha Engineering Company, 2010.

Five County Association of Governments. 1995. Kanab City, Utah, General Plan. St. George, Utah.

Ground-Water Conditions in the Upper Virgin River and Kanab Creek Basins Area, Utah, Technical Publication No. 70, State of Utah, Department of Natural Resources, 1971.

Kane County Water Conservancy District, Draft Water Resources Master Plan, Phase I & II, prepared by Boyle Engineering and Alpha Engineering Company, April 1996.

State Water Plan, Kanab Creek/Virgin River Basin, Utah Board of Water Resources, August 1993.

The History of Kane County, Kane County Daughters of Utah Pioneers, edited by A.F. Robinson, Utah Printing Company, SLC, Utah, 1970.