WaterSMART: Water and Energy Efficiency Grants for FY2015
Funding Opportunity Announcement No. R15AS00002
Funding Group I

Advanced Metering Infrastructure Program

Sandy City Corporation
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January 21, 2015

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EXECUTIVE SUMMARY

Date:	January 21, 2015
Applicant:	Sandy City Corporation
City, County, State:	Sandy City, Salt Lake County, Utah
Project Name:	AMI Program
Project Length:	3-years
Estimated Completion Date:	December 15, 2017 (Substantial Completion)

PROJECT SUMMARY

Sandy City Corporation is applying for funding by the Bureau of Reclamation's WaterSMART: Water and Energy Efficiency Grants for FY 2015 Funding Opportunity Annoncement No. R15AS00002. The City is applying for $300,000 in federal funding assistance for Federal Funding Group I, to implement an Advanced Metering Infrastructure Program, which includes the installation of 9,219 new water meters for residential, commercial, and irrigation users along with a new smart meter software system. Funds will be used to purchase new smart meter software and to purchase and install AMI meters and appurtenances. The purpose of the AMI Program is to increase water conservation and water use efficiency by providing real-time water consumption data to the City and its customers. The project will provide benefits under the following tasks:

- Task A – Water Conservation – Water conservation will be improved by increasing customer understanding of their water uses compared to neighbors, leak detection enabled by real-time water consumption data, and public education through water audits.
- Task B – Energy-Water Nexus – reduced water use through conservation produces a linear reduction in energy use associated with source production, conveyance, and treatment requirements.
- Task C – Benefits to Endangered Species. Endangered species recovery is maintained as in-stream flows are maintained by reducing water consumption.

The Project is not located on a Federal facility.

TECHNICAL PROPOSAL FOR ADVANCED METERING INFRASTRUCTURE PROGRAM

BACKGROUND

Sandy City is located in Salt Lake County, Utah as indicated in Figure 1 (following this page).

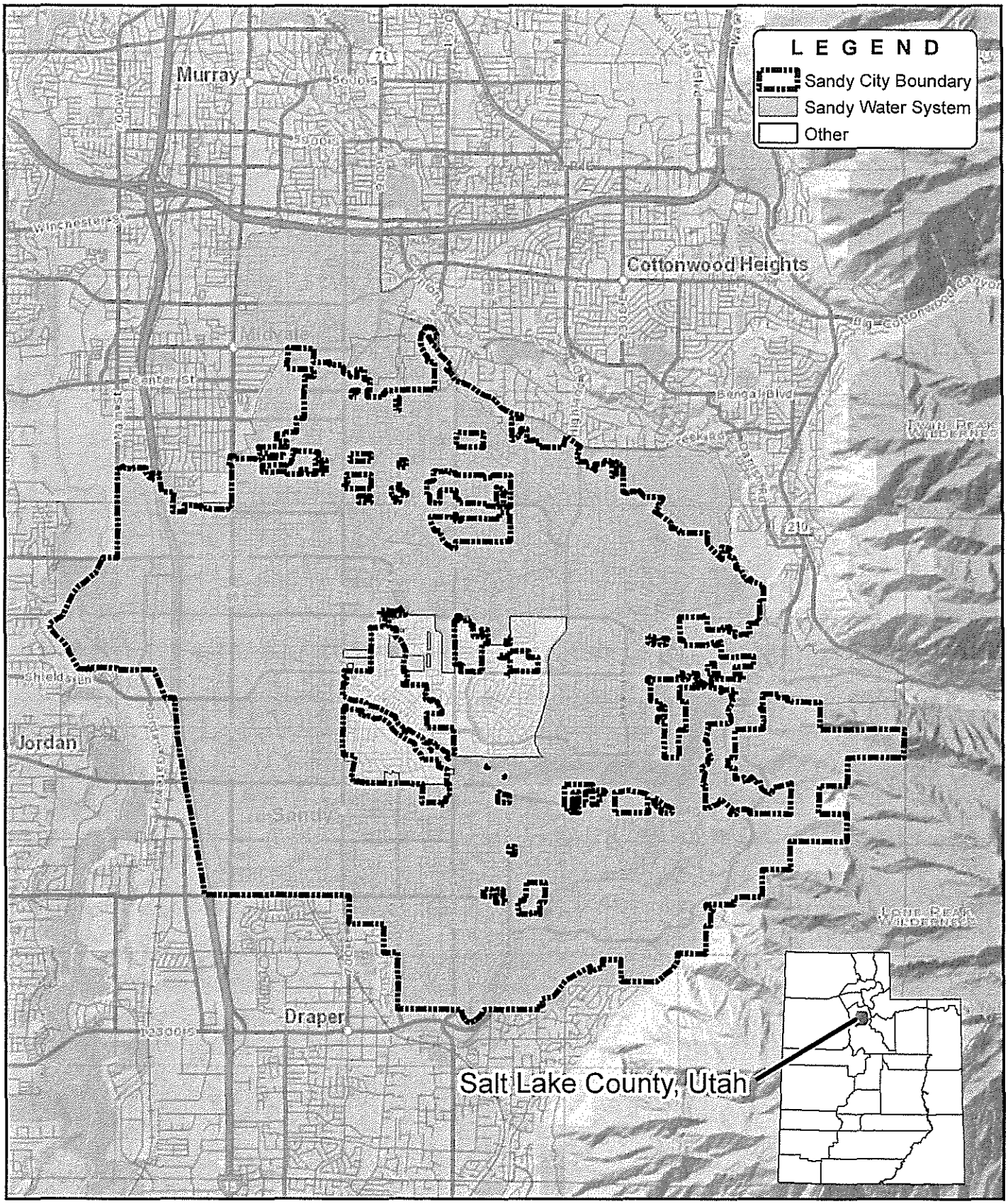
City Water System History

The earliest settlers in Sandy obtained water directly from nearby Little Cottonwood Canyon Creek, Bell Canyon Creek and Willow Creek. Starting in the year 1848, the first irrigation canals were constructed in the area. By 1856, there were a total of 12 ditches from Little Cottonwood Creek and numerous others from the smaller mountain streams. Sandy was a mining and smelting town in its early days. Mule teams would haul ore from the silver and lead mines in Little Cottonwood Canyon to be refined in Old Sandy. As an inevitable consequence of mining and industrial development, water from the creeks and canals soon became polluted and unsafe to drink. Ezekiel Holman dug one of the first wells and charged five cents a bucket for its water. For a time during the 1870s, water was hauled from the canyons into the City on wagons in forty-gallon tanks.

As the mines began to be played-out, agriculture took on a greater role and an even greater water supply was required. The mountain creeks could no longer provide all the water needed for the City, farms, and orchards. A system of canals was then constructed from the Jordan River to provide supplemental irrigation water to the area. These canals were able to provide "exchange" water to farmers allowing more of the higher quality mountain stream supplies to be used for culinary purposes. These canals, constructed in the 1880s, pass directly through the Historic Sandy area.

These canals draw water from Utah Lake which declines during dry periods making inaccessible much of the storage in the lake. In 1902, a pumping plant was installed at the outlet of Utah Lake. The more dependable water supplies were a great boon to the agriculture industry of the area which included production of apples, grapes, alfalfa, wheat, barley, beets, potatoes and peaches. Livestock production was also important including cattle and a thriving poultry industry.

The first municipal water system consisted of wood stave pipes from springs in Little Cottonwood Canyon. The pipeline led to a concrete storage reservoir located one mile east of town at what is now approximately 8800 South and 1000 East. The storage tank provided pressurized service to homes in town starting about the 1920s. Connection fees were five dollars and included a stop cock, curb box, and iron pipe. Municipal water supplies were also used for a time as dust control on City streets.



Sandy
PUBLIC UTILITIES

SANDY CITY
SALT LAKE COUNTY, UT

SANDY CITY
WaterSMART FY2015

NORTH:

SCALE:
0 3,000 6,000
Feet

FIGURE NO.
1

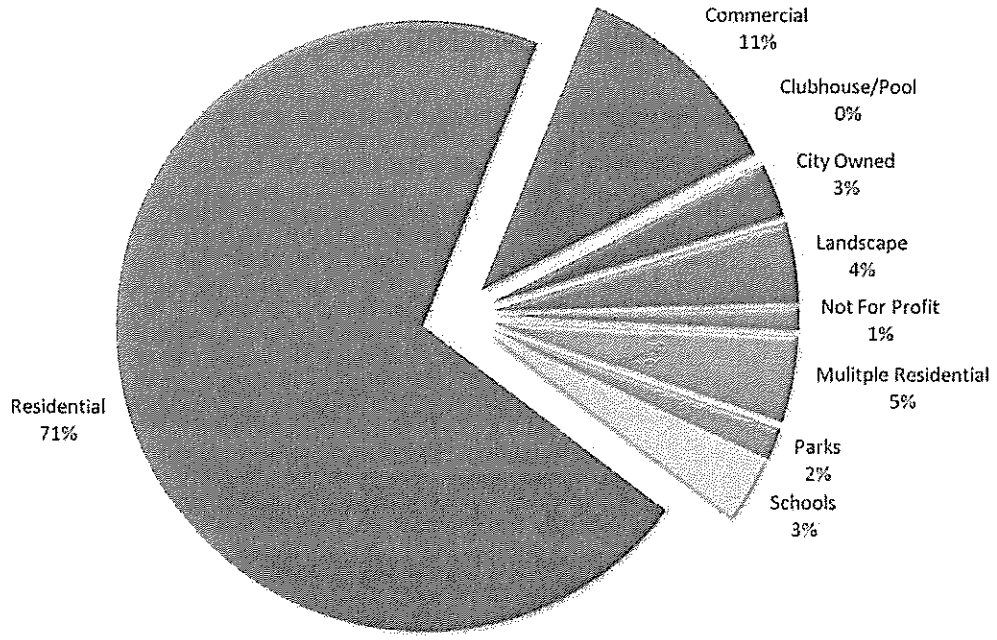
P:\Sandy City\2015 AMI Grant Application\4.0 GIS\4.1 Projects\Figure 1 Sandy City Water Service Area.mxd amckinnon 1/7/2015

By 1970, Sandy City was still a relatively small town with a population of 6,438. By 1980, the population had rocketed to 52,210. By 2000, it would double to almost 100,000. This explosive growth would require extensive water infrastructure development. To meet these growing needs, Sandy filed on 14 municipal wells which were developed over time as demand increased. The City also purchased the Union and Jordan Irrigation Company and joined first, the Jordan Valley Water Conservancy District (JVWCD, then called the Salt Lake County Water Conservancy District) and later the Metropolitan Water District of Salt Lake and Sandy (MWDSLS) to meet the increasing demands.

Existing Water System

The existing water system serves most of the area within the Sandy City corporate limits as well as some of the areas just outside of the City limits. The City's existing water service area serves approximately 90,000 residents and 56,000 employees. Figure 2 indicates the approximate water use by volume from the City's existing 25,000 connections.

Figure 2
Water Use by Connection Type

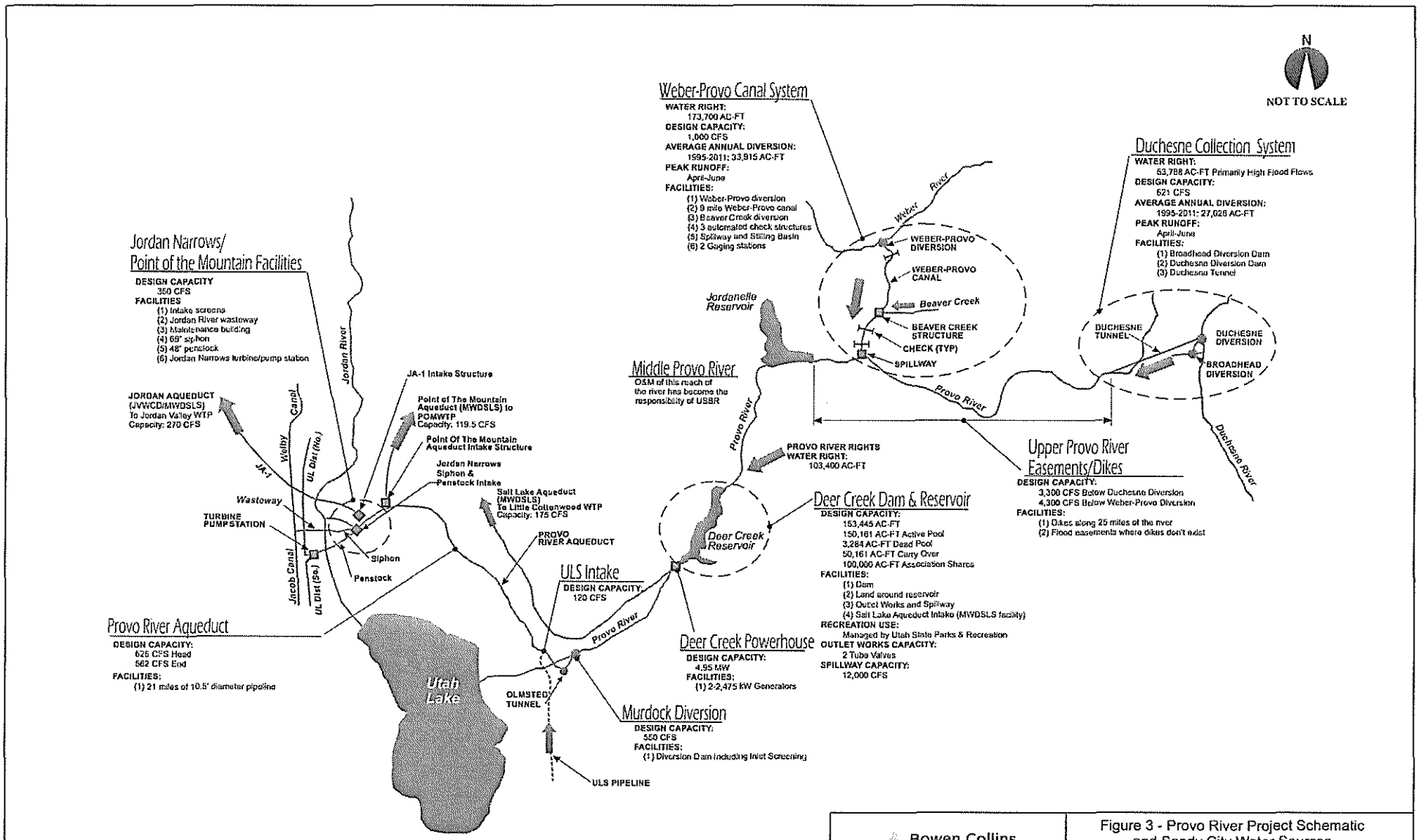


Sources

Most water in the City is provided by its 21 municipal wells and the high quality snowmelt runoff from the nearby Little Cottonwood Canyon and Bell Canyon. However, the City is also dependent on a number of Bureau of Reclamation water projects that

deliver water to the Wasatch Front through the Metropolitan District of Salt Lake and Sandy (MWDSLS) and the Jordan Valley Water Conservancy District (JVWCD). Figure 3 (following this page) shows a schematic of the Provo River Project and how some Sandy City water sources must travel a long distance to reach Sandy City. Water that could be used by Sandy City residents could potentially have travelled from Duchesne County via the Duchesne Tunnel or from Weber County via the Weber-Provo Canal. A few of the significant Bureau of Reclamation projects that contribute to the Sandy City water supply include:

- Upper Provo River Reservoirs – This includes all of the reservoirs in the Uintah Mountains that store snowmelt for use later in the water year. Most of these reservoirs were constructed by the Bureau of Reclamation for seasonal water storage.
- Duchesne Tunnel – This tunnel was constructed to help convey water from Duchesne River (Green River) watershed into the Provo River watershed.
- Jordanelle, Deer Creek, and Strawberry Reservoirs – These reservoirs store water for seasonal fluctuations in water supply, but also long term for multi-year drought conditions.
- Salt Lake Aqueduct – This 42 mile aqueduct is one of the major aqueducts that brings water from Deer Creek Reservoir to the Sandy City area.
- Little Cottonwood Treatment Plant – This treatment facility is the main water treatment facility for Sandy City. However, several other treatment facilities in the Wasatch Front area constructed by or with the Bureau are used to supply water to Sandy City.



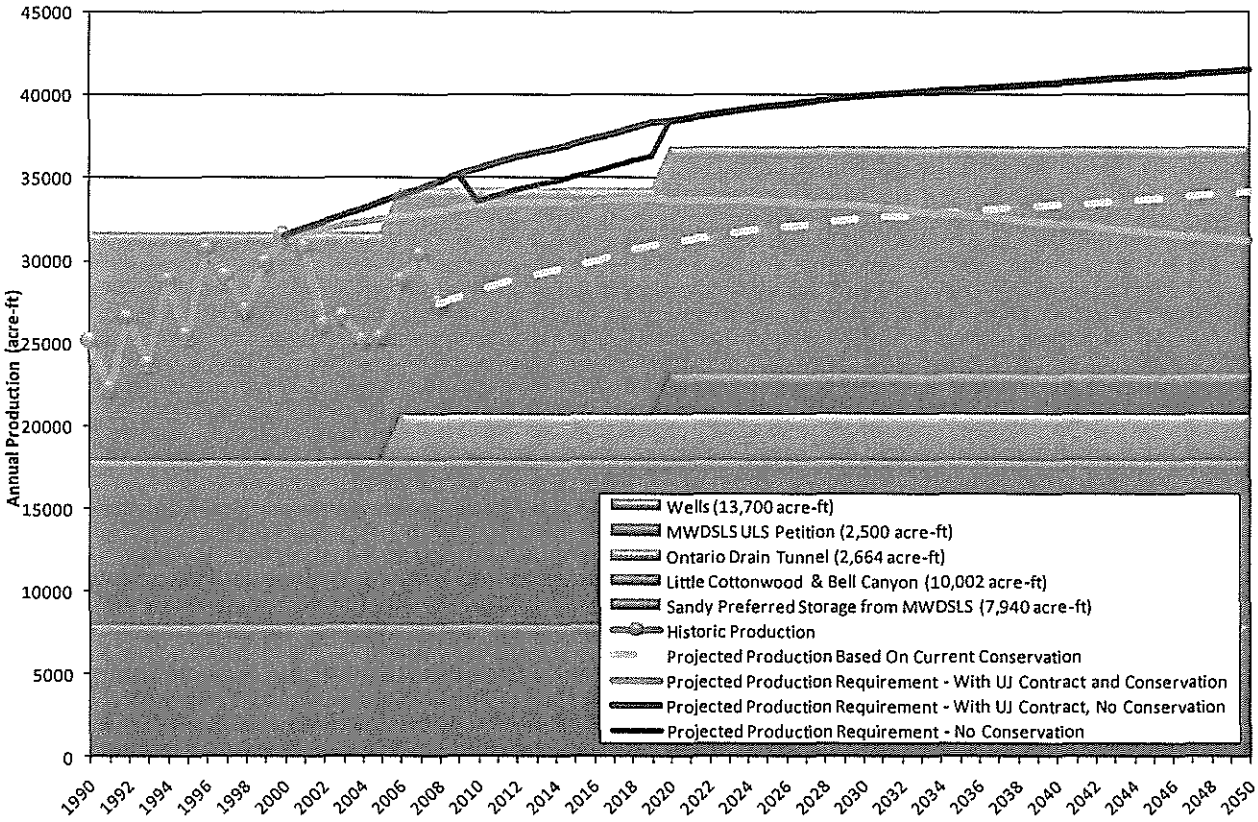
Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

Figure 3 - Provo River Project Schematic and Sandy City Water Sources

WaterSMART FY2015

Figure 4 indicates the general water supply for Sandy City during dry year conditions when surface waters from local canyons run low. Figure 4 also indicates the projected demand in the City through the year 2050 with and without conservation.

Figure 4
Projected Annual Production Demand & Dry Year Supply



MWDSLS – Metropolitan District of Salt Lake and Sandy
ULS – Utah Lake System
UJ – Union and Jordan Irrigation Company service area

Based on 2000 baseline demands, the City would not have sufficient supplies to meet production requirements during dry years.

Distribution System

Water supplies are distributed to Sandy City customers through a network of 10 storage tanks (36 million gallons of storage), and 420 miles of distribution pipe. Most water in the City flows by gravity through pressure reducing valves, but the City also has 9 pump stations used to deliver flow to higher elevation service areas once it has been treated.

TECHNICAL PROJECT DESCRIPTION

Because of concerns regarding the long-term sustainability of its water supply, Sandy City has been implementing aggressive water conservation measures to reduce water use in the City since the year 2000. Sandy City was awarded the Water Conservation Award by the U.S. Conference of Mayors for 2011 along with the State of Utah "Best of State" award for water conservation in 2011. Sandy City is one of only two cities that implemented all recommended conservation measures recommended by a State of Utah water plan. Among the conservation measures the City has implemented have been improvements to its water metering system.

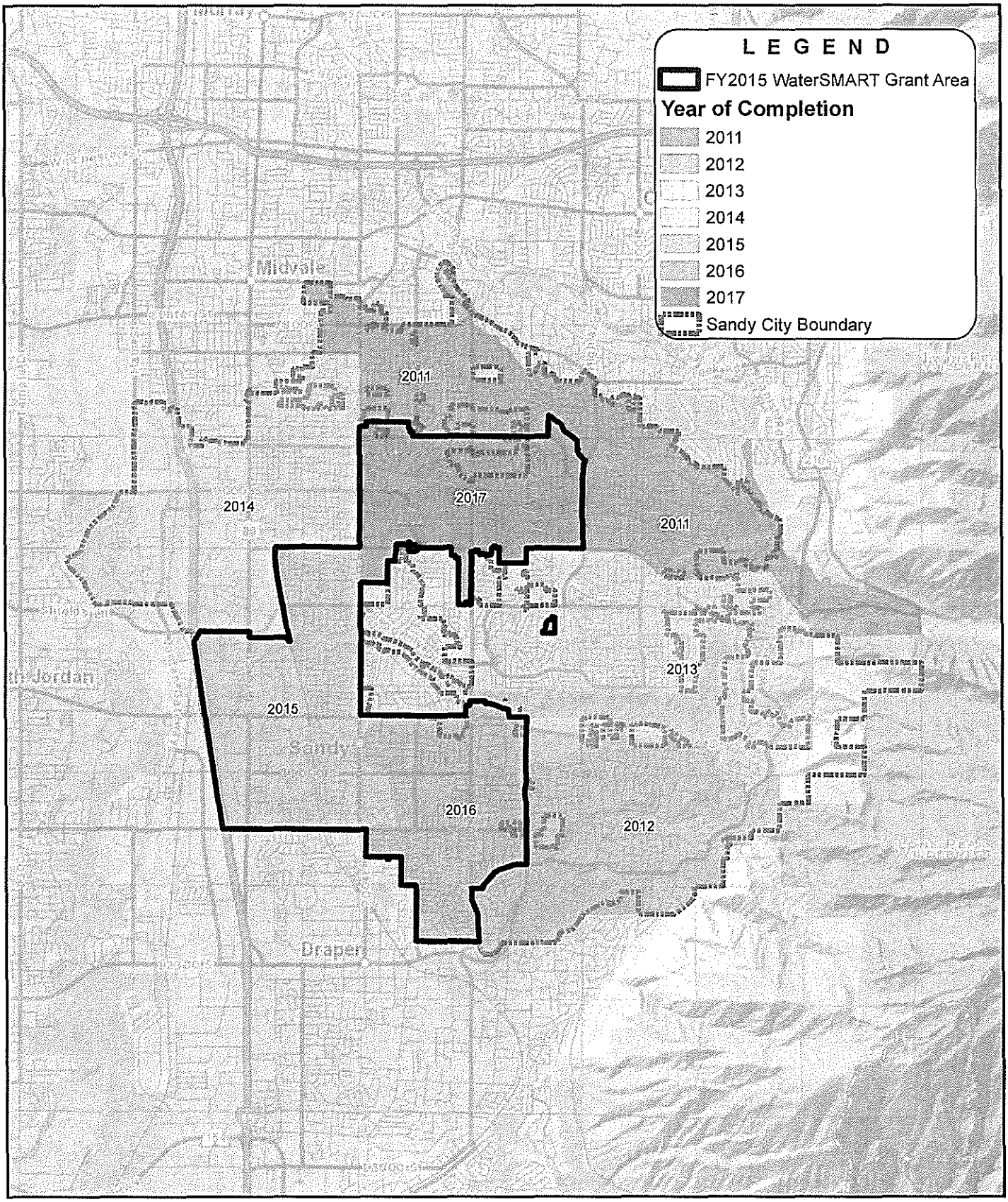
Historically, the City billed for water on a bi-monthly (every other month) basis. In 2003, the City began billing customers on a monthly basis. In 2003, the City also began acquiring automated meter reading equipment to make it easier to read meters. However, as of 2011, the City began implementation of a 7-year fixed base advanced metering infrastructure (AMI) program. Sandy City is in the fifth year of this multi-phase project to install an AMI system.

Figure 5 shows the areas where the AMI system has already been implemented with the remaining areas to be completed. The project area where Sandy City is requesting funds from the WaterSMART FY2015 grant program is indicated in Figure 5. Table 1 summarizes past phases of the AMI Program along with the future phases that Sandy City is requesting funds to help complete.

Table 1
Summary of Sandy City AMI Program & Construction Costs

	Meter Size (inches)						New	Historic / Projected Construction Cost
Fiscal Year Ending*	0.75	1	1.5	2	3	4	Meters	
2012	5,563	368	75	41	6	8	6,061	$1,518,130
2013	1,929	839					2,768	$761,092
2014	2,602	212					2,814	$849,441
2015	2,646	267					2,913	$760,358
Subtotal of Completed Phases	**12,740**	**1,686**	**75**	**41**	**6**	**8**	**14,556**	**$3,889,021**
2016	3,221	194					3,415	$1,046,000
2017	3,018	103					3,121	$911,000
2018	2,472	211					2,683	$783,000
Subtotal of Future Phases	**8,711**	**508**					**9,219**	**$2,740,000**
Total	**21,451**	**2,194**	**75**	**41**	**6**	**8**	**23,775**	**$6,629,021**

*Fiscal year begins July 1 and ends June 30. The grant would apply to fiscal year 2016 – 2018.



Sandy
PUBLIC UTILITIES

Advanced Metering Infrastructure Program Phases

SANDY CITY

WaterSMART FY2015

NORTH:

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FIGURE NO. 5

P:\Sandy City\2015 AMI Grant Application\4.0 GIS\4.1 Projects\Figure 5 AMI Phases.mxd amckinnon 1/9/2015

The new IPERL meters use the Sensus FlexNET AMI system. Meters carry a 20-year warranty. The total construction cost estimate for future phases of the project is $2,740,000. This is the amount the City is requesting funding for.

AMI Software

While the City has been in the process of installing the new AMI equipped meters, the City has not yet purchased and implemented a new software system capable of using all of the potential data collected by the new meters. AMI meters can generate a large amount of data that may be difficult to manage. The City's current software system has basic benefits such as leak alerts and basic utility billing. However, because of the large volume of data that is produced by the AMI meters, the City is currently investigating new software systems capable of taking full advantage of the AMI system. Current vendors that have been contacted to provide demonstrations and bids to the City include: MeterSense, Water Smart, and Sensus (Premium). The purpose of these software systems is to improve billing so that the AMI meters can provide the full benefit of a smart meter water system. If awarded the WaterSMART grant, the City is committed to spending up to $50,000 on new billing software to maximize the capabilities of the AMI meters.

AMI Benefits

The purpose of this AMI system is to better track water system demands in real time to measure effects of conservation measures. By tracking real time data of water system demands, the City will be able to educate customers regarding water use and also identify leaks and other areas where additional conservation may be possible. The City is currently using the AMI system to improve the following areas of conservation:

- **Time of Day Audits** – In 2001, the Sandy City Council adopted an ordinance restricting sprinkler irrigation between 10:00 a.m. and 6:00 p.m. for all water users. Evapotranspiration during this time frame can lead to up to 50 percent of irrigated water being wasted. The AMI system has the ability to provide alerts to the City when water uses indicate irrigation occurring during this time frame. Violations are generally addressed with friendly reminders to customers. However, the ordinance does allow the City to assess fines to chronic violators.
    - **Peak Use Data** – With the City's current AMI data, it is possible to educate customers regarding peak usage. For example, Sandy City is able to alert customers to key periods of high demand that may be leading to higher water bills. By identifying peak demand periods, customers can be made aware of times of day or times of year where water is potentially being wasted.
- **Leak Alerts** – One very important benefit of improved data collection is the ability to identify customer leaks. AMI systems can detect two types of leaks. First, AMI software can be programmed to recognize large sustained increases in flow departing from normal use patterns. This is indicative of catastrophic pipeline breaks. When this type of break is detected, home owners can be notified

in case they are away at work or out of town, allowing them to respond to the break as quickly as possible. A second type of leak can be identified by the AMI system by recognizing when a small amount of flow is consistently being detected at the meter. This is indicative of a small leak somewhere in the home or between the meter and the home. In this case, the City can contact the resident to identify the issue and encourage the resident to investigate. In both cases, AMI can save water for the City and money for its customers. The EPA estimates the average household's leaks can account for more than 10,000 gallons of water wasted every year.[1] This represents a significant area of potential conservation.

- **Water Audits** – In addition to time of day and leak alerts, it is also possible to identify the largest users of water on a monthly basis as wells as peak instantaneous demand basis. The City has always been able to track the largest volume users by month. The new AMI system will also be able to identify the highest users by peak day and peak hour. This may help identify users that have less efficient fixtures or sprinkler systems. For those users with excessive water use, Sandy City will provide information and resources to help in their efforts to save water. Over the last five years, Sandy City has provided water audits to 170 residents and 20 commercial connections.
- **Expanded Public Education** – Sandy City already has an extensive public education program that includes water conservation classes, xeriscape demonstration gardens, a water conservation website, an elementary school education program, free water conservation materials, and conservation forums. The AMI system further extends the potential for public education by creating a web portal where each customer can view their own water uses. With some smart meter billing systems, it is possible for customers to compare water-use to the nearest neighbors to indicate how their water use compares to their neighbors. A large-scale field research project completed by Georgia State University identified savings of up to 5 percent when customers were able to compare their use with those of others[2]. Users may also request water audits through the "Slow the Flow" conservation campaign.
- **Drought and Water Emergency Measures** – In addition to its efforts to achieve long-term water use reductions through conservation, Sandy City also has a plan for reducing water consumption in times of drought or other water emergency (such as a line break). The City's *Contingency Water Restriction Plan* includes the restriction of water use by large users, stricter enforcement of existing City conservation practices, voluntary reduction of water use, with mandatory reductions of water through enforcement as a last resort. The City's new AMI system will be capable of quickly identifying large water users in the case of a water emergency and enforcing conservation restrictions if necessary.

[1] http://www.epa.gov/WaterSense/pubs/fixleak.html

[2] Paul Ferraro & Michael Price, 2011. "Using Non-Pecuniary Strategies to Influence Behavior: Evidence from a Large Scale Field Experiment," NBER Working Papers 17189, National Bureau of Economic Research, Inc.

EVALUATION CRITERIA

Evaluation Criterion A: Water Conservation

The City's long-term water conservation goal is to reduce per capita water use from year 2000 consumption rates by 25 percent by the year 2025. This is in line with the State of Utah's proposed water plan. This project is a critical component of the City's overall conservation plan.

Subcriterion No. A.1(a) – Quantifiable Water Savings

Describe the amount of water saved. For projects that conserve water, state the estimated amount of water conserved in AF per year (include direct water savings only).

How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.

Although the long term benefits of improved billing and public education can be difficult to track, the City anticipates a minimum conservation of approximately 5 percent related to improved utility billing and public education. Table 2 lists the water use in the City over the last 5 years along with the 5-year average.

Table 2
5-year Historic Water Use

	Annual Supply (acre-ft)	Average use (acre-ft / connection)
2009	25,184	1.019
2010	24,724	0.998
2011	23,473	0.945
2012	28,439	1.144
2013	25,442	1.011
5-year Average	**25,452**	**1.024**

Based on a 5 percent conservation rate anticipated with the new meter system, estimated conservation of the AMI system is summarized for the 2015 project area and the City as a whole in Table 3 below.

Table 3
Summary of Water Conservation through Public Education

	Project Area (9,219 new meters)	City-wide Project Area (23,775 new meters)
Annual Saving (acre-ft)*	470	1,213
Life-Cycle Savings (acre-ft)*	9,403	24,251

*Savings based on 0.051 acre-ft/connection/year (5% reduction from average) and a 20-year life cycle.

The EPA estimates the average household's leaks can account for more than 10,000 gallons of water wasted every year. Based on this data, Table 4 estimates the amount of water that may be saved through the AMI system's leak alert data.

Table 4
Summary of Water Conservation through Leak Alerts

	Project Area (8,711 Residential Connections)	City-wide Area (21,451 Residential Connections)
Annual Saving (acre-ft)*	267	658
Life-Cycle Savings (acre-ft)*	5,347	13,166

*Based on average 10,000 gallons/year per residential connection

Table 5 summarizes the total savings anticipated from the 2015 AMI Project.

Table 5
Summary of Total Water Conservation

	Project Area	City-wide Area
Annual Saving (acre-ft)	738	1,871
Life-Cycle Savings (acre-ft)	14,750	37,417

The City also anticipates increasing the number of water audits for residential and commercial connections as a result of the new AMI billing system. However, it is unclear how many more audits the City would conduct every year as a direct result of AMI. Therefore conservation from additional audits has not been included.

What is the applicant's average annual acre-ft of water supply?

The City's dry year supply is indicated in Figure 4 above and would be 34,306 acre-ft. This is the supply that would be available to City under drought conditions. For an average water year, anticipated supply to the City would be close to 68,265 acre-ft.

Where is the water currently going?

The majority of potential water that may be conserved is likely used as irrigation water for landscaping. As a result, the large majority of water is likely lost through evapotranspiration. Some of this water may be depleted by plant growth while the rest infiltrates into the ground. Conserved water from early leak detection would normally be discharged either into the ground or into the wastewater collection system. In both cases, the water eventually discharges to the nearby Jordan River and Great Salt Lake.

Where will the conserved water go?

In the short run, conserved water may be stored in the Jordanelle, Deer Creek, and Strawberry Reservoirs and may go to support flows in rivers for wildlife. In the long term, conservation goals will extend the available supply of water to Sandy City so that the City can continue to satisfy future demands within its existing water rights. In essence, conserved water will allow the City to meet its future demand requirements while maintaining maximum instream flows for other purposes.

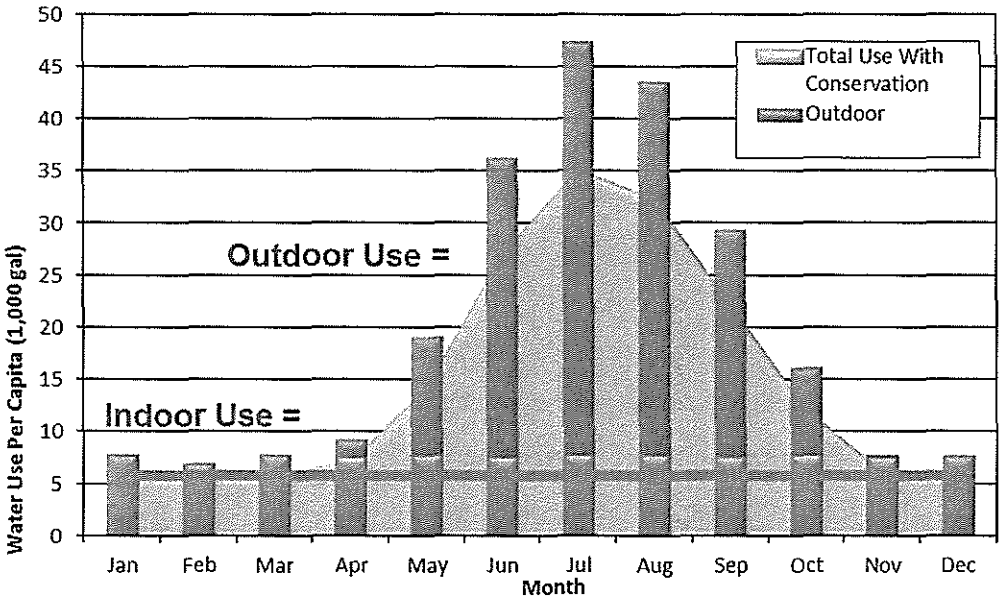
(b) How have current distribution system losses and/or the potential for reductions in water use by individual users been determined?

Water produced by City wells or entering the City's water system from treatment plants or other connections is metered using supervisory control and data acquisition (SCADA) systems. This is required as part of annual reports to the State of Utah regarding water rights. For billing purposes, all meter connections are tracked monthly. All Sandy City Corporation water users (i.e. Parks department or others) are also metered so that metered demands should represent all water usage. The City's historic system loss over the last 10-years has been as high as 17%, but has been on average around 7 percent. The City would like to reduce average system losses to less than 3 percent on an annual basis. Improved meter accuracy with the AMI system should help the City come closer to this target.

© For individual water user meters installation, refer to studies in the region or in the applicant's service area that are relevant to water use patterns and the potential for reducing such use. Please explain in detail how expected water use reductions have been estimated and the basis for the estimations.

A typical Utah household will use twice as much water for irrigation as needed[3]. This represents significant potential for additional conservation. Figure 6 shows the potential conservation in Sandy City based on the City's 2010 Water Master Plan.

Figure 6
Potential Seasonal Conservation in Sandy City



* Estimated outdoor use with conservation is based on watering recommendations from the Utah Department of Water Resources web page. It is based on turf in full sun on sandy soil in Salt Lake County. It is calculated as 26 inches of supplemental irrigation annually over 6736 square feet (average irrigated acreage per Sandy City residents). Additional conservation could be obtained through turf reduction or xeriscaping. Estimated indoor use with conservation is based on a reduction from the existing average indoor use of 67 gpcd to 55 gpcd as recommended by the AWWA Research Foundation, *Residential End Uses of Water, 1999.*

Sandy City's 2010 Water Master Plan identified a per capita indoor water use rate of approximately 67 gallons per capita per day (gpcd). The American Water Works Association (AWWA) estimates that indoor water use can be reduced to approximately 55 gpcd with moderate conservation goals that do not require significant changes in lifestyle. This includes installing ultra-low water use toilets and shower heads, installing water efficient clothing and dish washers, installing aerators on all faucets, and limiting showers to ten minutes or less. This represents a potential conservation rate of 21 percent for indoor water use or 6.5 percent for overall water use.

[3] http://www.conservewater.utah.gov/reslawnguide.html

Because the majority of Sandy City homes (85 percent) are greater than 20-years old, many indoor fixtures have the potential for improvements with regards to leak repairs and/or higher efficiency fixtures. Sandy City does not anticipate all residents to switch to low flow fixtures, but anticipates that improved billing, customer outreach, and leak detection available with the AMI system will make it possible to reduce water use in Sandy City as calculated in Table 3.

(d) If installing distribution main meters will result in conserved water, please provide support for this determination (including, but not limited to leakage studies, previous leakage reduction projects, etc.). Please provide details underlying any assumptions being made in support of water savings estimates (e.g., how leakage will be reduced once identified with improved meter data).

Distribution water meters will result in conservation as described in Tables 3 through 5. The City has not yet purchased a software package that can support all of the functions of the AMI meters. However, with just the basic software data that comes with the IPERL meters installed over the past few years, the City has been able to notify many residents of leaks. In addition, the City has been contacted by some customers complaining of high water bills as a result of the more accurate meters. This has led to significant improvements in water use (up to 27 percent reduction in water use at one connection).

(e) What types (manufacturer and model) of devices will be installed and what quantity of each?

The City will be installing 508 one-inch and 8,711 three-quarter-inch Sensus iPERL meters. The new iPERL meters will use the Sensus FlexNET system.

(f) How will actual water savings be verified upon completion of the project?

The City will document all connections with leak alerts and document the estimated volume of the leak. Water savings can be calculated by extrapolating estimated leakage over a single year.

In general, the AMI meters may result in a higher billed usage per connection because of the improved accuracy of the AMI meter and a reduction in "system loss" through meter inaccuracy. Some older meters may have been under reporting actual water use. For some Sandy City customers that have received an AMI upgraded meter (in areas outside of the proposed project area), some significant reductions in water consumption have been identified by this change alone. Some customers with significantly higher bills as a result of the improved accuracy reduced consumption by as much as 27 percent after installation of the AMI meter (meter no. 0076674213 vs meter no. 0003312585) for a similar 6-month period of use. This is a severe example, but the City will be able to compare annual water use before and after implementation of the AMI system. For the early reporting period associated with this grant application, the City may only be able to use a 6-month period for comparisons; but the City anticipates a gradual reduction in production requirements per connection (or per person) over time beyond the reporting period. The City is

committed to ongoing monitoring and comparisons beyond the reporting period to make sure conservation objectives are being achieved.

In addition, the City will use the AMI data to identify up to 50 residential customers per year in the project area to conduct water audits. The City will then be able to easily measure potential changes in water use at each audited connection using the AMI system.

Subcriterion No. A.2 – Percentage of Total Supply

Provide the percentage of total water supply conserved: State the applicant's total average annual water supply in acre-feet.

Approximately 738 acre-ft/year of water may be conserved after implementation of the AMI system in the Project Area. However, the supply for just this area is difficult to define. On a City-wide basis, the City anticipates to conserve 1,871 acre-ft/year after implementation of the AMI system. Based on the City's 5-year average water supply as indicated in Table 2, this results in a 7.4 percent water conservation rate.

$$\frac{1{,}871 \text{ AF/year}}{25{,}452 \text{ AF/year}} = 7.4\%$$

Subcriterion No. B.1 – Implementing Renewable Energy Project Related to Water Management and Delivery

This is not applicable to the project.

Subcriterion No. B.2 – Increasing Energy Efficiency in Water Management

Describe any energy efficiencies that are expected to result from implementation of the water conservation or water management project (e.g. reduced pumping).

Please provide sufficient detail supporting the calculation of any energy savings expected to result from water conservation improvements. If quantifiable energy savings are expected to result from water conservation improvements, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.

In 2009, the Utah Division of Water Resources performed a study of energy requirements related to water source, conveyance, and treatment needs for water users along the Wasatch Front. The results of the study identified the relative cost of water in terms of energy. Table 6 summarizes the results of this study[4].

[4] Utah Division of Water Resources 2012. The Water-Energy Nexus in Utah, Meeting the Water and Energy Challenge, September 2012.

Table 6
Energy Intensity Ranges for Wasatch Front Water

Water Cycle Phase	Energy Intensity (kWh/AF)
Source & Conveyance Facilities	
Surface Water	0 – 100
Groundwater	700 – 950
Recycled Water	10
Water Treatment	40 – 50
Distribution	140 – 220
Wastewater Treatment	400 – 850

In an average water year, the City's water supply will be delivered to the City from the following sources: Little Cottonwood and Bell Canyons, groundwater, and storage delivered from the Metropolitan Water District of Salt Lake and Sandy (most likely from Deer Creek Reservoir). Table 7 represents an estimate of the energy use and potential energy conservation for the Sandy City water cycle.

Table 7
Sandy City Water Cycle & Energy Conservation

	Water Supply (AF/year)	Source Conveyance		Water Treatment		Distribution		Wastewater Treatment*		**Total**
Total Conserved Water	1,871	Intensity (kWh/AF)	Energy Use (kWh/yr)	Intensity (kWh/AF)	Energy Use (kWh/yr)	Intensity (kWh/AF)	Energy Use (kWh/yr)	Intensity (kWh/AF)	Energy Use (kWh/yr)	**Energy Use (kWh/yr)**
Bell & Little Cottonwood Canyon	0	0	0	45	0	180	0	625	0	**0**
Groundwater	1,200	825	990,347	45	54,019	180	216,076	625	375,131	**1,635,573**
MWDSLS Storage	671	100	67,058	45	30,176	180	120,704	625	209,556	**427,495**
Total Conserved Energy			**1,057,405**		**84,195**		**336,780**		**584,688**	**2,063,067**

*wastewater treatment energy costs apply to roughly 50 percent of conserved water (the approximate ratio of annual indoor/outdoor use)

Most of the conserved water in the City will result in reductions in source production from groundwater and MWDSLS. This is because these sources cost the City more in terms of water purchase costs and/or energy costs. The energy conservation rate is estimated to be approximately 11 percent of the energy used for source conveyance, water & wastewater treatment, and distribution. As a result, the energy conservation rate for the City will be somewhat higher than the water conservation rate (7.4 percent) in the City because reliance on water sources that require more energy will be reduced. Energy conservation per meter (23,775 new meters in Sandy City) will be approximately 87 kWh/year/meter. For the project area which includes 9,219 meters, energy conserved is estimated to be approximately 799,975 kWh/year. This is equivalent to approximately $29,519/year for the project area (based on $0.0369/kWh from Rocky Mountain Power Schedule 6).

Please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements?

In general, many of the pressure zones in Sandy City can operate by gravity because the preferred water source in the City are the water supplies from nearby canyons above the City. However, the City has a number of booster stations to deliver flow to higher pressure zones from groundwater sources or for higher elevation pressure zones. Tables 8 and 9 describe size of booster pumps and wells in Sandy City.

Table 8
Existing Booster Stations

Name	# of Pumps	Address	Zone	Capacity (gpm)	Horsepower	Operating Comments
#1	3	9785 S. Eastdell Dr	Z3 to Z2	4,500	200	
#2	3	2710 E. Durban Rd	Z2 to Z3	3,500	75	
A-1	2	9881 S. Wasatch Blvd	Z2 to Z1	2,000	(3)-100	Run 2 of 3
Granite Mesa	2	8970 S. 1300 E.	Z6 to Z4	2,500	(1)-75, (1)-100	
High Bench	2	11331 S. Eagle View Cv	Z2 to Z1	1,500	(2)-125	
Metro (Hand)	3	2868 E. Newcastle Dr	to Z3	25,000	(3)-300	Run 2 of 3
Metro (Granite)	3	2868 E. Newcastle Dr	to Z2	4,500	(3)-250	Run 2 of 3
Palmer	3	9140 S. Sterling Dr	Z4 to Z3	5,000	(1)-100, (2)-200	All can run
Pepperwood	4	11711 S. Hidden Brook Blvd	Z3 to Z2	9,000	(4)-300	Run 3 of 4
			Total	**57,500**		

Table 9
Existing Wells

Name	Address	Zone	Status	Design Capacity (gpm)	Peak Capacity (gpm)
7500 South (Robinson)	7500 S. 430 E.	5	Operating	800	600
Alta Canyon Village	2010 E. Village Pt. Way	3	Operating	2,000	1,700
Bicentennial (Wallin)	590 E. 8680 S.	5	Operating	3,000	2,630
Big Canyon	3775 E. Little Cottonwood Rd	1	Operating	1,000	840
Brandon Canyon Park	1900 E. 11400 South	3	Operating	800	926
Canyon Village	1822 E. So. Bridgeway	3	Operating	1,800	1,600
Cemetery	9120 S. 700 E.	5	Operating	1,500	1,522
City Hall	8800 S. 280 E.	N/A	Out of Service	-	-
Copperview	8500 S. 70 W.	6	Operating	1,700	1,530
Dimple Dell	10600 S. 2000 E.	3	Operating	4,000	4,040
Falcon Park (Palmer)	9140 S. Sterling Dr.	3	Operating	2,100	1,766
Flat Iron	8416 S. Viscounti Dr.	4	Out of Service	-	-
Grambling Way (Severson)	8396 S. Grambling Way	4N	Operating	1,600	1,390
Granite Mesa	8800 S. 1200 E.	4N	Operating	1,300	1,240
Little Cottonwood	7900 S. 2000 E.	3N	Operating	1,750	1,388
Lone Hollow	#2 Lone Hollow	2	Operating	1,550	1,550
Paradise Valley	1975 East Justin Park Dr.	3	Operating	2,000	2,200
Pepperwood	10800 S.2200 E.	2	Operating	3,000	2,600
Richards Ditch	8000 S. Royal Lane	3N	Operating	2,100	2,177
Small Canyon	9750 S. 3775 E.	1	Operating	600	450
Wildflower	9895 S. Wildflower Rd.	3	Operating	2,000	1,440
			Total	**34,600**	**31,589**

Using the conservation rate described under sub criterion A.2, anticipated pumping requirements for the City would potentially decline by 7.9 percent.

Please indicate whether your energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.

In general the energy saving estimate originates from the point of diversion. In Table 6, surface water sources generally have less energy requirements than groundwater sources. Local surface water sources have almost no conveyance energy requirements compared to surface water delivered from the MWDSLS. This is because the energy cost for these sources is negligible because the source is delivered to water treatment facilities without any pumping requirements.

Does the calculation include the energy required to treat the water?

Table 6 includes potable and wastewater treatment costs.

Will the project result in reduced vehicle miles driven, in turn reducing carbon emissions? Please provide supporting details and calculations. Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).

The City's existing Automated Meter Reading system requires City employees to drive through neighborhoods to collect meter data. This requires significantly less fuel than

historic manually read meter data, but is still fairly energy intensive. The new AMI system will eliminate all mileage associated with the City's former meter reading system. This will result in a significant savings in fuel every year.

Prior to beginning implementation of the AMI system, Sandy City vehicles (which consist of Ford Rangers) were driving approximately 12,200 combined miles/year to read meters. An average gas mileage for fleet vehicles has been estimated at 14.8 miles/gallon which results in a potential reduction in fuel use of 824 gallons/year for all vehicles. Greenhouse gas emissions are estimated to be approximately 17.68 pounds/gallon[5]. This reduction in mileage will therefore result in a reduction in greenhouse gases of approximately 14,568 lbs/year. In addition to the reduction in greenhouse gases, the reduction will promote clean air conservation efforts. This is particularly important in Sandy City because of air inversion problems in the City that trap air pollution in the valley during winter months and create unhealthy air conditions.

Subcriterion No. C – Benefits to Endangered Species

In Salt Lake County, the June Sucker (Chasmistes liorus), is a federally-recognized candidate species[6]. However, there are a number of other federally-recognized candidate species in counties that contribute water to Sandy City through the MWDSLS. The Bonytail Chub (Gila elegans) and Humpback Chub (Gila cypha) are both found in Duchesne County[5], Utah which contributes water to the Provo River drainage.

What is the relationship of the species to water supply?

The June Sucker is a lakesucker endemic and unique to Utah Lake, Utah[7] (a receiving body for water from the Provo River drainage). The endangered species was federally listed as such with critical habitat on April 30, 1986. The Bonytail Chub and Humpback Chub both can be found in the Green River in Utah and are freshwater fish.

What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?

The primary means of benefitting these species is the reduction of required water Sandy City uses from the MWDSLS. By reducing required supply requirements, there is potential to increase available in-stream flow for the Chubs and maintain habitat for the June Sucker.

For projects that will directly accelerate the recovery of threatened or endangered species or address designated critical habitats, please include the following elements:

(2) How is the species adversely affected by a Reclamation project?

The June Sucker primarily lives in Utah Lake and migrates to the Provo River for spawning in late May and June. According to the June 1999 Recovery Plan, the Provo River is the only

[5] http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11
[6] www.fws.gov/endangered/index.html
[7] U.S. Fish and Wildlife. June 1999. June Sucker (Chasmistes liorus) Recovery Plan. June 1999.

remaining natural spawning habitat for the species. Although adult June Sucker still spawn in the river, it is believed that habitat and flow alterations are factors in reduced spawning success or recruitment. Flow alterations include the altered hydrologic regime in the Provo River as a result of Reclamation storage facilities including the Jordanelle and Deer Creek reservoirs.

(2) Is the species subject to a recovery plan or conservation plan under the ESA?

The June Sucker Recovery Plan was finalized by the U.S. Fish and Wildlife Service in 1999. The plan identifies actions needed for recovery of the June Sucker to occur.

(3) What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?

The primary means of benefitting these species is the reduction of required water Sandy City uses from the MWDSLS and the Jordan Valley Water Conservancy District (JVWCD). By reducing required supply requirements, there is potential to increase available in-stream flow for the Chubs and maintain habitat for the June Sucker. Long-term protection and recovery of the June Sucker will require additional instream flows in the Provo River.

Subcriterion No. D – Water Marketing

No water marketing component is included as part of this project. However, conservation incorporated as part of this project may lead to potential water markets in the future under drought conditions. Potential water sources that could be made available during drought conditions are discussed below.

Subcriterion No. E.4 – Other Water Supply Sustainability Benefits

Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?

Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by climate variation.

As identified in Figure 4, Sandy City would run out of water during drought conditions without conservation. The implementation of the AMI project as described above will be one component of the City's long term water conservation program. With conservation, the City would potentially be able to eliminate the need for two future water sources that the City currently does not rely on: the MWDSLS ULS petition, and the Ontario Tunnel. Alternatively, the City could reduce reliance on energy intensive groundwater sources that would be in high demand across the Salt Lake Valley during drought conditions.

Groundwater

On June 25, 2002 the State Engineer for the State of Utah issued the Salt Lake Valley Groundwater Management Plan. This plan announced that the process by which

groundwater rights were evaluated would be changing and established some groundwater management guidelines. For the groundwater area that Sandy City draws water from, the State Engineer determined a maximum withdrawal limit of 90,000 acre-ft. Potential withdrawal based on water rights in the groundwater area is 266,000 acre-ft. This means that at some future time, there may be significant reductions in the water rights of select groundwater users in the Sandy City area. Unfortunately many of the water rights held in Sandy City wells are junior water rights that may be affected by restrictions imposed by the State Engineer.

The City anticipates losing all of its available water rights with priority dates of 1976 or later during drought conditions. The annual yield of Sandy City ground water indicated in Figure 4 is based on the assumption the State Engineer uses 1976 as the cutoff date for water rights. However, the State Engineer could potentially cut water rights back further if conditions warranted. If groundwater rights are significantly restricted, many water users across the Salt Lake Valley area would need to rely on other sources to meet demands.

MWDSLS ULS petition

MWDSLS has petitioned the Central Utah Water Conservancy District for Central Utah Project water through the planned ULS. This system will bring water from Spanish Fork Canyon to the Provo Reservoir Canal in Orem. This water can then be conveyed to the Point of the Mountain Water Treatment Plant for treatment. The final volume of water associated with this request is still being discussed between MWDSLS, Salt Lake City, and Sandy City. For the purposes of this analysis, it has been assumed that Sandy will have a guaranteed delivery of 2,500 acre-ft from the ULS project beginning in 2020. With conservation, Sandy City may not need any of this water at build-out depending on the water year.

Ontario Drain Tunnel

MWDSLS has recently acquired a number of surface water rights associated with the Ontario Drain Tunnel. The estimated yield of these rights available to Sandy is 2,664 acre-ft in dry years and 3,267 acre-ft in average water years based on previous studies conducted by the City. Even though this water is in MWDSLS's name, this water was pursued at Sandy City's request and purchased using Sandy City funds. Therefore, Sandy City has the preferential right to all of the water from this source. With conservation, Sandy City may not need any of this water at build-out depending on the water year.

Will the project make additional water available for Indian tribes?

No.

Will the project make water available for rural or economically disadvantaged communities?

Additional water sources made available through conservation could be marketed to rural communities.

Does the project promote and encourage collaboration among parties?
o Is there widespread support for the project?

Since Sandy City began implementation of an AMI system in 2011, the City has been contacted by surrounding cities and service districts interested in beginning their own programs.

o What is the significance of the collaboration/support?

Because Sandy City was one of the first cities in the State of Utah to begin using an AMI system, the City has been able to demonstrate some of the benefits of the basic AMI system to surrounding cities and service districts.

o Will the project help to prevent a water-related crisis or conflict?

With conservation, Sandy City will not run out of water itself. In addition, excess sources that may be available as a result of conservation may reduce source crises for neighboring cities.

o Is there frequently tension or litigation over water in the basin?

Yes. Groundwater rights in the Sandy City area have been over allocated by approximately 300 percent. Surface water rights for sources in the Sandy area have been allocated and over allocated in many cases. This may be why the Bureau of Reclamation published a map in 2003 indicating the Salt Lake City valley as an area "highly likely" to have conflicts over water supply.

o Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?

Once the City implements a new billing system associated with the AMI meters, Sandy City anticipates being able to demonstrate water savings to surrounding cities that may be interested in AMI.

o Will the project increase awareness of water and/or energy conservation and efficiency efforts within a community?

One of the goals of the City's public education program will be to have individuals be able to compare their water use with that of their neighbors. The AMI meters and the associated billing system will significantly increase awareness of the City's water conservation and efficiency efforts.

o Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?

Once the City implements a new billing system associated with the AMI meters, Sandy City anticipates being able to demonstrate water savings to surrounding cities that may be interested in AMI.

o *Does the project integrate water and energy components?*

The AMI program will be responsible for reducing water demand in the City along with all of the associated energy required to pump, treat to potable water standards, and treat to wastewater discharge standards. In addition, there are energy (fuel) savings associated with reducing the amount of driving done by City personnel and vehicles.

Subcriterion No. F.1 – Project Planning

Does the project have a Water Conservation Plan, System Optimization Review (SOR), and/or district or geographic area drought contingency plans in place? Does the project relate/have a nexus to an adaptation strategy developed as part of a WaterSMART Basin Study)? Please self-certify, or provide copies of these plans where appropriate, to verify that such a plan is in place.

The City has a Water Conservation Plan that was updated in 2014. A copy of this plan has been included as Attachment C.

Provide the following information regarding project planning:

(2) Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Basin Study, drought contingency plan, or other planning efforts done to determine the priority of this project in relation to other potential projects.

The City's current water conservation plan includes a goal to replace meters every 8 years. The AMI meters that will be installed as part of this project are replacing older AMR meters that require City personnel to drive City streets once a month for data collection.

(2) Describe how the project conforms to and meets the goals of any applicable planning efforts, and identify any aspect of the project that implements a feature of an existing water plan(s).

One goal of the City's water conservation plan is to maintain an accurate meter system to reduce potential "system loss" from under reporting meters. Another goal of the water conservation plan is to continue and expand public education efforts. The AMI program proposed as part of this project and the associated billing software that the City anticipates implementing will be a big part of the City's public education program.

Subcriterion No. F.2 – Readiness to Proceed

Describe the implementation plan of the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. (Please note, under no circumstances may an applicant begin

any ground-disturbing activities—including grading, clearing, and other preliminary activities—on a project before environmental compliance is complete and Reclamation explicitly authorizes work to proceed).

The Sandy City AMI Program is in the 5th year of a project started by Sandy City in 2011. As a result, the City has experience preparing bid documents, and getting bids for meters over the last four years. Table 10 lists the critical dates that have been proposed for the project:

Table 10
Proposed Project Schedule

Project Milestones	FY2016	FY2017	FY2018
Number of Meters to be installed	**3,415**	**3,121**	**2,683**
Make Final Selection of Smart Meter Software	1-Jul-15		
Request bids for construction of AMI Project	1-Jul-15	1-Jul-16	1-Jul-17
Award Project to Contractor	1-Aug-15	1-Aug-16	1-Aug-17
Begin Construction of AMI meters	1-Sep-15	1-Sep-16	1-Sep-17
Substantial Completion of AMI meters	15-Dec-15	15-Dec-16	15-Dec-17
Begin New AMI billing system	1-Jan-16		

Please explain any permits that will be required, along with the process for obtaining such permits. Identify and describe any engineering or design work performed specifically in support of the proposed project.

Federal approvals for the project include the National Environmental Policy Act, National Historic Preservation Act, and Endangered Species Act compliance. However, because there is minimal or no earthwork required for construction of the project, activities required for Federal approvals should be minimal. The City has standard details for all meter boxes that are used in construction of the project. These details were developed by the City over the past several years. In most cases, no significant modifications to existing meter boxes are needed to install the new AMI meters.

There are no local permitting requirements.

Subcriterion No. F.3 – Performance Measures

Three performance measures will be used to track the project performance.

1. **Before & After Consumption Data** – The City will compare monthly consumption data for the project area before and after installation of the AMI meters. As a minimum the City anticipates collecting at least 6 months of data (from January 2016 to June 2016) of data that can be used to compare to historic water use data. However, the City will continue to collect data for the duration of the required reporting period to compare before and after consumption data.

2. **Leak Alerts** – Water services with leaks identified by the AMI system will be counted and the water savings for each leak will be estimated through extrapolation of the leak rate over a year.
3. **Water Audits** – The AMI system will be used to identify 50 residential customers per year for water audits. The AMI system will then be used to identify any potential savings by the user and the savings will be extrapolated.

Subcriterion No. F.4 – Reasonableness of Costs

Please include information related to the total project cost, annual acre-feet conserved, energy capacity, or other project benefits and the expected life of the improvement(s). For all projects involving physical improvements, specify the expected life of the improvement in number of years and provide support for the expectation (e.g., manufacturer's guarantee, industry accepted life-expectancy, description of corrosion mitigation for ferrous pipe and fittings, etc.). Failure to provide this information may result in a reduced score for this section.

Rocky Mountain Power provides most of the power for the service area that delivers water to Sandy City. Using the "General Service" energy charge (approximately $0.037/kWh) for the energy conservation shown in Table 7, the energy savings from the project area is estimated to be the equivalent of approximately $29,500/year. For a meter with a 20-year warranty, this is equivalent to approximately $590,400 over the life of the meters (assuming power escalation rates offset inflation and interest). The manufacturer warranty for the meters to be installed has been attached to this application as Attachment A. Table 11 lists the relative cost of the project in terms of water and energy saved.

Table 11
Reasonableness of Cost Summary

Project Cost Estimate	$2,784,046	
Power Savings (20-year)*	$590,400	
Net Project Cost (20-year)	$2,193,646	
Water Savings (20-year)	14,750	acre-ft
Energy Savings (20-year)	41,261,345	kWh
Cost / acre-ft saved	$148.72	$/acre-ft
Cost / kWh saved	$0.0532	$/kWh

*based on Table 7 estimate and Rocky Mountain Power Schedule 6

Subcriterion No. G – Additional Non-Federal Funding

Sandy City anticipates funding the majority of the project costs at approximately 89 percent.

$$\frac{\text{Non. Federal} = \$2{,}484{,}046}{\text{TotalProjectCost} = \$2{,}784{,}046} = 89.2\%$$

Subcriterion No. H – Connection to Reclamation Project Activities

(1) How is the proposed project connected to Reclamation project activities?

The AMI Project will reduce demand on stored water in Jordanelle and Deer Creek reservoirs (Reclamation Facilities). There will also be less conveyance requirements from Reclamation pipelines (e.g. the Salt Lake Aqueduct, etc.). There will also be reduced treatment requirements at Reclamation funded treatment facilities.

(2) Does the applicant receive Reclamation project water?

Yes, the Metropolitan District of Salt Lake and Sandy (MWDSLS) and the Jordan Valley Water Conservancy District provide water to Sandy City. Both of these entities rely on water from the Jordanelle and Deer Creek Reservoirs which are Reclamation projects.

(3) Is the project on Reclamation project lands or involving Reclamation facilities?

No, meters will be installed in the Sandy City right-of-way.

(4) Is the project in the same basin as a Reclamation project or activity?

Yes, the project is in the same basin as other water providers that use water stored in Reclamation reservoirs.

(5) Will the proposed work contribute water to a basin where a Reclamation project is located?

The project may contribute water to other Reclamation project users by reducing demand.

(6) Will the project help Reclamation meet trust responsibilities to Tribes?

The project may help Reclamation meet trust responsibilities to Tribes by reducing overall demand on facilities.

PERFORMANCE MEASURES

Performance Measure No. A.2: Measuring Devices: Municipal Metering

Will the project includes new meters where none existed previously or replaces existing meters?

The project will mostly be replacing older AMR-style meters.

Does the project includes individual water user meters, main line meters, or both?

The AMI Project includes individual water user meters, but no main line meters.

Does the project replaces existing meters with new meters, whether new technologies (automatic meter reading/ information) will be employed.

The Project includes upgrading meters to use an advanced metering infrastructure (AMI) system.

Are main line meters are included? Will system leak detection may be improved?

No.

Include a description of both pre and post-project rate structuring.

Sandy City uses a seasonal peaking charge to encourage conservation. The Base rate or monthly charge for most residents is as follows:

Base Rate (monthly charge)	
3/4" meter	$20.40
1" meter	$27.63
Overage (above 6,000 gal.)	
Off Season (Nov - May) / 1,000 gal.	$1.43
Peak Season (June - Oct) / 1,000 gal.	$2.42

The key element of the rate structure is an increased peak season overage rate during the months of June through October. The rate structure charges approximately 70 percent more for water during this period than during the winter months. The goal is to reduce peak system demands and reduce the waste of water on outdoor landscaping uses. The City will be implementing a new data management system to educate customers on water use. While the City is still evaluating which smart meter software to purchase, the City anticipates being able to show customers relative rates of water use comparing neighbor-to-neighbor. Customers may also be able to view their individual water use via a web portal.

Performance Measure No. B.2: Increasing Energy Efficiency in Water Management

Explain the methodology for calculating the quantity of energy savings resulting from the water management improvements or water conservation improvements

Tables 6 and 9 show the anticipated energy savings resulting from the water conservation improvements made possible by the AMI project. Energy savings were calculated based on studies performed by others related to the energy costs related to producing, conveying, and treating water.

Explain anticipated cost savings

The anticipated savings for energy is equivalent to 800,000 kWh per year or $29,500/year (using Rocky Mountain Power Schedule 6) for the project area.

Performance Measure No. C: Projects that Benefit Endangered Species or Critical Habitat

Reduced water use in Sandy City will benefit the June Sucker and other endangered fish species in the Colorado and Provo Rivers by increasing in-stream flow.

ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

1) Will the project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The AMI Project involves installation of water meters in existing meter boxes (in most cases). As a result, there will be no impact to the surrounding environment. There is no earth disturbing work involved with this project.

2) Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

Meters will be installed in existing meter boxes or in the City's public right-of-way in landscape strips. There are no species that will be impacted in the project area.

3) Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the project may have.

No.

4) When was the water delivery system constructed?

Pressurized water began as early as the 1920s. However, the majority of the modern water system serving Sandy City is less than 50 years old.

5) Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

No.

6) Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

There may be historic sites within the project area. Sandy City will check with the State Historic Preservation Office prior to beginning the project. However, any buildings or facilities in the project area will not be impacted by the project.

7) Are there any known archeological sites in the proposed project area?

No.

8) Will the project have a disproportionately high and adverse effect on low income or minority populations?

No, there will be no adverse effects resulting from the project.

9) Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

No.

(10) Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

No.

REQUIRED PERMIT OR APPROVALS

Applicants must state in the application whether any permits or approvals are required and explain the plan for obtaining such permits or approvals.

The City Council will need to approve request for bids. However, the City has been implementing phases of the AMI system over the past several years, so this project should be approved easily. The City will seek the appropriate environmental and historic approvals for sensitive sites. However, because the meter project will not involve ground breaking activities, the City does not expect any lengthy review.

No permits will be needed for this project.

NEPA – National Environmental Policy Act

The City does not anticipate any impacts on the environment and will fit within a Categorical Exclusion to NEPA. Any environmental impacts will be minimized during construction using best management practices.

NHPA – National Historic Preservation Act

The City will contact the State Historic Preservation Office prior to beginning any work in the project area. However, there will be no impacts on historic sites as a result of this project.

ESA – Endangered Species Act

There is no critical habitat or endangered or threatened species that will be affected by this project.

If awarded the WaterSMART grant by May 2015, the City will be able to secure all approvals by July 2015.

State Permits

No State permits will be required for the project.

Local Permits

There are no other local permits that will be required for the project.

LETTERS OF PROJECT SUPPORT

The City will be funding this project itself. No letters of project support are attached.

OFFICIAL RESOLUTION

An official resolution which identifies the official with legal authority to enter into an agreement with Reclamation was adopted by the City Council on January 20, 2015 and has been attached as Attachment B.

PROJECT BUDGET

Funding Plan and Letters of Commitment

1) How you will make your contribution to the cost share requirement, such as monetary and/or in-kind contributions and source funds contributed by the applicant (e.g., reserve account, tax revenue, and/or assessments).

The City will contribute its cost share to the project out of its capital funds which are generated using revenue from water sales. The City has the capacity to fully fund the $2,784,046 for the project.

2) Describe any in-kind costs incurred before the anticipated project start date that you seek to include as project costs. Include:
a) What project expenses have been incurred

The City has already spent nearly $4 million as documented in Table 1 constructing the AMI Program in the City. Project costs have included the installation data collectors (AMI towers, repeaters, and other communication equipment), meters and radios, and planning costs associated with obtaining bids and other materials to construct the AMI program. However,

the City is not including any of its historic costs in the grant application and is only including future phases of the AMI Program project costs.

b) How they benefitted the project

The primary means of educating customers about water use are the improved billing features unique to the AMI system.

c) The amount of the expense

The City will not be including any past expenses of funding through in-kind staff resources for planning in the grant application. Table 1 includes the documents construction costs expended by the City through December 2014 (nearly $4 million).

d) The date of cost incurrence

The City will not be including any past expenses of funding through in-kind staff resources for planning in the grant application. However, past invoices and/or billing records for historic construction costs can be provided to Reclamation upon request (also see Table 1).

4) Provide the identity and amount of funding to be provided by funding partners, as well as the required letters of commitment.

The City has no other funding partners

5) Describe any funding requested or received from other Federal partners. Note: other sources of Federal funding may not be counted towards your 50 percent cost share unless otherwise allowed by statute.

There are no other funds that have been requested.

6) Describe any pending funding requests that have not yet been approved, and explain how the project will be affected if such funding is denied.

There are no other pending funding requests.

Table 12
Summary of Non-Federal and Federal Funding Sources

Funding Sources	Funding Amount
Non-Federal Entities	
Sandy City	$2,484,046
Non-Federal Subtotal	**$2,484,046**
Requested Reclamation Funding	$300,000
Total Project Funding	**$2,784,046**

Letters of Commitment

The City will be funding this project itself with no commitments from other partners. No letters of commitment are required.

BUDGET PROPOSAL FOR AMI PROGRAM

Salaries and Wages

The proposed budget, included as Table 13 includes estimated time for Sandy City employees for the administration and oversight of the project. This is estimated time for project meetings and consultations with the design engineers, project visits, all required paper work, reporting, and other duties involved with the project. Salaries and Wages are based on 2014 salary and wages and totals $7,714 which is all a portion of the recipient cost share.

Fringe Benefits

Fringe benefits for City personnel is roughly 46 percent of salary and wages for the listed full time employees. Fringe benefits include investments in social security, medicare, state pension, life and disability insurance, workers compensation, sick leave, health insurance premiums, cell phone costs, and vehicle allowances. Total fringe benefits anticipated for the project are approximately $3,554 dollars and is a portion of the recipient cost share.

Travel

Travel costs were calculated using the City reimbursement rate of $0.56 per mile. Costs include approximately 155 miles for construction coordination and site visits for a total of $87 in travel and is a portion of the recipient cost share. Sandy City Hall is inside the project area of the project, so travel costs will be relatively low.

Equipment

There are no equipment costs required for this project. Any equipment needed for the project has been purchased previously.

Materials and Supplies

Material and supply costs are embedded within the contractual cost estimate for the project. A contractor will be supplying all materials and supplies needed for the project.

Contractual

Contractual costs for the project include the cost estimates for a contractor to supply and perform all meter installations. Total contractual costs are estimated to be approximately $2,739,691. The City is requesting $300,000 in matching funds for this budget item. The recipient's cost share is $2,439,691.

Environmental and Regulatory Compliance Costs

Environmental Compliance costs have been estimated to be approximately 1 percent of the total project costs. The City anticipates minimal environmental and regulatory compliance costs. The total budgeted amount for environmental and regulatory compliance is $28,000 and is included as a portion of the recipient cost share.

Compliance costs will include: the cost incurred by Reclamation to determine the level of environmental compliance required for the project, the cost of Reclamation and City personnel to prepare any necessary environmental compliance documents or reports, the cost of Reclamation to review any environmental compliance documents prepared by the City, the cost of the City to acquire any required approvals or permits or in implementing any required mitigation measures.

Reporting Costs

In addition to the compliance costs identified, the City anticipates some additional reporting costs required for the funding opportunity announcement (FOA). The following reports will be prepared by the City and submitted to Reclamation: SF-425 Federal Finance Report, semi-annual reports (two reports per year) and a final report. Reporting costs are estimated to be $5,000 and are a portion of the recipient's cost share.

Indirect Cost

All costs associated with the project are direct costs to the City.

Operational and Maintenance Expenses

There are no operational or maintenance costs included with this project.

Total Costs

The estimated total project cost for the AMI Program is $2,784,046. The requested federal share is $300,000; the total non-federal share is $2,484,046. A copy of the SF424C, Budget Information-Construction Programs is included in the attachments.

Table 13
Proposed Budget and Funding Plan

Budget Item Description	Computation		Recipient Cost Share	Reclamation Funding	Total Cost
	Unit	Quantity			
Salaries & Wages					
Program Manager, Scott Ellis - Operations Manager	$42.80	48	$2,054		$2,054
Meter Tech Supervisor	$23.58	240	$5,659		$5,659
Subtotal of Salaries & Wages					**$7,714**
Fringe Benefits					
Program Manager, Scott Ellis - Operations Manager	$19.90	48	$955		$955
Meter Tech Supervisor	$10.83	240	$2,599		$2,599
Subtotal of Fringe Benefits					**$3,554**
Travel					
Project Visits	$0.56	155	$87		$87
Equipment					$0
A					
Materials & Supplies					$0
Contractual					
AMI Water Smart Software	$50,000	1	$25,000	$25,000	$50,000
Meters 3/4"	$200	8,711	$1,467,200	$275,000	$1,742,200
Meters 1"	$250	508	$127,000		$127,000
Meter Interface Unit (MIU)	$54	9,219	$497,826		$497,826
Meter Installation	$35	9,219	$322,665		$322,665
Subtotal of Contractual Costs			**$2,439,691**	**$300,000**	**$2,739,691**
Environmental Compliance	$28,000	1	$28,000		$28,000
Reporting	$5,000	1	$5,000		$5,000
TOTAL COSTS			**$2,484,046**	**$300,000**	**$2,784,046**

ATTACHMENT A
iPERL & FLEXNET WARRANTY

Sensus Limited Warranty

I. General Product Coverage

Sensus USA Inc. ("Sensus") warrants its products and parts to be free from defects in material and workmanship for one (1) year from the date of Sensus shipment and as set forth below. All products are sold to customer ("Customer") pursuant to Sensus' Terms of Sale, available at: sensus.com/TC ("Terms of Sale").

II. SR II® and accuSTREAM ™5/8", 3/4" & 1" Meters...

are warranted to perform to AWWA New Meter Accuracy Standards for five (5) years from the date of Sensus shipment or until the registration shown below, whichever occurs first. Sensus further warrants that the SR II meter will perform to at least AWWA Repaired Meter Accuracy Standards for fifteen (15) years from the date of Sensus shipment or until the registration shown below, whichever occurs first:

	New Meter Accuracy	Repair Meter Accuracy
5/8" SR II Meter and accuSTREAM Meter	500,000 gallons	1,500,000 gallons
3/4" SR II Meter and accuSTREAM Meter	750,000 gallons	2,250,000 gallons
1" SR II Meter and accuSTREAM Meter	1,000,000 gallons	3,000,000 gallons

III. SR® 5/8", 3/4" & 1" Meters...

are warranted to perform to AWWA New Meter Accuracy Standards for one (1) year from the date of Sensus shipment. Sensus further warrants that the 5/8", 3/4" and 1" SR meter will perform to at least AWWA Repaired Meter Accuracy Standards for fifteen (15) years from the date of Sensus shipment or until the registration shown below, whichever occurs first:

	Repair Meter Accuracy
5/8" SR Meter	1,500,000 gallons
3/4" SR Meter	2,250,000 gallons
1" SR Meter	3,000,000 gallons

IV. SR 1-1/2" & 2"...

are warranted to perform to AWWA New Meter Accuracy Standards for one (1) year from the date of Sensus shipment. Sensus further warrants that the 1-1/2" and 2" SR meter will perform to at least AWWA Repaired Meter Accuracy Standards for ten (10) years from the date of Sensus shipment or until the registration shown below, whichever occurs first:

	Repair Meter Accuracy
1-1/2" SR	5,000,000 gallons
2" SR	8,000,000 gallons

V. PMM® 5/8", 3/4", 1" Meters...

are warranted to perform to AWWA New Meter Accuracy Standards for one (1) year from the date of Sensus shipment. Sensus further warrants that the 5/8", 3/4", and 1" PMM meter will perform to at least AWWA Repaired Meter Accuracy Standards for fifteen (15) years from the date of Sensus shipment or until the registration shown below, whichever occurs first:

	Repair Meter Accuracy
5/8" PMM	1,500,000 gallons
3/4" PMM	2,000,000 gallons
1" PMM	3,000,000 gallons

VI. PMM 1-1/2", 2" Meters...

are warranted to perform to AWWA New Meter Accuracy Standards for one (1) year from the date of Sensus shipment. Sensus further warrants that the 1-1/2", and 2" PMM meter will perform to at least AWWA Repaired Meter Accuracy Standards for ten (10) years from the date of Sensus shipment or until the registration shown below, whichever occurs first:

	Repair Meter Accuracy
1-1/2" PMM	5,000,000 gallons
2" PMM	8,000,000 gallons

VII. iPERL™ Water Management Systems...

that register water flow are warranted to perform to the accuracy levels set forth in the iPERL Water Management System Data Sheet available at sensus.com/iperl/datasheet or by request from 1-800-METER-IT, for twenty (20) years from the date of Sensus shipment. The iPERL System warranty does not include the external housing.

VIII. Maincase...

of the SR, SR II and PMM in both standard and low lead alloy meters are warranted to be free from defects in material and workmanship for twenty-five (25) years from the date of Sensus shipment. Composite and E-coated maincases will be free from defects in material and workmanship for fifteen (15) years from the date of Sensus shipment.

IX. Sensus "W" Series Turbo Meters, OMNI™ Meters and Propeller Meters...

are warranted to perform to AWWA New Meter Accuracy Standards for one (1) year from the date of Sensus shipment.

X. Sensus accuMAG™ Meters...

are warranted to be free from defects in material and workmanship, under normal use and service, for 18 months from the date of Sensus shipment or 12 months from startup, whichever occurs first.

XI. Sensus Registers...

are warranted to be free from defects in material and workmanship from the date of Sensus shipment for the periods stated below or until the applicable registration for AWWA Repaired Meter Accuracy Standards, as set forth above, are surpassed, whichever occurs first:

5/8" thru 2" SR, SR II, PMM, accuSTREAM Standard Registers	25 years
5/8" thru 2" SR, SR II, PMM, accuSTREAM Encoder Registers	10 years
Electronic Communication Index (ECI)	10 years
All HSPU, IMP Contactor, R.E.R. Elec. ROFI	1 year
Standard and Encoder Registers for:"W" Turbo and Propeller Meters	1 year
OMNI Register with Battery	10 years

XII. Sensus Electric Meters...

are warranted to be free from defects in material and workmanship for one (1) year from the date of Sensus shipment. Spare parts and components are warranted to be free from defects in material and workmanship for one (1) year from the date of Sensus shipment.

Repaired or refurbished equipment repaired by Sensus is warranted to be free from defects in material and workmanship for ninety (90) days from the date of Sensus shipment or for the time remaining on the original warranty period, whichever is longer.

XIII. Batteries, iPERL System Components, AMR and FlexNet™ System AMI Interface Devices...

are warranted to be free from defects in material and workmanship from the date of Sensus shipment for the period stated below:

Electronic TouchPad	10 years
RadioRead® MXU (Model 505C, 510R or 520R) and Batteries	20 years*
Act-Pak® Instrumentation	1 year
TouchRead® Coupler and AMR Equipment	1 year
FlexNet Water or Gas SmartPoint™ Modules and Batteries	20 years*
Hand Held Device	1 year
Vehicle Gateway Base Station	1 year
FlexNet Base Station (including the Metro and M400 base stations)	1 year
Echo Transceiver	1 year
Remote Transceiver	1 year
iConA and FlexNet Electricity SmartPoint Module	1 year
iPERL System Battery and iPERL System Components	20 years*
Residential Electronic Register	20 years*

* Sensus will repair or replace non-performing:

- RadioRead® MXU (Model 505C, 510R and 520R) and Batteries,
- FlexNet Water or Gas SmartPoint Modules (configured to the factory setting of six transmissions per day under normal system operation of up to one demand read to each SmartPoint Module per month and up to two firmware downloads during the life of the product) and batteries,
- Residential Electronic Register with hourly reads, and
- iPERL System Batteries, and/or the iPERL System flowtube, the flow sensing and data processing assemblies, and the register ("iPERL System Components") with hourly reads

at no cost for the first ten (10) years from the date of Sensus shipment, and for the remaining ten (10) years, at a prorated percentage, applied towards the published list prices in effect for the year product is accepted by Sensus under warranty conditions according to the following schedule:

Years	Replacement Price	Years	Replacement Price
1 – 10	0%	16	55%
11	30%	17	60%
12	35%	18	65%
13	40%	19	70%
14	45%	20	75%
15	50%	>20	100%

Note: Software supplied and licensed by Sensus is warranted according to the terms of the applicable software license agreement. Sensus warrants that network and monitoring services shall be performed in a professional and workmanlike manner.

XIV. Return...

Sensus' obligation, and Customer's exclusive remedy, under this Sensus Limited Warranty is, at Sensus' option, to either (i) repair or replace the product, provided the Customer (a) returns the product to the location designated by Sensus within the warranty period; and (b) prepays the freight costs both to and from such location; or (ii) deliver replacement components to the Customer, provided the Customer installs, at its cost, such components in or on the product (as instructed by Sensus), provided, that if Sensus requests, the Customer (a) returns the product to the location designated by Sensus within the warranty period; and (b) prepays the freight costs both to and from such location. In all cases, if Customer does not return the product within the time period designated by Sensus, Sensus will invoice, and Customer will pay within thirty days of the invoice date, for the cost of the replacement product and/or components.

The return of products for warranty claims must follow Sensus' Returned Materials Authorization (RMA) procedures. Water meter returns must include documentation of the

Customer's test results. Test results must be obtained according to AWWA standards and must specify the meter serial number. The test results will not be valid if the meter is found to contain foreign materials. If Customer chooses not to test a Sensus water meter prior to returning it to Sensus, Sensus will repair or replace the meter, at Sensus' option, after the meter has been tested by Sensus. The Customer will be charged Sensus' then current testing fee. Sensus SmartPoints modules and MXU's returned must be affixed with a completed return evaluation label. For all returns, Sensus reserves the right to request meter reading records by serial number to validate warranty claims.

For products that have become discontinued or obsolete ("Obsolete Product"), Sensus may, at its discretion, replace such Obsolete Product with a different product model ("New Product"), provided that the New Product has substantially similar features as the Obsolete Product. The New Product shall be warranted as set forth in this Sensus Limited Warranty.

THIS SECTION XIV SETS FORTH CUSTOMER'S SOLE REMEDY FOR THE FAILURE OF THE PRODUCTS, SERVICES OR LICENSED SOFTWARE TO CONFORM TO THEIR RESPECTIVE WARRANTIES.

XV. Warranty Exceptions and No Implied Warranties...

This Sensus Limited Warranty does not include costs for removal or installation of products, or costs for replacement labor or materials, which are the responsibility of the Customer. The warranties in this Sensus Limited Warranty do not apply to goods that have been: installed improperly or in non-recommended installations; installed to a socket that is not functional, or is not in safe operating condition, or is damaged, or is in need of repair; tampered with; modified or repaired with parts or assemblies not certified in writing by Sensus, including without limitation, communication parts and assemblies; improperly modified or repaired (including as a result of modifications required by Sensus); converted; altered; damaged; read by equipment not approved by Sensus; for water meters, used with substances other than water, used with non-potable water, or used with water that contains dirt, debris, deposits, or other impurities; subjected to misuse, improper storage, improper care, improper maintenance, or improper periodic testing (collectively, "Exceptions."). If Sensus identifies any Exceptions during examination, troubleshooting or performing any type of support on behalf of Customer, then Customer shall pay for and/or reimburse Sensus for all expenses incurred by Sensus in examining, troubleshooting, performing support activities, repairing or replacing any Equipment that satisfies any of the Exceptions defined above. The above warranties do not apply in the event of Force Majeure, as defined in the Terms of Sale.

THE WARRANTIES SET FORTH IN THIS SENSUS LIMITED WARRANTY ARE THE ONLY WARRANTIES GIVEN WITH RESPECT TO THE GOODS, SOFTWARE LICENSES AND SERVICES SOLD OR OTHERWISE PROVIDED BY SENSUS. SENSUS EXPRESSLY DISCLAIMS ANY AND ALL OTHER REPRESENTATIONS, WARRANTIES, CONDITIONS, EXPRESSED, IMPLIED, STATUTORY OR OTHERWISE, REGARDING ANY MATTER IN CONNECTION WITH THIS SENSUS LIMITED WARRANTY OR WITH THE TERMS OF SALE, INCLUDING WITHOUT LIMITATION, WARRANTIES AS TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, NON-INFRINGEMENT AND TITLE.

SENSUS ASSUMES NO LIABILITY FOR COSTS OR EXPENSES ASSOCIATED WITH LOST REVENUE OR WITH THE REMOVAL OR INSTALLATION OF EQUIPMENT. THE FOREGOING REMEDIES ARE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES FOR THE FAILURE OF EQUIPMENT, LICENSED SOFTWARE OR SERVICES TO CONFORM TO THEIR RESPECTIVE WARRANTIES.

XVI. Limitation of Liability...

SENSUS' AGGREGATE LIABILITY IN ANY AND ALL CAUSES OF ACTION ARISING UNDER, OUT OF OR IN RELATION TO THIS AGREEMENT, ITS NEGOTIATION, PERFORMANCE, BREACH OR TERMINATION (COLLECTIVELY "CAUSES OF ACTION") SHALL NOT EXCEED THE TOTAL AMOUNT PAID BY CUSTOMER TO SENSUS UNDER THIS AGREEMENT. THIS IS SO WHETHER THE CAUSES OF ACTION ARE IN TORT, INCLUDING, WITHOUT LIMITATION, NEGLIGENCE OR STRICT LIABILITY, IN CONTRACT, UNDER STATUTE OR OTHERWISE.

AS A SEPARATE AND INDEPENDENT LIMITATION ON LIABILITY, SENSUS' LIABILITY SHALL BE LIMITED TO DIRECT DAMAGES. SENSUS SHALL NOT BE LIABLE FOR: (I) ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES; NOR (II) ANY REVENUE OR PROFITS LOST BY CUSTOMER OR ITS AFFILIATES FROM ANY END USER(S), IRRESPECTIVE OF WHETHER SUCH LOST REVENUE OR PROFITS IS CATEGORIZED AS DIRECT DAMAGES OR OTHERWISE; NOR (III) ANY IN/OUT COSTS; NOR (IV) MANUAL METER READ COSTS AND EXPENSES; NOR (V) DAMAGES ARISING FROM MAINCASE OR BOTTOM PLATE BREAKAGE CAUSED BY FREEZING TERMPERATURES, WATER HAMMER CONDITIONS, OR EXCESSIVE WATER PRESSURE. "IN/OUT COSTS" MEANS ANY COSTS AND EXPENSES INCURRED BY CUSTOMER IN TRANSPORTING GOODS BETWEEN ITS WAREHOUSE AND ITS END USER'S PREMISES AND ANY COSTS AND EXPENSES INCURRED BY CUSTOMER IN INSTALLING, UNINSTALLING AND REMOVING GOODS. "END USER" MEANS ANY END USER OF ELECTRICITY/WATER/GAS THAT PAYS CUSTOMER FOR THE CONSUMPTION OF ELECTRICITY/WATER/GAS, AS APPLICABLE.

The limitations on liability set forth in this Agreement are fundamental inducements to Sensus entering into this Agreement. They apply unconditionally and in all respects. They are to be interpreted broadly so as to give Sensus the maximum protection permitted under law.

To the maximum extent permitted by law, no Cause of Action may be instituted by Customer against Sensus more than TWELVE (12) MONTHS after the Cause of Action first arose. In the calculation of any damages in any Cause of Action, no damages incurred more than TWELVE (12) MONTHS prior to the filing of the Cause of Action shall be recoverable.

ATTACHMENT B
OFFICIAL RESOLUTION
(To be adopted February 24, 2015
and submitted February 27, 2015)

OFFICIAL RESOLUTION OF THE CITY COUNCIL OF SANDY CITY REGARDING PARTICIPATION IN FUNDING FOR A BUREAU OF RECLAMATION WaterSMART GRANT PROJECT.

A. WHEREAS, the United States Department of Interior, Bureau of Reclamation, under its WaterSMART Grant Program, has made available to qualifying applicants grant funding on a matching fund or challenge grant basis funds for water conservation and management projects; and

B. WHEREAS, the Sandy City Corporation has identified a project that exemplifies the objectives of the WaterSMART grant program in its Advanced Metering Infrastructure (AMI) Program;

NOW, THEREFORE, BE IT RESOLVED by the City Council of Sandy City Corporation:

1. The City Council verifies that Mayor Tom Dolan has legal authority to enter into an agreement with Reclamation.
2. The City Council has reviewed and supports the application submitted.
3. The City is capable of providing the amount of funding and/or in-kind contributions specified in the funding plan.
4. That if selected for a WaterSMART Grant under the Fiscal Year 2015 program, the City will negotiate and execute a Cooperative Agreement with Reclamation on/or prior to the established deadline, to fund at least 50% of the project costs and provide documentation showing the sources of non-Reclamation funding that totals 50% of project costs for the Project.

ADOPTED AND APPROVED this _____ day of _____ 2015.

_____

Tom Dolan
Mayor

Attest:

_____

Corporate Secretary

ATTACHMENT C
WATER CONSERVATION PLAN

WATER MANAGEMENT AND CONSERVATION PLAN UPDATE

INTRODUCTION

Water conservation has different meanings to different people. People who have adopted a conservation ethic are likely to support a wide range of water conservation practices aimed at reducing water use. Others not so inclined often associate water conservation with inconvenience, deprivation, and dry yards. From Sandy City's perspective, water conservation means increasing the efficiency of water use in order to sustain future water supplies to its customers. It does not mean dry yards and brown lawns, but rather a wise use of water to ensure that it is not wasted. With this in mind, Sandy City has adopted water conservation as a key element in its long-term master plan to serve its customers.

Attitudes toward water supplies are changing. Water is no longer seen as an endless supply, but as a valuable commodity that needs to be managed wisely. With this change in attitude, conservation has become a larger part of water suppliers' plans to meet future water needs. Many water suppliers throughout the country have adopted conservation programs. Benefits experienced as a result of these programs include:

- Using existing water supplies more efficiently, which includes the utilization of Aquifer Storage & Recovery (ASR) methods.
- Maximizing utilization of existing water conveyance, treatment and distribution facilities
- Delaying or deferring expensive construction of capital improvement projects
- Reducing the need for additional water supplies.

Officials at the State of Utah Department of Water Resources recognize the potential of conservation programs to extend current water supplies. They have established a statewide conservation goal of reducing per capita water use from levels measured in 2000 by 25 percent by the year 2025.

Sandy City has already achieved a significant reduction in per capita use since 2000 (about 17 percent). However, Sandy City officials recognize that per capita use will return to higher levels without continued emphasis on the importance of conservation The City also recognizes the potential benefits of further conservation efforts, which ultimately will reduce costs to individual customers. Since sustained additional water conservation will be an important component in Sandy City's plans for future water use, this report will evaluate the City's current conservation program and will discuss additional measures that will allow the City to conserve water.

SERVICE AREA

The existing Sandy City water system service area is shown in Figure 1. The system serves most of the incorporated area of Sandy City as well as some areas outside the City's corporate boundaries. The portions of the existing service area located outside the City corporate boundaries can be categorized into two groups: the Granite area, an unincorporated area east of Sandy near the mouth of Little Cottonwood Canyon; and unincorporated County islands, relatively small areas of unincorporated Salt Lake County that are completely surrounded by Sandy City. Figure 1 also indicates that there are several areas within Sandy exterior boundaries that receive water from other water agencies. Three unincorporated county islands along 1300 East are currently served by the Jordan Valley Water Conservancy District. White City Township and a large block of Sandy City residents in the center of the City are served by the White City Water Improvement District.

For the planning purposes of this study, it was assumed that the ultimate Sandy City water system service area would include all areas currently served by the water system as well as the following additional areas: unincorporated County islands within the exterior boundaries of the service area (excluding the area currently served by the White City Water Improvement District); and the Creek Road area (an area that the City will likely annex in the near future). It was assumed that these areas would be annexed into the Sandy City water system by 2020.

CURRENT RATES

Currently, Sandy City charges 3/4" meters a monthly base rate of $20.40, which includes 6,000 gallons of water. One inch meters are charged a base rate of $27.63 . Overage rates are different for Summer and Winter usage. During the winter (Nov - May), connections are charged $1.43 for every thousand gallons above 6,000 gallons. During the summer months (June – Oct..), it's $2.42 for every thousand gallons above 6,000 gallons.

SANDY CITY'S PROJECTED WATER NEEDS

Historic Water Use

Table 1 summarizes Sandy City water use from 2005 through 2013. During this time the population of the service area decreased from approximately 98,686 to 86,030 a decrease of 13 percent. There was a decrease in population in 2010 according to the Census data. There was also a decrease in service population due to the sale of the Union East Jordan system to Midvale City.For the same period, the per capita water use varies from 207 gallons per capita per day (gpcd) in 2005 to 237 gpcd in 2013. The average per capita water use for this period is 236 gpcd.

As described in the 2010 Water System Master Plan and Rate Study Update, water use generally increases during dry years and decreases during wet years. It is estimated that for dry year conditions similar to those experienced in 1992, average per capita water use will increase.

Table 1
Historical Water Use and Production Data 2000-2013

	2000	2001	2002	2003	2004	2005	2006[4]	2007[4]	2008	2009	2010[6]	2011[7]	2012	2013	Average
Annual Production (AF)[1]	31,517	30,794	26,194	26,608	25,179	25,349	28,850	30,314	27,397	25,184	24,724	23,473	28,439	25,442	**27,104**
(AF)[2]	31,505	30,167	25,707	24,170	24,550	22,952	24,957	25,210	26,592	23,697	24,611	23,473	24,100	22,668	**25,311**
System % Loss	0.0%	2.0%	1.9%	9.2%	2.5%	9.5%	13.5%	16.8%	2.9%	5.9%	0.5%	0.0%	15.3%	10.9%	**6.5%**
Population Served	97,889	98,048	98,207	98,366	98,525	98,686	99,587	100,675	100,834	102,340	93,988	84,244	84,565	85,170	--
Average Day Production (mgd)	28.1	27.5	23.4	23.8	22.5	22.6	25.8	27.1	24.5	25.6	24.9	23.6	28.6	25.5	**25.2**
Average Day Production (gpcd)	287.4	280.4	238.1	241.5	228.1	229.3	258.6	268.8	242.6	219.7	234.8	248.7	300.2	266.7	**253.2**
Average Day Use (gpcd)	287.3	274.7	233.7	219.4	222.5	207.6	223.7	223.6	235.4	206.7	233.8	248.7	254.4	237.6	**236.4**
Peak Day	Jul. 27	Jul. 20	Jul. 15	Jul. 24	Jul. 11	Jul. 15	Jul. 24	Jul. 7	Jun. 27	Jul 24.	Jul.24	Jul. 22	Jul. 20	Jun. 29	---
Peak Day Production (mgd)	67.6	67.5	66.1	64.4	56.5	66.0	66.2	64.9	61.8	62.6	61.1	56.4	64.7	58.5	**63.2**
Peak Day Production (gpcd)	690.1	688.0	673.3	654.7	573.5	668.8	664.8	644.6	613.1	611.6	650.0	669.7	765.0	686.9	**661.0**
Peak Day Peaking Factor[3]	2.40	2.45	2.83	2.71	2.51	2.92	2.57	2.40	2.53	2.44	2.45	2.39	2.26	2.29	**2.51**

[1] Annual production as measured from production sources

[2] Annual use as determined from customer meter records provided by Sandy City Administrative Services

[3] Peaking factor defined as ratio of Peak Day Production to Average Day Production

[4] Sandy City conducted a large number of meter change outs in 2006 & 2007. Therefore metered sales likely under represent actual sales resulting in inaccurate system losses.

[5] As Sandy City does not have instantaneous flow data, Peak Hour is assumed to be 1.5 Peak Day Production per Salt Lake City and Park City Water Master Plans.

[6] Decrease in population was result of 2010 Census data, also, Union Jordan connections were sold in this year.

[7] Decrease in service population due to sale of Union East Jordan system to Midvale City.

Projected Water Production Requirements

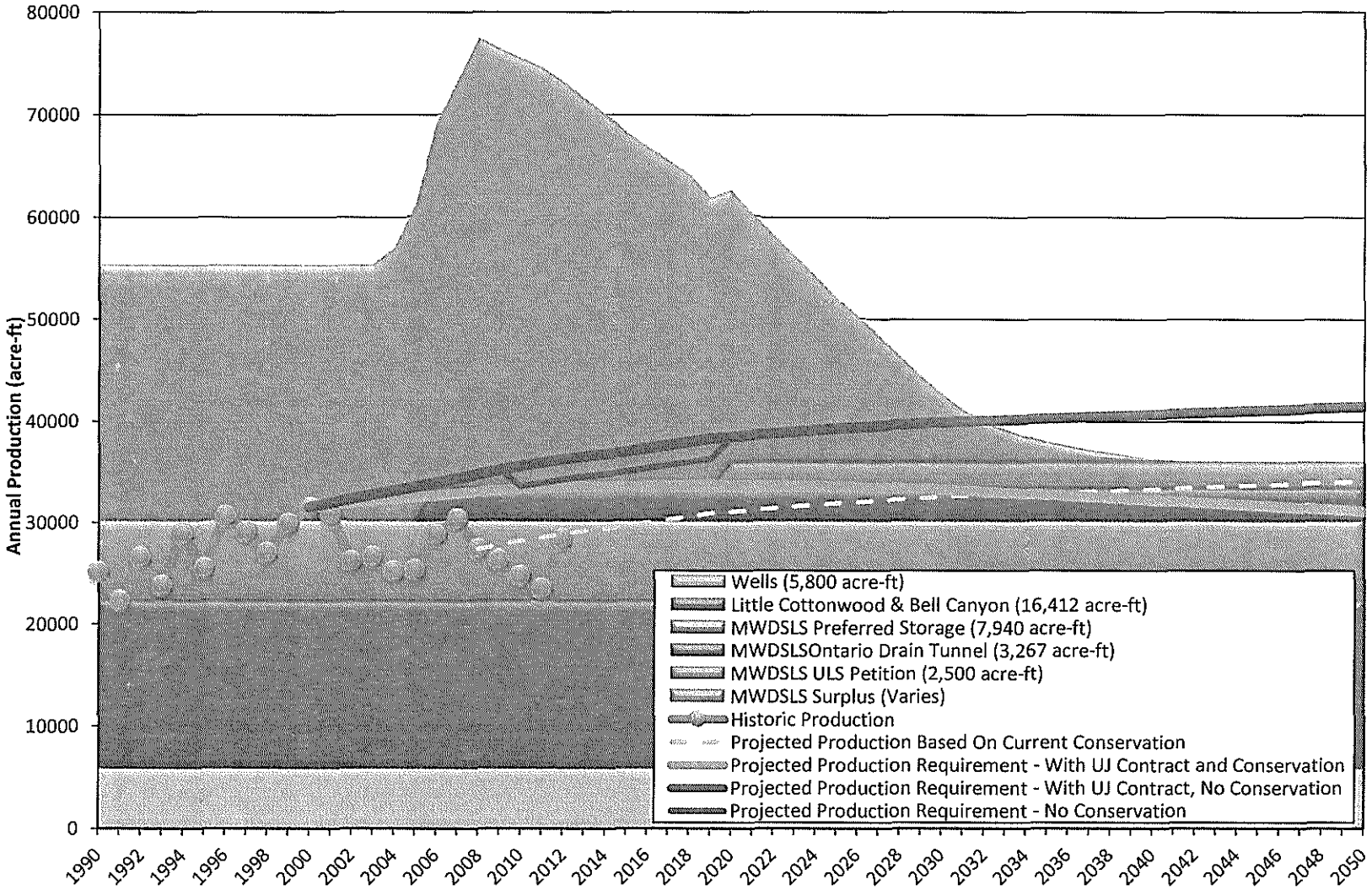
The 2010 Water System Master Plan indicates that Sandy City has adequate supplies to meet water production requirements in average and dry water years through the year 2050 with conservation. Figure 2 plots water production requirements against available supplies through the year 2050 for average water years. Figure 3 plots the same information for dry water years. As can be seen, with the current conservation that has already been achieved by Sandy since 2000, Sandy is projected to have enough water for both dry and average water years.

There are a few issues regarding Figures 2 and 3 that should be noted:

- These figures included both existing and planned sources as currently identified in the City's 2010 Water System Master Plan and Rate Study Update including new sources such as petitioned water through Central Utah Water Conservancy District's Utah Lake System (ULS). More information regarding the projected reliable yields of these sources is contained in the Master Plan.
- Even though Sandy no longer services the Union Jordan area, they are still under contract to provide 2,000 acre-ft through the year 2020 to that area. This additional demand has been included in the figures. The figures also include demand associated with serving the county islands and the Creek Road areas assumed to be annexed by 2020 as discussed above.
- A potential future supply problem facing the City is the potential loss of groundwater rights due to possible restrictions resulting from the Salt Lake Valley Groundwater Management Plan. Although the extent of potential restrictions is difficult to predict, Figure 3 includes the potential loss of approximately 5,600 acre-feet of junior groundwater rights that could be lost by the year 2050. This would reduce Sandy's groundwater rights to approximately 13,700 acre-ft. Figure 2, which is for an average water year, reflects an even greater reduction in the use of groundwater to only 5,800 acre-ft. Sandy does not need to use more than this during average years and has decided to restrict their groundwater use as a way to conserve even though groundwater is typically much cheaper than surface water.

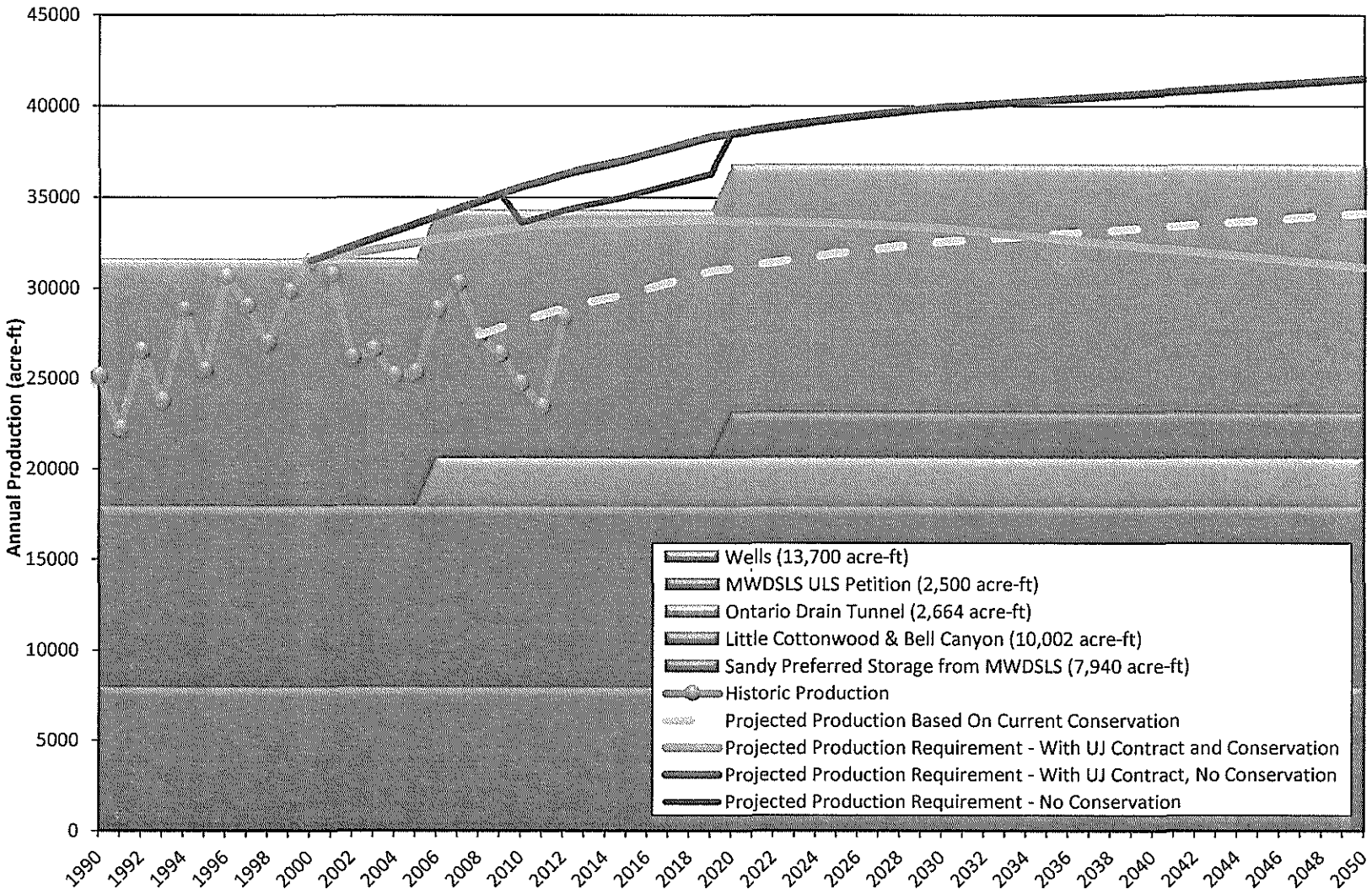
In summary, while Sandy has already achieved a significant amount of conservation since 2000 (approximately 17 percent), they will need to maintain this level to ensure that they have sufficient water through the year 2050. If they can do this, it is anticipated that no additional sources will be required, except as needed for additional redundancy. It should be emphasized that even though Sandy has achieved a large amount of conservation, conservation remains a critical component of Sandy City's future water plans. Metro Water District of Salt Lake and Sandy's (MWDSLS) Master Plan of System Improvements also depends on future water conservation by its member cities to meet demands on its system. As a result, conservation is not optional. The City must reduce its per capita water usage through conservation or it will face significant water shortages in future years.

Figure 2
Sandy Service Area Projected Annual Production Requirements - Average Year



*Production estimated based on historic water production..

Figure 3
Sandy Service Area Projected Annual Production Requirements - Dry Year



*Production estimated based on historic water production..

CONSERVATION POTENTIAL

To quantify the amount of water that can reasonably be conserved in Sandy City, a cursory analysis of current water use patterns has been performed. The following paragraphs discuss the results of this analysis.

Usage among different classes of customers is summarized for FY 2013 in Figure 4. 90 percent of the meters in Sandy City are for residential accounts, accounting for 67 percent of the total water use. Hence, residential water use represents the largest single area for potential conservation.

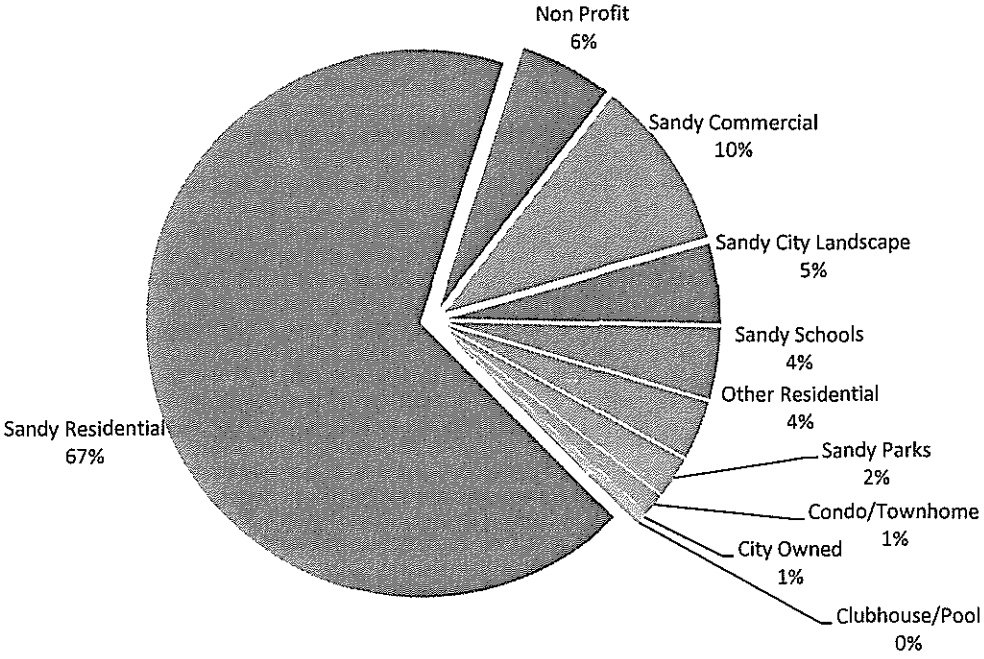
Figure 5 shows residential water use by month during an average year. It divides the water use into two categories, indoor and outdoor use. During the winter months (November through March), the average residential household used approximately 7,260 gallons of water per month. It has been assumed that almost all of this water is used indoors. As it gets warmer in the spring and summer, residential water use rapidly increases, reaching more than 45,000 gallons during the peak month of July. The additional water used during this period is assumed to be outdoor use, mostly for irrigation. Based on these assumptions, it is estimated that 38 percent of total residential water use occurs indoors, with the remaining 62 percent occurring outdoors.

Also shown in Figure 5 is an estimate of the projected level of water use for an average single family residential customer if reasonable water conservation measures were employed. The purpose of including this information is to provide a comparison of actual Sandy City residential use to potential use after conservation. Estimated indoor water use after conservation is based on an average water use of 55 gallons per capita per day (gpcd). This target level of 55 gpcd is based on estimates prepared by the American Water Works Association (AWWA). It is a moderate goal for conservation and only includes conservation measures that do not require significant changes in lifestyle. This includes installing ultra-low water use toilets and shower heads, installing water efficient clothing and dish washers, installing aerators on all faucets, and limiting showers to ten minutes or less. The current indoor water use per person is approximately 70 gallons per day. Reducing indoor use to the target level of conservation could reduce indoor residential water use by 530 million gallons (1,620 acre-ft) annually by the year 2025. This amount of residential indoor water conservation would result in an additional 6.5 percent reduction in system-wide water use.

The values of outdoor water use after conservation, shown in Figure 5, are based on irrigation recommendations from the Utah Department of Water Resources web page. It is recommended that Sandy City residents apply no more than 26 inches of supplemental irrigation annually. This recommendation is based on the most water thirsty of landscapes,

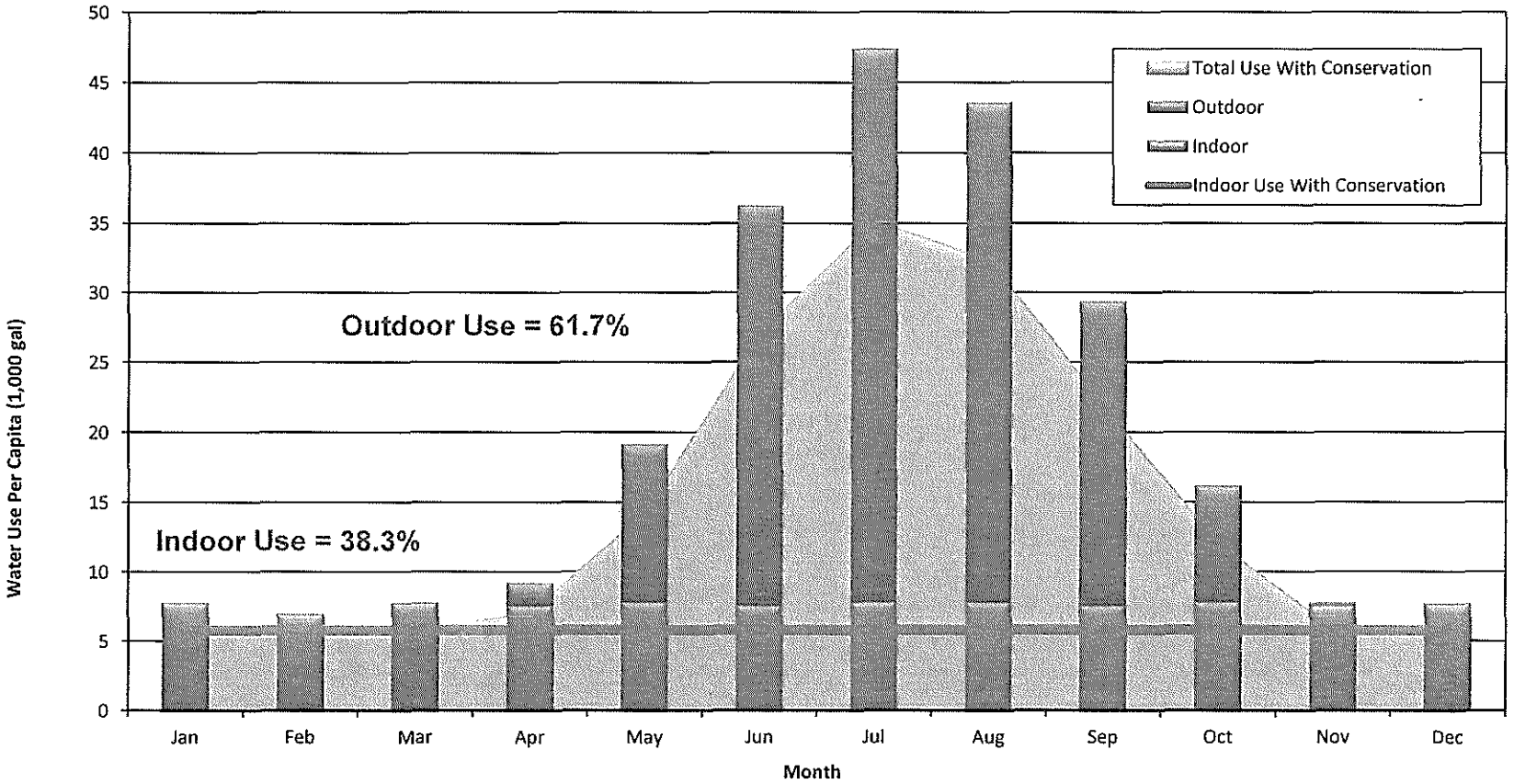
Table 2 2013 Water Usage by Connection Type				
Customer Class	**Accounts[1]**	**% of Connections**	**Annual Water Use[2]**	**% of Total Water Use**
Sandy Residential	22854	91.9%	4,954,363	67.5%
Non Profit	94	0.4%	407,287	5.5%
Sandy Commercial	913	3.7%	737,675	10.0%
Sandy City Landscape	327	1.3%	345,652	4.7%
Sandy Schools	39	0.2%	311,817	4.2%
Other Residential	245	1.0%	255,535	3.5%
Sandy Parks	51	0.2%	178,010	2.4%
Condo/Townhome	296	1.2%	91,978	1.3%
City Owned	35	0.1%	42,728	0.6%
Clubhouse/Pool	24	0.1%	17,172	0.2%
Total	24878	100%	7,342,217	100%

2013 Usage by Connection Type



[1] Based on 2013 Sandy City Meter Records.

[2] In thousands of gallons.



* Estimated outdoor use with conservation is based on watering recommendations from the Utah Department of Water Resources web page. It is based on turf in full sun on sandy soil in Salt Lake County. It is calculated as 26 inches of supplemental irrigation annually over 6736 square feet (average irrigated acreage per Sandy City residents). Additional conservation could be obtained through turf reduction or xeriscaping. Estimated indoor use with conservation is based on a reduction from the existing average indoor use of 67 gpcd to 55 gpcd as recommended by the AWWA Research Foundation, *Residential End Uses of Water, 1999.*

turf in full sun on sandy soil. Using this irrigation recommendation and the estimated Sandy City average irrigated area of 6,736 square feet per residential connection, the total amount of recommended outdoor water per residential account is 109,000 gallons annually. This is in contrast to the 147,500 gallons currently used outdoors by the average Sandy City connection. If outdoor water use could be reduced to the target conservation level, Sandy City could reduce water use by 900 million gallons (2,800 acre-ft) annually by the year 2025 . This is an additional 11 percent reduction in system wide water use. It should be emphasized that this reduction in outdoor residential water use can be achieved simply through correct watering practices. Additional conservation could be realized through turf reduction or xeriscaping.

From the results discussed above, it appears that, even though Sandy has attained a significant amount of conservation since 2000, there is still a significant amount of conservation that could be obtained just through conservation by single family connections. For moderate levels of conservation among single family residential customers only, annual water use in Sandy City can be reduced an additional 17% percent. When conservation in customer class categories other than residential is included, it appears that a reduction in per capita water use between 20 and 25 percent is possible. Although reaching this level of conservation will not require any drastic changes in lifestyle, it will require a concerted effort by City personnel and all consumers in the Sandy City service area.

CURRENT SANDY CITY WATER CONSERVATION MEASURES

As a result of increased awareness, Sandy City has been very aggressive in implementing several conservation measures to reduce water usage. In the State's recently released draft version of the Jordan Basin Water Plan, Sandy City was one of only a small number of cities that had implemented conservation measures under all seven recommended categories identified by the State. Some of these are identified below:

- **Water Meters** – All residential, industrial and institutional connections to the City's water system are metered. The City also meters water that is used in public areas such as parks and streetscapes. Sandy City has budgeted for the replacement of 12.5% of their meters every year, so that all meters are replaced every 8 years.

- **Pipeline Corrosion Protection** – Sandy City requires the installation of corrosion protection on all ductile iron pipes in acidic soil. This measure is designed to reduce leaks in pipelines.

- **Conjunctive Use of Surface and Groundwater** – Sandy City, by having membership in the MWDSLS, more efficiently utilizes surface waters when available and only uses groundwater supplies during periods of peak demand.

- **Public Education** – Sandy City constructed a xeriscape demonstration garden called Sego Lily Gardens in 1999 at its Zone 5 water tank site to illustrate landscape practices that conserve water. The gardens are open to the public

during the warm weather months. The gardens provide an opportunity for the City to inform the public of low-water use plants that are available and landscaping techniques that promote water conservation. In addition, the City and its residents are able to learn, by first hand experience, which plant varieties and irrigation methods are the most effective at providing an aesthetically pleasing yet water saving landscape for the various soils in the area.

- **Seasonal Rate Structure** – In December 2010, the City Council adopted a new water rate structure intended to provide an incentive for water users to conserve. The key element of the rate structure is an increased peak season overage rate during the months of June through October. The rate structure charges approximately 80 percent more for water during this period than during the winter months. The goal is to reduce peak system demands and reduce the waste of water on outdoor landscaping uses.

- **Monthly Billing** – As part of the implementation of the water rate structure in 2003, the City opted to begin billing customers on a monthly basis. The City has also acquired automated meter reading equipment that makes it easier to read the meters. Historically, the City billed on a bi-monthly basis. Monthly billing allows consumers to receive more frequent feedback on their water use habits and adjust their use accordingly.

- **Water Conservation Coordinator** – In 2002, the City hired a water conservation coordinator. Other staff members have also been hired with horticultural training and a specific emphasis on institutional water conservation. The duties of the water conservation staff include acting as park visitor guides at Sego Lily Gardens, developing conservation education material, and reviewing all landscape and irrigation plans for commercial development. The water conservation coordinator also gives presentations on conservation to community groups (schools, churches, businesses, residents, etc.). This position is now a part of the Support Services Manager's duties.

- **Expanded Public Education Program** – Sandy City has greatly expanded their public education program in recent years to include a number of new components:

    - ***"Slow the Flow" Campaign*** – Sandy City has provided financial support to the "Slow the Flow – Save H2O" water education campaign. This campaign is run by the Governor's Water Conservation Team in conjunction with districts and municipalities in the State to provide water education information, irrigation system water checks, advertising campaign, and related conservation efforts.

    - ***Water Conservation Education Program*** – Sandy City also supports a program to educate school-aged children about water and the importance of conservation. This program is specifically designed to motivate children to use water wisely and grow up with a conservation ethic. It is hoped that

this effort will motivate the children to encourage their parents to use water more wisely as well.

- ***Improved Xeriscape Demonstration Gardens*** – In 2002 and 2003, the Sego Lily Gardens were divided into different landscaped areas, each with separate metering. This allows water use to be measured for specific landscaping themes. It also provides more opportunities to exhibit various water wise plants and irrigation systems. In 2008, the Garden underwent a five year redesign to enhance citizen education.

- ***Water Conservation Classes*** – Water conservation classes are offered at Sego Lily Gardens. Topics discussed at the classes include low-water use landscape design, irrigation systems, varieties of turf, low-water use plants, and native plants. All classes are free to the public and held at the two annual fairs.

- ***Sandy City Newsletter*** – The City has utilized the City newsletter to educate and inform the public regarding conservation and other water issues. The City also advertises the garden fairs in these newsletters. The garden fairs offer free classes taught by experts on various topics.

- ***Water Conservation Web Site*** – On the Sandy City web site, there is a page devoted to water conservation at http://sandy.utah.gov/government/public-utilities/water-conservation.html. It provides conservation tips (both indoors and outdoors), announcements, pictures, and links to other water conservation related sites. There is also a dedicated page for Sego Lily Gardens (http://www.sandy.utah.gov/segolilygardens).

- ***Free Water Saving Material*** – The City has distributed water saving material to schools, community groups, and during events at Sego Lily Gardens. The material includes an indoor and outdoor water conservation kit, soil probes, and other educational information. The water conservation material is also sent to individual water users upon request. The City also works with Metropolitan Water District of Salt Lake and Sandy in a joint conservation team that includes the development and distribution of a water conservation calendar to businesses, schools, and other entities.

- ***Conservation Programs and Forums*** – Sandy City is actively involved with Water Week; including holding garden fairs at Sego Lily Gardens. Sandy City is also involved with the Utah Water Conservation Forum that reaches out to water conservation professionals across the state. Sandy City Public Utilities has actively been a supporting sponsor of the Sandy City Beautification Committee and their efforts to encourage wise water use and maintenance of landscapes throughout the city. Public Utilities

provides awards that are given to 12 citizens each year for wise water use and well maintained landscapes.

- **Line Replacement Program** –The City has a water fund budget for pipeline replacement. Funds reserved for this purpose will be used to replace old and failing water lines in the Sandy City water system. In addition to maintaining the system in good working order, it is hoped that this effort will reduce the number and severity of water leaks in the system.

- **Irrigation Restrictions** – Sandy City has coordinated with other water agencies to develop a six-phase water restriction protocol to be implemented in times of drought or other water emergencies. In December of 2001, The City Council adopted an ordinance specific to the Sandy City water system that permanently restricts sprinkler irrigation between 10:00 a.m. and 6:00 p.m. for all water users. Violations of this ordinance are generally met with friendly reminders from the City, but the ordinance does allow the City to assess fines to chronic violators. To date, the City has received adequate responses from violators and has not fined anyone.

- **Water Efficient Landscape Ordinance** – In January of 2002, the City Council adopted the Water Efficient Landscape Ordinance. The ordinance requires new commercial and multifamily developments, as well as new City-owned properties, to submit landscape and irrigation plans during the development review process. The plans are required to be designed by certified professionals in both landscape and irrigation systems. The landscaped areas of the new developments are required to meet certain irrigation system efficiency standards once installation is completed. In addition, water conserving plants are now required for slopes greater than 30 percent. The developments must also pass a water audit once the irrigation systems have been installed.

- **Conversion of Public Landscapes** – Many changes have been implemented in the landscaping of public areas. The Parks and Recreation Department is experimenting with the conversion of streetscapes to bark and/or low-water use trees and plants. At Flat Iron Park, the Parks Department has planted trees and shrubs on several inclines. Water use in these areas will be restricted once the plants are established. At the 40-acre Hidden Valley Park, only 2 acres are planted with turf, with native plants being used in the remaining area. Several detention basins have been re-landscaped with drought tolerant plants. City Hall has been landscaped with water wise plants and irrigation systems.

Aquifer Storage and Recovery Aquifer storage and recovery (ASR) refers to the concept of increasing groundwater supplies by increasing recharge to the aquifer. The concept utilizes underground storage capacity in the aquifer. During high spring flows, when the available flow in Little Cottonwood Creek, Bell Canyon Creek, and the Provo River exceed demand, a portion of the flow could be infiltrated into the ground at proposed new vadose well sites. A portion of this

water could then be withdrawn in the summer months when the water is needed. Additionally, excess water stored in wet years could be withdrawn in dry years. It has been estimated that approximately 8,970 ac-ft of water would be available for infiltration during average water years. Issues that need to be addressed include plugging of the vadose wells, permitting with the State of Utah, defining the amount of water that can be withdrawn versus what is stored, and the overall cost of infiltration and recovery of the water. The City is currently investigating ASR sites for Little Cottonwood creek water at Dimple Dell Park and Quail Hollow Park. The City is also investigating the possibility of using ASR with raw water from Bell Canyon Creek.

- **Water Audits** – Since December of 2001, Sandy City has worked at identifying which water users use excessive water on their landscape compared to plant needs. For those users with excessive water use, Sandy City will provide information and resources to help in their efforts to save water. Over the last five years, Sandy City has provided water audits to 170 residents and 20 commercial connections. Users may also request water audits through the "Slow the Flow" conservation campaign.

- **Water Conservation Hotline** – Sandy City has a water conservation hotline that was created in 2001. This hotline allows residents to report violations of irrigation restrictions and to ask questions regarding water conservation.

- **Charging True Water Costs to All Water Users** – In the past, Sandy City has not charged City departments the true cost of their water. For example, the Parks Department paid an annual charge based on a budget number rather that the amount of water actually used. Although the Parks Department has traditionally done a commendable job of managing their water use, not charging the true cost of water gave the department little motivation to conserve. This policy has been changed and City departments are now charged based on actual consumption.

- **Park Computerization** – All of the City's parks have been equipped with automatic irrigation systems. The larger parks have been equipped with systems that monitor daily weather reports and adjust output at each zone to maximize irrigation efficiency.

Most of the conservation measures documented above attempt to conserve City water through reductions in demand. In addition to these demand side conservation measures, Sandy City has also made efforts to conserve City water through improved use of sources on the supply side:

- **Improved Utilization of Bell Canyon Creek Water Right.** Sandy City has rights in Bell Canyon Creek that have historically been utilized principally for flood irrigation through an aging ditch system. While some of the water was historically treated by JVWCD through the South East Regional Water Treatment Plant (SERWTP), capacity limitations at the plant limited use of this source for

potable purposes. With MWDSLS's expansion of the Little Cottonwood Water Treatment Plant (LCWTP) and recent improvements completed by the City, Bell Canyon water can now be diverted to Little Cottonwood Creek and then treated at the LCWTP (whether directly or by exchange). During dry-year conditions, 863 acre-feet of new useable water is estimated to be available through Sandy City's water rights in Bell Canyon Creek. The City has also facilitated the enclosure of the historic open ditch system operated by the Bell Canyon Irrigation Company. This conservation measure is saving hundreds of acre-ft previously lost through seepage and evaporation from the ditch.

- **Expanded Use of Little Cottonwood Creek Water Rights**. Sandy City has primary water rights in Little Cottonwood Creek, some of which are treated by MWDSLS, in their LCWTP. These water rights generally allow for Sandy City utilization of approximately one-third of the Little Cottonwood Creek discharge. Little Cottonwood Creek experiences its highest flow rates in May, June, and the first part of July. Because of past limitations in diversion capacity, some of these water rights have not historically been fully utilized. Over the last several years, however, MWDSLS has made a number of improvements to the LCWTP. This includes upgrading the capacity of LCWTP to 150 mgd and eliminating historic diversion bottlenecks. With the LCWTP improvements, Sandy City can now utilize more of its creek water rights in the spring and save their MWDSLS water stored in Deer Creek for later in the summer season.

Drought and Water Emergency Measures

In addition to its efforts to achieve long-term water use reductions through conservation, Sandy City also has a plan for reducing water consumption in times of drought or other water emergency. The current Sandy City drought and water emergency policy consists of two major components. First, Sandy City is a member agency of the Salt Lake Valley Conjunctive Management Team. This team consists of the water directors of Sandy City, Salt Lake City, MWDSLS, and JVWCD. During a water emergency, this team convenes to pool resources that can be used to resolve the emergency.

The second component of Sandy City's water emergency policy is the *Contingency Water Restriction Plan.* This plan was originally adopted in 1992 and revised in 2001. It consists of six phases of water restrictions[1].

Phase I	Request selected large users (parks, golf courses, churches, schools, and local government) to modify their water use to reduce demand in the distribution system.
Phase II	Request residents avoid wasteful water use practices.
Phase III	Restrict outdoor watering between 10 a.m. and 6 p.m.
Phase IV	Request voluntary reduction of water usage (amount to be determined).
Phase V	Mandate a reduction of water usage (amount to be determined).

[1] From the 1996 Sandy City Water Management and Conservation Plan

Phase VI Mandatory reduction with enforcement.

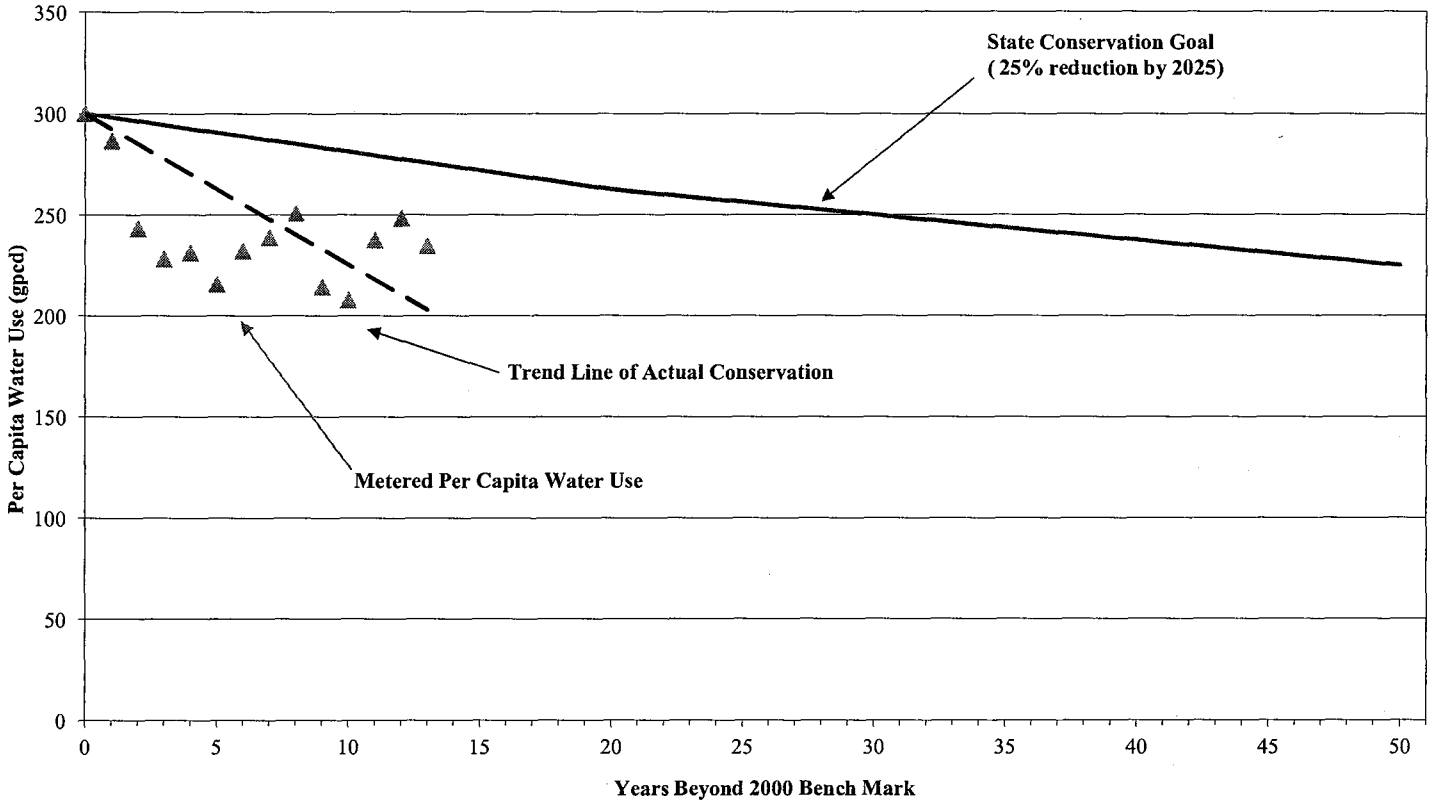
It is recommended that Sandy City continue to periodically review its preparation for drought and other water emergencies.

Current Conservation Status

Through the conservation efforts described above, Sandy City has already seen a significant reduction in per capita water use. This can be seen in Figure 6, which shows a reduction in per capita water from 285 gpcd in 2000 to 237 gpcd in 2013. This is a reduction of 17% and is well ahead of the State's conservation goal. Per capita water use will continue to be monitored in the future to measure the City's success in achieving its goals.

Figure 6 - Sandy City Conservation Trend

Documentation of Conservation Performance
Metropolitan Water District of Salt Lake and Sandy



POTENTIAL WATER CONSERVATION MEASURES

This section presents potential water conservation measures that can be implemented by Sandy City in addition to their current conservation efforts. These potential measures are based on a review of the 1996, 2003 and 2010 master plans, a review of conservation activities performed by Sandy City since those master plans were completed, a review of MWDSLS' Master Plan of System Improvements, and the City's 2010 water system master plan updating process. The measures are with the demand side of conservation (projects that attempt to conserve water by decreasing demand).

Measures currently being considered

All of the potential conservation measures currently being considered by Sandy City can be grouped into three basic categories:

Mandated Conservation – This category includes any measure or ordinance that requires residents and businesses to implement water conservation measures. Examples of water conservation measures in this category include the City's Water Efficient Landscape Ordinance and the ordinance requiring ultra-low water use toilets in all new construction. Outdoor irrigation restrictions would also fall into this category.

Pricing – This category refers to any measure affecting the price of water that is designed to encourage conservation.

Public Education – This refers to any method of distributing information among residents and businesses to aid in their personal efforts to conserve water. This includes the vast majority of programs currently being implemented in Sandy City and in neighboring communities.

Sandy City currently has conservation programs in all three of the categories described above. Hence, there are very few new programs the City can start to encourage conservation. Instead, it is recommended that the City increase its conservation effort by expanding and improving its existing conservation programs. Ideas for improvement in each of the three categories listed above are discussed in the following paragraphs.

Mandated Conservation

- Expanded City Ordinances Regarding Water Conservation

Pricing

- Frequent Conservation Rate Structure Updates and Improvements

Public Education

- Expanded Water System Audits

- Continued Public Education Efforts

These conservation measures are discussed in detail in the paragraphs that follow. Because of the inter-related nature of demand side conservation measures, the amount of water that will be saved by each individual program cannot be calculated with any degree of accuracy.

Expanded City Ordinances Regarding Water Conservation. The City has made an important first step in issuing the Water Efficient Landscape Ordinance for new commercial and multifamily developments. The City will periodically review this ordinance to identify additional modifications to that may offer additional opportunities for conservation. As the City is mostly built-out, it is anticipated that these will focus on water checks and audits to help existing customers reduce use. Other methods should be evaluated to help the City find the best approach to helping existing customers. The City should also update their Conservation Plan at least every five years and have it adopted by Ordinance. As part of the adoption, the City will need to hold a public hearing.

Frequent Conservation Rate Structure Updates and Improvements. Sandy City adopted a conservation oriented water rate structure in 2002.

It is a seasonal rate structure that charges more for water during the summer months to discourage outdoor water use. All indications are that the adopted rate structure has had a positive influence on encouraging conservation by Sandy City customers. Although this rate structure is more conservation oriented than the previous Sandy City rate structure, there are a number of rate structures that are even more aggressive in terms of conservation. As part of future rate studies, the City should continue to explore the most conservation oriented rate structures. These rate structures were not adopted at this time because of residents' current attitudes regarding conservation and because of the difficulty in administering these types of rate structures. As attitudes regarding conservation change and as the City's capacity to administer complicated rate structures increases, the City could consider adopting one of the more aggressive conservation rate structures.

Expanded Water System Audits. The "Slow the Flow" program offers audits to water users. The audit includes checking sprinkling systems. After the audit, the program offers suggestions to improve water use efficiency. As resources are available, audits should be expanded to more water users. The City is beginning to identify large users including schools, parks, and churches with large landscaped areas, and then calling them to offer audits. This will include residential customers as well.

Continued Public Education Efforts. Sandy City currently supports many water conservation programs such as the "Slow the Flow" water conservation campaign and the Water Conservation Education Program. Sandy City needs to remain active in public education on water conservation to sustain a long-term reduction in water use. Potential additional public education efforts may include:

- **Increased Advertising of Lending Library with Water Conservation Materials.** Public education could be enhanced by making educational videos

about water conservation available for loan. This would give residents who are unable to attend existing conservation classes the opportunity to learn new conservation techniques at home.

- **Expanded Web-Based Information.** For many people, the Internet is now their primary source for information regarding water conservation. Additional resources should be committed to expanding the conservation information currently provided on the City's web site or providing links to other conservation websites.

CONCLUSIONS AND RECOMMENDATIONS

In order to meet projected future demands, Sandy City must promote water conservation to its customers. Many consumers have traditionally been hesitant to conserve water because they perceive that significant water conservation will only be achieved through major changes in lifestyle. Sandy City water use records suggest that this is not necessarily true. Although some conservation measures do require lifestyle changes, there is enough water currently being wasted that Sandy City can likely achieve its conservation goals through fairly modest conservation efforts.

Recommended Conservation Alternatives

To achieve its conservation goal of a 25 percent reduction in per capita water use by the year 2025, Sandy City needs to continue to actively encourage conservation. The following actions are recommended to enhance Sandy City's existing conservation program:

Implement Supply Side Conservation Recommendations. This report detailed a number of supply side conservation programs. While these conservation measures are recommended, they are not currently a critical part of the City's current master plan. Any new water resulting from aquifer storage and recovery (ASR) programs will be used to support groundwater rights that may be restricted as part of the Salt Lake Valley Groundwater Management Plan. The City is currently investigating ASR sites at Dimple Dell Park and Quail Hollow Park.

Meter Replacement Program. In an effort to ensure that customer meters remain accurate, the City is working to develop a meter replacement program. Currently, the City has established a goal of replacing meters every eight years.

Implement Frequent Conservation Rate Structure Updates and Improvements. Of all the demand side conservation recommendations listed above, the most influential will be the development of an effective conservation rate structure. Various studies have shown that people will only conserve water when provided a financial incentive to do so. The City has taken an important step by implementing a conservation oriented rate structure. By implementing a seasonal rate structure, Sandy City is providing a financial incentive to its customers to conserve water. Sandy City should monitor the effect of this rate structure on water use and look for ways to gradually improve the rate structure.

Review City Ordinances Regarding Landscaping and Water Conservation. The preferred method of motivating consumers to conserve water is through effective pricing as discussed above. A less preferred method of motivating consumers to conserve water is the use of conservation ordinances. Public acceptance of measures mandating conservation is generally low. Measures such as outdoor irrigation restrictions are often met with great resistance and can actually result in increased water use. Sandy City has already considered a number of ordinances and has adopted a commercial landscaping ordinance. It is recommended that Sandy City periodically revisit existing landscaping ordinances and eliminate any provisions that may hinder consumers' efforts to conserve.

Continue Public Education Efforts. The two previous conservation categories are mainly designed to provide incentives to consumers to conserve water. Once consumers are effectively motivated to conserve water, Sandy City should focus on providing information and support to water users as they individually examine ways to conserve water. The public education measures described in this report will help accomplish this task. These measures should be implemented or expanded as finances and time permit.

Financial Effects of Conservation

Conservation can have several positive financial effects for a water supply agency. Conservation may postpone or completely eliminate capital projects associated with growth. It can also reduce the water rights a municipality must require. Unfortunately, conservation also has certain financial drawbacks. Water agencies derive large portions of their operational budgets from water sales. Reductions in water usage due to conservation can significantly reduce the agencies' total income. Fortunately, there are several ways a water agency can minimize the adverse financial effects of conservation. The following actions are recommended to keep the water fund in good fiscal health while continuing to encourage conservation:

Separate Fixed vs. Variable Costs. The costs associated with water treatment and delivery can generally be divided into two categories. Fixed costs are expenses that do not vary with the amount of water sold. They include facility construction, water rights purchasing, administrative costs, etc. Conversely, variable costs are expenses that are solely dependent on the amount of water sold. They include water purchases from outside agencies, pumping costs, etc. To the extent possible, fixed and variable costs should be separated during the rate making process. Fixed costs should generally be recovered through the monthly base rate charged to customers, while variable costs should be recovered through volumetric charges. This is the basic approach followed in the rate study in the Master Plan.

Provide For Conservation In Rate Model. The rate model presented in the Master Plan calculates future water rates based on water sales projections. The effect of conservation on the water fund's finances can be minimized by reducing water sales projections by the amount of anticipated conservation. If the amount of conservation can be accurately predicted, conservation will have no effect on the water fund's

bottom line. The difficulty of this approach, of course, is accurately predicting conservation rates in the model. If too much conservation is predicted, the water users are saddled with higher water rates than needed. If not enough conservation is predicted, water sales revenue will be inadequate to meet revenue requirements. Actual water use should be monitored closely and the rate of conservation adjusted as necessary.

Implement Conservation Programs Incrementally. Conservation measures should be implemented with a staged approach designed to curtail growing water usage but not drastically reduce overall water sales or revenues to the water agencies. By implementing these programs slowly, the City will have sufficient time to perform periodic financial reviews and make adjustments as needed.

Perform Frequent Rate Model Updates. Because of the difficultly in accurately predicting future conservation efforts, the rate model included in the Master Plan should be frequently updated (once every two or three years). Frequent updates will allow the City to closely monitor water use and make adjustments in the rate schedule as needed. Experience has shown that customers are generally reluctant to change their water use habits. Reductions in water use due to conservation efforts usually occur in small annual increments. As long as the City commits to performing frequent rate model updates, conservation should never result in large revenue shortfalls.