City of St. George Water Conservation Plan Update

2013

Contents

Water System Overview 3
Current Water Use 3
Existing Water Sources 4
Projected Water Needs 4
Current Conservation Efforts 5
System Improvements 8
Conservation Goals 8
Pricing Structure 10
Water Conservation Policies/Ordinances 12
Water Conservation Coordinator 13
Conclusion 13
APPENDIX A 14
APPENDIX B 30

Water System Overview

The City of St. George serves a population estimated at 72,897 as of the 2010 national census. There are 22,281 connections in the water system as of December 31, 2012. This includes Municipal and Industrial (M&I) meters as well as meters for irrigation and reuse water customers. Water meters are read and billed monthly. Meters are read with automatic meter reading (AMR) technology.

Current Water Use

Total water delivered for the year ending December 2012 was 9,962,286,126 gallons. Of this, 8,886,825,000 gallons was used within the City by its residential, commercial and industrial users and includes reuse and irrigation quality water. Water use by class breaks downs as follows:

Account Type	Number of Accts	Gallons delivered
Commercial	1,449	1,646,835,161
Industrial	476	1,032,262,450
Residential	19,785	5,481,566,498
City Use – unbilled		726,211,394
Wholesale		1,072,629,163

To be consistent with the Utah Division of Water Resources (DWR) and for the purpose of this study, the water use presented in this report refers to the diverted amounts, not actual consumptive amounts, used or depleted amounts. The per capita water use is calculated by dividing the total amount of water diverted (culinary, secondary irrigation or re-use quality water) by the total population of the City of St. George.

In considering the per capita water use, it is important to note that approximately 6,000 of the dwelling units in the City of St. George or 27% of the metered connections are second homes or vacation homes. These homes still use a considerable amount of water, but the population associated with these homes is not accounted for in the per capita use population. Also not included in the per capita calculation are the students that attend Dixie State University from outside the City.

The total amount of water diverted and used by the City in the year 2012 was 8,886,875,503, this amount divided by the 2012 population estimate of 75,561 which is based on the 2010 census, results in a per capita use of 322 gallons per day. As stated above, this includes all water diverted which includes the water used for commercial/industrial customers, hotels, restaurants, offices etcetera. The City of St.

George serves two industrial parks, numerous businesses associated with the hospitality industry, a hospital that serves the county as well as a university. Much of the water included in the per capita calculation is used by those that commute into the City from other areas and therefore is not included in the population count. If only residential water diverted was included in the per capita use, the calculation would be closer to 195 gallons per person per day and this amount does not take into account the second homes in the City.

Existing Water Sources

The current potable water sources include the following:

- Eleven wells in the Gunlock Well Field
- Three wells in the Ledges Well Field
- Two wells in the Millcreek Well Field
- Five wells in the Snow Canyon Well Field are jointly owned by the cities of St. George, Ivins and Santa Clara. The City of St. George's portion is 64% of the facility.
- Mountain Springs
- West City Springs
- Water purchased from the Washington County Water Conservancy District (WCWCD) and treated at the Quail Creek Water Treatment Plant (QCWTP).

Current irrigation sources of water include the following:

- Shares in several privately owned irrigation companies
- Seven irrigation quality wells
- Treated effluent from the regional Waste Water Treatment Plant

The City has a Reuse Plant that treats effluent from the Waste Water Treatment Plant bringing it up to irrigation quality standard. Reuse water is supplied to Sunbrook golf course, Southgate golf course, Sun River golf course, Bloomington Country Club and Entrada golf course. Extension of the reuse pipeline is in the planning stages to make this water available to more large irrigators.

Projected Water Needs

The City of St. George purchases approximately 15,500 acre feet of water from the Washington County Water Conservancy District. This is surface water from the Virgin River treated to meet potable water standards. Additionally, the City produces from ground water and springs an additional 8,000 acre feet of water for potable use. With current water sources, an additional 5,000 acre foot of water can be

developed for potable use. In addition, the Gunlock Well Field has approximately 7,700 acre feet of water rights which can be used for drinking water if treated to meet the arsenic regulation effective in the year 2006 of 10 parts per billion. With the conversion of secondary water rights to M&I use, the City would have the capacity to deliver approximately 45,000 acre feet of water.

Currently the population is about 75,000. Assuming a growth rate of 3% annually, this will meet water demand until the year 2030 or a population of 125,000.

The City supports the WCWCD Lake Powell Pipeline project. This project will provide the county with an additional 70,000 acre foot of water which will meet the water demand for the county into the year 2050.

The above projections assume no additional progress with respect to conservation efforts. However, the City's ongoing conservation effort is successful with City customers responding to the efficiency message. Water use has dropped approximately 9% since the year 2002.

Current Conservation Efforts

Current conservation efforts are varied. The City works closely with the WCWCD with respect to many water issues, including conservation. Some of the conservation programs are funded and operated by the City, some in partnership with the WCWCD. The WCWCD consistently offers matching funding for grant opportunities for which the City applies. This helps stretch the available conservation dollars from the Water Services Department budget. Additionally, most rebate programs offered by the WCWCD are also open to City of St. George residents.

The first step in conservation has been education. Customers who understand how they use water are better able to implement efficiency in water use. The education aspect is many faceted. Listed below are several of the educational activities the City sponsors and/or participate in.

- Classroom presentations to K-12 students.
- Participation in the annual Water Fair offered to all 4th grade students in the county. Many issues are covered at the Water Fair including conservation, waste water treatment, culinary water treatment, source water protection and more.
- Celebration of Water Week annually with events such as a Garden Fair and Mayor's Water Walk.

- Financial and in kind support for the WCWCD Demonstration Gardens at Tonquint Park
- Monthly Garden workshops – cooperative effort with the WCWCD
- Material distributed through the utility office and in booths at various community events
- Conservation tips, brochures, links available through the City's web page and the department's Facebook page.
- The department also has a Twitter account, sending tweets primarily during the irrigation season to remind customers to adjust clocks based on weather.
- Periodic articles in the local newspaper regarding conservation programs
- WaterSense promotional partner, making customers aware of water saving devices and programs that are labeled through this EPA program.

In addition, programs are offered to assist customers in reducing their per capita use.

- Free residential lawn water audits – which includes more education material provided to the customer as well as a suggested irrigation schedule to work with their irrigation system design, landscape and soil type. The following is the number of residents in St. George that participated in the program.

    - 2006 – 80
    - 2007 – 130
    - 2008 – 95
    - 2009 – 62
    - 2010 – 35
    - 2011 – 67
    - 2012 - 78

- The City continues to offer rebate program for replacement of older high flow toilets. With the creation of the EPA's WaterSense program, rebates are offered for retrofits with WaterSense labeled models. WaterSense labeled models use 1.28 gallons per flush (gpf) or less and are shown to flush an adequate amount of waste on the first flush. This has made the program easier to administer and for customers to understand.

    - 2010-2012 – Completed program
        - $37,500 Bureau of Reclamation grant
        - $30,434 – Water Services Department funding
        - $8,000 – WCWCD funding
        - 946 fixtures were replaced
        - A review of water records shows a savings of 957 gallons per month per toilet replaced. The savings cannot be attributed entirely to lower flush per gallon; some of the savings is mostly due to replacement of fixtures that were leaking.

    - 2012 – 2013 – Completed with funding from the following sources
        - $37,500 Bureau of Reclamation grant
        - $29,646 Water Services Department funding
        - $8,000 WCWCD funding
        - 1,007 toilets were replaced

    - Participants included residential, multi-family customers as well as several hotel/motel retrofits.

- 2013-2015 – In progress
    - $37,500 Bureau of Reclamation grant
    - $33,646 Water Services Department funding
    - $4,000 WCWCD funding
    - To date over 200 toilets retrofitted

The first program offered by the City targeting outdoor water use started in 2009 and ended in 2011. Unfortunately it did not generate much customer interest. A significant portion of the funding was not used. However, two home owner associations (HOA) with significant amounts of common area did take advantage of the program. One upgraded their irrigation system to make it more efficient. The other replaced grass with plant material off the Washington County plant list identified as moderate or low water use. A reduction in water consumption of approximately 2.4 million gallons or approximately 12% was realized when water use was compared one year prior to and post implementation.

The most recent outdoor program rebated the installation of a pressure regulating valve (PRV) on irrigation systems. It ran from July 2011 through June 2013. Generally, landscapes are irrigated at the same pressure as is delivered at the meter. Pressure at the meter can fluctuate from 40 pounds per square inch (psi) to over 120 psi. At the higher pressures, pop up irrigation nozzles tend to mist rather than forming droplets that reach the ground and soak into the soil. A significant amount of water is lost to evaporation when irrigated at higher than recommended pressures. Additionally, sprinkler system failures, such as popped off nozzles, leading to excessive water waste are a result of high water pressure. Although PRV's are required on homes as part of the building code, they are not required on irrigation systems and so therefore, are not routinely installed.

- 2011 – 2013 PRV installation on irrigation systems
    - $25,000 Bureau of Reclamation grant
    - $20,013 Water Services Department funding
    - $5,000 WCWCD funding
    - 789 customers have participated to date.
    - An annual water savings of 1.9 million gallons of the 315 participant records evaluated, or an average of 6,300 gallons annually per customer.

System Improvements

The City was awarded a grant from the Bureau of Reclamation to upgrade the Supervisory Control and Data Acquisition System (SCADA). This project involved the upgrade of the SCADA system to allow for equipment and software to be installed at each tank to monitor tank levels and allow for remote control of wells. The project provided real time information to be collected from the tanks and wells to prevent tank overflow and decrease occurrences of problems related to SCADA system operation's miscommunication. It has provided better management of the water resources. Although the grant funding has been depleted, the SGWSD continues to invest in the SCADA system to better manage the water system.

Another efficiency action taken was to collect the water from private irrigation companies that are not used by share holders. Previously, this water flowed into the Virgin River; it is now collected and stored on the Snow Park Pond, making more irrigation water available for City faculties and other irrigation users.

Conservation Goals

Future goals continue along the lines of the existing programs. The City will continue the education efforts as well continue to look for effective rebate and incentive programs to offer its customers. Most rebate programs are offered because of grant funding which helps stretch the conservation funds. The Bureau of Reclamation continues to support many of the rebate programs as does the WCWCD by contributions to the required matching funds.

In order to evaluate possible water conservation programs, the conservation coordinator has collaborated with the Alliance for Water Efficiency to use the Water Conservation Tracking Tool software to predict demand, cost/benefit of various programs and track outcomes. Appendix A provides an overview of the results of this collaboration.

The conservation coordinator will continue to apply for grants as the opportunities become available. Some possible future programs may include:

- Purchase of leak detection equipment to help locate leaks on the system.

- Continuation of the WaterSense Labeled Toilet Rebate Program
- Residential Low-Flow Showerheads
- Commercial Pre-rinse spray valves

In an effort to continue to educate customers about the positive role plant material plays in the environment and in water conservation, the City is working with partners to develop the Red Hills Desert Garden. This garden will showcase the plant material of the three plateaus that come together in Washington County, the Mohave, Great Basin and Colorado. Plant material that will survive and thrive once established on rainwater only will be used in the landscape. The plant material will be labeled with its common and botanical names so that visitors to the garden can identify plants they like and can use in their own landscape. Additionally, a fish viewing area is being constructed to educate visitors regarding the endangered species in the Virgin River and what is being done to protect them. With education regarding the Desert Tortoise and pathways that transition from the garden into Pioneer Park and the Red Cliff Desert Preserve, it is expected that this facility will draw many visitors providing much education.

Partners in this effort include those listed below:

- WCWCD
- The Virgin River Recovery Program
- The Red Cliffs Desert Preserve

Along with the formal partners listed above, community support is being solicited, both to stretch the dollars as well as create a feeling of ownership and pride in the garden. Some of the elements to be constructed with donated labor and/or material from within the community are listed below:

- Bench Swing
- Entry Arch
- Pavilion
- Shade structures
- Benches

A fact summary sheet is included in Appendix B. Construction of the fish viewing area is underway and the restrooms have been installed. The WCWCD is taking the lead in this project and has provided the following schedule for the remaining construction:

- Construction began in May of 2013
- Estimated completion date is spring of 2014.

The SGWSD supports and promotes conservation programs offered by the WCWCD as St. George customers can participate in those programs as well as any offered by the City. Continued partnership with the WCWCD will assist the City in continuing to lower its per capita water use. It is anticipated that per capita water use can continue to be lower by 1.5% to 2% per year. Water use is measured through the meters on a monthly basis. This is the basis of measuring water savings.

Pricing Structure

The City has a tiered water rate structure that charges more per 1,000 gallons with increased water use. The standard rates are listed below.

Effective 7/1/2012

REGULAR SCHEDULE		***CONSERVATION SCHEDULE***	
3/4" Meter		**3/4" Meter**	
Base Rate (5K)	22.47	**Base Rate (5K)**	22.47
5-10	0.78	5-10	0.78
10-15	0 .90	10-15	0.90
15-20	1.00	15-20	1.00
20-25	1.11	20-25	1.11
25-30	1.22	25-30	1.22
30-35	1.33	30-35	1.33
35-40	1.44	35-40	1.65
40-45	1.55	40-45	2.20
Over 45,000	1.66	Over 45,000	2.67
1" Meter		**1" Meter**	
Base Rate (1K)	$ 45.71	**Base Rate (10)**	$ 47.30
5-10	.78	10-20	1.10
10-15	.90	20-30	1.25
15-20	1.00	30-40	1.36
20-25	1.11	40-50	1.49
25-30	1.22	50-60	1.62
30-35	1.33	60-70	1.75
35-40	1.44	70-105	2.16
40-45	1.55	Over 105K	2.67
Over 45K	1.66		

1 1/2" Meter		**1 1/2" Meter**	
Base Rate (5K)	$56.18	**Base Rate (20K)**	$ 88.00
5-10	.78	20-40	1.10
10-15	.90	40-60	1.25
15-20	1.00	60-80	1.36
20-25	1.11	80-100	1.49
25-30	1.22	100-120	1.62
30-35	1.33	120-140	1.75
35-40	1.44	140-180	2.16
40-45	1.55		
Over 45K	1.66	OVER 180K	2.67

2" Meter		**2" Meter**	
Base Rate (5K)	$81.32	**Base Rate (40K)**	$169.40
5-10	.78	40-80	1.10
10-15	.90	80-120	1.27
15-20	1.00	120-160	1.38
20-25	1.11	160-200	1.50
25-30	1.22	200-240	1.62
30-35	1.33	240-280	1.75
35-40	1.44	280-360	2.16
40-45	1.55		
Over 45K	1.66	OVER 360K	2.67

3" Meter		**3" Meter**	
Base Rate (5K)	$218.66	**Base Rate (80K)**	$301.95
5-10	.78	80-130	1.10
10-15	.90	130-180	1.32
15-20	1.00	180-230	1.49
20-25	1.11	230-300	1.61
25-30	1.22	300-400	1.72
30-35	1.33	400-560	1.88
35-40	1.44	560-720	2.16
40-45	1.55		
Over 45	1.66	OVER 720K	2.67

4" Meter		**4" Meter**	
Base Rate (5K)	$490.03	**Base Rate (160K)**	$ 635.80
5-10	.78	160-220	1.10
10-15	.90	220-300	1.32
15-20	1.00	300-400	1.49
20-25	1.11	400-580	1.61
25-30	1.22	580-740	1.72
30-35	1.33	740-1120	1.88
35-40	1.44	1120-1440	2.16
40-45	1.55		
Over 45,000	1.66	Over 1440K	2.67

6" Meter		**6" Meter**	
Base Rate (5K)	$845.61	**Base Rate (320K)**	$1309.00
5-10	.78	320-400	1.10
10-15	.90	400-560	1.32
15-20	1.00	560-720	1.49
20-25	1.11	720-1040	1.61
25-30	1.22	1040-1540	1.72
30-35	1.33	1540-2240	1.88
35-40	1.44	2240-2920	2.16
40-45	1.55		
Over 45,000	1.66	Over 2920	2.67

BILLING DATES DURING WHICH CONSERVATION RATE IS EFFECTIVE:

Cycle #1	Cycle #2
4/15	4/30
5/15	5/31
6/15	6/30
7/15	7/31
8/15	8/31
9/15	9/30

Water Conservation Policies/Ordinances

The City has adopted a Culinary Water Shortage/Drought Management plan. It is a four stage plan and can be implemented to address a water shortage due to a short term supply issue or in response to drought conditions. Generally, the City Council, based on recommendation from Water Services Department staff enacts Stage One at the beginning of the summer season. As well as entering into Stage One the Council generally prohibits day time watering. Irrigation done with culinary water can only be completed between 8:00 pm and 8:00 am.

An advantage of using the plan versus an ordinance to implement time of day watering mandates is that it provides an opportunity to advertise the day time watering policy of the City on an annual basis. Because the news media picks up on the council agenda item dealing with entering into Stage One of the plan an opportunity to refresh the idea of water efficiency and conservation in the minds of our customers is created. It also gives the council an opportunity to support the conservation message promoted by staff.

Irrigation water use is not addressed in the management plan for several reasons.

- System production and storage is limited so there is not enough water to allow all customers to irrigate during the night hours.
- Some of the irrigation water is provided through shares in various irrigation companies. These companies determine watering schedules.

The City has adopted a Landscape Standard. While not adopted specifically as a conservation measure, it addresses some issues such as prohibiting turf on slopes of 30% or greater and encouraging use of plant material adaptive to this climate. It also requires a water audit within 30 days of installation of the landscape, this should help customers understand how much water their landscape will need by providing a suggested irrigation schedule both for during and after the establishment of the landscape.

Staff is drafting a water waste ordinance to present to City Council for approval. The ordinance will address excessive watering that result in run-off and impose a fine for those that don't correct the problem after multiple written warnings. The fine would be allocated to a revenue fund specifically to support conservation education efforts.

Water Conservation Coordinator

The City has had a fulltime Conservation Coordinator since 2003. It is a shared position with the Energy Services Department. The responsibilities of this position include, but are not limited to, community outreach and education and implementation of conservation strategies that result in a reduction of water and energy use.

Conclusion

The City of St. George has been successful in dropping per capita water use as well as using technology to improve the efficiency with which City facilities use water. Residents and businesses have responded favorably to the water wise/conservation message. The City plans to continue with the conservation effort, moving in the direction of improving the wise water use ethic that has begun.

APPENDIX A

Alliance for Water Efficiency Tracking Tool Analysis for the City of St. George, Utah

May 15, 2013

The Alliance for Water Efficiency's Water Conservation Tracking Tool is an Excel based model that can be used to evaluate the water savings, costs, and benefits of conservation programs for a specific water utility. The process of evaluating the costs and benefits of potential efficiency programs is a critical step in planning effective programs. The Tracking Tool provides a user friendly interface and flexibility that allows users to project outcomes under various conditions.

With funding from the Walton Family Foundation, the Alliance for Water Efficiency used its Water Conservation Tracking Tool to analyze the costs and savings potential of a suite of water efficiency programs for the City of St. George, Utah. The analysis output is intended to provide planning support for the implementation of cost-effective water efficiency options in the City of St. George service area. The results presented in this report, and in the accompanying AWE Water Conservation Tracking Tool, do not represent specific recommendations. Rather, the information is presented to inform the planning and decision making process, provide insight into savings potential, and to equip the city with a powerful decision support tool.

This document describes the modeling process, provides results of the Tracking Tool run, discusses greenhouse gas reductions and potential revenue impacts associated with water efficiency programs, and ends with a conclusion. The accompanying Tracking Tool file and User Guide should also be referenced for more information. Twelve water efficiency programs were evaluated for the City of St. George. The service area assumptions are discussed in the next section, which is followed by a description of each water efficiency program. The Alliance for Water Efficiency worked with the City of St. George and conducted its own research to obtain input data.

Service Area Assumptions

The Tracking Tool requires a variety of data inputs that can be thought of in two primary groups: (1) inputs that provide information about the service, and (2) area inputs that define the parameters of the planned water efficiency programs. The service area assumptions are entered on the Common Assumptions, Specify Demands, Avoided Costs, and Utility Costs and Benefits worksheets. It would be excessive to list each data point, but some of the more pertinent inputs are described in this section.

The Common Assumptions worksheet contains demographic, weather, water sector, and price data. The first data input required by the Tracking Tool is a population forecast, which AWE obtained from the Utah Governor's Office of Planning and Budget. As can be seen in Table 1, the population is projected to increase from 77,270 in 2012 to 214,888 in 2050 (an increase of 178 percent over 38 years).

City of St. George Population Forecast				
2012	**2020**	**2030**	**2040**	**2050**
77,270	94,763	128,756	168,054	214,888

Table 1: City of St. George Population Forecast

Other notable service area assumptions include an interest rate of 4 percent and an inflation rate of 3 percent. Overall costs and benefits were set to be expressed in 2013 dollars. May 1st was selected as

the peak season start date and October 30th was selected for the peak season end date. Reference evapotranspiration was entered as 33.79 inches per year with 8 inches of precipitation. The water customer classes entered were residential, commercial, industrial, government, and wholesale. All sectors were assigned a water rate of $1.22 per 1,000 gallons, except the Industrial class which was set to $1.66. Wholesale rates were not factored into the analysis and were only referenced to characterize the demand profile.

The water demand forecast was projected using the Tracking Tool's built-in calculator that relies on population growth rates to estimate future water use. This requires the user to enter a peak (35.17 MGD) and off-peak (13.60 MGD) average demand for the base year (2012). This generated an annual average of 24.35 MGD. The total number of accounts for each customer class and the associated demand share are entered here as well. The residential sector dominates total consumption at 61 percent, with the remainder of demand being 16 percent commercial, 7 percent industrial, 0.8 percent government, 7.2 percent wholesale, and 8 percent non-revenue water. Figure 1 illustrates the customer class demand shares.

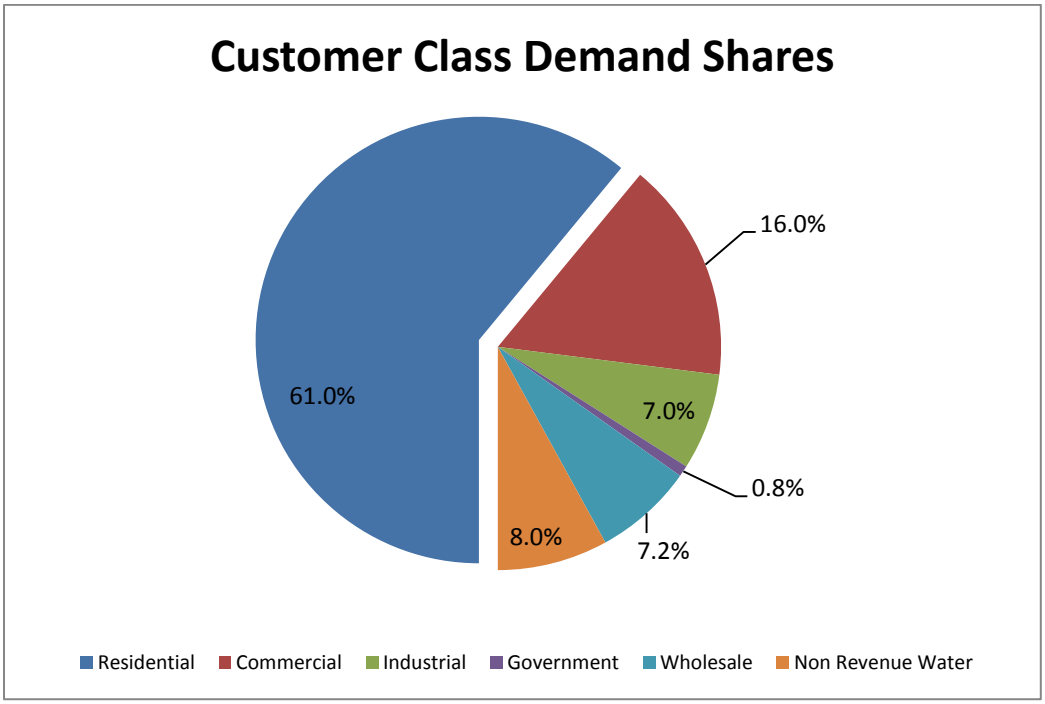

Figure 1: Customer Class Demand Shares

Avoided costs are critical inputs for the AWE Tracking Tool, without them it would be impossible to quantify benefits. The short run avoided costs for the City of St. George were entered as $840/MG for water purchases with an expected 3 percent nominal rate of increase per year, and $180/MG for energy for transmission, treatment, and distribution, which also assumed a 3 percent nominal rate of increase per year. On the wastewater side, it was assumed that it costs $1,250/MG for energy for transmission, treatment, and discharge. The Tracking Tool estimated that the City of St. George would exceed its

current capacity of 58 MGD by 2028 and need to add 39 MGD.[1] It was estimated this expansion would cost $818,181 per MGD. This number was derived from the Peoria, AZ *Water, Wastewater & Solid Waste Expansion Fee Study*.[2] It was the closest community to St. George for which the project team could find comparable water storage expansion cost estimates.

Any annual overhead costs pertaining to the management and implementation of the complete suite of programs were entered on the Utility Cost and Benefits tab. For 2014-2018 it was assumed that overhead costs will be incurred at $60,000 per year for staff and $5,000 per year for marketing and outreach. These costs are not factored into individual programs, but do impact the net present value for the sum of all programs (see Utility Costs and Benefits worksheet row 198).

Water Efficiency Programs Investigated

The portfolio of efficiency programs included in this analysis target the residential, commercial, and industrial sectors. Following the list of 12 programs is a description of the assumptions and results of each of the programs. The summary contains a table of all programs for quick reference.

1. Residential High-Efficiency Toilets
2. Residential Low-Flow Showerheads
3. Residential High-Efficiency Clothes Washers
4. CII 1/2 Gallon Urinals
5. CII Valve-Type High-Efficiency Toilets
6. CII Laundromat
7. CII Pre-Rinse Spray Valve
8. CII Dishwasher
9. Residential Turf Replacement
10. CII Cooling Tower
11. Hotel Low-Flow Showerhead
12. Hotel 3.5 gpf Toilet to High-Efficiency Toilet Retrofit

Residential High-Efficiency Toilets

High-efficiency toilet replacement programs can reduce residential water consumption significantly, particularly if the toilets being replaced were installed prior to January 1, 1994 (the date the Energy Policy Act of 1992, which created a maximum flush volume of 1.6 gallon per flush for toilets, went into effect). The predicted savings in the model assume a 3.5 gpf toilet is being replaced by a fixture with a 1.28 gallon flush volume and the estimated annual savings per fixture is 10,453 gallons, with a rebate level of $75 and a processing cost of $50.[3] It was estimated that 1,000 fixtures would be rebated per

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[1] The model sets the capacity increment by taking the difference between current system peak capacity and the peak capacity needed to meet demands 20 years from the year in which current system capacity equals peak period demand.

[2] Peoria, AZ *Water, Wastewater & Solid Waste Expansion Fee Study* http://www.peoriaaz.gov/uploadedFiles/Peoriaaz/Departments/Budget/Final_Expansion_Report_10-31-07.pdf

[3] Current St. George toilet rebate is $75. http://www.sgcity.org/conservation/Residential%20Toilet%20Rebate%20Application.pdf

year for 2014, 2015, 2016, 2017, and 2018 for the residential sector. The residential sector contains both single-family and multifamily housing.

This measure predicts a benefit cost ratio of 4.48 which is quite high. Raising the rebate level may result in greater participation while maintaining a positive benefit cost ratio. Careful attention should be paid to the other assumptions such as program start-up costs and overhead. Additionally, the city may wish to have a direct installation program to insure toilets are properly installed and fitted, and that only 3.5 gpf or greater are being replaced. Having a direct installation program would increase the costs but would add reliability to the estimated benefits. The B/C ratio of 4.48 indicates there is room to increase costs for the high-efficiency toilet program and maintain cost-effectiveness. A direct installation program for toilets could be combined with a showerhead program and/or a residential survey. It is estimated that this program will provide an average annual savings of 25.89 million gallons.

The WaterSense program labels high-efficiency toilets, and there are a wide variety of models that the city can rely on to provide efficient flush volumes and high performance.[4]

Residential Low Flow Showerheads

Residential low-flow showerheads represent a common water efficiency program option. A savings per showerhead of 2,062 gallons per year was assumed, with a per-unit cost of $15 to the utility (including price of showerhead and processing). The cost of $15 per showerhead may be on the high side but assumes the purchase of a quality fixture that users will enjoy and continue to use. It is important to note that showerheads can easily be removed (or never installed, if provided as a give-away). The below savings estimates and B/C ratio assume 100 percent installation and use. The city may wish to install showerheads as part of a residential survey program, or in combination with a HET direct installation program.

It is important to be aware of the increasing potential for thermal shock (which may cause sudden movement and result in a fall) and scalding when using showerheads that have a flow rate less than 2.5 gpm. For more information on this please see the following resources:

- WaterSense Specification for Showerheads Supporting Statement (pages 6 & 7): http://www.epa.gov/WaterSense/docs/showerheads_finalsuppstat508.pdf
- Plumbing Engineer Feature on Safety and Low Flow Showerheads: http://www.plumbingengineer.com/dec_10/showers_feature.php
- American Society of Sanitary Engineering (2012) Scald Hazards Associated with Low-Flow Showerheads: http://www.asse-plumbing.org/Scaldhazards.pdf
- Alliance for Water Efficiency Residential Shower and Bath Introduction: http://www.a4we.org/Residential_Shower_Introduction.aspx

It was estimated that 1,000 fixtures would be installed per year for 2014, 2015, 2016, 2017, and 2018 for the residential billing sector. The benefit cost ratio is calculated to be 2.36, indicating that this will be a

[4] WaterSense Labeled Toilets http://www.epa.gov/WaterSense/products/toilets.html

cost-effective program. The average annual savings of this program are estimated to be 1.48 million gallons.

Residential High-Efficiency Clothes Washers

High-efficiency clothes washer programs are often found to be a cost-effective solution to reduce service area water demands, and were included in this assessment. It was estimated that each clothes washer replaced would save 7,043 gallons per year at a cost of $150 per unit to the utility ($100 rebate and $50 processing cost). Five hundred clothes washers were projected to be rebated in the years 2014, 2015, 2016, 2017, and 2018 for a total of 2,500 units. The benefit cost ratio is calculated to be 1.11, indicating the benefits slightly outweigh the costs. The average annual savings of this program are estimated to be 12.91 million gallons, with a useful life of 11 years.

New federal standards were adopted on May 31, 2012 and take effect in 2015, with increasingly efficient standards taking effect in 2018.[5] Therefore if a residential clothes washer program is employed, it should be continually reevaluated as the new standards begin to avoid free-ridership.[6]

CII 1/2 Gallon Urinals

Water consumption associated with urinals is often significant in commercial and institutional settings. This program was included to take advantage of the possible savings opportunities that can occur when replacing inefficient urinals with 0.5 gallon per flush models. (The current federal standard is 1.0 gallon per flush.) It was assumed each urinal retrofit would result in 6,206 gallons saved per year at a cost of $150 per urinal to the utility. The cost includes a$100 for the rebate and $50 for processing.[7] The average annual savings of this program are estimated to be 1.34 million gallons, with a useful life of 25 years. The B/C ratio is calculated to be 1.99. Fifty urinal replacements were planned for the years 2014-2018 for a total of 250.

There are a variety of WaterSense labeled urinals to choose from, ensuring accurate flush volume estimates and excellent performance.[8]

CII Valve-Type High-Efficiency Toilets

Replacing toilets with more efficient models in commercial buildings offers a great opportunity for savings. A single HET retrofit in a commercial setting is estimated to save 11,441 gallons per year, which is 9.5 percent greater than the assumption used in this analysis for a residential retrofit (10,453 gallons per year). It was assumed each toilet retrofit would cost the utility $225 for the fixture and $50 for

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[5] Federal Register (May 31, 2012) Energy Conservation Program: Energy Conservation Standards for Residential Clothes Washers - https://www.federalregister.gov/articles/2012/05/31/2012-12320/energy-conservation-program-energy-conservation-standards-for-residential-clothes-washers

[6] 2012-05-31 Energy Conservation Program: Energy Conservation Standards for Residential Clothes Washers; Direct final rule. http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0019-0041

[7] Current rebate amount is $100 http://www.sgcity.org/conservation/Commercial%20Urinal%20Rebate%20Application%207.12.pdf

[8] WaterSense Urinals http://www.epa.gov/watersense/products/urinals.html

processing. One hundred replacements were planned per year from 2014-2018. The average annual savings of this program are estimated to be 2.83 million gallons. Under the current model parameters, the program is expected to be cost-effective with a B/C ratio of 2.20.

There was previously some trepidation in recommending the use of high-efficiency flushometer toilets in commercial buildings, due to some potential issues with drainline carry. WaterSense, for example, has yet to develop a specification for flushometer HETs. The Plumbing Efficiency Research Coalition (PERC) recently completed its project, *The Drainline Transport of Solid Waste in Buildings* and recommended that WaterSense move forward with a specification for flushometer HETs.[9]

CII Laundromat

This program relates to the replacement of inefficient family sized commercial washing machines that are found in laundromats and in multifamily common area laundry facilities. Each replaced clothes washer is estimated to save 31,435 gallons per year at a cost of $370 per unit to the utility ($320 rebate plus $50 for rebate administration and processing). The savings per machine is much higher than the expected saving for a residential unit (7,043 gallons per year) due to the higher frequency of use. A modest 25 machines were planned to be replaced per year for 2014, 2015, 2016, and 2017. Average annual water savings resulting from this program are 2.36 million gallons with a useful life of 9 years. The B/C ratio of 1.58 suggests the benefits are expected to exceed the costs.

CII Pre-Rinse Spray Valve

Pre-rinse spray valves (PRSV) are commonly used in commercial kitchens to rinse food and other debris from plates before they are put in a dishwasher. A traditional PRSV uses high volumes of water, usually 2 to 5 gpm.[10] The U.S. national standard requires PRSV's to use no more than 1.6 gpm. A high-efficiency PRSV uses less than 1.3 GPM and removes food residue faster than the traditional PRSV. Not only is the water flow rate reduced, the PRSV operator spends less time rinsing the same amount of dishes. Programs that seek to replace old and inefficient PRSV's have to potential to save large amounts of water.

The program entered in the Tracking Tool assumes each replaced unit will result in an average savings of 28,285 gallons per year. The cost of the replacement to the utility is expected to be $150 with a $2,000 initial start-up cost. It was estimated that 50 PRSV's would be installed per year from 2014-2018 for the commercial sector. The benefit cost ratio is calculated to be 3.73, indicating that this will be a cost-effective program. The average annual savings of this program are estimated to be 1.22 million gallons.

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[9] Plumbing Efficiency Research Coalition (2012) The Drainline Transport of Solid Waste in Buildings http://www.a4we.org/uploadedFiles/Resource_Center/Library/residential/toilets/Drainline-Transport-Study-PhaseOne.pdf

[10] Alliance for Water Efficiency Commercial Dishwasher Introduction - http://www.allianceforwaterefficiency.org/commercial_dishwash_intro.aspx?terms=pre+rinse

CII Dishwasher

Dishwashers are often the most water intensive component of a commercial food operation and consume a great deal of energy due to the use of hot water. Because of this, commercial dishwashers are a great water using appliance to target with an efficiency program. The long life (20-25 years) of dishwashers, coupled with the high water and energy savings potential, allows a great return on investment for the utility and the consumer. The modeling assumptions for this program included a savings of 57,757 gallons per year for each dishwasher replaced and a cost of $1,000 per unit to the utility. The program is forecasted to replace 15 units per year from 2014-2018 for a total of 75, and generate 3.61 million gallons of savings annually with a benefit cost ratio of 2.33.

Residential Turf Replacement

How common is residential turf in St. George and what is the willingness of customers to replace it with a xeriscaped surface? These are important factors in determining whether or not a turf replacement program is worth pursuing. The turf replacement program scripted in the Tracking Tool did not produce cost-effective results. This can be adjusted to determine a cost that will produce adequate benefits, or the program can be included as is and be offset by other efficiency investments.

The turf program entered in the Tracking Tool assumes each replaced unit will result in an average savings of 34,656 gallons per year. The cost of the replacement to the utility is expected to be $972 with a $2,000 initial start-up cost.[11] It was estimated that the utility would replace 5 residential turf areas in 2014, 2015, 2016, and 2017. The benefit cost ratio is calculated to be 0.32, indicating that this will not be a cost-effective program. The average annual savings of this program are estimated at 0.53 million gallons with a useful life of 10 years.

CII Cooling Tower

Cooling towers are commonly used in central cooling systems for buildings, for refrigeration, cold storage facilities, dry cleaning, medical equipment, manufacturing and industry. Cooling towers remove heat from the air and equipment and require large amounts of water even when well maintained. Significant quantities of water can be wasted when they are not maintained properly, the equipment is inefficient, or there are leaks.

The program scripted for this assessment involves reducing water consumed by cooling towers with the use of conductivity controllers and efficient management practices. It was estimated that 10 cooling towers would be retrofitted per year for 2014, 2015, 2016, and 2017 for the industrial sector at a cost of $625 per unit. The B/C ratio is calculated to be 3.46, indicating that this will be a cost-effective program. The average annual savings of this program are estimated at 5.25 million gallons with a useful life of 5 years.

[11] Model assumes a cost of $0.45/sqft of turf area, and an average turf area of 2,160 sqft.

Hotel Low Flow Showerhead and Hotel 3.5 gpf Toilet to High-Efficiency Toilet Retrofit

Two hotel programs were looked at as possible water demand management measures for the commercial sector. St. George has many hotels with a substantial occupancy rate, and can reduce water consumption by replacing inefficient showerheads and toilets with efficient fixtures.[12]

50 replacements were projected per year from 2014–2018 for a total of 250. The toilet program savings estimates are based on the replacement of 3.5 gpf toilets with 1.28 gallon per flush HETs. The showerhead replacement savings assume a 3.0 gpm showerhead is being replaced with a 2.5 gpm model. Because the Tracking Tool does not contain a program for hotels, some assumptions were made to estimate the annual savings per fixture. Table 2 contains these assumptions which work out to an estimated savings of 4,862 gallons per year for toilets and 1,752 gallons per year for showerheads. The average annual savings are estimated to be 0.17 million gallons for the showerhead replacements and 1.17 million gallons for the toilet retrofits, with B/C ratios of 3.19 and 6.07 respectively.

Hotel Fixture Replacement Program Savings Assumptions		
Occupancy Rate	60%	
Avg Guests/Room	2.0	
Toilet Savings Estimates		
Flush Rate	5	Flushes/Guest/Day
Assumed Flush Volume (pre retrofit)	3.5	Gallons
Flush Volume (post retrofit)	1.28	Gallons
Daily Savings	22.2	Gallons
Annual Savings	**4,862**	Gallons
Shower Savings Estimates		
Shower Use Duration	8	Minutes/Guest/Day
Assumed Flow (pre retrofit)	3	Gallons
Flow (post retrofit)	2.5	Gallons
Daily Savings	8.0	Gallons/Day
Annual Savings	**1,752**	Gallons

Table 2: Hotel Showerhead and Toilet Retrofit Savings Assumptions.

Results

The City of St. George has relatively high wholesale water purchase costs at $840 per one million gallons. Because of the high wholesale price of the City's water, efficiency programs have a high probability to produce benefits that outweigh the costs. Water efficiency programs also reduce costs associated with wastewater treatment. There are considerations beyond just the short run avoided water purchase and treatment costs. St. George's population is expected to more than double by 2040, which will require additional water supply and capacity. While updating and improving infrastructure is not completely avoidable due to natural deterioration, significant costs can be avoided by lowering the need for capacity expansion. Water efficiency programs may be absolutely necessary to sustain future population and economic growth.

[12] The Salt Lake Tribune
http://www.sltrib.com/sltrib/money/53367714-79/percent-utah-hotel-occupancy.html.csp

In total, 12 water efficiency programs were entered into the AWE Water Conservation Tracking Tool. Two toilet programs top the list in terms of cost-effectiveness. The first is a residential HET program and the second is an HET replacement program for hotels. Contributing to the cost-effectiveness is the relatively low rebate amount of $75. Increasing this rebate would add costs, but may increase participation. The city may wish to invest in a direct installation program that will ensure fixtures are properly installed. This could be combined with a survey program and showerhead installation program. These are the types of considerations that should be given to any efficiency programs selected for implementation.

Activity	Annual per Unit Savings (gal)	Total Program Unit Activity 2014-2018	Utility Cost per Unit	Program Start-up Cost	Present Value Benefit	Present Value Cost	Net Present Value	B/C Ratio
Residential High-Efficiency Toilets	10,453	5,000	$ 125	$ 2,000	$ 2,701,292	$ 603,324	$ 2,097,968	4.48
Residential Low-Flow Showerheads	2,062	5,000	$ 15	$ 2,000	$ 175,223	$ 74,125	$ 101,098	2.36
Residential High-Efficiency Clothes Washers*	7,043	2,500	$ 150	$ 2,000	$ 403,269	$ 362,779	$ 40,490	1.11
CII 1/2 Gallon Urinals	6,206	250	$ 150	$ 2,000	$ 75,626	$ 38,043	$ 37,583	1.99
CII Valve-Type High-Efficiency Toilets	11,441	500	$ 275	$ 2,000	$ 295,646	$ 134,261	$ 161,384	2.20
CII Laundromat	31,435	100	$ 370	$ 2,000	$ 59,755	$ 37,734	$ 22,021	1.58
CII Pre-Rinse Spray Valve	28,285	250	$ 150	$ 2,000	$ 141,916	$ 38,043	$ 103,873	3.73
CII Dishwasher	57,757	75	$ 1,000	$ 2,000	$ 172,897	$ 74,125	$ 98,772	2.33
Residential Turf Replacement	34,656	20	$ 972	$ 2,000	$ 6,547	$ 20,756	$ (14,210)	0.32
CII Cooling Tower	209,880	40	$ 625	$ 2,000	$ 90,368	$ 26,132	$ 64,236	3.46
Hotel Low-Flow Showerhead	1,752	250	$ 15	$ 1,000	$ 14,649	$ 4,589	$ 10,060	3.19
Hotel 3.5 gpf Toilet to High-Efficiency Toilet Retrofit	4,862	250	$ 75	$ 1,000	$ 115,391	$ 19,022	$ 96,369	6.07
Subtotal Conservation Activities					**$ 4,252,578**	**$ 1,432,934**	**$ 2,819,644**	**2.97**
Total With Overhead & Public Information**					**$ 4,252,578**	**$ 1,722,303**	**$ 2,530,276**	**2.47**

**Not included in subtotal or total with overhead.*

***Overhead includes $65,000 per year from 2014-2018 for staff and marketing.*

Table 3: Summary of Water Efficiency Programs

Table 3 suggests the 12 water efficiency programs evaluated via the AWE Water Conservation Tracking Tool will produce benefits that exceed the costs. The benefits produced from the scripted water efficiency programs are from avoided variable supply and wastewater costs. The programs did not produce a capacity benefit in this example, but more aggressive and sustained effort would likely change that. With overhead costs included, the benefits outweigh expenditures by $2,530,276 with a B/C ratio of 2.47. The overall cost-effectiveness is important to consider because it may provide headroom to invest in measures that are predicted to have costs that outweigh the benefits. Funding measures with B/C ratios of less than 1 could be advantageous if it were a program that increases interaction with customers (e.g., customer survey program) or a program that would offer marketing exposure (e.g., rebate for highly desired technology).

Activity	Sector	Annual Program Water Savings (kgal)*						
		2014	2015	2016	2017	2018	2019	2020
Residential High-Efficiency Toilets	Residential	10,453	20,567	30,354	39,827	49,000	47,431	45,925
Residential Low-Flow Showerheads	Residential	2,062	3,877	5,474	6,879	8,116	7,142	6,285
Residential High-Efficiency Clothes Washers	Residential	3,522	7,043	10,565	14,086	17,608	17,608	17,608
CII 1/2 Gallon Urinals	Commercial	310	621	931	1,241	1,552	1,552	1,552
CII Valve-Type High-Efficiency Toilets	Commercial	1,144	2,251	3,322	4,359	5,363	5,191	5,026
CII Laundromat	Commercial	786	1,572	2,358	3,144	3,144	3,144	3,144
CII Pre-Rinse Spray Valve	Commercial	1,414	2,687	3,833	4,864	5,791	5,212	4,691
CII Dishwasher	Commercial	866	1,733	2,599	3,465	4,332	4,332	4,332
Residential Turf Replacement	Residential	173	347	520	693	693	693	693
CII Cooling Tower	Industrial	2,099	4,198	6,296	8,395	8,395	6,296	4,198
Hotel Low-Flow Showerhead	Commercial	88	168	241	309	372	343	317
Hotel 3.5 gpf Toilet to High-Efficiency Toilet Retrofit	Commercial	243	486	729	972	1,216	1,216	1,216
Single-family Total		16,903	33,219	48,991	64,258	79,056	76,513	74,149
Small Commercial Total		5,841	11,496	16,981	22,312	24,617	21,738	18,927
Industrial Total		173	347	520	693	693	693	693
Total		**22,918**	**45,062**	**66,492**	**87,263**	**104,366**	**98,944**	**93,770**

*Program *savings continue beyond 2020, see accompanying Tracking Tool file for more infomration.*

Table 4: Annual Water Efficiency Program Water Savings

Table 4 shows the projected annual savings per program through 2020 and includes totals for all sectors. Savings from some conservation programs will extend beyond 2020 and can be viewed in the accompanying Tracking Tool file. Conversely, savings estimates for other programs may level off or begin to decline in Table 4. This is due to program activity ceasing and the useful life being reached. When comparing the amount of water saved by each measure it is important to note that the activity level (i.e., number of rebates/replacements) are very different for each program. For example, the turf replacement program has much lower savings estimates than the residential HET measure. However, the HET program is estimated to have 5,000 total replacements over the course of 5 years compared to 20 turf replacements. If the turf replacement program were deemed popular, cost-effective, and logistically feasible the number of replacements could be increased greatly (according to this analysis turf replacement is not cost-effective for this service area).

Greenhouse Gas Reductions

The water and energy connection has gained a lot of recognition in recent years, yet the reduction of energy consumption and greenhouse gas emissions is an often overlooked benefit of water efficiency programs. The amount of embedded energy in water, particularly on the water utility side, is not widely understood and can be difficult to quantify. In 2011 the Alliance for Water Efficiency added a greenhouse gas module to the Tracking Tool that estimates energy and greenhouse gas emission reductions resulting from efficiency programs and the plumbing code. Figure 2 illustrates the collective reduction in greenhouse gases through 2025 based on the scenario created for St. George. Tabular data is available in the Tracking Tool file provided with this report which also includes information on energy savings, value of energy savings, and specific greenhouse gas emission reductions.

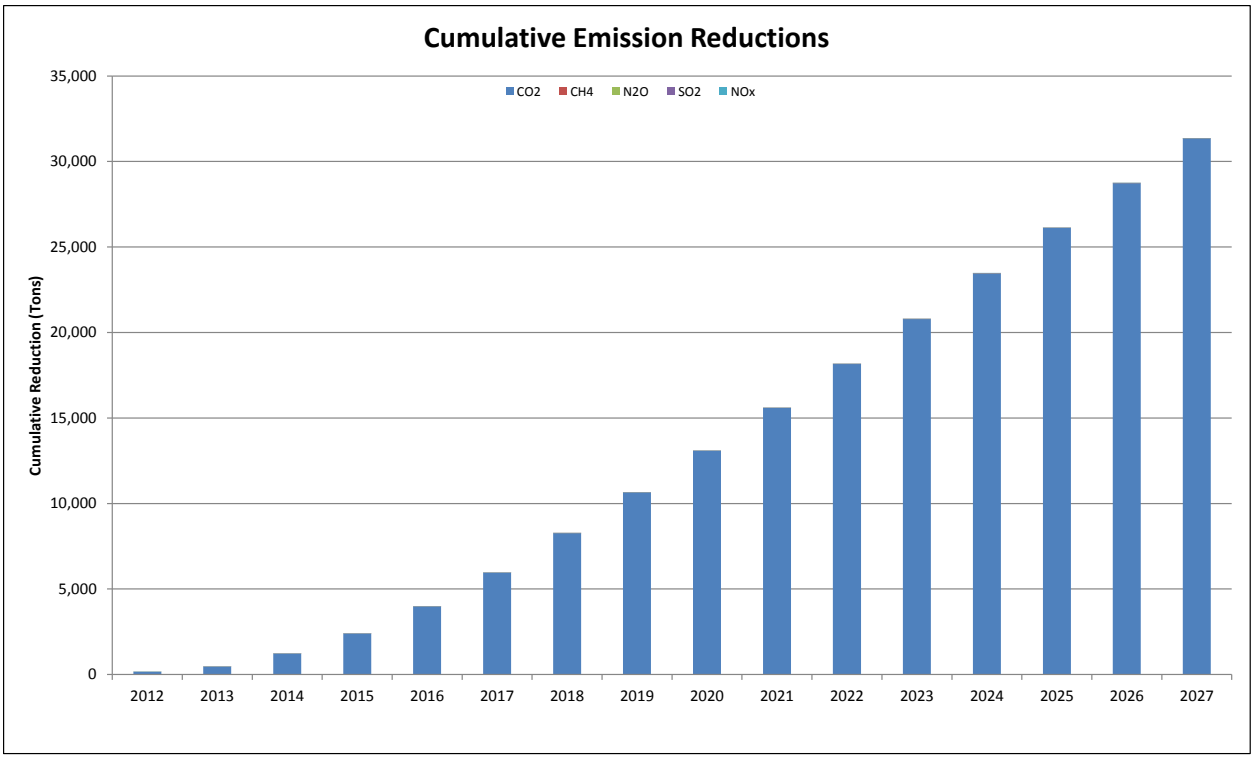

Figure 2: Cumulative Emission Reduction from Efficiency Programs

Potential Impact to Revenue

Planning water efficiency programs must include an evaluation of the potential changes to the utility's revenue requirement stemming from the recovery of the initial investment costs, and to accommodate any resulting reductions in demand. Other factors such as plumbing codes, weather, and economic conditions can also have an effect on revenue. Proper planning can avoid revenue shortfalls and the need to sharply raise rates and alienate customers. This topic is discussed extensively in the AWE *Declining Water Sales and Utility Revenues Summit Summary and White Paper*.[13] Figure 3 displays the theoretical changing revenue requirement if all of the water efficiency programs are employed at the scripted costs and produce the estimated savings. There are two scenarios depicted in Figure 3. First, the blue bars show the changing revenue requirement if the utility pays for the water efficiency programs up front with cash. Second, the red bars show changing revenue requirements with 20-year debt financing.

[13] AWE Declining Water Sales and Utility Revenues Summit Summary and White Paper http://www.allianceforwaterefficiency.org/Declining-Sales-and-Revenues.aspx

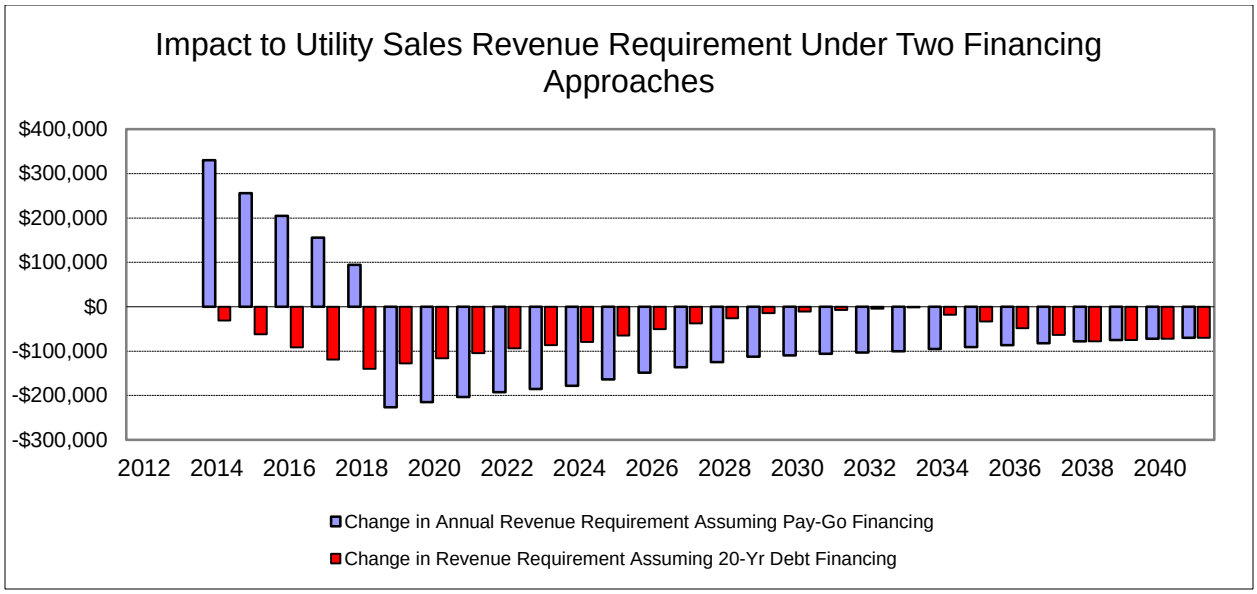

Figure 3: Impact to Sales Revenue Requirement

Figure 4 illustrates the impact to the average water rate per thousand gallons. If the water efficiency programs are paid for up front (blue line) with cash the utility would need to raise rates more sharply to meet revenue requirement than if a 20-year debt financing approach (red line) were used. The debt-financing option requires a raise in rates as well, but the average water bill is expected to be $0.09 less per month. Customers who take part in the efficiency programs or otherwise reduce water use will have lower bills, while users that do not reduce water consumption will have slightly higher bills. The revenue impacts of the efficiency programs will change if the city elects to increase the level of activity, which will result in a higher investment and a larger reduction of water use (i.e., more money to recover and reduced sales). This is not necessarily a negative consequence, rather something that needs to be understood and managed.

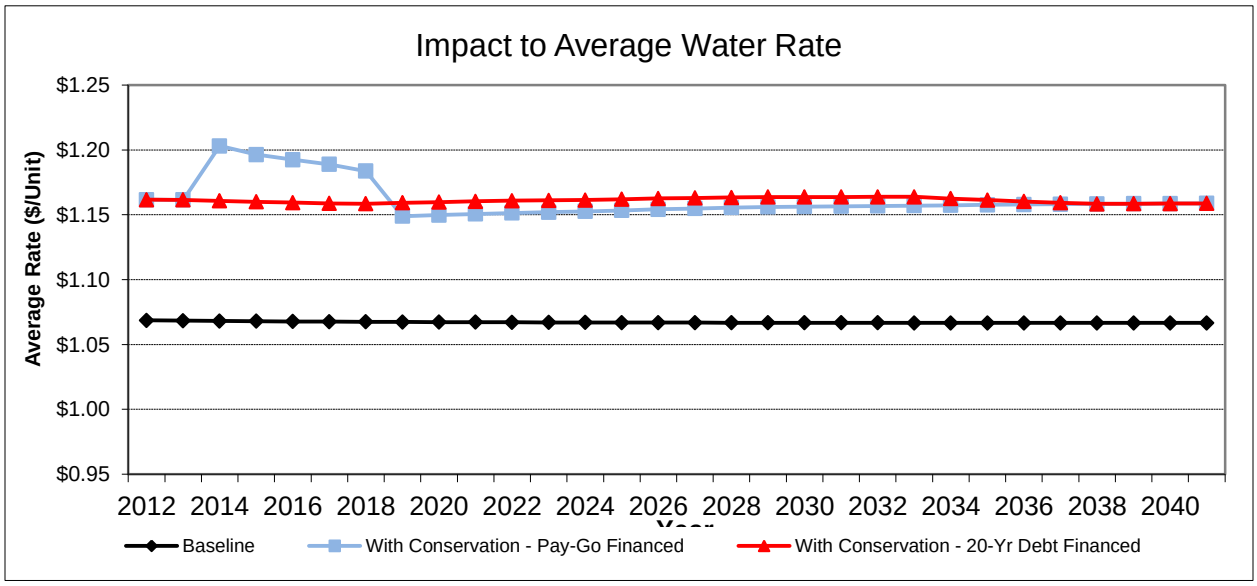

Figure 4: Average Impact to Water Rate

Conclusion

The results presented in this report can be used as an advanced starting point in the planning process. The City of St. George now has a copy of the AWE Water Conservation Tracking Tool that is fully populated with input data and scripted with efficiency programs. The Alliance for Water Efficiency highly recommends that the City of St. George staff utilize the Tracking Tool and further refine the parameters of the conservation programs and other data inputs as appropriate. City staff will know if programs are logistically feasible and practical in the culture of the service area. Variables such as initial start-up costs, overhead, rebate levels, and estimated savings can be changed with ease and the results will be recalculated automatically.

Financial inputs such as interest rates, inflation, water purchase and treatment costs, and customer billing rates may be susceptible to large fluctuations associated with any shifts in the overall economy. These inputs should be monitored and adjusted as appropriate. Additionally, the level of activity for each program should be evaluated by city staff, as they will likely have a better understanding of the market potential and saturation levels for various water efficient fixtures. The current estimates for number of rebates were set to be practicable and not overwhelming. Increasing the number of fixture replacements and retrofits will produce a greater, and perhaps more meaningful, level of savings. The Alliance for Water Efficiency can provide assistance to the City of St. George to facilitate continued use of the Tracking Tool and management of the data inputs as they change over time.

Water efficiency programs look to be a cost-effective option for the City of St. George. This report and accompanying Tracking Tool Excel file contain information that will empower the city to plan successful goal-based efficiency measures, and help avoid making costly mistakes.

APPENDIX B

Facts

From the Washington County Water Conservancy District

RED HILLS DESERT GARDEN BACKGROUND

The Red Hills Desert Garden (Garden) is being constructed to provide a demonstration of water-wise landscaping using native and low water use plants. The Garden will provide practical and reproducible examples of landscaping appropriate for our climate, tolerant of our local water quality, and wise in water use. Parking, restrooms, a pavilion, educational information, and other features will support workshops, fieldtrips, and visitors in general.

Partners:
The project is a collaborative effort between the Washington County Water Conservancy District (District), the City of St. George (City), Washington County (County) on behalf of the Washington County Habitat Conservation Plan (HCP) and the Virgin River Resource Management and Recovery Program (Program).

Need:
The District is committed to increasing water conservation and anticipates that the Garden will provide information in support of this effort. The City supports water conservation and also wishes to provide for the opportunity to enhance the existing park and trail features along Red Hills Parkway. The Program wishes to increase public knowledge and awareness of the local native and endangered fish.

Components:
The Garden will include a constructed stream supplied with Virgin River water from the nearby Skyline Pond. The stream will be stocked with local native fish and will include a fish viewing area and interpretive information. The constructed stream and all its associated features will be funded by the Program in an effort to complement and enhance the Garden and provide a singular opportunity to improve appreciation of endangered fish.

The HCP calls for an educational center and the County anticipates locating the center adjacent to the Garden to take advantage of the highly visible and visited location immediately adjacent to the tortoise reserve.

Funding:
Thousands of people are expected to visit the Garden annually and water savings resulting from the knowledge applied should more than pay for the costs of the Garden.

Funding will be provided by the partners through grants and other funding sources that may become available. The District allocates annual funding for water conservation activities and has been accumulating a fund over the years for demonstration garden educational activities. The District has already received a grant from the Utah Division of Water Resources and anticipates many donations of materials and labor necessary to complete the project. The Program is funding the stream through federal and state funds.

Costs incurred to date include $34,452 for design of the native fish stream, $64,907 for the construction of off-site storm water, sewer and water utilities to serve the garden and future education center, and $318,037 for rough grading of the garden and the fish stream.

Collaborative contributions from the partners will include the following:

- The City provided the land for the project. The City will also provide landscape architecture design and civil engineering, staff to maintain the area, and water for the fish stream and Desert Garden.
- The District will provide employees for maintenance and will be responsible for utility costs not provided by the City. The Program will provide staff to care for the fish and their habitat. The Program has budgeted $480,000 to finance the entire cost of the stream channel and the fish viewing area.

Decision Record:
The partners in the project have been working together to plan the Garden since 2008. Information has been disseminated and support gathered for the project through the public meeting process. The agencies hosting the public meetings include:

- Washington County Water Conservancy District
- St. George City Council
- Washington County Commission
- Red Cliffs Desert Reserve HCAC and the
- Virgin River Program.

Water Conservation:
The District has been actively pursuing water conservation since 1995 when it adopted its Water Conservation Plan. Since that time, water use has been reduced by 18%. Just in the last decade between 2000 and 2010, there was a 13% decrease in water usage. Education regarding outdoor landscaping is essential to help in the effort to build a water conservation ethic among the residents of Washington County. This project will enhance that public education process.