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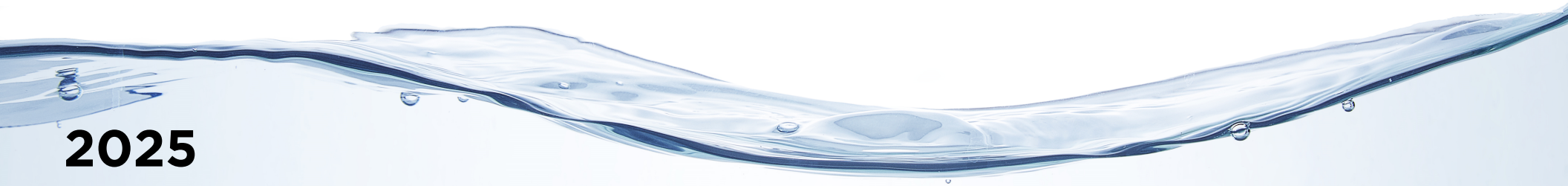

2025

SALT LAKE CITY WATER CONSERVATION PLAN

Public Utilities

CHAPTER ONE: SUPPLY AND DEMAND

CHAPTER TWO: HISTORICAL WATER USE

CHAPTER THREE: CONSERVATION GOALS

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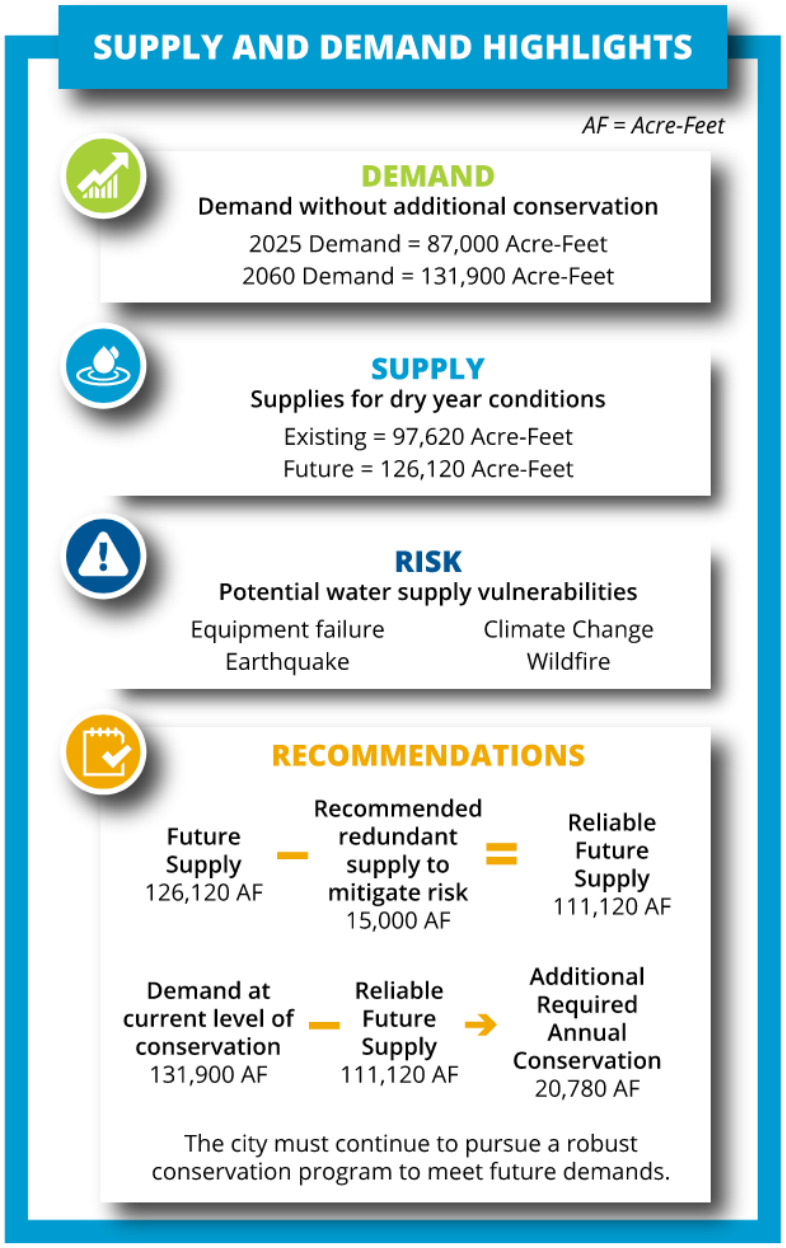


CHAPTER ONE: SUPPLY AND DEMAND

1.0 Introduction

Salt Lake City Department of Public Utilities (Department or SLCDPU) retained Bowen Collins & Associates (BC&A) to complete a supply and demand master plan for its water system[1]. The purpose of that study was to compare the availability of water supplies to the existing and future demands on the system. The results of that study are meant to guide the Department's decisions regarding supply management and development, as well as inform the Department's decisions regarding demand management, including the establishment of conservation targets. Key elements of that study are summarized here to ensure consistency within the Department's multiple planning processes.

The details contained in this chapter are derived nearly entirely from the *Salt Lake City Water Supply and Demand Master Plan, 2019* (*Supply and Demand Plan*), including service area, demand projections, current and future water supplies, water supply risks, and recommended actions. As summarized in the highlights to the left, future demand (without additional conservation) will outpace future supply by approximately 14 percent, owing in part to anticipated growth. A number of potential risks have been identified, though impacts from climate change bring the widest range of variables and may alter both water supply and demand projections.

A number of strategies have been identified to meet this potential water supply shortfall. One strategy already in place is to plan for reserve water supplies through the use of operational and planning practices. Continued research related to climate change will improve our understanding of supply and demand impacts, lessening uncertainty. Lastly, and the subject of this plan, is to expand an already robust conservation program by improving our understanding of water use behaviors and patterns to further enhance water conservation efforts and meet newly established demand reduction goals.

[1] *Salt Lake City Water Supply and Demand Master Plan*, Bowen Collins & Associates, February 2019

1.1 Salt Lake City Public Utilities Service Area

Salt Lake City (City) currently provides all retail water service within Salt Lake City corporate boundaries. It also provides retail service to portions of other communities on the east side of the Salt Lake Valley. This includes portions of South Salt Lake, Mill Creek, Holladay, Murray, Cottonwood Heights, and unincorporated Salt Lake County. The service area is shown in Figure 1-1 with a larger, more detailed map included in the appendix to this plan.

The Utility service area is shown in pink. It should be noted that there are two private water providers completely surrounded by the City's service area. The University of Utah (shown in red) and Holliday Water Company (shown in blue) have their own sources and distribute water within their respective service areas. They also purchase water from the Utility, with that purchased water included within this analysis.

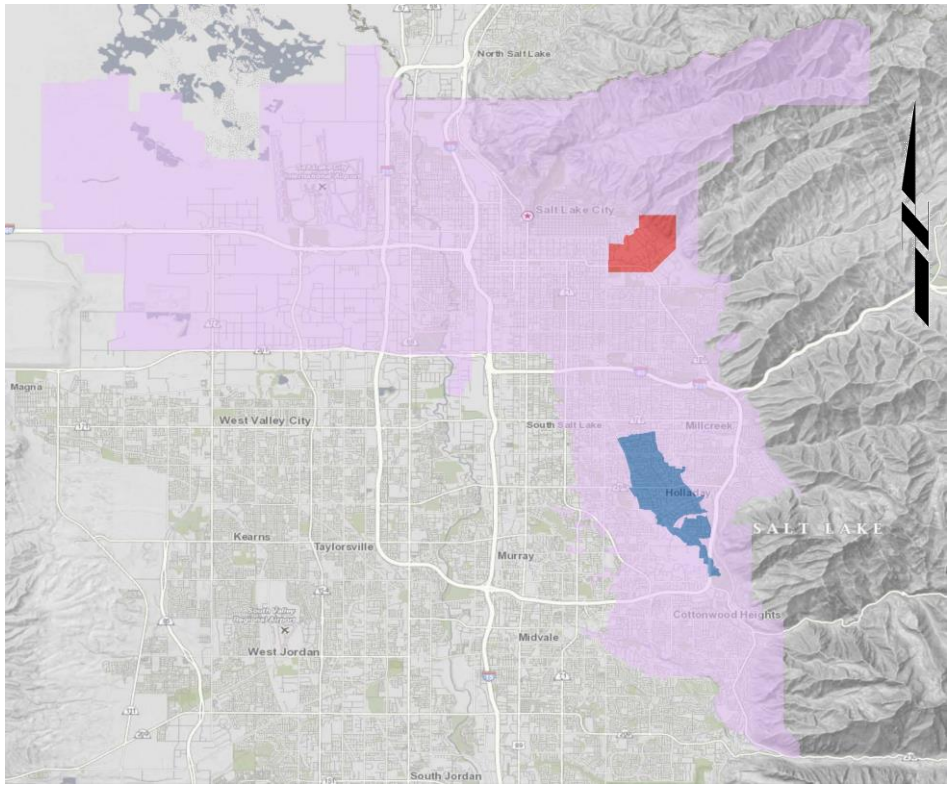
1.2 Demands on the Water System

When discussing water demand, system water volume is measured either as production or water sales. Water supply needs are typically discussed in terms of production, where water demand is assessed by analyzing water sales.

Water Sales. Water sales (sometimes referred to as "water use") refers to the amount of water metered at the point of connection to customers. This total amount is reported to the State of Utah Division of Water Rights and Central Utah Project (CUP) annually for tracking water use and conservation progress. Because of the more detailed information available regarding individual water customers, water sales are used for calculating use and reduction values in Chapters 2 and 3.

Production. Evaluation of supply is based on demands on the water system expressed in terms of production requirement. The production requirement is the amount of water that must be produced at wells and treatment plants, and be purchased from wholesale providers, in order to meet the entire water supply and water storage needs of the system and our customers. Water sales do not represent the full volume of water within the system. Inherent in any system is water loss, which is the difference between produced water and authorized consumption. This water loss may be real losses (such as leakage, unmetered authorized uses such as firefighting water, and storage tank overflows) and apparent losses (such as meter inaccuracies at the point of delivery, data errors, or theft of water).

Figure 1-1
Water System Service Area



As future production requirements are evaluated, there are limitations in making these projections. We cannot predict actual demand, but we can project future use by evaluating select demographic factors. This information then informs projections of total water use.

Water production requirements in the service area were estimated by first developing projections for the four characteristics predictive of demand as shown in Figure 1-2:

- Residential Population to predict residential indoor use;
- Employment Population to predict commercial and institutional indoor use;
- Industrial Area to predict industrial uses; and
- Irrigated Area to predict outdoor use for all water user classifications (residential, commercial, institutional, and industrial).

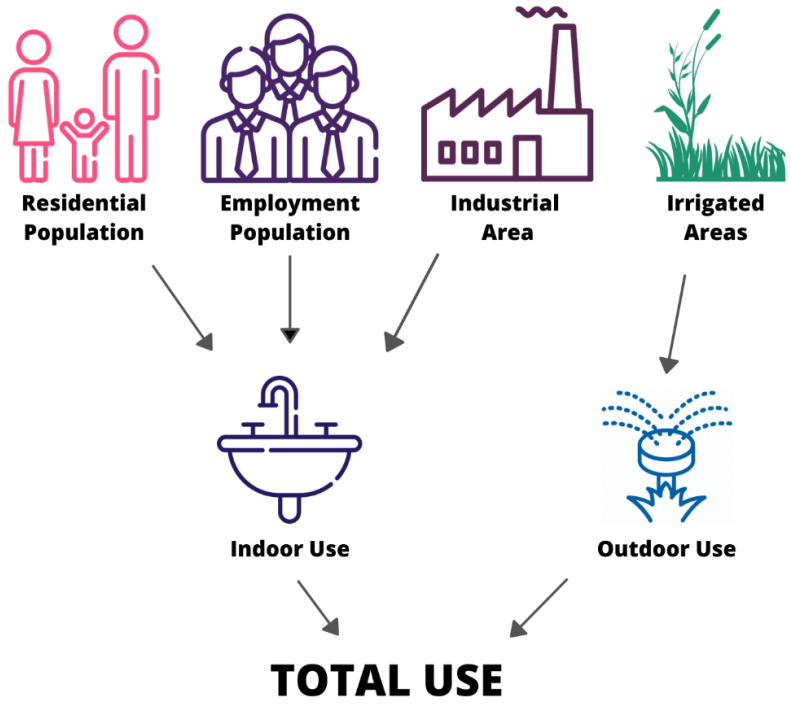
The water production for each characteristic was projected with respect to anticipated growth and development. The predictions of system growth are based on planning data (e.g. SLC zoning maps), regional planning data (e.g. U.S. 2010 census and Wasatch Front Regional Council growth projections), and coordination with City officials. For additional detail, please refer to the *Supply and Demand Master Plan.*

With growth in each component projected, it is then possible to model future indoor and outdoor water use:

Indoor Use. For most indoor use, it was determined that water demand could be reasonably estimated using residential population (to project residential water use) and employment projections (to project commercial and institutional water use). The only type of indoor use that did not appear to be well represented by these two parameters is industrial use. For industrial demands, water use was projected based on total developed industrial area.

Outdoor Use. Outdoor use was determined by evaluating estimated total irrigatable area multiplied by historical outdoor water use. This was initially estimated to be 3.5 AF/acre (or 42 inches of water per season) in 2001,[2] but has gradually decreased to an estimated current use of 2.66 acre-feet (32 inches of water per season).[3]

FIGURE 1-2
DEMOGRAPHIC FACTORS PREDICTIVE OF DEMAND



The final step of projecting demands is to combine the projected indoor and outdoor water demand.

[2] Per 2001 irrigation water use data. See *Salt Lake City Water Supply and Demand Master Plan*, p2-9

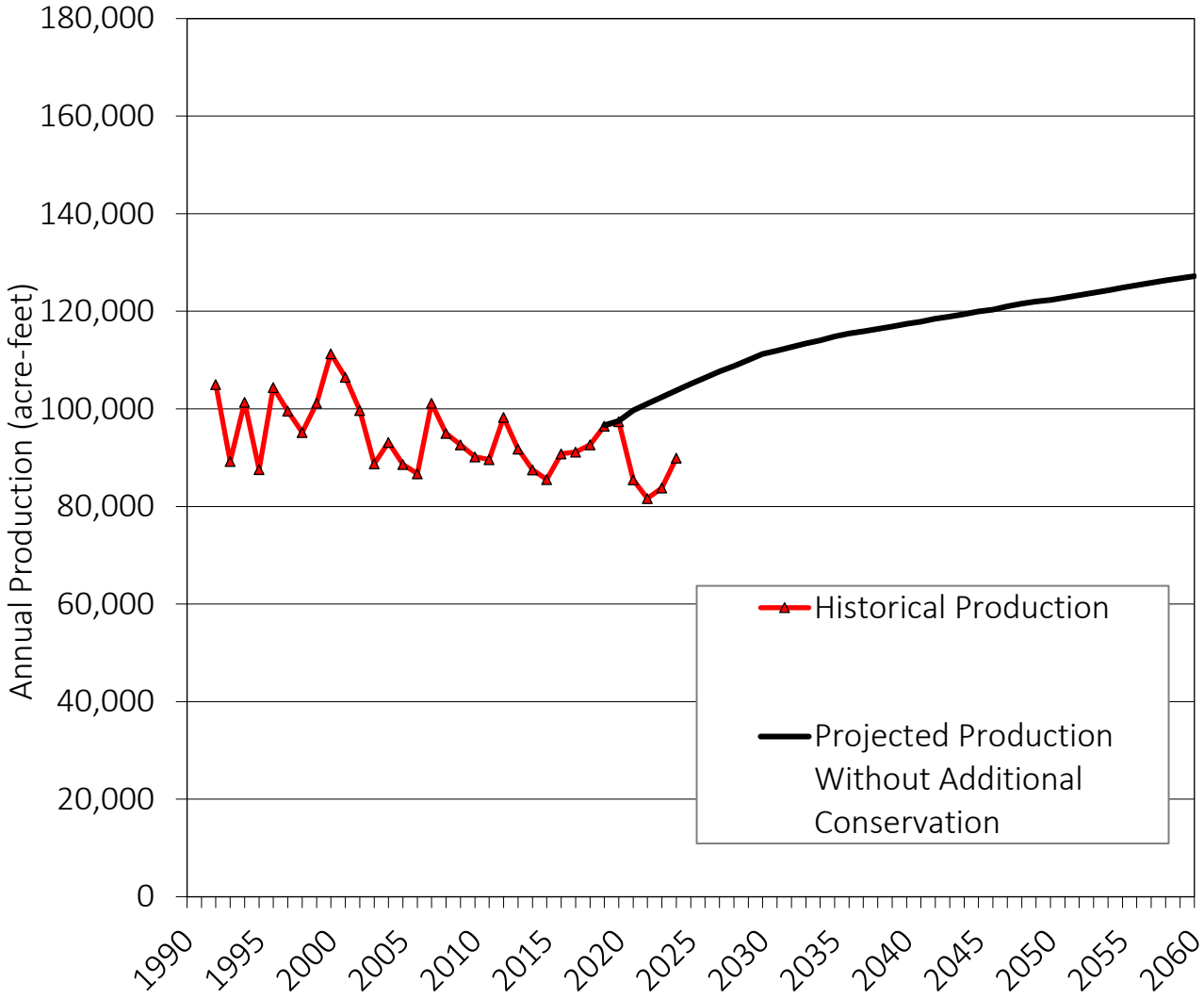
[3] Per recent water use data (2022-24). See Chapter 2. Please note that these values are for water production. Actual application rate at the point of delivery (including system losses) will be 10 to 12 percent less.

The outcome of this analysis is displayed in Figure 1-3, which shows the historical and projected water production requirements in terms of annual production. This projected water production is based on expected demands if no additional conservation is achieved beyond what has been accomplished to date. Without increased levels of conservation, required production is expected to increase from 87,000 acre-feet today to about 127,200 acre-feet by the year 2060, or roughly a 34% increase in production to meet population growth over the next 40 years.

1.3 SLCDPU Water Supply

The City has a number of existing water sources and is also planning future supplies. Like nearly all water sources, the water produced is tied to precipitation. As intuition would suggest, in years with above average snow and rainfall, sources almost always produce more, and sometimes a lot more. Conversely, in dry years, sources usually produce less water. Consecutive dry years can exacerbate pressures on supplies and result in reduction in source water. This reduction can then be compounded by increased demands due to hotter and drier periods. Water demand management during times of drought is addressed in the *Drought and Water Shortage Contingency Plan*, which can be found on line at www.slc.gov/utilities/conservation. Available water associated with both existing and future sources for both average and dry water years is summarized in the following sections.

Figure 1-3
Projected SLCDPU Service Area Annual Production Requirements



1.3.1 EXISTING SOURCES

The existing water supply comes from a number of different sources, and for planning purposes, have been grouped into three categories:

Surface Water Sources. Salt Lake City and the Department hold water rights for a number of surface water sources. This includes surface water treated at the following utility-owned and operated treatment plants: Big Cottonwood Water Treatment Plant (BCWTP), Parleys Water Treatment Plant (Parleys WTP), and City Creek Water Treatment Plant (CCWTP). This category also includes portions of surface water in Little Cottonwood Creek. This water is treated at Little Cottonwood Water Treatment Plant (LCWTP), a plant owned and operated by Metropolitan Water District of Salt Lake & Sandy (MWDSLS). Expected yields for each source based on historic flow records, available storage, and available treatment capacity at each of the plants are summarized in Table 1-1.

TABLE 1-1
PROJECTED ANNUAL YIELD OF SLCDPU SURFACE WATER SOURCES

Source	Average Year Yield (acre-feet)	Dry Year Yield (acre-feet)	Comments
BCWTP	22,000	18,900	Dry Year in 2015
Parleys WTP	11,200	3,100	Dry year based on firm yield of Little Dell Reservoir
CCWTP	5,950	4,500	Dry Year in 2015
LCC (LCWTP)	20,350	14,320	Dry year in 2015
Total	59,500	40,820	

Groundwater Sources. Salt Lake City and the Department hold water rights for a number of groundwater sources. For evaluation purposes, groundwater sources have been broken into two categories:

Base Wells and Springs. The City has several springs and artesian wells that require little or no pumping. Water from these sources is used year-round. The estimated average production of these sources is 7,500 acre-feet per year. This is for both average and dry water years.

Peaking Wells. All remaining ground water sources are generally used only during the summer months to meet peak demands. Annual water production from these wells will vary significantly based on needs, but has an estimated maximum of 10,400 acre-feet.

Preferred Storage Rights through Metropolitan Water District of Salt Lake & Sandy (MWDSLS). This category of supply consists of water received through membership in MWDSLS. This includes water stored in Deer Creek and Jordanelle Reservoirs and comes in two components as follows:

MWDSLS Provo River Project (PRP) Storage. The average year production of this source is 53,760 acre-feet. This is based on the full MWDSLS allotment of 61,700 acre-feet less 7,940 acre-feet of preferred storage reserved for Sandy City. Dry year production from this source has been estimated at 18,900 acre-feet. This is based on a 43.5% percent allotment from Deer Creek Reservoir as was experienced during the recent drought (2013).

MWDSLS Central Utah Project (CUP) Storage. The available supply from this source is assumed to be 20,000 acre-feet in both average and dry years, which is the contractually defined amount.

Utah Lake System Water. The City petitioned Central Utah Water Conservancy District (CUWCD) for Central Utah Project (CUP) water through the planned Utah Lake System (ULS). This system was completed this year and is expected to supply 3,100 acre-feet going forward.

1.3.2 FUTURE SOURCES

Aquifer Storage and Recovery (ASR). In conjunction with Sandy City and MWDSLS, the City is currently investigating the utilization of aquifer storage and recovery. This option will utilize high spring runoff from surface water sources to be injected or infiltrated into the aquifer and documented with the State Engineer. Then, in dry years, this water would be available for extraction through wells. It is estimated that potential dry year yield of this source will be 5,900 acre-feet. This amount could be greater depending on sustained conservation efforts, as reduction in demand would reduce extraction volume.

New Well Development. Development of additional groundwater has been planned to meet future growth and estimates development of current rights could yield up to 12,000 acre-feet additional groundwater.

Wastewater Reuse. Opportunities for wastewater reuse have been studied. Initial plans for wastewater reuse would produce approximately 4,200 acre-feet annually.

Additional Surface Water Development. Another potential supply is the development of a treatment plant to treat water from Millcreek Canyon or from other surface water sources. Based on historic flow records for Millcreek, potential yield from this source is estimated to be 3,970 acre-feet in an average year and 3,300 acre-feet in a dry year.

Secondary Water. Recently, an analysis of potential opportunities for using secondary water on City properties within its service area[4] was completed. While there are some limited opportunities for the use of secondary water, the analysis concluded that most of these opportunities were not viable at this time. The analysis also concluded that nearly all of the secondary water rights would be needed for other purposes in a dry year and correspondingly would not add appreciably to the reliable annual water supply of the City. A final consideration is that within the City watershed, secondary water is generally derived from the same sources as is culinary water, that is, from snow melt from the Wasatch Mountains. With this in mind, secondary water does not offer a new or discrete supply and so does not fully alleviate culinary demand burdens.

1.3.3 TOTAL ANNUAL WATER SUPPLY

The total projected production of each category of supply described above is summarized in Table 1-2. For dry year conditions, annual supply is expected to increase from its existing yield of 97,620 acre-feet to a total future yield of 126,120 acre-feet.

TABLE 1-2
SLCDPU PROJECTED DRY YEAR PRODUCTION
EXISTING AND FUTURE SOURCES

Supply Category	Projected Average Year Production (acre-feet)[1]	Projected Dry Year Production (acre-feet)
Existing Surface Water Sources	59,500	40,820
Existing Groundwater Sources	7,500	17,900
Existing Storage Sources	73,760	38,900
New Wells	0	12,000
Additional Surface Water (MCWTP)	3,970	3,300
ULS	3,100	3,100
ASR[2]	-5,900	5,900
Additional SLC Surface Water	4,200	4,200
Total[3]	146,130	126,120

1. New Wells are projected at no production in the average year not because they are not available, but because they are not needed during average (or wet) years.
2. ASR is shown to have a negative production in the average year to represent the use of excess surface water source in the spring for injection into the aquifer. Thus, it will be a new demand, represented here as a "negative" source. This activity will occur in average years to make water available for extraction in dry years.
3. Secondary water supply is not included in this table as it is already being used for other purposes or was determined to not be a viable source of water at this time. Refer to *Salt Lake City Secondary Water Irrigation Master Plan*.

[4] *Salt Lake City Secondary Water Irrigation Master Plan,* Bowen Collins & Associates, February 2019.

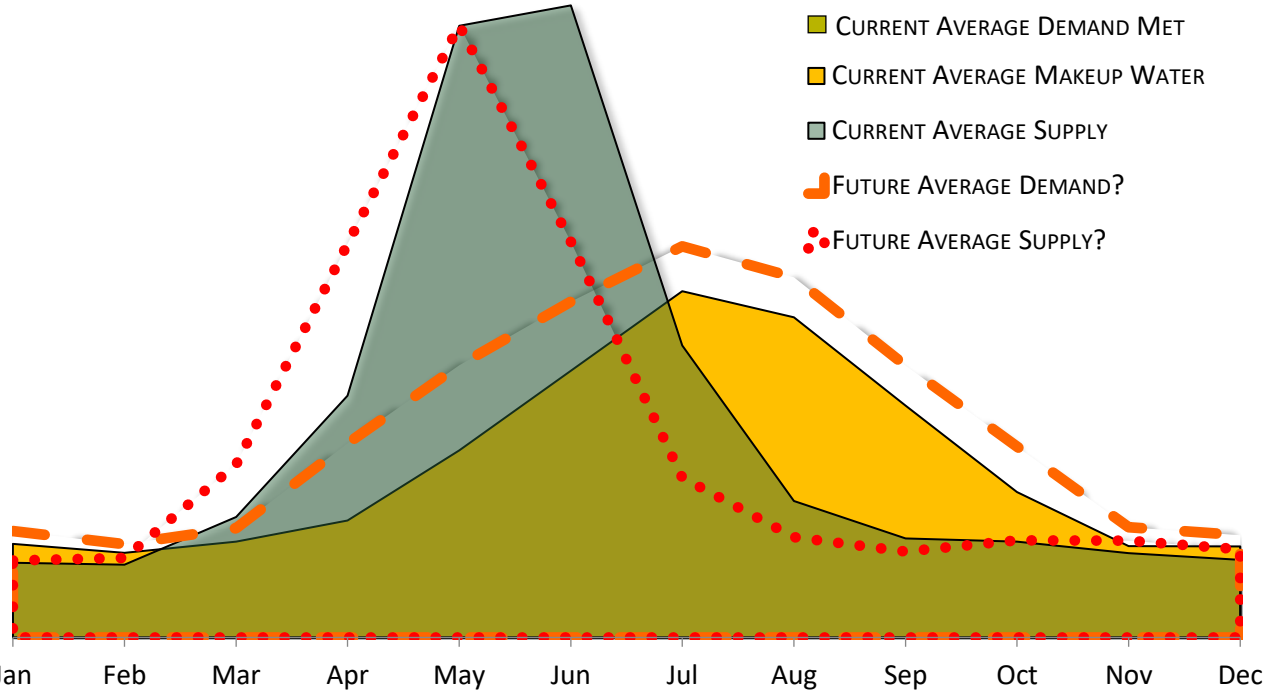
1.4 Water System Risk

When planning for water supply, it is important to prepare for uncertainty by identifying and addressing risk and vulnerability to water supplies and within the system infrastructure. Regardless, if these uncertainties take the form of extreme weather conditions, system interruptions or failures, or other events, careful analysis and planning can mitigate or ameliorate negative outcomes. Four important questions were considered when analyzing long-term water supply projections in relation to mitigating risk:

i. **Is the historical data an appropriate indication of future source performance in the critical planning scenario (i.e. the "dry year")?**

The last 30 years have been drier than the long-term measured period of record.[5] However, this 30-year dry period is typical of dry periods in the paleo record.[6] Therefore, the use of historical data (over the past 30 years) to describe future source performance appears to be an appropriate starting point.

Figure 1-4
Potential Impacts of Climate Change on Supply and Demand



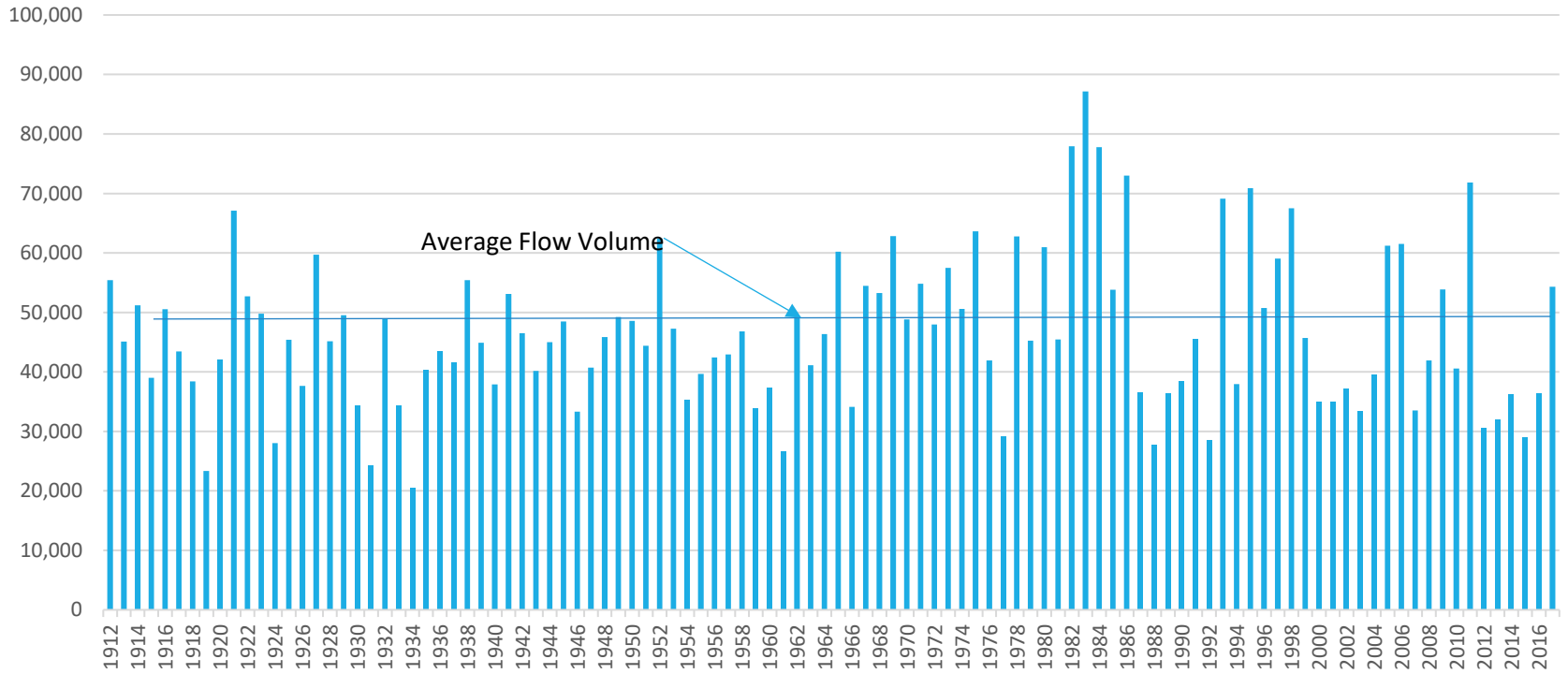
ii. **Are there factors (such as climate change) that would cause water supplies to perform differently than in the past?**

There are several conceivable events that might affect future supplies in such a way that would cause future performance to be different than the historical record might suggest. These events can range from temporary supply interruptions (with causes such as sudden equipment failure, earthquake, or wildfire) to long term changes to supply performance (with causes such as climate change).

Climate change analysis is incorporated into long-term water resource planning. Though immediate changes in climate or weather variability are addressed in the *Drought and Water Shortage Contingency Plan*, increasing frequency or duration of these variables will affect day-to-day water demand. As such, it is important to consider the impacts of climate change not only to supply, but also to demand as conceptually shown in Figure 1-4.[7] The EPA Climate Change Adaptation Resource Center identifies water demand modification as one of many viable strategies for increasing water supply resilience and security in the face of climate change.

[5] See Figures 4-2 and 4-3 from the *Water Supply and Demand Master Plan.*
[6] See Figures 4-4 and 4-5 from the *Water Supply and Demand Master Plan.*
[7] Climate Resilience Approaches in Salt Lake City. May 16, 2018. *Laura Briefer*. American Water Resources, Utah Section.

FIGURE 1-5
LITTLE COTTONWOOD CREEK-ANNUAL FLOW VOLUME AT LCWTP



iii. What level of system redundancy is reasonable to address possible supply interruptions, such as a source failure or outage?

As part of its *Water Supply and Demand Master Plan,* several supply redundancy criteria have been adopted to address potential supply interruptions. This includes different levels of redundancy for single source loss and catastrophic loss of water supplies. Additional details regarding these redundancy criteria are contained in the *Water Supply and Demand Master Plan*. (See Figure 1-5).

iv. How can demand management and conservation proactively reduce potential impacts to supply or system as a result of risk?

Demand management can be an effective tool in ameliorating future potential negative impacts related to risk and vulnerability of supply. This is the primary topic of this plan and is addressed in Chapter 4.

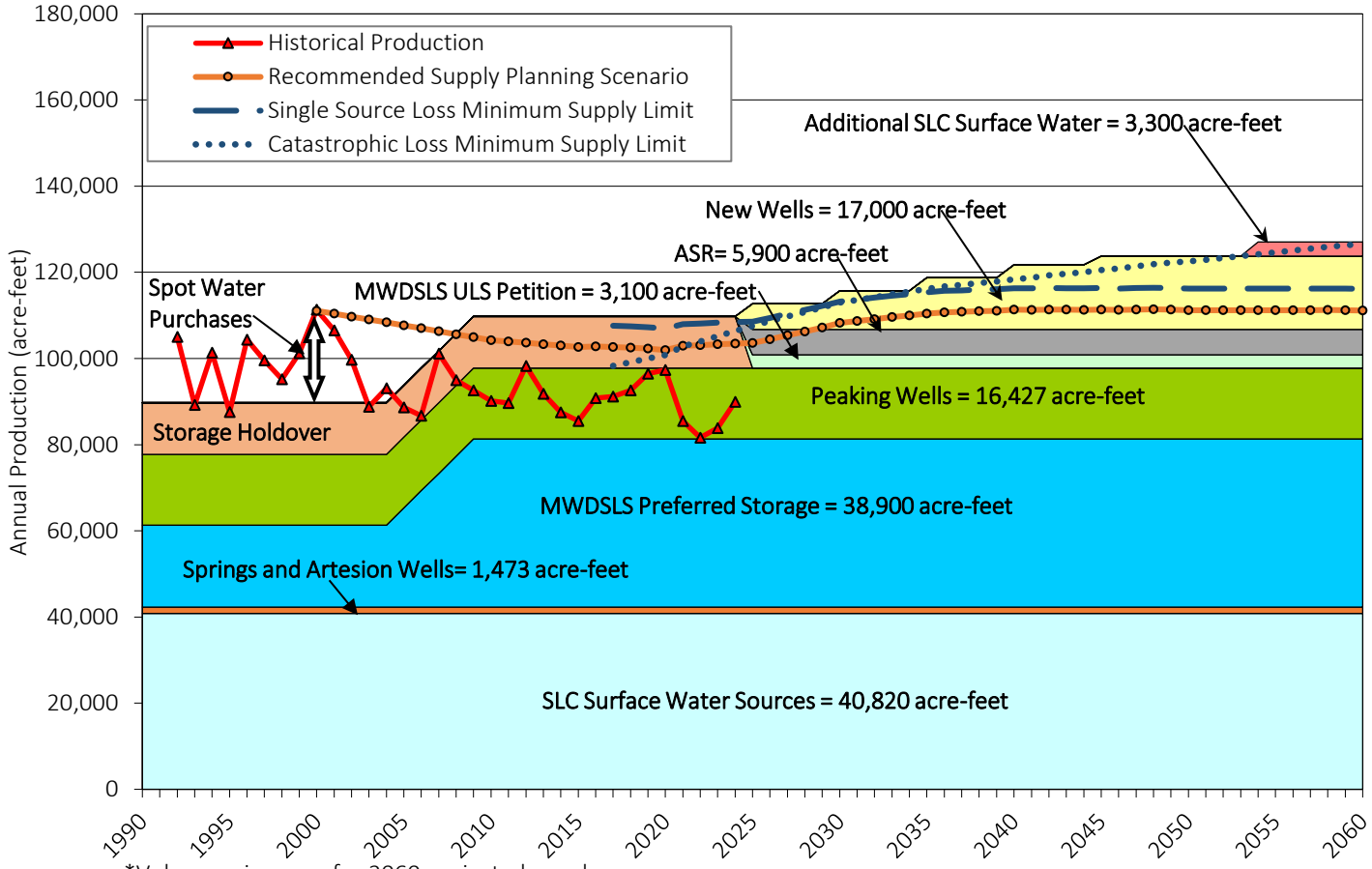
Relative to risk, it should be noted that all practical and necessary steps are undertaken to minimize these types of risks. This includes regularly scheduled maintenance, regular inspections of key equipment, advanced asset management tracking, and rehabilitation and replacement planning. Additional discussion pertaining to risk, vulnerability, and potential mitigation can be found in the *Drought and Water Shortage Contingency Plan.*

1.5 Future Annual Production Requirements Compared to Future Demand

Figure 1-6 compares the total dry year water supply (including new supplies that have not yet been developed) with SLCDPU's recommended supply planning demand scenario (including applicable provisions for risk). The scenario assumes that:

- Conservation will, minimally, continue to maintain pace with recent levels and the current regional Conservation goal (15% reduction in per capita water usage by 2040).
- The new conservation goals (see Chapter 3), which meet or exceed the State's newly adopted regional conservation goals; and
- Required production will include provisions to meet both the "Single Source Loss" and "Catastrophic Loss" levels of supply risk as described in the previous section.
- Reuse water is no longer a projected water source, as the Utility is making that water available to Great Salt Lake.

Figure 1-6
Projected SLCDPU Annual Production Requirements vs. Supply (Dry Year)
With Supply Redundancy Buffers



*Volumes given are for 2060 projected supply.

As can be seen in Figure 1-6, as long as the recommended supply planning scenario is met by the end of the planning window, current and anticipated future supplies are sufficient for long term projected system demands.

However, the figure also shows that there will be very little excess capacity when supply risk and recommended redundancy is considered. This means that failing to meet the conservation goals could result in risk of inadequate water supply for projected demands. Reviewing and reevaluating these goals to lessen risk, decrease pressure on reserved water, improve supply redundancies, and optimize changes in technology and behavior related to demand management is recommended.

1.6 Recommendations

Based on the analysis summarized above, the following actions identified in the *Water Supply and Demand Master Plan* are recommended for inclusion in the *SLC Water Conservation Plan*:

Increase Efforts in Water Conservation Programming to Achieve Short- and Long-term Goals. Water supply challenges will occur if conservation programming efforts and outcomes to achieve the recommended planning scenario goals defined in this report (see Chapter 3) are not reached. Details of the conservation program proposed to meet these goals are discussed in Chapter 4 of this plan.

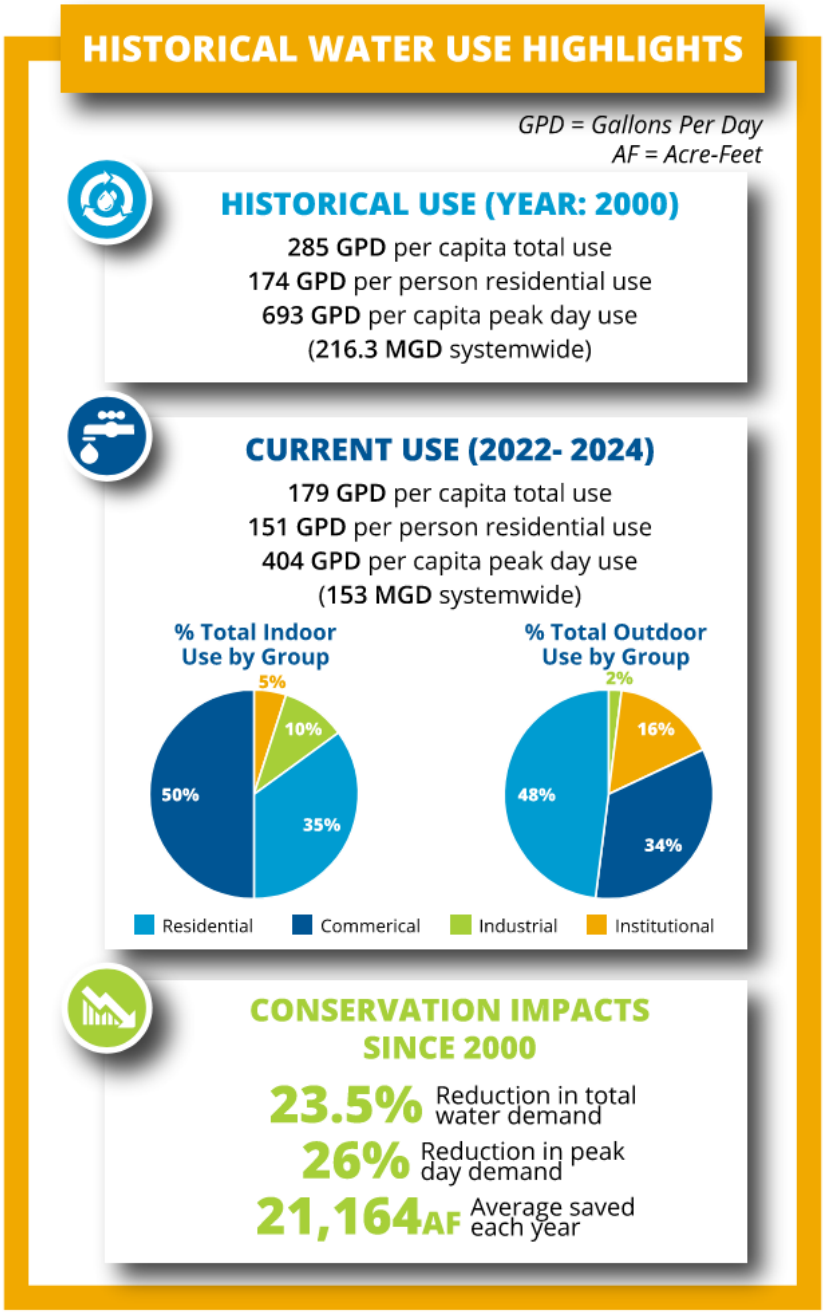
Protect and Manage Water Supply. The City will require all identified water supplies to accommodate future growth with adequate buffer to address reasonable risk to the water supply. This includes:

- Developing an Aquifer Storage and Recovery (ASR) program (Estimated completion time =2025)
- Developing new groundwater wells (gradually added between 2026 and 2036)
- Plan to dedicate water previously planned for reuse to the Great Salt Lake.
- The City should continue to monitor supplies and demands into the future and refine project timelines accordingly.

Monitor Effects of Climate Change. Climate change impacts analysis should continue to remain a component of long-term water resource planning. Though immediate changes in climate or weather variability can be addressed in the *Salt Lake City Drought and Water Shortage Contingency Plan (2019)*, increasing frequency or duration of these variables will affect day-to-day water demand. As such, it is important to consider the impacts of climate change not only on supply but also demand. The US Environmental Protection Agency Climate Change Adaptation Resource Center identifies water demand modification as one of many viable strategies for increasing water supply resilience and security in the face of climate change. Continued monitoring of the water supply and demand is recommended, modifying this plan as necessary to address changing circumstances associated with climate change.[8]

Review and Reevaluate Conservation Goals. Regular review of conservation goals and outcomes will help to reduce risk, increase resiliency, and improve the ability to respond to changes in demand and supply, particularly in light of impacts to supply of increased reduction in use for Great Salt Lake.

[8] *Resilient Strategies Guide for Water Utilities*. US-EPA 2019



CHAPTER TWO: HISTORICAL WATER USE

2.0 Introduction

Measuring water demand in terms of water production is the common practice for supply planning; however, water sales can be a more useful measurement when considering water use by connection and customer. This measurement is useful because water delivery meters are tied to specific end users. As discussed in Chapter 1, water use data reported to the State of Utah Division of Water Rights is based on water sales.

The service area has been fully metered at the customer connection for nearly one hundred years. Meters are read every month and bills are issued to every water customer, including city and other government entities. This depth of metering history and data informs planning processes, and in particular, shapes the nature of water demand management and conservation planning.

To analyze historical water use, we consider not only total water sales, but also general characteristics of those using the water, as well as the nature of water use patterns. Identifying types of customers and aggregating them into groups–classifications–helps us more effectively analyze water use, recognize patterns, chart trends, and anticipate future water needs based on the characteristics of our customers (user classifications) and the numbers of customers within each classification. This analysis informs planning across all aspects of the Department and is particularly useful in conservation planning.

This chapter documents historical water use based on total water sales, water sales in several classifications and subclassifications, water use as expressed as gallons per capita day (gpcd) and impacts of historical water conservation. Additionally, water loss–the difference between water produced and water sold–is also discussed, as well as an overview of water conservation program impacts.

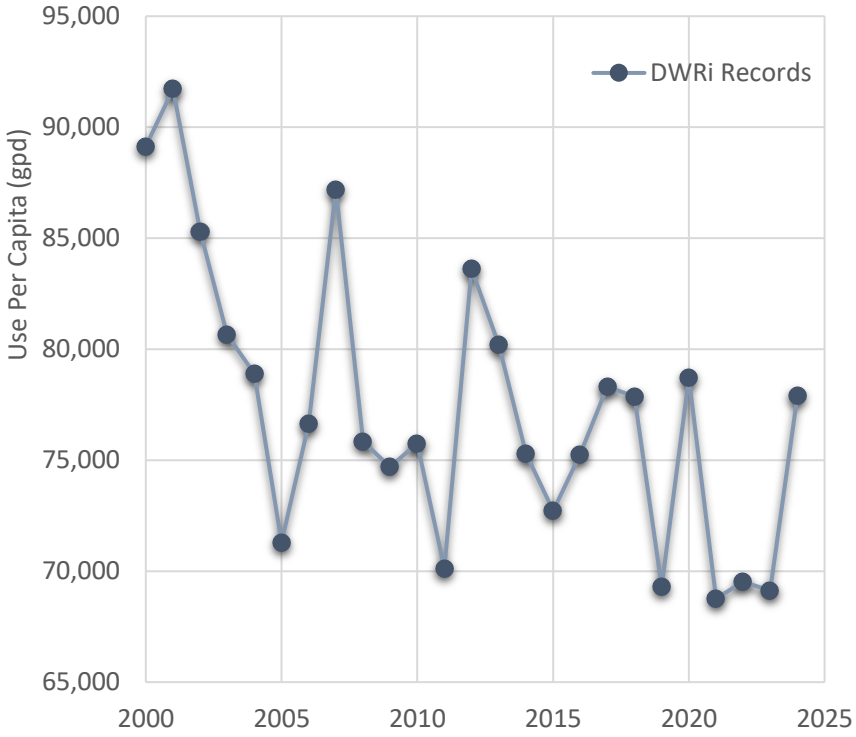
2.1 Total Water Use

Water sales data has been collected, analyzed, and reported for many years. A summary of the reported sales since 2000 is shown in Table 2-1 and plotted in Figure 2-1.

Table 2-1
Water Sales in Acre-Feet

Year	Total Sales Reported to DWRi
2000	89,138
2001	91,712
2002	85,306
2003	80,641
2004	78,900
2005	71,297
2006	76,645
2007	87,190
2008	75,843
2009	74,697
2010	75,755
2011	70,130
2012	83,611
2013	80,196
2014	75,300
2015	72,722
2016	75,261
2017	78,310
2018	77,867
2019	69,299
2020	78,713
2021	68,767
2022	69,523
2023	69,134
2024	77,901

Figure 2-1
Water Sales (gpd)



2.2 Per Capita Use

The primary way in which the State has chosen to measure water use and conservation progress is based on per capita water sales. Per capita water sales are calculated by dividing total water sales by a census-based population, a simplistic statistical analysis representing complex use characteristics. Per capita water sales for the service area over the past 18 years is shown in Figure 2-2.

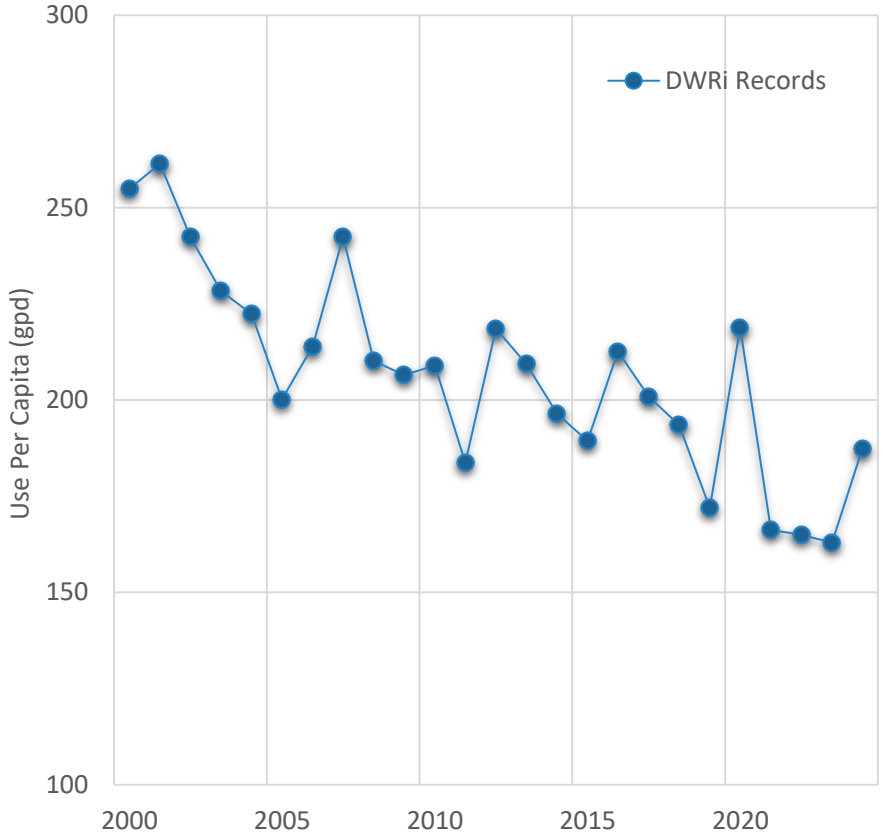
The per capita measuring approach is commonly used by the State of Utah as it provides a uniform methodology that can be applied to the many water systems it regulates. Unfortunately, there are also a number of weaknesses associated with measuring water and conservation progress based on per capita water sales.

System Losses. Basing calculations on water sales rather than water production does not capture the effect of system losses on water consumption. Consequently, elimination of leaks and other system losses has no effect on per capita water sales even though these kinds of savings are an important part of overall conservation efforts. This may also result in undervaluing water loss programing as an effective conservation tool, as this method of calculation does not account for water loss and therefore reducing water loss does not alter gallons per capita calculations.

Effects of Land Use. Per capita water sales can be misleading because it does not adequately communicate the effects of density and other land use aspects on water use. For example, if a community significantly increases its population density, the amount of outdoor water use associated with each person may go down. This may result in lower per capita water sales even if the actual efficiency of water use does not improve. While this type of decrease in per capita water sales may reduce peak demand, it may not reflect overall changes in water use as a result of densification.

Demand Forecasting. Frequently used to forecast future water demand, the use of per capita consumption assumes that water use increases in a predictable manner as population grows. This, however, ignores a number of national trends important to determining use levels, including but not limited to drought, recession, changes in demographics, changes in household or lot size, changes in commercial and industrial profiles, and improvements in technology.

Figure 2-2
Salt Lake City Per Capita Water Use (GPD)



Additionally, assuming use increases with population ignores the role of conservation planning, education, and improvements in efficiencies related to use.[1]

Misinterpretation. Per capita consumption may also be misinterpreted to mean "volume of water used per person," when in fact, it includes much more than direct use by individuals. As noted above, it also includes water use from all other classifications (commercial, institutional, and industrial) averaged across the population. Comparing gallons per capita of communities with differing

[1] *Water Conservation Programs M52*, page 41

demographics or commercial and industrial bases can lead to misleading comparisons or characterizations of how water is actually being used. This may also affect an individual's response to calls to conserve as they may not relate to the volume of water described in the gallons-per-capita statistic. When looking at residential use only, use per person in 2024 was only about 81 gpd (indoor and outdoor use).

Adjustment for Equivalent Employment Population. While the weaknesses above are universal to all water providers, there are also some other weakness to using per capita water sales that are unique to the situations of individual water providers. One of these weaknesses is the impact of daytime employment population on water demand. Salt Lake City has a larger daytime worker population compared to other cities in Utah. Not only is the total magnitude large, but the ratio of workers to permanent population is also much larger than most other communities, even when compared to similarly sized communities across the country. This was demonstrated as an outcome of the 2000 US Census. The consequence of this larger-than-average worker population is that, in calculating per capita water sales, the standard calculation does not account for a daytime population surge of nearly 50 percent of the residential population. This in turn could result in under-projecting daytime water needs and distribution capacity. Additionally, this daytime surge may result in inflated daily per capita calculations.

To account for this issue, a revised methodology has been developed which calculates per capita water sales based on a revised population number.[2] This revised population number includes both permanent residents and an equivalent residential population representing the higher than average worker population. This revised population has been used to generate the results in Figure 2-10. Because of these weaknesses, tracking water use and conservation on a per capita basis does not provide as complete a view of actual water use patterns as is necessary to properly analyze and evaluate water use patterns and trends for planning purposes. However, since this is the method traditionally used by the State to track water use, it will continue to be referenced here. Additional metrics will also be added where useful to help define and clarify water use and conservation within the service area.

2.3 System Losses

As discussed in Chapter 1, water use (as measured through sales at individual delivery points), does not encompass all of the water held or consumed in the water system. Water loss is defined as the difference between water produced and authorized consumption (such as metered water sales or fire protection). The resulting "unaccounted for" water may be apparent loss, such as theft or data analysis errors, or real losses, which consist of water lost through all types of leaks and breaks within the water infrastructure system. Understanding the nature of system loss is critical to developing effective management and mitigation strategies, with the goal of reducing system-wide losses.

A comparison of water sales to metered production can identify the magnitude of water losses in the system. This is summarized in Table 2-2.

Table 2-2
Estimated System Losses 2021-2024

YEAR	Sales (Acre-feet)	Production (Acre-feet)	System Losses (Acre-feet)	System Losses (%)
2021	68,767	85,473	16,706	19.54%
2022	69,523	81,634	12,111	14.84%
2023	69,134	83,813	14,679	17.51%
2024	77,901	89,939	12,038	13.38%

To verify and address system losses, a water loss and control audit in accordance with AWWA M36 recommendations has been conducted from 2000 to 2024.[3] More details of these programs can be found in Chapter Four: Water Conservation Programs.

[2] Documentation of MWDSLS Conservation Performance – ULS Supply Petition, Bowen Collins & Associates, April 28, 2006

[3] American Water Works Association (AWWA). 2017. M52 Water Conservation Programs: A Planning Manual, Second Edition. Denver, Colorado.

2.4 Use by Classification and Sub-Classification

To provide additional background and context for developing, evaluating, and ultimately implementing conservation measures, it is useful to understand the details of how water is used within the service area. The figures and tables contained in this section have been assembled to provide additional detail regarding the breakdown of use by customer classification. These same classifications and sub-classifications will be used in the discussion of conservation programing in Chapter 4.

Customers have been organized into a number of classifications based on shared characteristics such as use patterns and costs of service. This includes both broad classifications (residential, commercial, industrial, and institutional) and more narrowly defined sub-classifications (single-family residence, triplex, hospital, restaurant, etc.). The classifications and sub-classifications used for this analysis are summarized in the corresponding graphic (Figure 2-3).

Total numbers of existing connections by classification as reported to the DWRi are summarized in Table 2-3. Reported use by classification is summarized in Table 2-4 and Table 2-5. Table 2-4 includes a long-term record of use by

Figure 2-3
Water Use Classification and Sub-Classification

Residential	Commercial	Institutional	Industrial
Single Residence	Business	School	Industrial customers of all types
Duplex	Hospital	Church	
Triplex	Hotel or Motel	Parks	
Fourplex	Restaurant	Government	
	Apartment		
	Miscellaneous		

classification as reported to the DWRi. Table 2-5 includes records from 2021-2024 based on improved customer classification data as discussed previously. Total use by classification and sub-classification are shown graphically in Figures 2-4 and 2-5, respectively.

TABLE 2-3
TOTAL CONNECTIONS

YEAR	Residential	Commercial	Industrial	Institutional	Total
2024	73,256	9,322	272	1,332	84,182

TABLE 2-4
REPORTED WATER SALES TO DIVISION OF WATER RIGHTS (ACRE-FEET)

YEAR	RESIDENTIAL[2]	COMMERCIAL	INDUSTRIAL	INSTITUTIONAL[1]	TOTAL
2010	43,283	17,584	3,397	11,491	75,755
2011	40,703	16,534	2,688	10,205	70,130
2012	48,611	18,813	3,331	12,856	83,611
2013	44,454	19,078	3,459	13,205	80,196
2014	42,283	18,587	3,699	10,731	75,300
2015	40,702	17,723	3,474	10,823	72,722
2016	42,695	17,858	3,527	11,181	75,261
2017	43,534	20,313	3,662	10,801	78,310
2018	44,272	18,792	3,627	11,176	77,867
2019	38,642	17,145	3,745	9,767	78,867
2020	46,294	16,881	3,693	11,845	69,299
2021	39,543	16,228	3,690	9,306	78,713
2022	36,817	15,996	3,870	12,840	68,767
2023	36,817	17,616	4,118	10,583	69,523
2024	39,914	18,921	5,577	13,490	69,134

1.In 2005 and 2006, a portion of SLC water use was reported under a customer class labeled as "Other". This use has been included under the institutional classification in Table 2-4.
2. For purposes of this table and consistency with State reporting documents, apartments are included in the residential classification. However, apartments will be considered commercial for all subsequent portions of this report.

TABLE 2-5
UPDATED WATER SALES DATA (ACRE-FEET)

YEAR	Residential	Commercial[1]	Institutional	Industrial	Total
2022	29,522	29,658	7,713	4,076	70,969
2023	29,567	28,959	7,194	4,161	69,882
2024	32,177	31,555	8,152	4,378	76,261

1. Including apartments.

FIGURE 2-4
VOLUME OF USE BY CLASSIFICATION (AF/YEAR)

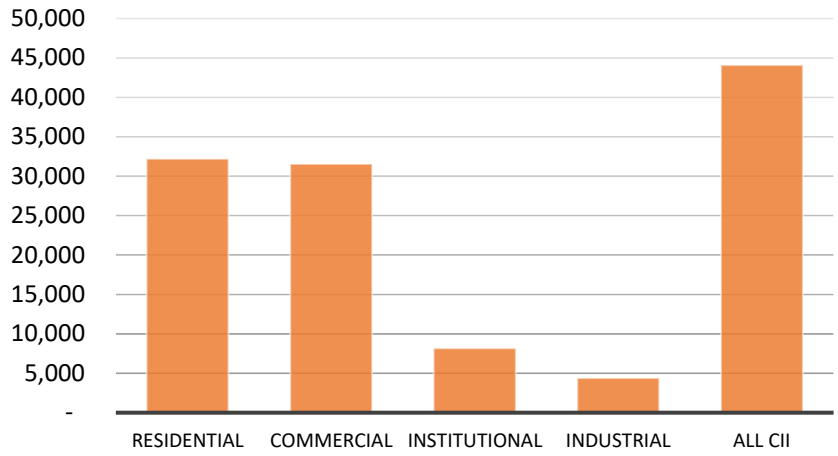
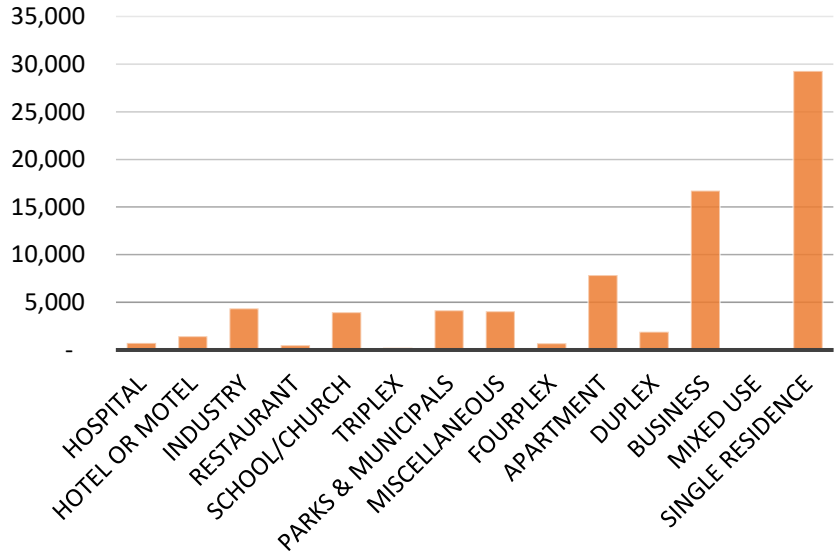


FIGURE 2-5
VOLUME OF USE BY SUBCLASSIFICATION (AF/YEAR)



2.5 Indoor and Outdoor Water Use

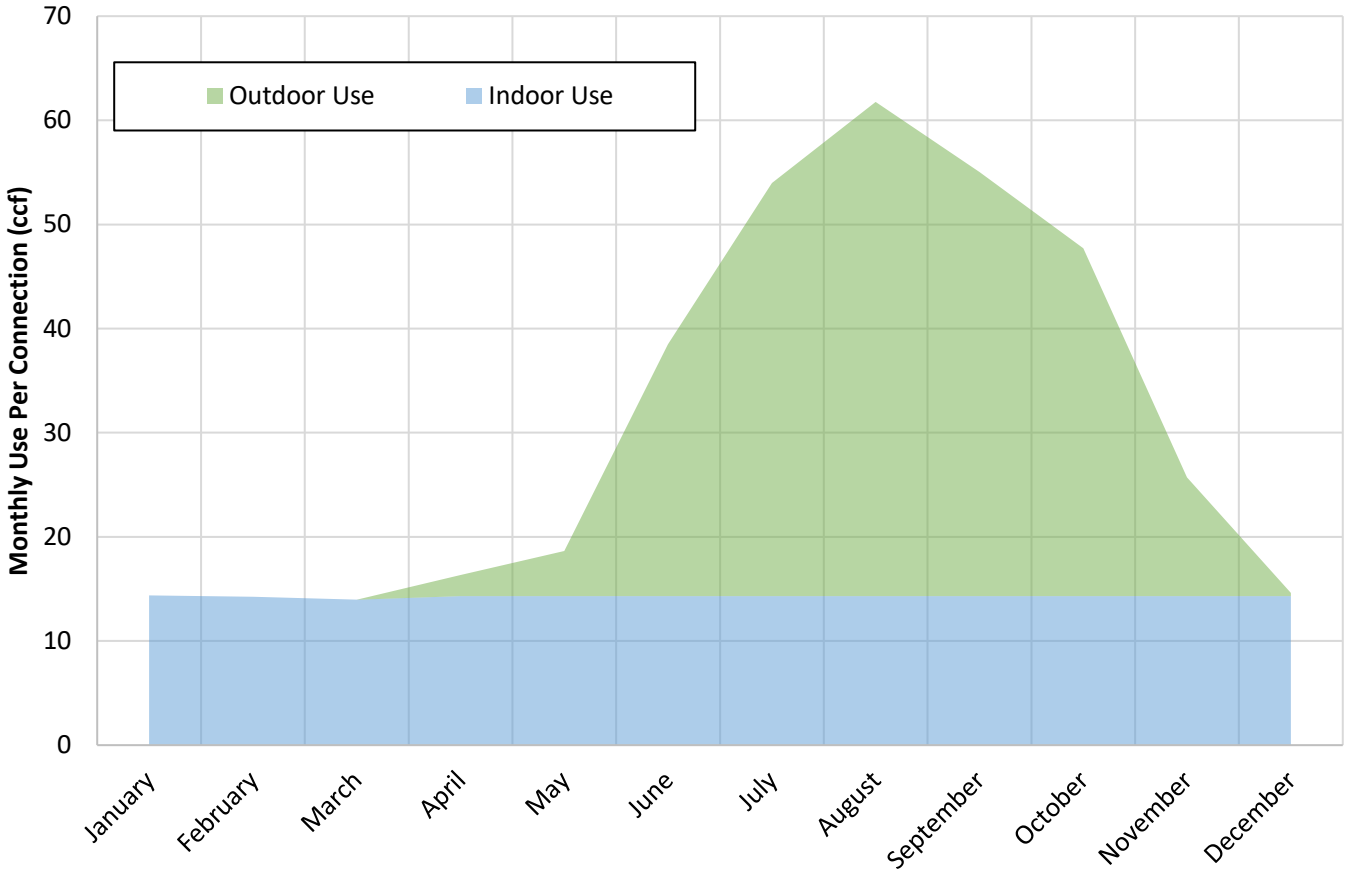
Water meters are read and recorded every month (or more factually, by a range of days approximating a month).

Understanding not only how much water is used, but also when it is used helps in both supply planning and demand management.

One way to evaluate water use is to consider whether the water is being used indoors or outside. As this region has a distinct winter season, some inferences can be made regarding water use based on the time of year of the use.

With this in mind, it is assumed that water use which occurs in winter months (November through March) is used indoors. Water use during the months of April through October (approximating the landscape irrigation season) is a combination of outdoor and indoor use. Outdoor use, (assumed to be water primarily used to support landscapes) is therefore determined to be the volume of water use during the irrigation season, less the volume of water during the winter months. This process has shortcomings, in that other water use patterns may alter with shifts in the season, but it represents the best estimate based on available data and is accepted industry practice. Figure 2-6 illustrates this analysis within the single-family residential classification.

Figure 2-6
Seasonal Water Use, Single Residence (2022-2024)



While the reasonableness of this assumption might make sense with residential properties, it is less certain that the same assumption can be made for commercial, institutional, and industrial customers. However, to simplify the discussion of seasonal water use and for purposes of this plan, outdoor water use is water used during the non-winter months and is assumed to be used on landscapes. As installation of AMI technology (Advanced Metering Infrastructure, or smart meters), CII analysis, and WaterMAPS™ is completed, this analysis will greatly improve in accuracy.

Estimates for winter and summer usage by customer classifications follow.

Water Use by Classification (Figures 2-7 through 2-9). When looking at the broader classifications, the two largest water users are the residential and commercial classifications. Residential use accounts for about half of all outdoor use and a third of all indoor use. Conversely, commercial water accounts for about half of indoor use and a third of the outdoor use. Because more water is used outdoors than indoors, residential water use is greater overall.

The percentage of water used indoors and outdoors varies significantly between the various classifications. Almost 80 percent of institutional water use occurs outdoors while industrial outdoor use is less than 20 percent. This makes sense, given that institutional users include parks, schools, and other sub-classifications that are responsible for and maintain outdoor public spaces. Overall, about 46 percent of the water is used indoors and 54 percent is used outdoors.

FIGURE 2-7
LOCATION OF USE BY CLASSIFICATION

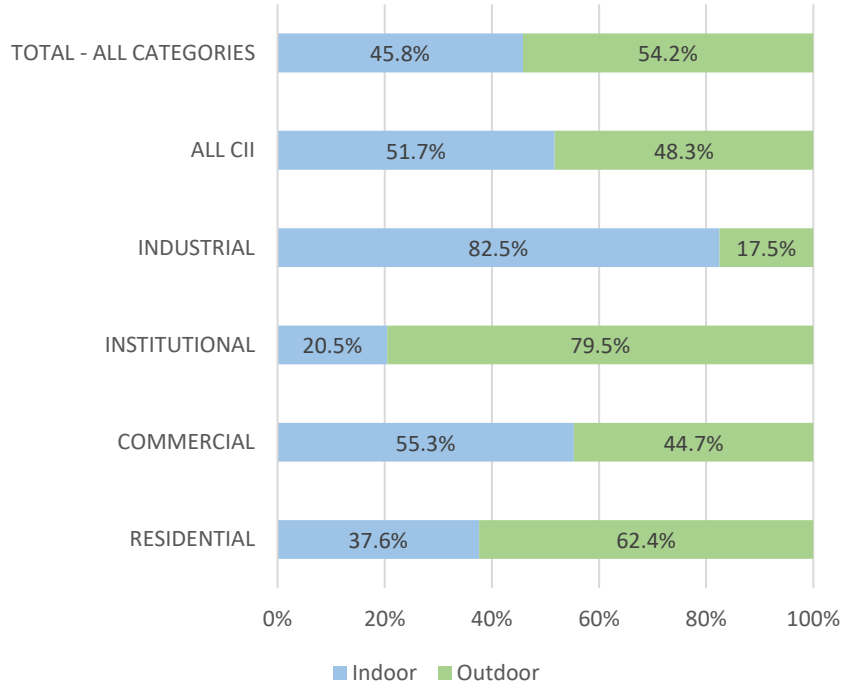


FIGURE 2-8
% TOTAL INDOOR USE BY CLASSIFICATION

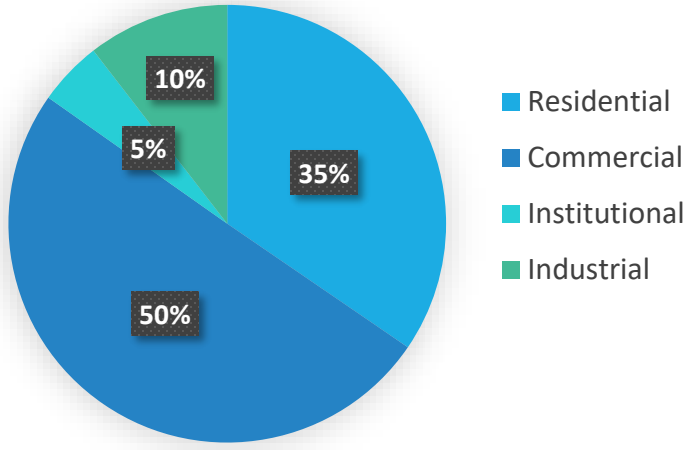
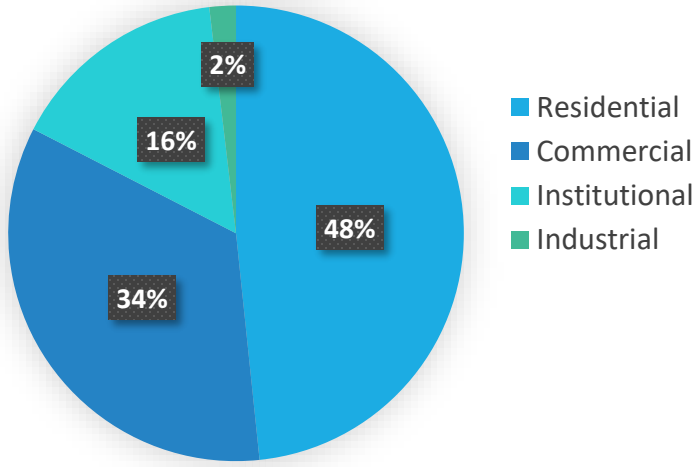


FIGURE 2-9
% TOTAL OUTDOOR USE BY CLASSIFICATION



Water Use by Sub-Classifications (Figures 2-10 through 2-12). Water use varies between sub-classifications. The sub-classification of single-family residence uses more water both indoors and outdoors than other sub-classifications. While the total portion of indoor water use by single-family customers is slightly more than indoor use by businesses, it is more than double the outdoor use of any other sub-classification. This may not be due to overuse but may be a result of property characteristics unique to this sub-classification. Analyzing use at this level, for instance, through programs like WaterMAPS™, can improve conservation programming design, and therefore, effectiveness. This in turn will help to assure that conservation goals are achieved in a manner that is timely, cost effective, and fair.

Water use also varies within larger classifications. Residential outdoor use varies from 65 percent for single-family residential use to 31 percent for higher density properties. Among commercial users, Miscellaneous uses more water outdoors, while restaurants and hotels use more indoors. It is not unexpected that Parks has their highest percentage of use outdoors, and should not in itself be interpreted as overuse, but may indicate opportunity to conserve.

FIGURE 2-10
LOCATION OF USE BY SUB-CLASSIFICATION

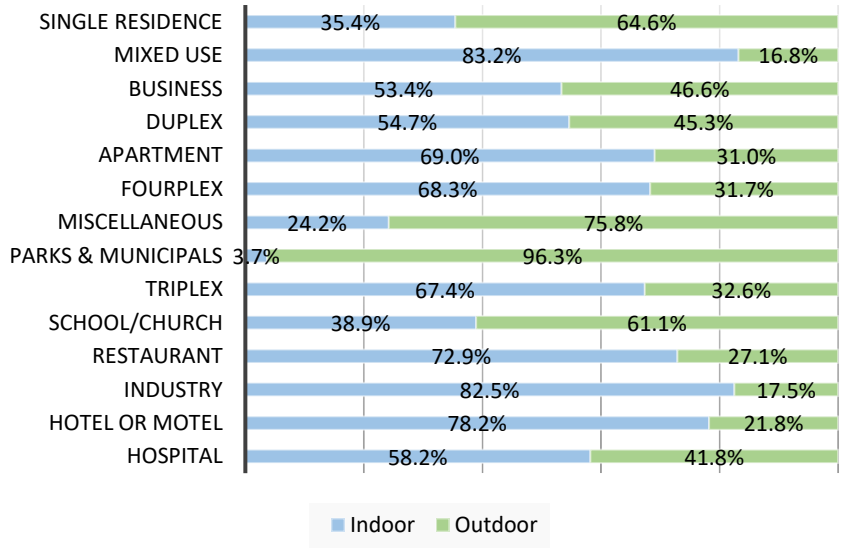


FIGURE 2-11
% TOTAL INDOOR USE BY SUB-CLASSIFICATION

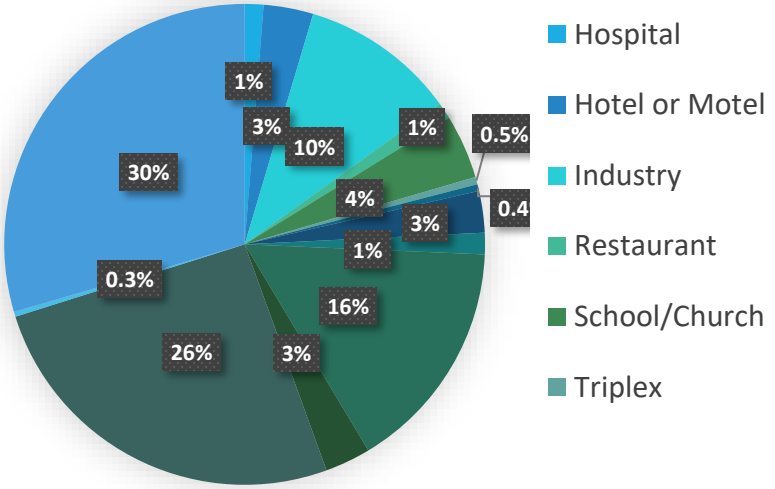
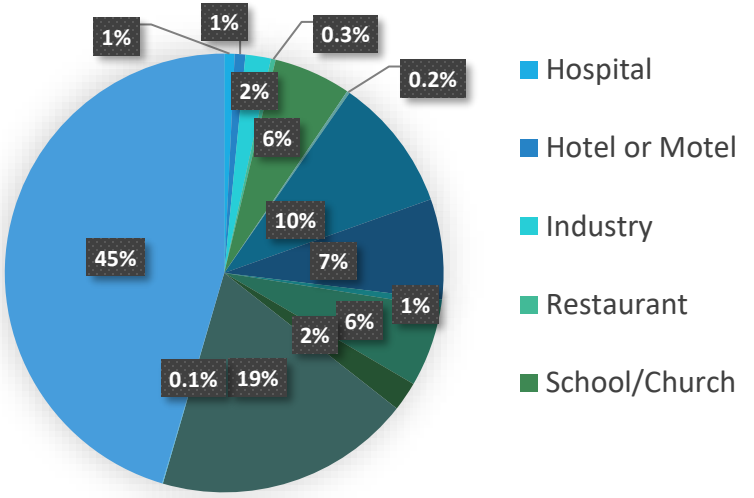


FIGURE 2-12
% TOTAL OUTDOOR USE BY SUB-CLASSIFICATION



Total Volume of Indoor and Outdoor Use (Figures 2-132 and 2-14). Figures 2-13 and 2-14 summarize indoor and outdoor water use by classification and sub-classification in terms of total volume (based on 2024 water use data). This provides some perspective on the total potential for conservation savings in each area.

Consistent with previous conclusions, these figures confirm that much of the volume of water saved through conservation will need to come from single-family residences. However, the combined volume of other user types is also significant and cannot be overlooked. Detailed analysis for the commercial, industrial, and institutional classifications will ensure a clearer picture of water use patterns within these sectors. Understanding how businesses, offices, and industry use water helps identify opportunities for conservation, facilitating the development and implementation of effective demand management strategies. Commercial, industrial, and institutional customers are integral partners in the community, and helping them become better water stewards while not imperiling the economy benefits everyone.

FIGURE 2-13
VOLUME OF USE BY LOCATION OF USE AND CLASSIFICATION (AF/YEAR)

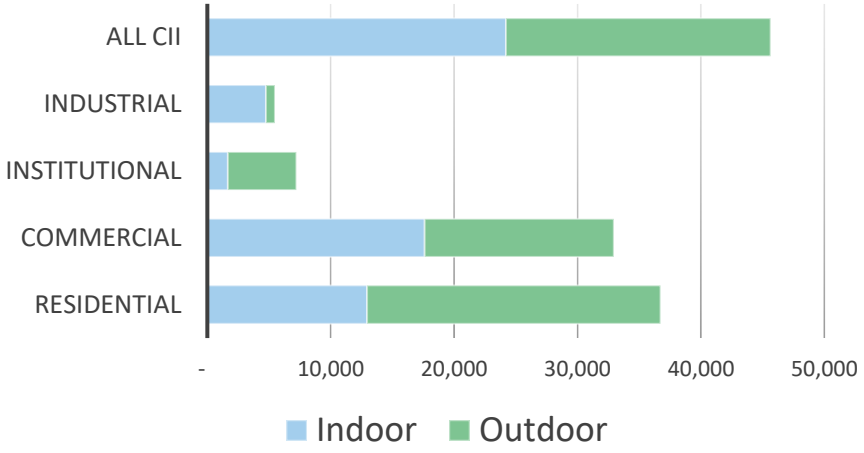
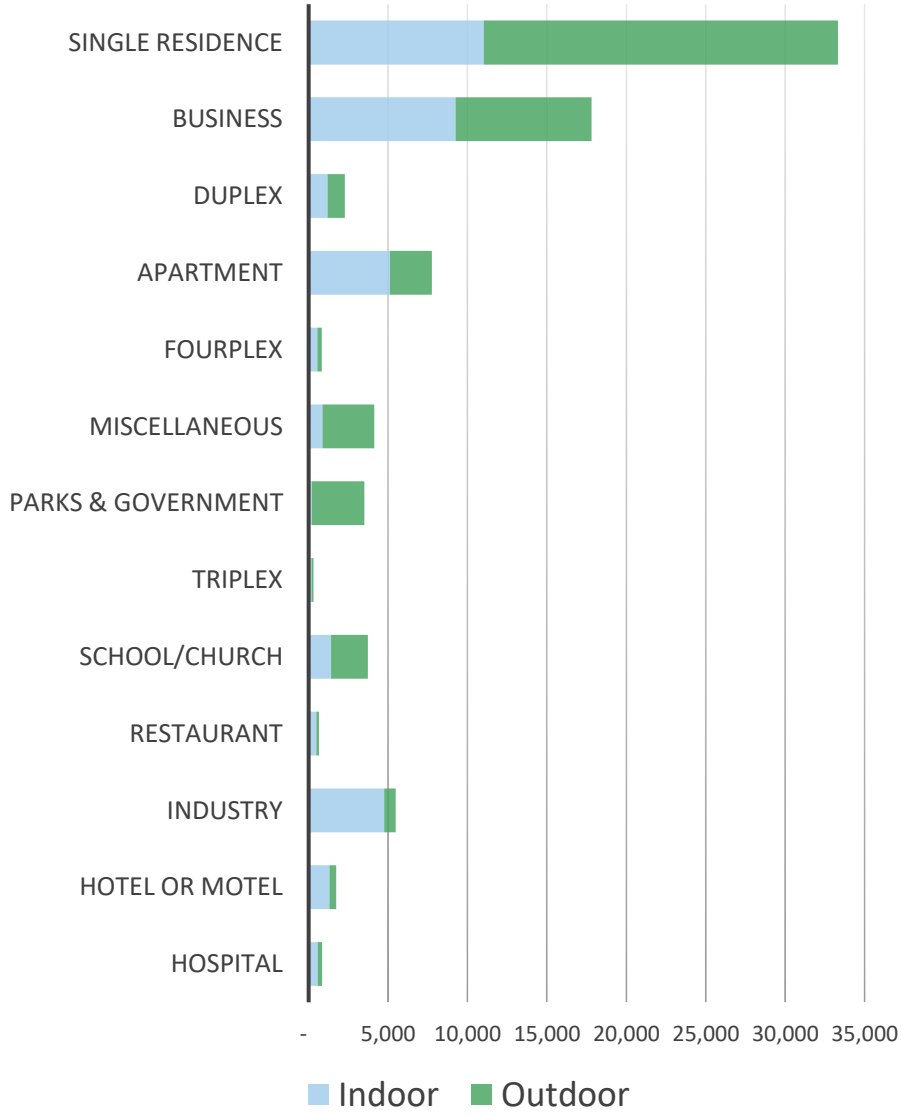


FIGURE 2-14
VOLUME OF USE BY LOCATION AND SUB-CLASSIFICATION (AF/YEAR)



Summary of Per Capita Use by Classification (Table 2-6 and Figure 2-15). Table 2-6 and Figure 2-15 summarize use by classification on a per capita basis as requested in the State's guidelines for conservation plans. Results are shown for 2024 water use. It should be noted that the per capita calculation has been based on the same equivalent population as used for generating Figure 2-1. As a result, while the figure and table are consistent with previous per capita calculations and may be useful in visualizing the ratio of use between the various classifications, they should not be interpreted as an accurate calculation of per person water use on a residential basis.

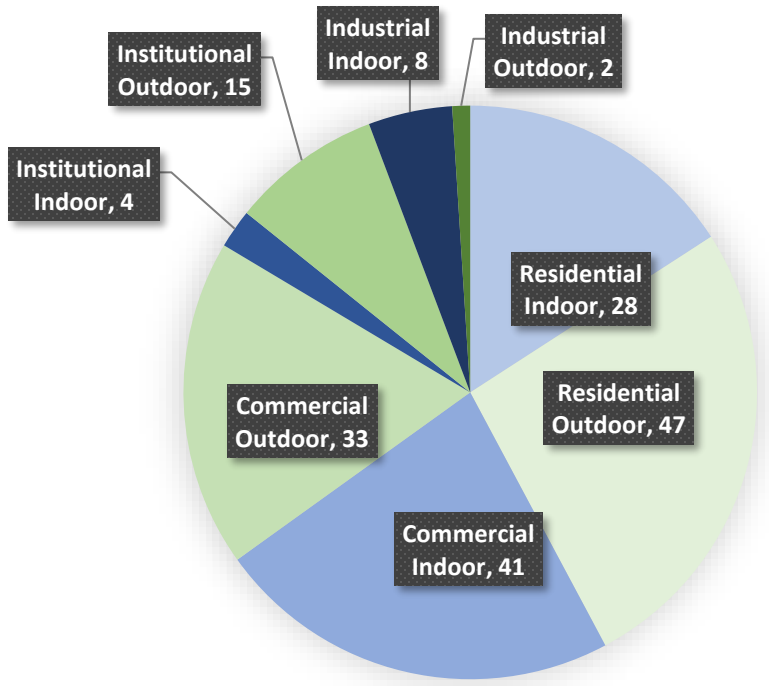
Additionally, the range of characteristics within the commercial and industrial classifications is far greater than those within other classifications, making evaluations of per capita use by classification dubious in value. For example, commercial classifications contain small clothing boutiques (low water users) and large, many-tabled restaurants (high water users). Oil refineries are included in the industrial classification (high water user), but so are retail shipping warehouses (low water users). Even the residential classification is diverse, including single-family homes and multistory apartments with hundreds of units.

Advances in metering technology, improvements in data and records keeping, and continued CII and WaterMAPS™ analysis will refine the data and bring more relevance to this particular statistical report.

TABLE 2-6
2024 PER CAPITA WATER USE BY CLASSIFICATION (GPD)

	Residential[4]	Commercial	Institutional	Industrial	Total
Indoor	28	41	4	8	82
Outdoor	47	33	15	2	97
Total	76	74	19	10	179

FIGURE 2-15
PER CAPITA WATER USE BY CLASSIFICATION (GPD)



Total All Classifications = 179 gpd

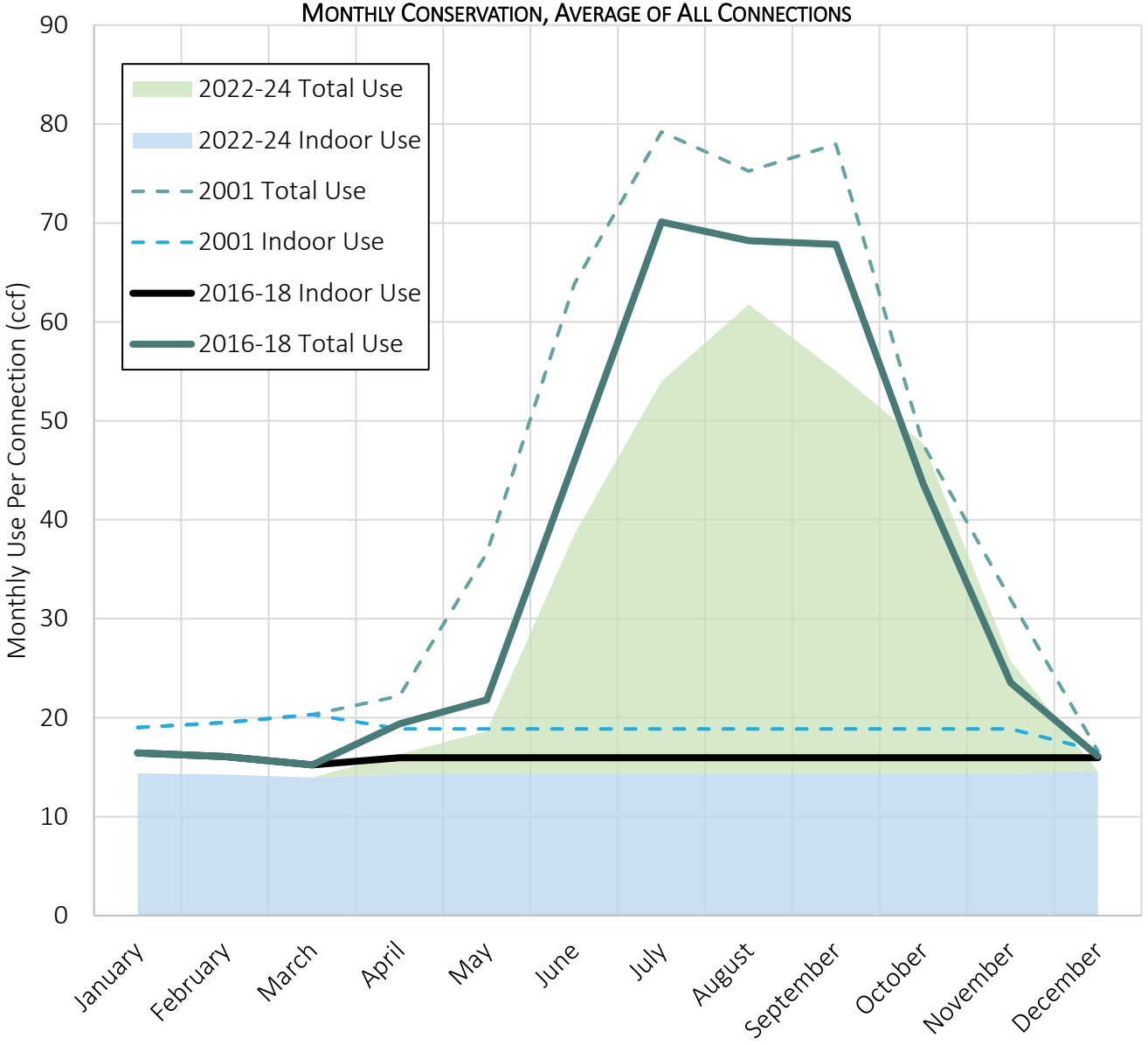
[4] It should be noted that values in this table are based on the State of Utah's methodology for calculating per capita water use (use per category divided by total permanent population). As a result, calculations may appear different than those in the Historical Use and Demand chapters. For example, the reported "Residential" indoor use of 28 gpcd includes single-family household indoor use divided by the total population. The State's methodology separates single-family residential from apartments and other multiunit housing, placing these classifications in the "Commercial" category. This can result in an underrepresentation of the actual indoor use of residential customers. For purposes of this plan, indoor use of residents (all residential indoor use divided by permanent population) is 40.2 gpcd, and includes single family, duplex, triplex, and multiunit customers.

2.6 Conservation Progress to Date

Significant progress has been made in improved efficiencies and conservation over the last two decades. While detailed records are not available for 2000, detailed analysis of water use patterns for each subsequent year was conducted. To evaluate where and how water was conserved, the water use patterns from 2001 have been compared to water use patterns over the 2022-24 period. The results are shown in Figures 2-15 through 2-18.

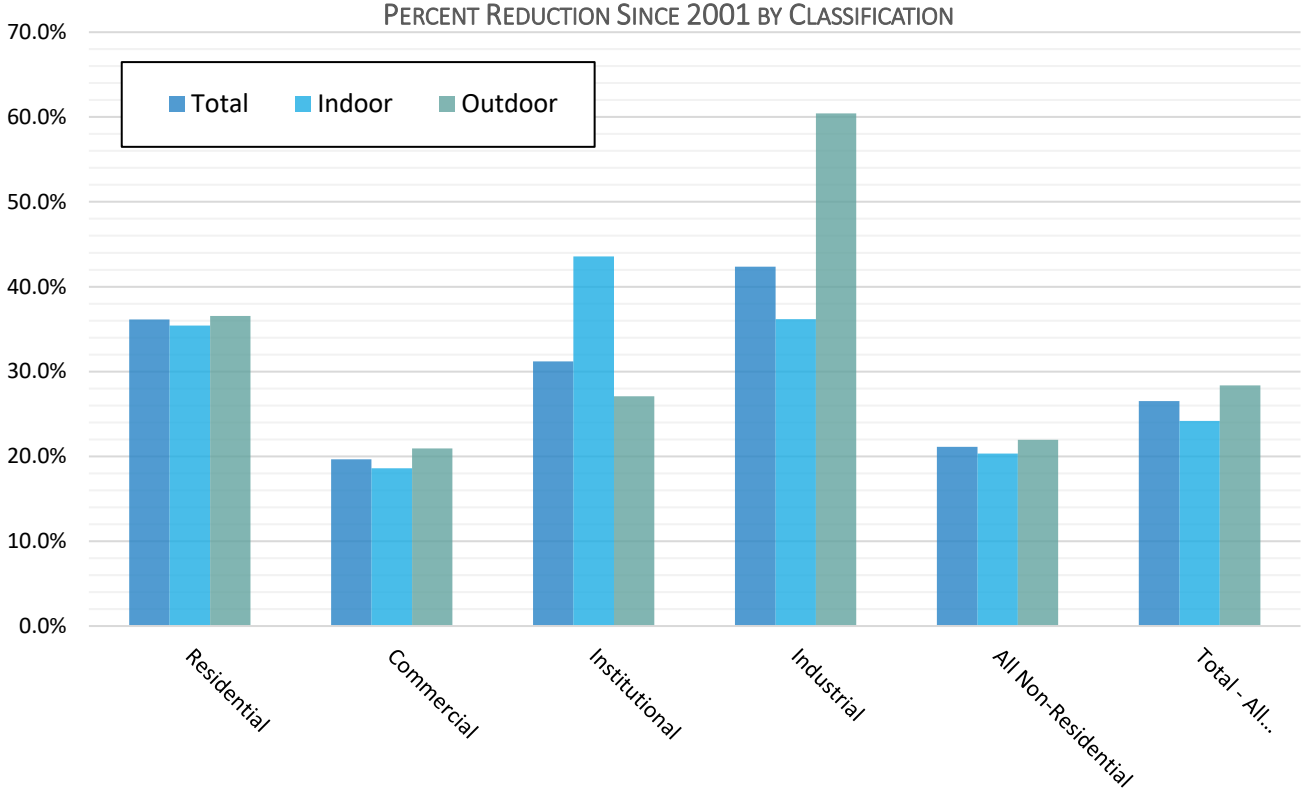
Monthly Conservation Averaged Across Connections (Figure 2-16). Figure 2-16 shows estimated indoor and outdoor water use in the service area over the course of the year for both recent (average of 2022-24) and historical (2001 and 2016-18) water use patterns. As can be seen in the figure, the community has done an excellent job in saving water both indoors and outdoors and throughout recent years. This seems to indicate that the conservation program and messaging has been helpful in increasing overall awareness of the value of water, the importance of conservation, and implementing effective strategies for accomplishing sustained water use reductions.

Figure 2-16
Monthly Conservation, Average of All Connections



Percent Water Use Reduction by Classification (Figure 2-17). Figure 2-17 shows the percent reductions by customer classification since 2001. These results have been calculated based on the reduction in water sales per connection. A few interesting trends can be observed in this figure:

FIGURE 2-17
PERCENT REDUCTION SINCE 2001 BY CLASSIFICATION



i. Conventional thinking has been that conservation will need to come primarily from outdoor water use. However, the percent savings between estimated indoor and outdoor water since 2001 is about the same. There is slightly more savings outdoors than indoors (28.4% vs. 24.2%), but the difference is less than might have been expected.

ii. Commercial savings are a little less than half of the savings observed for residential customers since 2001. This does not necessarily indicate that commercial customers have not reduced water use appropriately. Further analysis is required to determine the capacity to reduce water use based on current practices and technologies. Continuing efforts to disaggregation of water use within all CII classifications will improve understanding of water use patterns and enhance programing opportunities.

iii. Institutional customers have seen the largest reduction in total use of all classifications. This demonstrates the efforts of large property managers in golf, parks, and other open spaces to reduce water use. While there is always more to do, this means institutional users have taken a good first step in conserving water on its properties.

iv. Industrial customers appear to be showing an increase in indoor water use since 2001. In considering this result, it should be emphasized that the values reported here are based on sales per connection. While it is possible that per-connection water use has increased since 2001, it is also possible that new industrial connections have been added since 2001, accounting for the apparent increase in average use per connection. Ideally, these results could be presented in a format that only looked at water used by industrial customers that existed in 2001 to see how their actual water use has changed. Unfortunately, the data does not exist to make this distinction. Work is on-going to clarify water use within this classification. For more detailed information, refer to Chapter 4. Industrial customers, however, had the greatest reduction in outdoor use between classifications.

Percent of Water Use Reduction by Sub-Classification (Figure 2-18). Figure 2-18 shows the percent of water use reduction by sub-classification. This provides some additional detail regarding where reductions in per connection water use have occurred since 2001. Similar to what was observed for industrial customers in Figure 2-16, the "negative savings" observed for hospitals, hotels, and apartments are not believed to be per capita increases in water use, but a function of an increase in the number of connections or expansion in service within these sub-classifications since 2001. The conservation reported for indoor use in the miscellaneous classification may not be representative of actual savings, but a function of change in how customers in this classification are being reassigned to other classifications. As work continues in CII analysis, understanding of water use patterns and actual use reductions will improve.

Volume Water Use Reduction by Classification (Figure 2-19). Figure 2-19 shows the estimated volume of water saved each year by each customer classification as a result of conservation. These results are an approximation of water volume use reductions as calculated by multiplying the percent reduction per connection by the average use per connection. As a result, it continues to reflect the same problem with industrial use as noted previously. However, it does provide some indication of the magnitude of reductions in various areas.

As can be seen in Figure 2-19, use reductions outdoors accounts for slightly more than 54% of the total reduction. While the percent reduction of indoor use to outdoor use is comparatively similar (as noted previously), the larger total volume of water used outdoors results in a greater volume of conservation reductions . A similar conclusion can be made regarding residential water use reductions. About two-thirds of the total decrease in use is derived from residential customers. This is not because residential customers are saving at substantially higher rates, but simply because they, as a classification, use more water than other classifications. Research being conducted utilizing WaterMAPS, the CII Analytics Tool, and other methodologies will help to increase understanding of water use, demand reduction, and capacity to conserve across all classifications. See Chapter 4: Water Conservation Practices for program details.

FIGURE 2-18
PERCENT REDUCTION SINCE 2001 BY CLASSIFICATION

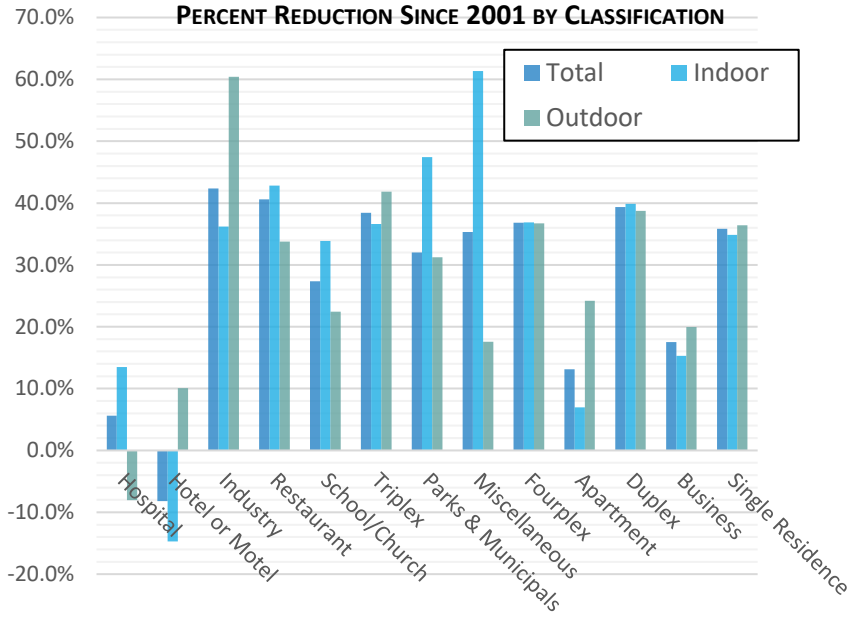
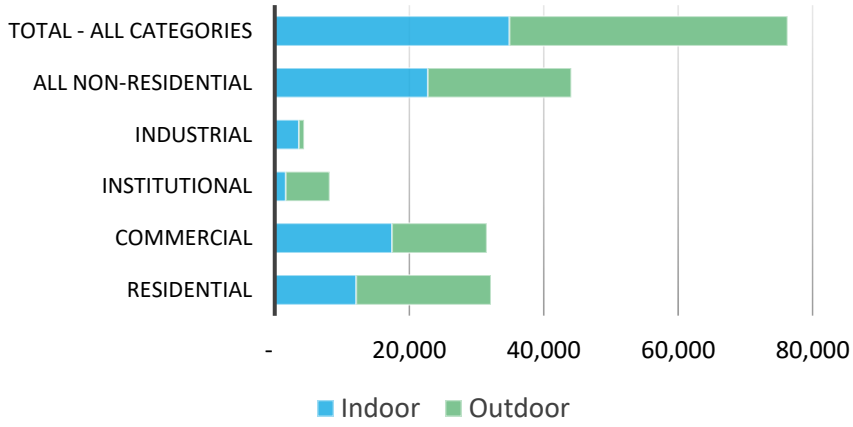


FIGURE 2-19
VOLUME OF CONSERVATION SINCE 2001 BY LOCATION OF USE AND CLASSIFICATION (AF/YEAR)

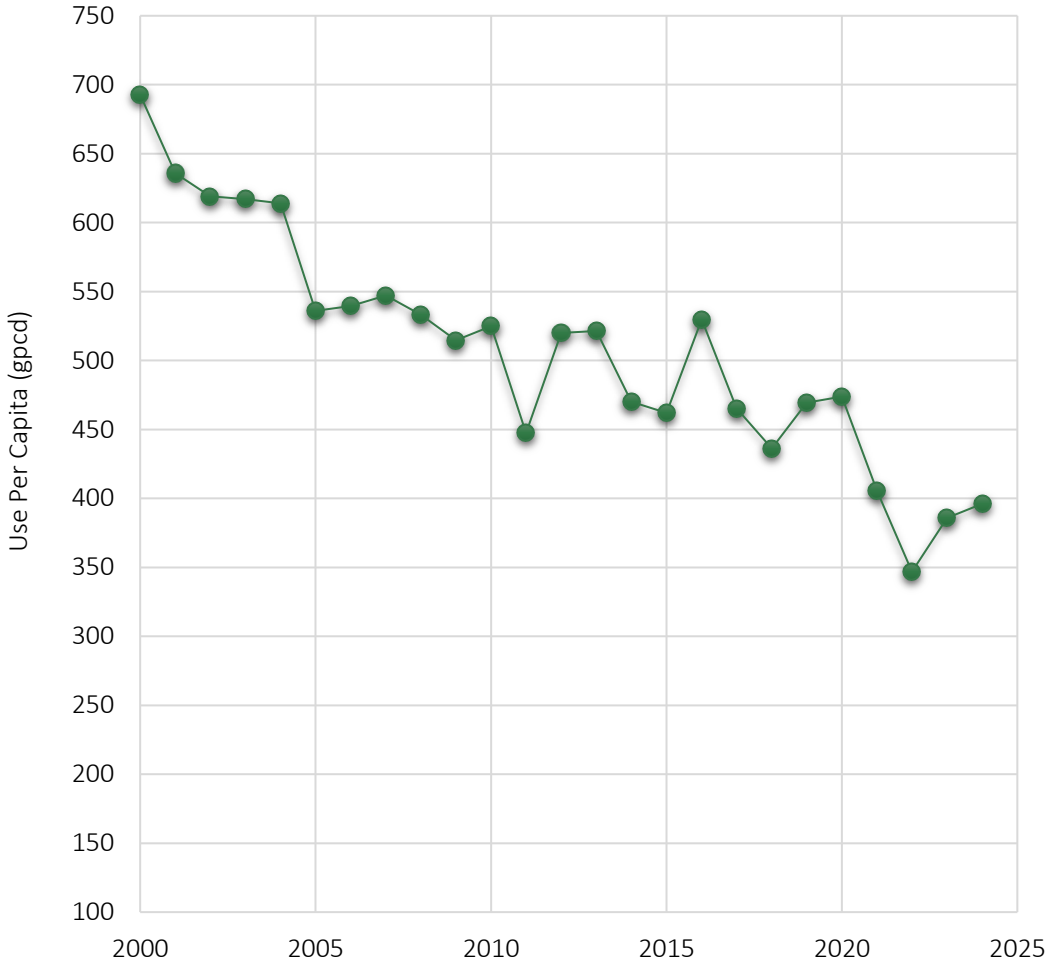


Peak Day Water Use Reduction (Figure 2-20). All of the previous figures have focused on reductions in the volume of water used annually. However, significant strides have been made in reducing peak demands. This is important because most of the water infrastructure facilities must be sized to meet peak demands. Reducing these demands translates to significant savings for the service area.

In system-wide numbers, peak day demand has been reduced from 216.3 million gallons per day (mgd) to 160.0 mgd in 2024. This is a reduction of 26 percent. While this is impressive in itself, the reduction is even greater when growth is taken into account. If peak day demand is converted into a per capita value following the same procedure described for total annual demands (see description of Figure 2-1), the observed reduction increases to 38 percent. Figure 2-20 shows how the reduction in per capita peak demand has occurred over time.

Water savings associated with this reduction in demand are sizable, as identified in the recently completed storage and conveyance plan When this new plan[5] (using updated demand projections with conservation) is compared to the previous plan[6] (based on historical demands without conservation), several projects are now able to be eliminated or decreased in size or scope because of reduced peak demands. Estimated savings associated with downsized or eliminated conveyance project resulting from recent and projected conservation exceed $20 million.[7] When considering avoided costs of water supply, storage, and conveyance, the cumulative cost savings associated with water conservation between 2000 and 2024 is approximately $420 million (see Appendix P).

FIGURE 2-20
SALT LAKE CITY DEPARTEMNT OF PUBLIC UTILITIES
PER CAPITA PEAK DAY WATER USE (GPCD)



[5] *Salt Lake City Water Storage and Conveyance Plan*, BC&A, 2020
[6] *Major Conveyance Study*, BC&A, January 2007
[7] Based on elimination or downsizing of projects identified in the 2007 *Major Conveyance Study* that are no longer needed. This includes elimination of the 4500 South Transmission Main and Storage Tank (Project 3.3B), 7800 South Low Improvements (Projects 3.6A, 3.6B, 3.6C, and 3.12B), and adjustments to the size of the East-West Aqueduct (Projects 3.1A and 3.1B).

CONSERVATION GOAL HIGHLIGHTS

GPD = Gallons Per Day
AF = Acre-Feet

GOAL

	Current	2030	2040	Long Term
Gallons Per Capita	179	174	164	146
% Reduction		2.9%	8.4%	18.7%

OVERALL TARGETS

Residential Indoor Use
49 GPD/person

Outdoor Use
22.8" average irrigation

WATER USE REDUCTION

Annual water use reduction since 2000:
23,400 AF/yr

Needed additional long-term water use reduction:
20,780 AF/yr

Additional Water Use Reduction by Classification (AF/yr)					
	Residen-tial	Commer-cial	Institu-tional	Indus-trial	Total
Indoors	3,356	4,574	440	934	9,305
Outdoors	5,569	3,906	1,788	213	11,475
Total	8,926	8,479	2,228	1,147	20,780

CHAPTER THREE: CONSERVATION GOALS

3.0 INTRODUCTION

As discussed in Chapter 1, conservation is an essential part of water resource planning to meet the future water needs of its community. The purpose of this chapter is to articulate and describe the goals for conservation that will:

- Keep on track to meet its long-term water supply needs.
- Facilitate efforts to increase resource and system resilience in the face of identified risks, including climate change.
- Encourage the continued wise use of an important limited resource; and
- Be consistent with conservation goals established by the State, Central Utah Project, Alliance for Water Efficiency, US-Environmental Protection Agency, and this plan.

This chapter highlights historical and proposed goals from various sources that are relevant to current conservation planning efforts. Included are discussions of specific goals articulated in the Governor's Water Conservation Goal, the Utah Lake System contract with the Central Utah Project, and the recently updated State Regional Conservation Goals. Also included is a discussion of the relationship between conservation goals and the ongoing need to support efforts to protect Great Salt Lake.

Achievements towards programmatic goals are also discussed in this chapter, such as those outlined in the Governor's Strategic Water Plan, American Water Works Association (AWWA) G-480 Checklist, Alliance for Water Efficiency (AWE) Landscape Guidelines, and the State Division of Water Resources Water Conservation Plan Checklist. Additionally, the Appendices contain these guidelines and goals in checklist format.

Central to this chapter and the discussions contained are these newly developed established conservation goals. These goals have been developed based on outcomes of the *Salt Lake City Water Supply and Demand Master Plan* and reflect current and future projections of both supply and demand within the service area. While not identical to the State Regional Goals, these goals meet or

exceed these regional goals and are more in keeping with our own system, resources, and characteristics.

3.1 Conservation Goals

3.1.1 GOVERNOR'S 2001 STATEWIDE WATER CONSERVATION GOAL

In 2001, Governor Mike Leavitt published a statewide conservation goal to reduce per capita water use by 25 percent (as compared to water use from the benchmark year of 2000). Governor Gary Herbert later enhanced that goal by reducing the timeline to be met by 2025.

While the conservation goals over the years have been guided by supply and demand, as well as climate and drought concerns, the Governor's Statewide Goal has been used as a benchmark for measuring program achievements. Additionally, the statewide goals were incorporated into the water supply plan as part of the SLCDPU's *2007 Major Conveyance Study*. As documented in Chapter 2, water users within the service area have thus far stayed significantly ahead of this goal in its efforts to reduce water use.

3.1.2 CENTRAL UTAH PROJECT CONSERVATION AGREEMENT (UTAH LAKE SYSTEM CONSERVATION GOALS)

As part of its request for water from the Utah Lake System (ULS), the City has entered into an agreement (through Metropolitan Water District of Salt Lake and Sandy) with Central Utah Water Conservancy District (CUWCD) to achieve a minimum level of conservation. This conservation requirement specified a reduction in per capita water use (from year 2000 levels) of 12.5 percent by 2020 and 25 percent by 2050. While this is an important goal from a contractual standpoint, it has not been the driver of conservation programming goals as internal conservation goals have been more aggressive. However, achieving this goal results in avoided additional cost on water purchased through these agreements, adding to the value of the conservation programming beyond the achievement of water use reduction goals.

3.1.3 RECOMMENDED STATE WATER STRATEGY, JULY 2017

In 2013, Governor Gary Herbert convened a group of stakeholders with extensive backgrounds to form the State Water Strategy Advisory Team. Out of this process, a diverse group of water practitioners, advocates, and academics were asked to help devise a state water strategic plan. Stephanie Duer, the City's water conservation manager, participated in this process, representing both Salt Lake City specifically, and municipal interests in general. The group examined a range of issues, including, but not limited to conservation, competing demands on water, the roles of technology and science, how law and policy affect our relationship with water, and sustainability and the environment.

The outcome of this process is the *Recommended State Water Strategy,* published in 2017. Strategies were organized into eleven categories, with the first being the role of conservation in supporting a sustained water supply. Conservation, demand management, demand reduction, improvements in efficiencies, and the role of technology and science also appear in each of the other ten strategies.

Though this strategic plan does not articulate specific goals, it does outline ideas and approaches to enhancing and building on conservation efforts. Those strategies pertaining most closely to urban demand management and conservation have been collected and organized in a list in the appendices. These strategies were tracked as part of the development of this plan and have also been integrated into day-to-day programming as appropriate.

3.1.4 UTAH'S REGIONAL M&I WATER CONSERVATION GOALS, NOVEMBER 2019 AND JUNE 2025

Over the last several years, efforts have been made to better understand how the State of Utah manages water conservation efforts in the state, including the process for identifying and assigning water use reduction goals. These efforts include a legislative audit completed in 2015 and the *Recommended State Water Strategy* completed in 2017 by the Governor's Water Strategy Advisory Team (GSWAT) (see Section 3.1.3). One of the major conclusions of both documents was the need to update the State's conservation goal to make it more regionally appropriate and relevant.

One of the limitations of the historical statewide water conservation goal is that it failed to integrate the effects of regional climate, local and discrete supply, and water use pattern differences. Utah is a large state with diverse terrain, climates, populations, development patterns, and attitudes that affect what water is available and how it is used. With this in mind, the State commissioned a study to reevaluate the statewide conservation goal, and to establish water conservation goals that reflect each region's characteristics, challenges, and

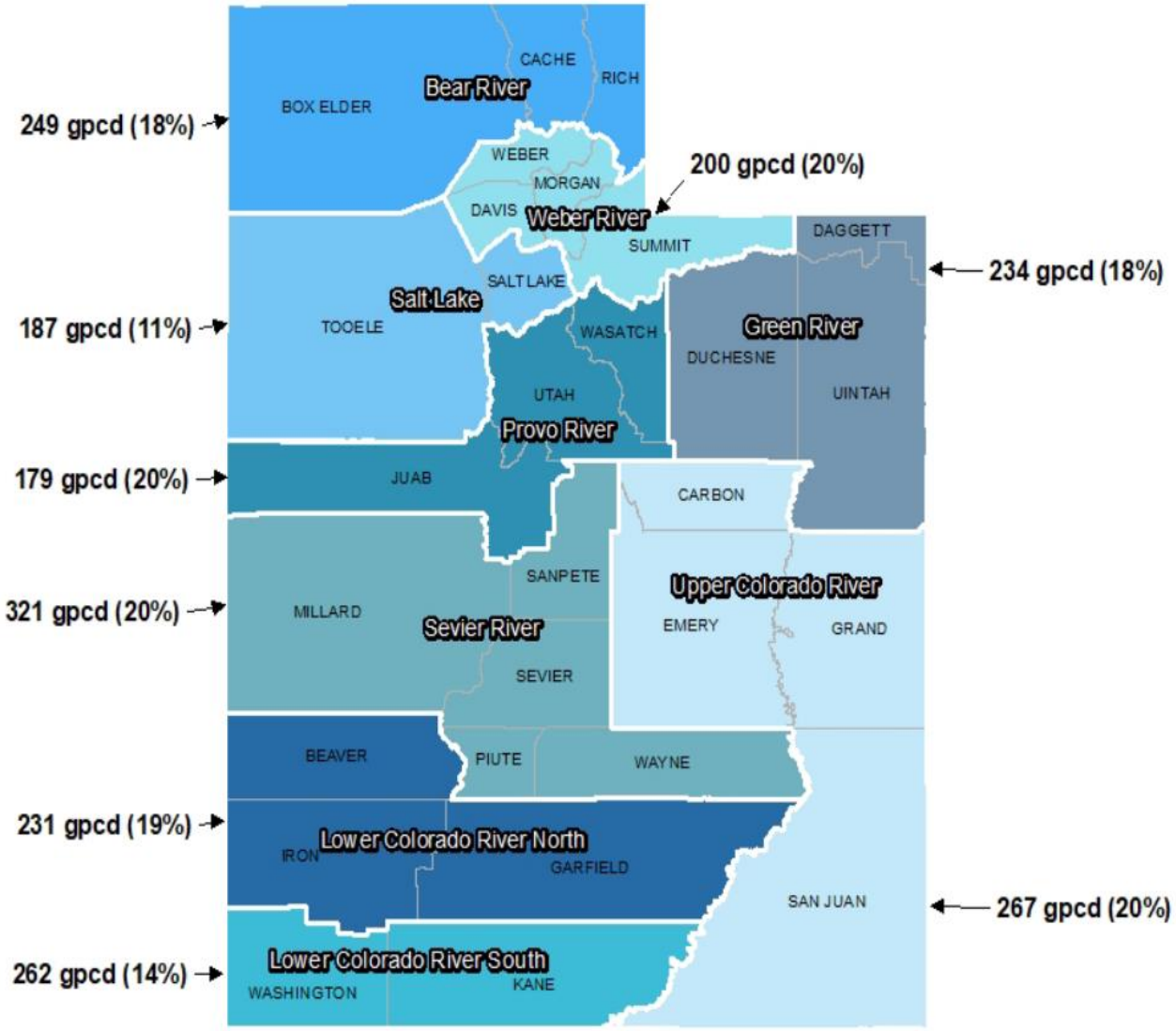
opportunities as related to water. The result is Utah's *Regional M&I Water Conservation Goals.*

The goals established in the *Utah's Regional M&I Water Conservation Goals* are shown in Figure 3-1.[1] For the Salt Lake region (consisting of Salt Lake and Tooele Counties), the new goal was to reduce per capita water use to 187 gallons per capita per day (gpcd), an additional 11% reduction from the average use in the region observed in 2015. In 2025 (during the preparation of this plan), the Division of Water Resources presented a few modifications to this goal. The major proposed changes included moving from 2015 as a baseline to the average of 2015 to 2019 and changing the goal for a specific gpcd value for each region to a percentage reduction to be applied evenly to all entities. In other words, the new regional goal for SLCDPU would be an 11% reduction from their average water use from 2015 to 2019.

While not official "goals", the study also identifies some projected future levels of conservation. This includes achieving a cumulative 15% reduction in use by 2045 and 19% by 2065.

The existing SLCDPU service area is contained in the Salt Lake Region, which also includes all of Salt Lake and Tooele Counties.

FIGURE 3-1
UTAH'S REGIONAL M&I WATER CONSERVATION GOALS



[1] *Utah's Regional M&I Water Conservation Goals*. Utah Division of Water Resources. November 2019.

3.1.5 WATER CONSERVATION AND GREAT SALT LAKE

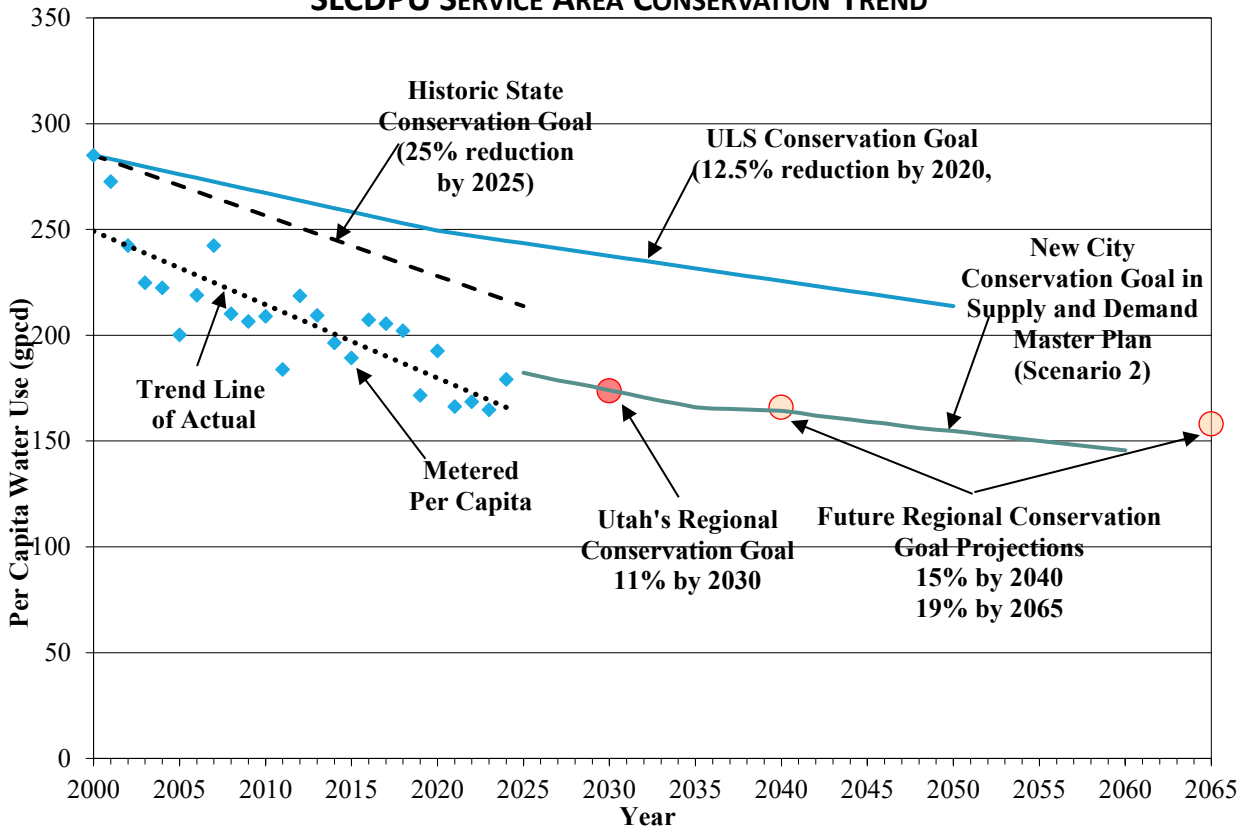
Salt Lake City is committed to doing what it can to support efforts to support and restore Great Salt Lake. As part of that effort, additional conservation scenarios are being evaluated that might achieve goals beyond those stated in Chapter 3. Part of this evaluation is the role of depletion in achieving additional water savings for Great Salt Lake. This task has been added to ongoing research relating to refining projected demand reductions (see Table 4-6, R-17).

3.1.6 SALT LAKE CITY WATER SUPPLY AND DEMAND MASTER PLAN CONSERVATION GOALS

As part of its water supply and demand study, a number of conservation scenarios were considered. These scenarios parallel similar scenarios developed for the State's regional conservation goals.

Ultimately, a scenario was selected (referred to as Scenario 2 in the *Salt Lake City Water Supply and Demand Master Plan)*[2] that both achieves the goal of continuing to reliably supply water for long-term needs and is slightly more aggressive than the new state regional goals. This scenario is the new conservation goal moving forward.

FIGURE 3-2
SLCDPU SERVICE AREA CONSERVATION TREND



3.1.7 COMPARISON OF CONSERVATION GOALS

Historical and proposed water conservation goals are summarized and compared in Figure 3-2. All values are shown in terms of per capita water use, based on equivalent population adjusted for employment (see Chapter 2). As shown in the figure, the proposed conservation goal for this plan is consistent with the State's regional conservation goals and meets or exceeds all other historical goals.

Included in the figure is also the observed per capita water use in the service area. From the figure, it can be seen that customers within the service area are meeting or exceeding all of its previously established goals. There was a slight rebound in per capita water use last year. Even with the excellent results achieved to date, this emphasizes the need for continued and increased efforts in the promotion of long-term conservation, including enhanced education and outreach efforts.

[2] Salt Lake City Water Supply and Demand Master Plan, page 2-11

3.2 Details of SLCDPU Conservation Goals

While an overall conservation goal is an important first step in planning, it will be difficult to turn the goal into reality unless we understand the individual components of the goal, that is, who is using the water, and how and when they are using it. The purpose of this section is to provide additional information regarding the conservation goals so that more detailed plans can be developed to achieve discreet components of the goal.

3.2.1 OVERALL CONSERVATION GOAL

For the planning window of the *Salt Lake City Supply and Demand Master Plan*, the long-term conservation goal can be expressed in the following metrics summarized in Table 3-1 and Table 3-2.

Table 3-1
Long-Term Conservation Goals
Expressed as Per Capita Use (Gallons Per Day)[3]

2015-19 SLCDPU Observed	Regional M&I Conservation Goal for 2024	2022-24 SLCDPU Observed	Utah's Regional M&I Goal Long-term (2065)	SLCDPU Long-term Goal (2060)
195	182	171	158	146

Table 3-2
Percent Reduction in Per Capita Use To Achieve Long-Term Goals

State Regional Long-term Goal from 2015-29 Observed (2065)	SLCDPU Historic Long-term Goal from 2015-19 Observed (2060)	SLCDPU Long-term Goal from 2022-24 Actual
19.0%[4]	25.1%	14.6%

As can be seen in the tables, long-term goals exceed Utah's Regional M&I Conservation Goals for the Salt Lake region.

3.2.2 CONSERVATION GOAL BY CUSTOMER CLASSIFICATION

As a starting point, it is useful to define the water use characteristics that will need to be achieved in order to reach long-term water use reduction goals.

Changes in per capita water demands may result from a number of factors, not all of which are the result of more prudent water use. For example, increases in density (and the corresponding decrease in average lot size) may significantly decrease per capita outdoor water use, even if water use patterns do not otherwise change. Economic growth and socio-economic conditions, improvements in fixture and appliance efficiency, and climate change are examples of other factors that may, for better or worse, affect demand.

To better measure where savings will be derived through conservation activities, we need first understand the who and how of water use. Besides the factors mentioned above, it is also helpful to examine water use by grouping customers together that exhibit similar characteristics, demographics, or water use behaviors. For example, homeowners use water differently than do businesses, and both have water use patterns different from schools. By grouping water users into classifications with similar characteristics, we can improve water use analysis and enhance programing to achieve demand reduction. Setting conservation goals for water use reduction in specific water use areas will enhance our opportunities to successfully achieve our conservation goals.

For conservation planning purposes, customers have been disaggregated into the primary classifications of residential, commercial, institutional, and industrial, which are the same classifications used in Chapter 2 to facilitate analysis of historical water use. These groups have been further divided into subclassifications (see Section 2.3). The analysis of historical use and projected future growth presented in Chapter 2 is used here to estimate how much savings may come from each classification and subclassification based on the following general assumptions:

- Residential indoor water use to be reduced to 49 gpcd
- Outdoor water use to be reduced to 22.8 inches average irrigation

[3] Based on equivalent population adjusted for employment as described in Chapter 2.

[4] State Regional Goals measured as reduction from average 2015 to 2019 water use.

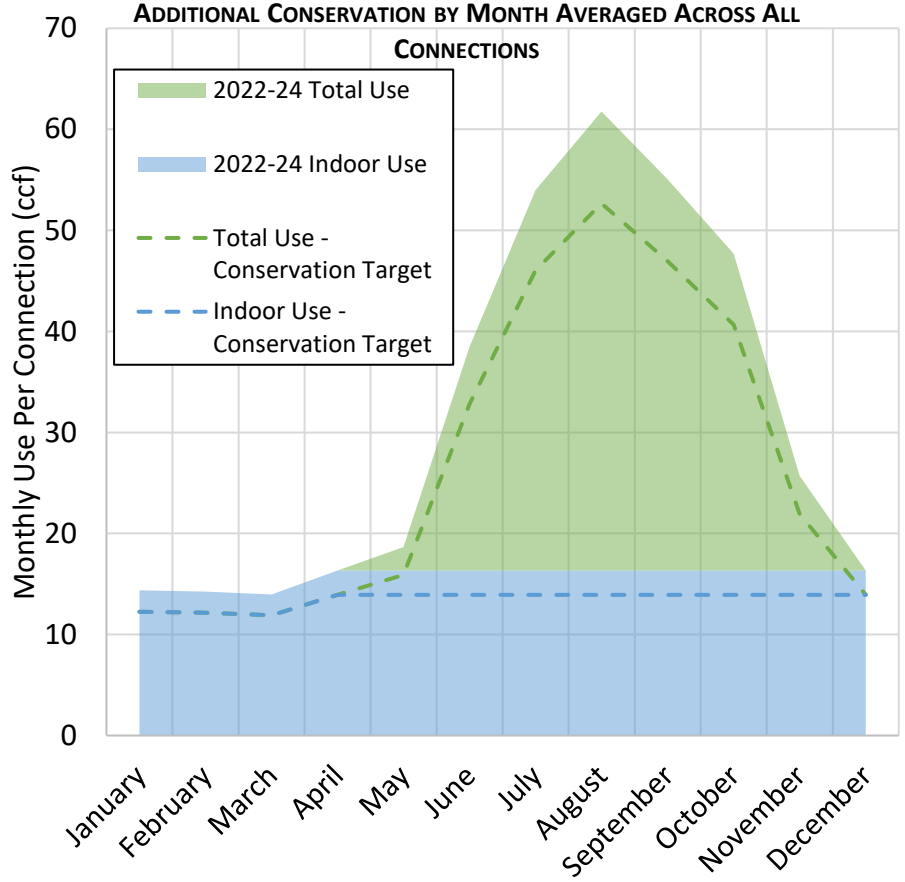
- CII indoor reduction to be determined

For Commercial, Industrial, and Institutional customers (CII), it has been assumed that outdoor conservation will occur at the same rate as in the residential classification, but indoor water use will be reduced in an amount equal to approximately 50 percent of the reduction observed in residential use.[5] This is based on maintaining the same ratio of conservation between residential and non-residential classifications as observed in the past (see Chapter 2). As work continues in evaluating water use in CII sectors, enhanced understanding of disaggregated water use patterns will facilitate establishment of more meaningful goals within the CII sector. For more details, see Chapter 4.

Based on these assumptions, projected conservation by classification and season of use is summarized in Figures 3-3 through 3-5.

Additional Conservation Throughout the Year (Figure 3-3). Figure 3-3 shows current indoor and outdoor water use over the course of the year, as well as projected demand reductions needed to attain the planned long-term conservation goal. As seen in the figure, additional conservation is needed both indoors and outdoors, as well as throughout the course of the year.

FIGURE 3-3
ADDITIONAL CONSERVATION BY MONTH AVERAGED ACROSS ALL CONNECTIONS

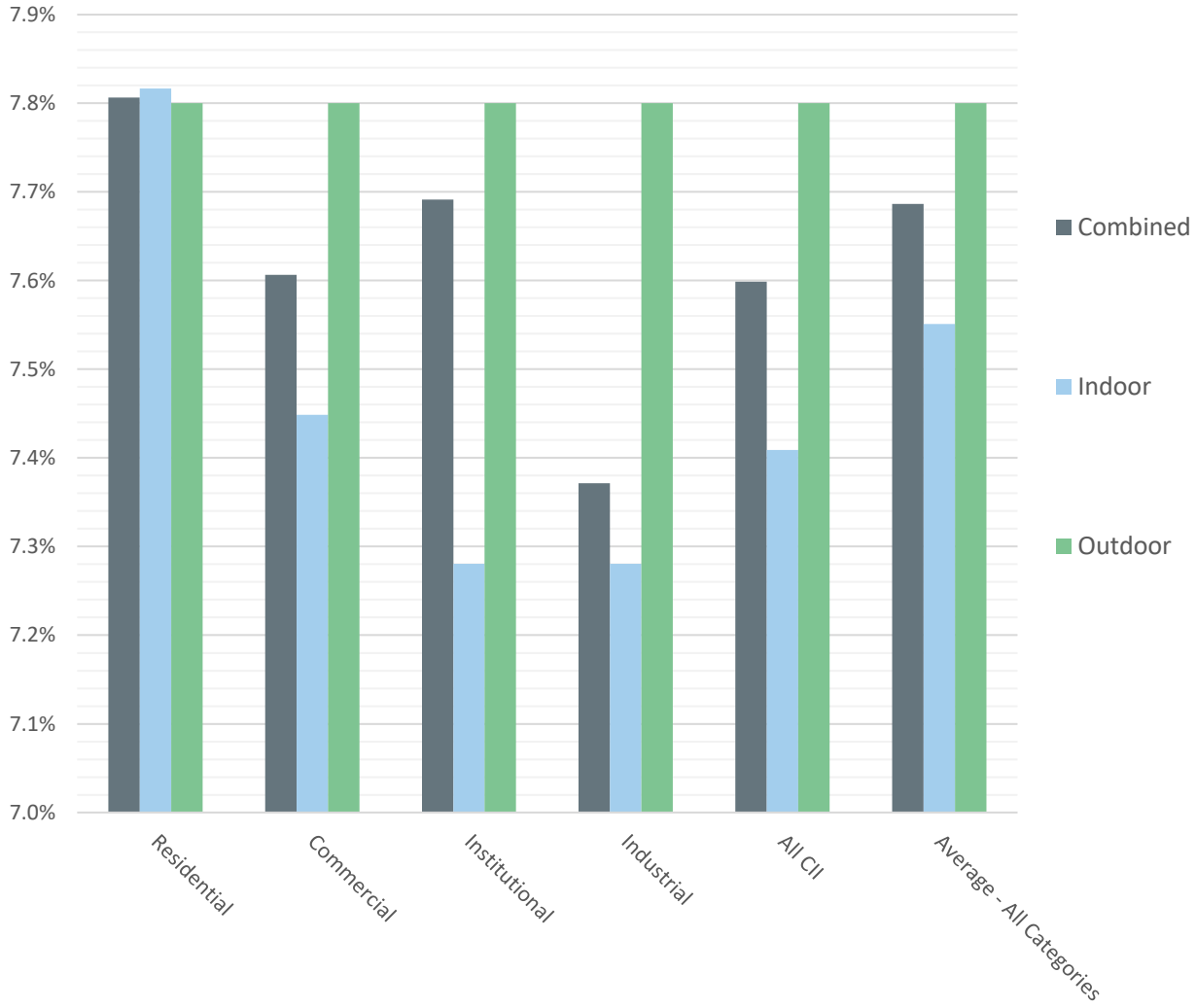


[5] The exception to this is the apartment sub-classification where it has been assumed that indoor water savings will be the same as residential.

Estimated Additional Conservation by Customer Classification (Figure 3-4). Figure 3-4 provides estimated, disaggregated conservation targets for both indoor and outdoor water use by customer classification. Target outdoor conservation on a percentage basis is identical for all groups. Indoor targets vary depending on the estimated potential conservation for each group based on historical average use by classification.

Note that indoor industrial conservation is indicated as only about half of what is expected for other CII customers. This does not mean that industrial users are not expected to make the same effort to conserve water as other CII customers. An active conservation program among industrial customers is recommended and necessary. All industrial users are expected to look for ways in which they can improve their water use. The lower indoor conservation target at this writing is a recognition that there is a great deal of variability in the nature of industrial water use that makes the establishment of a single, aggregate reduction goal difficult. Further analysis is necessary to better understand water use patterns and the capacity to conserve within this and other CII sub-classifications.

FIGURE 3-4
ESTIMATED ADDITIONAL PERCENTAGE TO ACHIEVE LONG-TERM GOAL BY CUSTOMER CLASSIFICATION



Estimated Additional Conservation Per Classification by Volume (Figure 3-5).[6] In addition to considering percent reductions, it is often useful to understand the accompanying volume of water that will need to be reduced within each classification. Figure 3-5 provides perspective in this regard.

As can be seen in the figure, most of the water reduction in the service area will need to come from residential customers. This is not a conscious attempt to target these customers but simply a reflection of the size of this customer classification, its current volume of use, and the estimated capacity to conserve within this classification. To aid the residential customers conceptualize the level of conservation proposed in this plan, Table 3-3 identifies target conservation on a per-household basis over time.

Even though other customer classifications may currently appear to have lower reduction demands expressed, conservation will be needed in all areas to reach planned short- and long-term goals. Also, as understanding and evaluation of water use continues, with the accompanying analysis of the capacity to conserve, these conservation targets should be reviewed and refined.

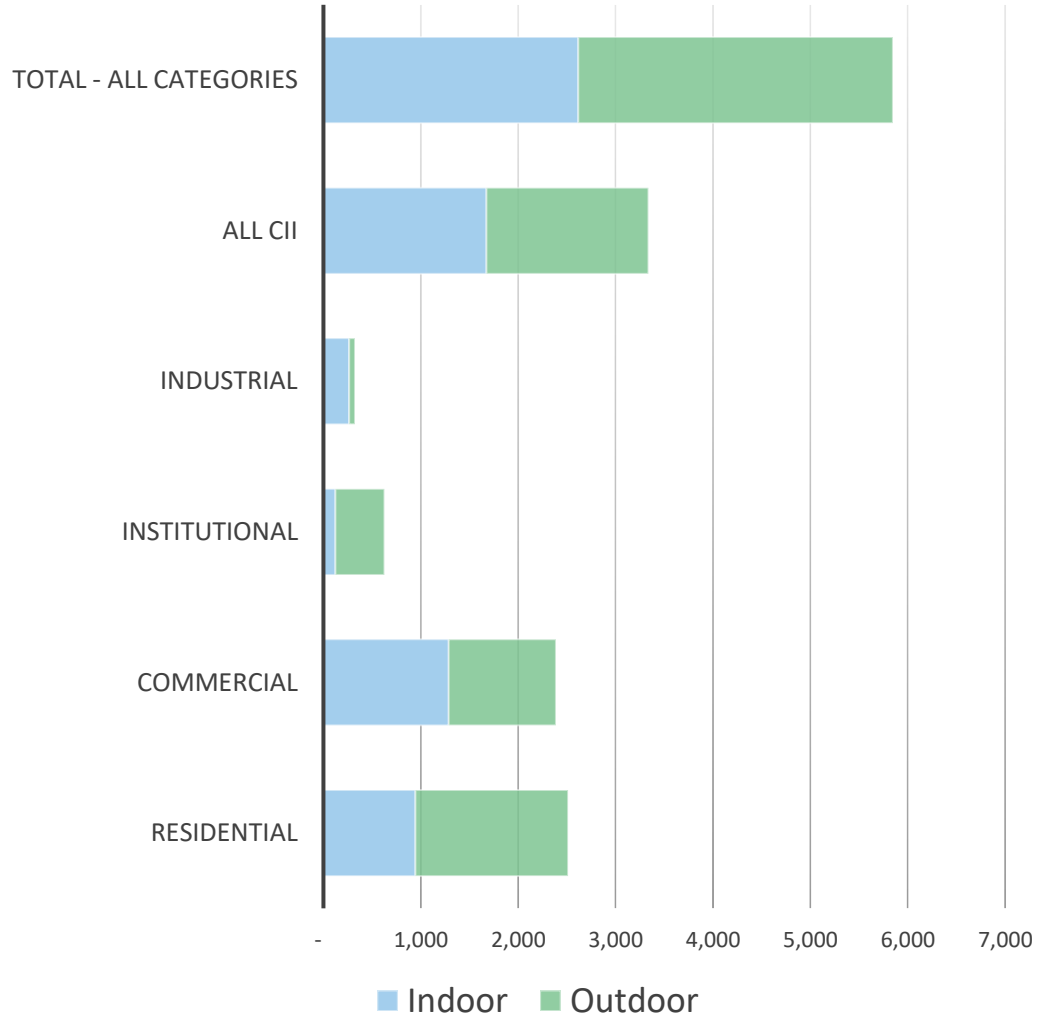
TABLE 3-3

RECOMMENDED PER-HOUSEHOLD INTERIM CONSERVATION GOALS

	2024	10-year	Long-Term
Total Per-Household Use Target (gpd)	389	377	359
Per-Household Indoor Use Target (gpd)	138	134	127
Per-Household Outdoor Use Target (gpd)	251	244	232

FIGURE 3-5.

VOLUME OF CONSERVATION NEEDED TO ACHEIVE LONG-TERM GOAL BY LOCATION OF USE AND CLASSIFICATION (AF/YEAR, EXISTING CUSTOMERS)



[6] Water use reduction for industrial customers will be more clearly defined as CII analysis continues.

3.2.3 CONSERVATION GOALS BY SUB-CLASSIFICATION

As with analysis of historical water use, conservation goals may also be divided into sub-classifications, a practice helpful in the design and implementation of conservation strategies. The result is highly targeted, efficient programs. The limitation is that there is a great deal of difference between customers within the classifications, and so a stated reduction goal that is averaged for the larger classification may not align reasonably with specific water patterns of discrete customers within a classification.

For example, while the residential classification generally has similar patterns between its sub-classifications, commercial and industrial classifications are very diverse, from art galleries to grocery stores and bottling plants to oil refineries. Being aware of these variabilities highlights the need for further analysis.

With these caveats in mind, projected conservation by sub-classification and season of use is summarized in Table 3-3 and Figure 3-6. Figures 3-7 through 3-10 further highlight the differences in water use patterns across various industries. It should be emphasized that savings in each sub-classification are an estimate for planning purposes only. As additional information and insight is gained, modifications to these numbers will occur and it may be determined that more conservation is appropriate for some groups and less in others. These types of adjustments are expected and to be encouraged, as conservation programing is adjusted to optimize its program impacts while ensuring water use reduction "burdens" are shared equitably between all water customers.

It should also be noted that total volumes contained in Table 3-3 are for existing customers only. As future customers are added, these new customers, whether residential or CII, will also need to contribute toward achieving water conservation goals. Although not a true "reduction" in water use (since they have not yet used water), future customers will contribute to reducing per capita water use as they implement the same improvements in water use efficiency as is being pursued by existing customers. When the efforts of both existing and future users are combined, the total volume of reduced water use (compared to existing water use patterns) is expected to be an additional 16,100 AF/year over the current annual use levels. When considering only the new reduction goal and not what has already been achieved, approximately 6,800 AF/yr of this total is expected to come from residential customers with the remaining 9,300 AF/yr. coming from CII classifications.

FIGURE 3-6
VOLUME OF CONSERVATION NEEDED TO ACHEIVE LONG-TERM GOAL BY LOCATION OF USE AND SUB-CLASSIFICATION (AF/YEAR, EXISTING CUSTOMERS)

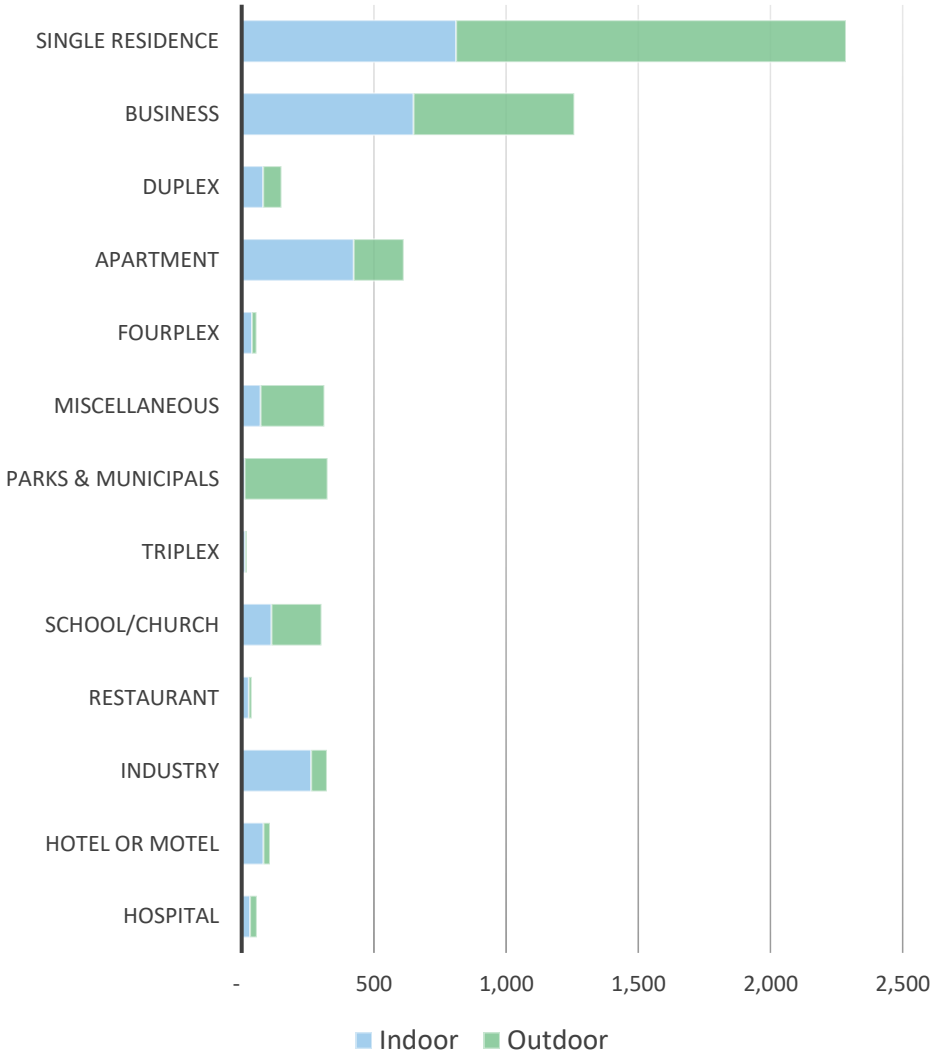


FIGURE 3-7
HOTEL AND MOTEL TOTAL ANNUAL USE

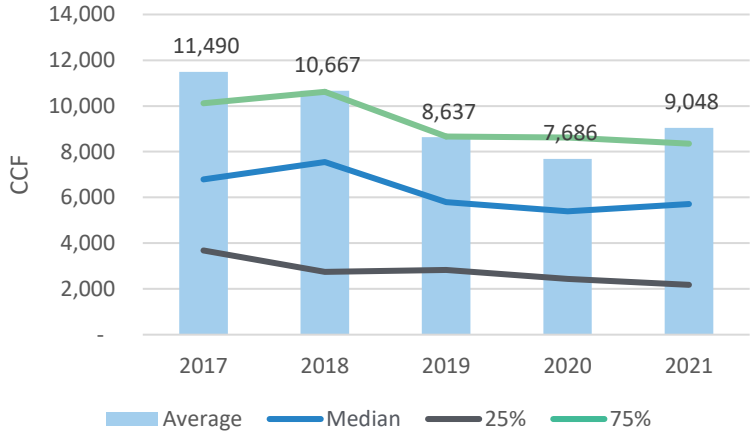


FIGURE 3-8
FINANCE & INSURANCE TOTAL ANNUAL USE

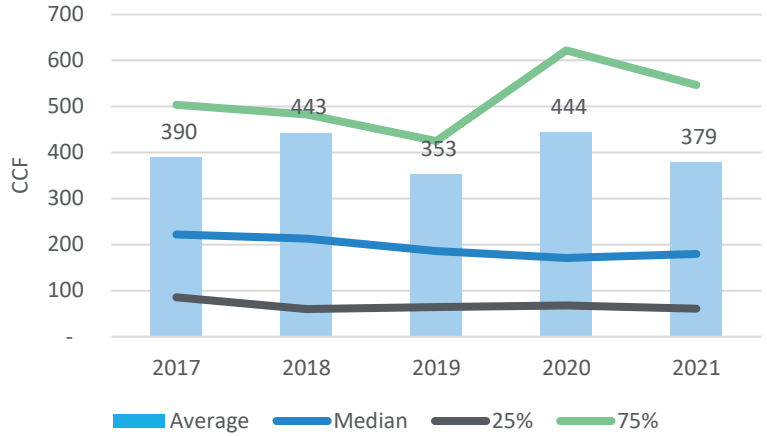


FIGURE 3-9
HOSPITALS TOTAL ANNUAL USE

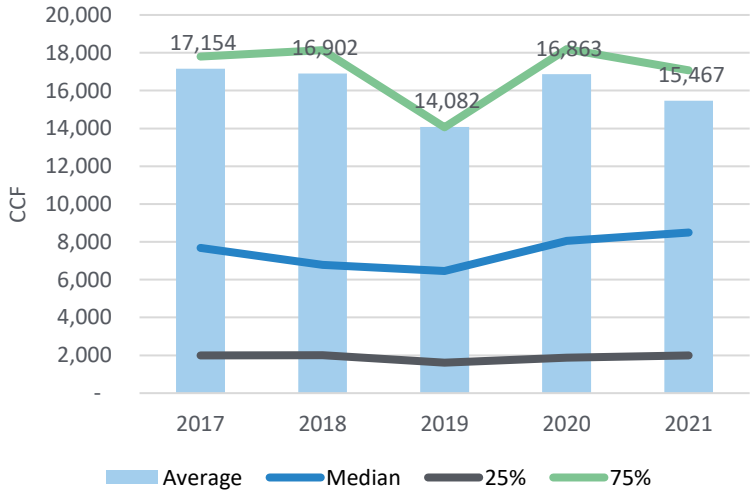
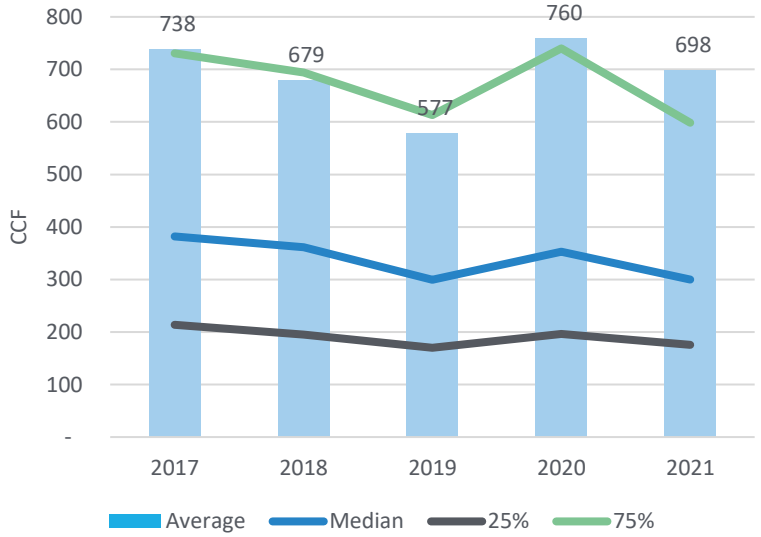


FIGURE 3-10
REAL ESTATE AND RENTAL LEASING TOTAL ANNUAL USE



When analyzing water use, particularly when it comes to setting water use reduction goals, it is not enough to consider total water use, or even estimates of seasonally driven water use. More relevant are estimates that consider the efficiency of that water use and if there exists a capacity to conserve.

In 2023, in conjunction with USU/CWEL, the Utility launched the WaterMAPS™ program. The WaterMAPS™ program integrates parcel data, land cover data, water meter data, and weather data to calculate what is called the "Landscape Irrigation Ratio (LIR)." LIR values indicate how efficiently water is being used to maintain a landscape and whether the water use is outpacing the water need. LIRs are calculated on both an annual and a monthly basis.

Figure 3-11 shows the mean LIR for all evaluated CII connections; Figure 3-12 shows the LIRs by CII sub-classifications. This analysis helps to refine outdoor water conservation goals within the various CII classifications.

FIGURE 3-11
CII MEAN LIR

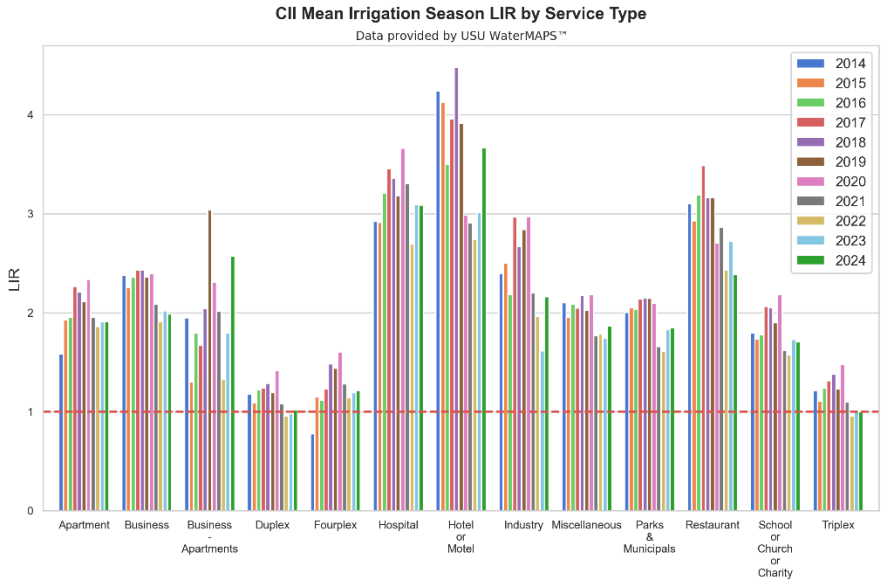


FIGURE 3-12
CII LIR BY SERVICE CONNECTION

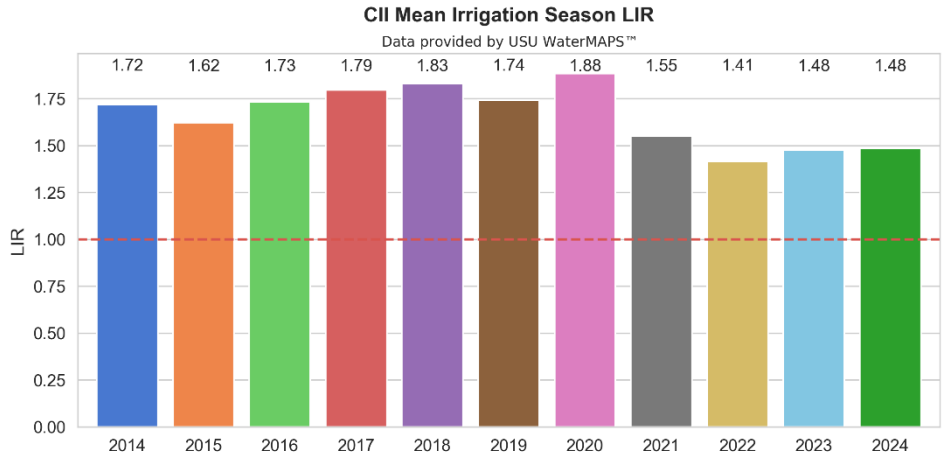


TABLE 3-4

LONG-TERM CONSERVATION GOALS BY SUB-CLASSIFICATION

	Location of Use	Hospital	Hotel or Motel	Industry	Restaurant	School or Church or Charity	Triplex	Parks & Government	Miscellaneous	Fourplex	Apartment	Duplex	Business	Single Residence	Total
Current Annual Use (AF) [7]	Total	757	1,449	4,378	510	3,977	250	4,175	4,074	721	7,850	1,920	16,729	29,286	76,076
	Indoor	441	1,134	3,611	372	1,548	168	154	987	492	5,419	1,049	8,928	10,373	34,675
	Outdoor	316	316	767	138	2,429	82	4,020	3,087	229	2,431	870	7,802	18,913	41,401
Daily Use Per Connection (gpd)	Total	16,093	9,656	14,369	1,566	6,432	433	5,049	5,218	603	4,166	382	2,300	389	66,656
	Indoor	9,370	7,554	11,851	1,141	2,503	292	186	1,264	412	2,876	209	1,227	138	39,022
	Outdoor	6,722	2,102	2,518	425	3,929	141	4,863	3,954	191	1,290	173	1,073	251	27,634
Goal for Future Annual Use (AF)	Total	700	1,342	4,056	472	3,675	230	3,850	3,762	665	7,237	1,770	15,471	27,000	70,229
	Indoor	409	1,051	3,348	345	1,435	155	143	915	454	4,995	967	8,278	9,562	32,057
	Outdoor	292	291	707	128	2,240	75	3,707	2,847	211	2,241	802	7,193	17,438	38,172
Required Reduction in Annual Use (AF)	Total	57	107	323	38	302	20	325	313	56	613	150	1,258	2,286	5,848
	Indoor	32	83	263	27	113	13	11	72	38	424	82	650	811	2,618
	Outdoor	25	25	60	11	189	6	314	241	18	190	68	609	1,475	3,229
% Savings	Total	7.5%	7.4%	7.4%	7.4%	7.6%	7.8%	7.8%	7.7%	7.8%	7.8%	7.8%	7.5%	7.8%	7.7%
	Indoor	7.3%	7.3%	7.3%	7.3%	7.3%	6.7%	7.3%	7.3%	7.8%	7.8%	7.8%	7.3%	7.8%	7.6%
	Outdoor	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%	7.8%
Savings Per Connection (gpd)	Total	1,207	714	1,059	116	489	34	393	400	47	325	30	173	30	5,124
	Indoor	682	550	863	83	182	19	14	92	32	225	16	89	11	2,947
	Outdoor	524	164	196	33	306	11	379	308	15	101	14	84	20	2,155

[7] For the purposes of this table, all volumes are shown for existing customers only. As future users join the system, it is assumed that they will use water at the same reduced level as identified in the conservation goals.

3.2.4 FIVE- AND TEN-YEAR CONSERVATION GOALS

As noted previously, current goals are ahead of the Governor's Water Conservation Goals and ULS Goals. With this in mind, it is not enough to meet the new Regional goals; more aggressive goals will be important–both to keep pace with long-term supply plans and to model good water resource stewardship. Correspondingly, this conservation plan has identified 5- and 10-year conservation goals as summarized in Table 3-4. These goals follow the overall structure of the regional goals[8] but are more aggressive to account for conservation reductions already achieved and the need to both sustain those achievements and meet additional water use reductions.

To assist Department personnel in identifying and implementing the practices and programming needed to meet these goals, Table 3-6 provides the estimated water use reduction need of the various classifications. This table calculates the needed reduction in total volume required to reach the goals, along with disaggregation of how this reduction might be divided between indoor and outdoor use. While it is not necessary to achieve the exact mix of conservation shown in this table, and it is certain that these volumes will need to be revised over time as more information is collected, this table provides staff with a starting point to estimate how and where conservation efforts should be initially focused.

TABLE 3-5
RECOMMENDED INTERIM CONSERVATION GOALS

	2024	5-year	10-year	Long-Term
Per Capita Use (gpcd)	179	174	166	146
Percent Reduction Per Capita	-	2.9%	7.4%	18.7%
Percent Reduction Indoors	-	1.2%	3.0%	7.6%
Percent Reduction Outdoors*	-	1.2%	3.1%	7.8%
Percent Reduction Total Use	-	1.2%	3.0%	7.7%

**Represents reduction in total outdoor water use for existing customers*

TABLE 3-6
INTERIM CONSERVATION GOALS BY CLASSIFICATION (AF/YEAR)

Classification	Location	5-Year	10-Year	Long-term
Residential	Indoors	1,033	1,704	3,356
	Outdoors	1,714	2,828	5,569
	Total	**2,746**	**4,532**	**8,926**
Commercial	Indoors	1,407	2,322	4,574
	Outdoors	1,202	1,983	3,906
	Total	**2,609**	**4,305**	**8,479**
Institutional	Indoors	135	224	440
	Outdoors	550	908	1,788
	Total	**686**	**1,131**	**2,228**
Industrial	Indoors	287	474	934
	Outdoors	65	108	213
	Total	**353**	**582**	**1,147**
All Classifications	Indoors	2,863	4,724	9,305
	Outdoors	3,531	5,826	11,475
	Total	**6,394**	**10,550**	**20,780**

[8] *Utah's Regional M&I Water Conservation Goals* for the Salt Lake Region indicates that just over half of the long-term goal should be achieved in the next ten years (234 gpcd to 201 gpcd [2030 Goal] vs. 169 gpcd [2065 long-term projection]). This same ratio has been assumed for the 10-year goal, adjusted to account both the lower initial starting point and more aggressive goal. The 5-year goal has been similarly interpolated.

CHAPTER FOUR: CONSERVATION PROGRAMS, PRACTICES, AND MEASURES

4.0 Introduction

Few resources are as critical to a community's health, well-being, or economy as water. Over the duration of its history, the Utility has protected its water resources, from critical watersheds, through urban riparian corridors, in the stormwater system, its water rights, and, of course, by practicing and promoting the wise and efficient use of water. This plan not only reflects that history of conservation; it demonstrates the continued commitment to lead through example. With reliance on research, science, and experience, and in partnership with the community, academicians, and stakeholders, the Utility strives to achieve sustainable reductions in water use to ensure a reliable and secure water supply today and for the future. For us, water is not just a resource; it is a responsibility.

The first steps in developing effective programing are to understand how much water there will be, who the customers are and how they use water, and what future water use will look like to ensure a sustained supply and fair access. Chapters One, Two, and Three address these questions, respectively. This chapter describes the programming that will help maintain a sustainable, reliable supply and achieve the goals described within this plan.

Programs, practices, and measures need to consider short- and long-term conservation goals and improve water efficiency or reduce water waste, all while maintaining quality-of-life standards. Programs must be relevant to how water is used or wasted, present meaningful opportunities for engagement to all customers, and be equitable in reach and access. Foremost, conservation programming must move attitudes, behaviors, practices, and actions in such a manner as to facilitate meaningful, measurable, and sustained conservation.

This chapter focuses on the programs initiated or proposed that meet the above criteria and support and facilitate short- and long-term water use reductions that will help to meet the conservation goals outlined in Chapter 3.

4.1 Conservation Planning Process

There are many manuals, texts, and papers describing methods for successful conservation planning and programming, and this planning process has been informed by and benefited from those resources.

The first steps in program planning involve assessing supply and demand, evaluating historical use, and establishing water use reduction goals, both systemwide and by the customer classifications described in previous chapters. This chapter addresses the discussion of program selection criteria, description of programs, summary of evaluation processes, and program outcomes where available. Though these steps are identified here linearly, the process is fluid and iterative, reflecting both the nature and dynamics of planning processes, and the shifting nature of our relationship to water.

4.1.1 Criteria

The criteria for program selection are simple; programming should:

- Help to reduce water use or water waste,
- Enhance water stewardship ethos,
- Have community and political support,
- Be equitable and fair, and
- Provide a cost-benefit to the Utility and its rate payers.

Though not all programs exhibit all these criteria, all programs have most of these criteria.

4.1.2 Evaluation

Program evaluation is not as straightforward as identifying a quantity of water saved. Some programs, such as outreach, may be difficult to measure in terms of gallons saved, but they bring a high degree of community benefit and add to our understanding of water. Research and metrics, on the other hand, present ample opportunity for measuring program outcomes, either through gallons saved or participants reached. Every effort was made to identify some method of measurement and provide a benchmark or metric to facilitate program evaluation; these measures are provided in Tables 4-2, 4-3, 4-4, 4-5, and 4-6. Other methods for evaluation include industry best practices or regulatory frameworks for plan development. The appendices include checklists that informed the development of this plan and against which it is compared.

- EPA WaterSense Program
- ANSI/AWWA G480 Conservation Program Operations and Management
- Utah DWRe Water Conservation Master Plan Checklist
- State of Utah Regional Goals

4.1.3 Resource allocation

A necessary step in this process is the establishment of fiscal and staffing resource budgets. Fiscal year 2025 allocations for specific program measures are included in this plan and are included in program measure focuses where available and listed in Tables 4.2, 4.3, 4.4, 4.5, and 4.6. More extensive future budget planning is a component of the Research and Metrics Program.

Combined program budget allocation for the 2025 fiscal year is approximately $672,000. This does not include program measure funds derived from partnerships, grants, or other sources.

4.1.4 Terminology

Within this chapter and throughout the plan are various terms used to express conservation planning, goal setting, and program development. Some terms used extensively in this chapter follow:

Water conservation. Those practices, techniques, and technologies that reduce water consumption, water loss, and water waste, or improve the efficiency of water use.

Practice. An action, procedure, or method that is beneficial, empirically proven, cost-effective, and widely accepted in the professional community.

Measure. A device, incentive, or technology targeted at a particular type of end user or water use that, when implemented, will save water. Measures may be a component of a specific practice.

Program. A set of conservation practices and/or measures planned to be implemented together.

For example, maintaining an irrigation system in working condition is a practice; installing high efficiency nozzles is a measure, and offering irrigation system evaluations which assist in improving practices and identify measures, such as the Water Checks, is a program.

For a more extensive glossary, please refer to the Appendices.

4.2 Conservation by Connection

To identify the water conservation goals expressed in this plan, projections of future reliable water supply coupled with the optimal strategy to plan to not use every drop (reserved water) were analyzed through the lens of historical water use patterns and future predicted growth. These goals are expressed in terms of millions of gallons and acre feet by classifications and subclassifications. While these expressions meet the language of various standards for conservation planning, they hardly meet the intent, which is to derive meaningful, actionable goals to guide and measure conservation programs and outcomes for actual water users. It is this level of conservation goal setting that is attempted here.

Using population and economic growth indicators, the number of service connections, and historical use by classification and sub-classification, along with future supply and demand projections, we derive water use reduction goals within classifications by connection as summarized in Table 4-1.

Table 4-1
Additional Reduction in Per Connection Use Needed (gpd/Connection)

Classification	Location	5-Year	10-Year	Long-term
Residential	Indoors	14	23	46
	Outdoors	10	17	34
	Total	24	40	79
Commercial	Indoors	314	517	1019
	Outdoors	214	353	695
	Total	527	870	1714
Institutional	Indoors	36	59	117
	Outdoors	121	199	393
	Total	157	259	509
Industrial	Indoors	159	262	516
	Outdoors	35	57	112
	Total	193	319	628

There are limitations to these calculations. As mentioned previously in earlier chapters, while the customers in some classifications are relatively uniform in use characteristics (residential), others are much more diverse (commercial and industrial). Even within the residential classifications, there are distinctions in use patterns. The differences in water use patterns between single-family homes and multi-family units, small urban and large suburban lots, owners and renters, are examples of the complexity of this task.

Another limitation is that the assumption of future use based on historical practice does not account for innovations in technology that will inevitably change how water is used or measured, nor can it account for changes in population or development projections. Installation of Advanced Metering Infrastructure (AMI) will greatly enhance our understanding of water use and waste at the connection-level, study is ongoing to determine how this technology will impact use as an influencer of behavior. Assumptions made regarding landscapeable area and irrigation requirements described in Chapter 2 (see Figure 1-2) depended on data from the year 2000. But we know from observation, turf studies conducted by the Center for Landscape Efficiency (CWEL), as well as initials findings derived from WaterMAPS™ that those estimates are likely unnecessarily generous. As research continues, we will gain insights into the capacity to conserve in landscapes and thus inform that area of programing and also future planning scenarios.

The limitations become more obvious when CII classifications are evaluated. Landscape nurseries, laundromats, and breweries are all classified as Commercial, though it is apparent they have vastly different water use profiles as well as different needs when addressing conservation. Industries range from shipping warehouses with little water demand to oil refineries, much greater consumers of water by comparison. The CII analytics project, as well as AMI will greatly enhance understanding of water use by discreet commercial and industrial profiles. Collaboration with Alliance for Water Efficiency (AWE), US-EPA WaterSense, CalWEP, and others will help identify benchmarks and standards by which to evaluate these sub-classifications and enhance meaningful programming.

Even with these limitations, the value of moving towards goals of this nature should not be ignored or overlooked. As understanding of water use patterns is deepened, these initial estimates for water use reduction will be refined and made even more relevant.

4.3 Socioeconomic Impacts of Conservation

Effective conservation programming considers the characteristics of the customers using water, both as individuals and within user classifications. While it is commonplace to consider characteristics such as "single-family residence", "apartment", or "restaurant", less common is the integration of demographics and socioeconomic characteristics into the analytical and programing framework. According to Beecher, et al,[1] neglecting the unintended effects of conservation programming on socioeconomic groups can result in unexpected analytical, practical, and political consequences, which may undermine desired program outcomes and have negative impacts on some customer groups.

The service area is a diverse community in both its characteristics and its water needs. Understanding, and being responsive to this diversity helps to build positive relationships and ensure we meet our long-term goals of a resilient water supply. Income, household composition, housing, language and ethnicity, education, and special needs are all important characteristics that may affect water use. Businesses, too, have characteristics that need to be identified and analyzed so that programing builds partnerships and increases participation.

As conservation programming is developed, understanding the relationship between water use and socioeconomic and other demographic characteristics enhances program outcomes while ensuring that the end user has the tools and support necessary to make good choices regarding water use. Additionally, this understanding also helps to identify potential barriers to participation, improving overall program design, reducing unintended consequences, and increasing participation.

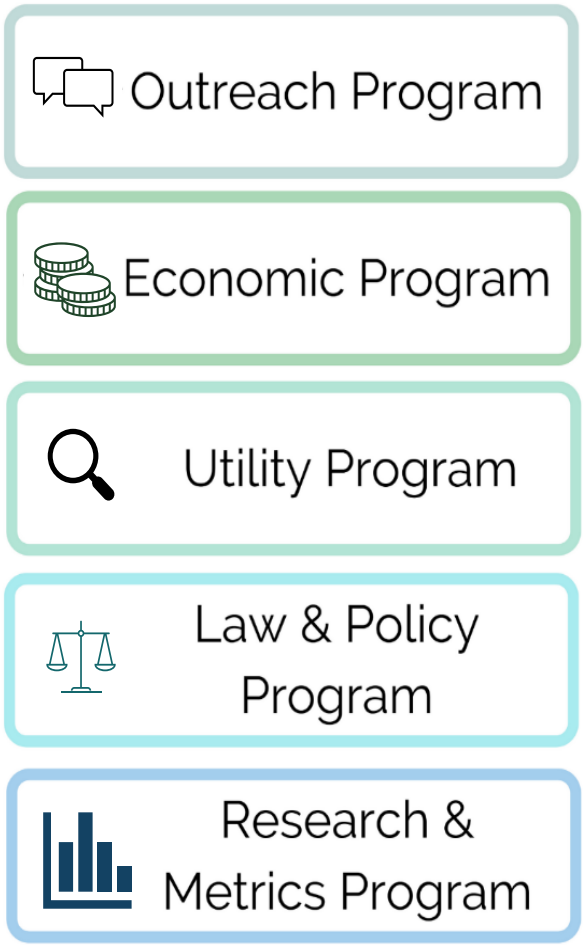
Conservation programing can be an effective tool to mitigate the impact of inevitable price increases across all user classifications and socioeconomic characteristics. Helping customers understand their relationship with water and providing meaningful and actionable tools and knowledge to make better choices helps customers manage water costs while also reducing their water footprint. The Utility recently completed a technical memorandum which provides an analysis of the relationship between water conservation and water rates. This analysis showed significant savings attributed to a sustained reduction in water use in the avoided costs associated with developing new water supply, water storage, and capital improvement costs when compared to water demand without conservation. Communicating these savings to customers may enhance general understanding of the value to conserve, as well as conveying the practical outcomes of a robust conservation program.

To be successful and sustainable, everyone—every person, business, industry, school, church, government agency—needs to be engaged in reducing water demand and protecting our water resources. Effective programing should facilitate water demand reduction across all sectors and user classifications, without placing the burden for conservation on one group, or excluding any group. Striving for equity and fairness in program implementation, whether through well-thought-out pricing structures, availability of product and behavioral incentives, or access to educational materials and classes will help to remove barriers to participation, improve program reach, and avoid unintended consequences that limit access or unfairly shift the burden of conservation.

In addressing these variables, conservation programming can:

- Improve affordability for customers;
- Enhance customer relationships;
- Respond to environmental justice concerns;
- Manage risk and uncertainty of water supplies;
- Achieve enhanced water efficiency;
- Decrease costs by reducing opportunity costs; and
- Reduce water utility revenue losses.

[1] Beecher, Janice A., Thomas Chesnutt, David Pekelney. Socioeconomic Impacts of Water Conservation. AWWA Research Foundation and American Water Works Association. 2001.



4.4 Water Conservation Programs, Practices, and Measures

Water conservation is a critical component of water resource management and should not be viewed as a temporary measure or as a public relations tool. Effective water conservation can sustain and extend water supplies; alleviate infrastructure capacity issues; mitigate impacts to supply and demand due to weather and climate variability; address affordability; and foster a sense of community-shared stewardship. To achieve this, conservation programming needs to provide the necessary tools to achieve and sustain these effects, and therefore, needs to fully address the how, who, when, and where of water use. At the core of this conservation plan are the programs, practices, and measures supported and funded through the water conservation program.

For conservation programming to achieve and sustain the necessary water use reductions, it needs to address the diverse nature of water use within the service area. To ensure programming reflects the complexity of the water infrastructure and the diversity of end users, practices have been organized into five program focuses: Outreach, Economics, Utility Operations, Law and Policy, and Research and Metrics. Within each of these programs is a selection of practices and measures that meet the criteria identified on page 4.2. Some, like lawn watering guides and Water Check, have been active since the conservation program was created in June 2001. Other practices, such as WaterMAPS™, the CII analytics tool, and SLC TurfTrade are more recent and still evolving. There are also practices new to the program planned for the coming years, including landscape assessments and elementary school curricula. Though the practices are varied, they all meet some, if not all the criteria of providing targeted, meaningful, and equitable programing that will facilitate meeting and sustaining short- and long-term water conservation goals.

4.4.1 Programs

The water conservation program is comprised of dozens of practices and measures organized into one of five programs:

Outreach. Education, information, and community engagement are how we inform and encourage the adoption of practices, behaviors, and technologies that reduce water use and water waste. Sometimes considered “soft” practices, due in part to the difficulty of isolating and quantifying practice outcomes and effectiveness, none the less, these practices are typically simple to enact and have limited barriers to customer participation. This program focuses on conveying information and engaging in community dialogue that facilitates the meeting of conservation goals. And though difficult to measure, they are informed by the outcomes of the Research & Metrics program and so are based in actionable science.

Economic. The price of water is an important mechanism through which to convey the value of water. Though, to clarify, it is not merely the rate at which water is charged, but also the other information that is conveyed in a water bill. Even more fundamentally, that meters are read, and bills are generated and

provided in a timely manner also help to inform the customer and convey the value of this limited resource. There are other ways, too, that economics can play a role in water conservation. Illustrating avoided costs can also be an incentive to reduce water use, whether it is the avoided costs associated with water use in a higher tier, or the avoided costs of not having to develop new sources of water. More direct incentives, in the form of rebates, can also help to reduce water use and offer the added benefit of potentially providing measurable outcomes.

Utility Operations. To be a leader in water conservation, it is not enough to have a plan, but to integrate that plan into daily operations, maintenance, and capital programs. This program focuses on identifying and implementing opportunities to integrate conservation best practices into all aspects of department functions. From landscape management to construction of stormwater wetlands and street-side biofiltration; water supply planning to distribution system operations, conservation can and does support broader Department functions.

Law & Policy. Salt Lake City has landscape code provisions that proactively encourage the implementation of best practices in landscapes; periodic review of these provisions ensures that the City continues to meet the intension of these provisions. Currently lacking are codes that clearly state water use prohibitions. Though codes exist that allow the regulation of water use, the codes as currently written do not clearly address water waste, so review will facilitate addressing this lack. There are also codes that support a variety of planning processes, including conservation and drought planning. City policy can also support conservation efforts by addressing the adoption of actions internally to City departments and divisions which support conservation. Ongoing review of City codes and policies that support conservation is an iterative process that is most successful when other City stakeholders are engaged in partnership, as demonstrated in the City's participation of Growing Water Smart, which still brings together Planning, Utility, and other City staff to more fully integrate water and planning.

Research & Metrics. Fundamental to the implementation and effectiveness of conservation programming is the adoption of programs that provide the necessary outcomes. Science, research, and analytics are at the core of conservation programming, ensuring that all other programs and practices have a basis in knowledge, research, and science.

4.4.2 Practices and Measures

Within each program is a selection of practices and measures designed to facilitate the achievement of short- and long-term water conservation goals. These practices and measures are directed at specific end users to address various types of water use. They are designed to be implemented alone or in combination and all meet one or more of the identified criteria. For practice and measure details, see the corresponding practice tables.

4.4.3 Program Tables

Each practice and measure are listed in one of the following tables (Tables 4.2, 4.3, 4.4, 4.5, and 4.6), with select practices receiving more detailed coverage in section focuses. Within the tables, practices are generally described by title, target audience, practice timeline, project cost, metric or measurement, and partnership.

Number (No.). Each practice is assigned a number within its program. This is useful when identifying practices relevant to specific documents, grant applications, and similar circumstances where space constraints limit the full title of description of a practice.

Practice Title. The name of the practice, which is sometimes broadly descriptive, as in the case of "Brochures," and sometimes specific to a single practice, such as "WaterMAPS™". Effort has been made to keep the names descriptive and brief.

Classification. Not all practices are for every customer. This column organizes and identifies practices by classification. These classifications correspond to the classifications described and used throughout this plan. They include Residential (Res), Industrial (Ind), Commercial (Com), and Institutional (Inst). (See Figure 2-2).

Brief Description. Generally, an expansion on the practice title or a broader, though short, description.

Practice Timeline. Timeline details may range from a single event, for instance, the development of a study or plan, to ongoing practices such as meter replacement or monthly billing. "Active" column indicators include "√" (Active), "ID" (In Development), TBD (To Be Determined), or NA (Not Applicable or Not Active). Implementation indicates when the practice was active or is planned to be active.

Cost/Funding. Costs mostly reflect current budget allocations or future planned allocation estimates. Costs over the practice lifetime have not been calculated, unless noted. In some cases, funding has been provided in the form of grants, memorandum of understanding, or as a component of partnership, which have been noted accordingly. The development of recommended five- and ten-year budgets is a component of the Research and Metrics program and is currently underway.

Reach/Metrics. Measuring practice effectiveness helps determine if resources (staff time or budget) are being allocated in a manner that supports program goals or allocated sufficiently to ensure practice success. Some of these measures are soft, such as the number of visitors to a garden, brochures mailed, website visits; some are hard, as in the number of Water Checks performed, metered water use reduction, or commercial audits completed. Not all programs should be measured by the same metric; for one thing, that isn't practical or pragmatic. A demonstration garden may serve multiple purposes but how do you measure how much water has been saved due to its existence? How much water is saved when schoolrooms are visited, or when phone calls are answered? This is where the measurement of reach helps to inform practice evaluation: how many visitors, how many classrooms, how many brochures. These practices bring value, even if the measure of success is knowing the reach, as they have value in the relationships built, the assistance provided, and opportunity for inspiration.

Partnerships. The Utility has been fully vested in conservation programing for decades. And while Utility staff have accomplished a great deal towards implementing conservation programs, partnerships have been instrumental to the ongoing success and will continue in importance as work towards achieving current and future water use reduction goals continues. Some partnerships are more singular and tied to specific practices, such as the contract with Utah State University Climate Center to operate and maintain research quality weather stations within our service area. Other partnerships revolve around funding, particularly grants, as is the case of drought planning and the Bureau of Reclamation. Other partnerships are ongoing, such as the work with CUWCD and DWRe pertaining to CII studies. Some partnerships, such as the one with Utah State University (USU), have relevance beyond the scope of specific practices, informing conservation efforts across the reach of programing and providing invaluable collaboration. However, the most valued partner is the community; the people, businesses, industry, and institutions served who do the work of saving water every day.

Savings. Ideally, every conservation practice or measure has demonstrable water savings. This is, however, difficult to assess for most practices. Improvements in metering technology and the integration of GIS/IT technologies in conservation programing will improve this moving ahead. In the meantime, where possible, historical and projected water savings have been provided.

Not every practice can be described with all these details, but every effort has been made to provide as much detail as possible within these pages. Where details are either not available or not relevant, it has been so indicated. For instance, some programs have no direct cost, such as developing internal City department conservation plans. In other cases, practice metrics may be difficult to determine; how, for instance, do we measure the impact of a garden or brochure?

Within each program there are summaries of select practices and measures, intended to offer more detail, including timeline, budget, and desired outcomes. These select practices represent current and proposed programming that is reflective of short- and long-term conservation goals, as well as the needs and interests of water customers across all classifications.

4.5 Outreach

Education and public outreach are a necessary component of successful conservation programing. Though the types of programing vary, they share the common attributes of informing and educating customers of the needs and benefits of conservation; the risks to the community and environment in not conserving; and actions to take to achieve water conservation goals.

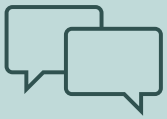
Outreach initiatives are characterized as being customer-focused, low-input programs with an emphasis on education and information to motivate changes by either adopting or abandoning general or specific practices. These initiatives are thought of as "soft programs," in that they depend on behavioral changes and not changes to fixtures or infrastructure. Programs can generally be organized by those designed to change behavior or to encourage the adoption of new methodologies and techniques.

Outreach also includes education and messaging campaigns, designed to provide actionable, proven techniques and methods for reducing water use. Such campaigns include "Never Waste," "Rain On/Sprinklers Off," and "7 Gallon Challenge," to name a few.

Outreach practices also create opportunities for reciprocal, iterative dialogue, leading to community engagement and acceptance, critical for program success and the achievement of short- and long-term conservation goals. It is in classroom settings, community gatherings, and social media that we, as practitioners, can hear and learn from the customers for whom these programs are designed, to make programming accessible, meaningful, and actionable.

Outreach isn't "just talk." The Water Check program provides site-specific guidance to assist property managers or homeowners in improving irrigation efficiency. WaterMAPS™ delivers relatable and actionable information to property owners to enhance understanding of the relationship between landscape characteristics and water need. Providing actionable information commercial, industrial, and institutional customers will enhance engagement by those sectors in conservation efforts and deliver meaningful results in demand reduction. Residential leak detection programs inform homeowners of indoor water loss, while delivering messages of the importance of managing all water use and waste. Learning labs offer education, advice, and guidance in improving landscape practices, leak detection and repair, and other areas of conservation.

The following are details of select conservation programs which reflect short- and long- term goals as outlined in Chapter 3 and address community feedback on existing programming.



FIVE-YEAR FOCUS

Outreach Programs

- Demonstration Gardens and slcgardenwise.com
- Public Access Cloud-based Portals
- Learning Labs
- School Programs
- Water Week

4.5.1 Demonstration Gardens And SLCGARDENWISE.COM [0-3, 0-4, 0-5]

Timeline: 2005 to present
2025 Budget: $14,500
Partners: TBD
Reach: Across all customer classifications
Savings: NA

While it may be difficult to measure the worth of public gardens, water conservation gardens bring value to conservation programming as well as to the neighborhoods where gardens reside. Offering information, education, and inspiration of best practices in landscaping methods and plant selection, demonstration gardens provide self-directed as well as led experiences. These spaces also create opportunities for volunteering, bringing value to the program and making learning a hands-on experience.

Demonstration gardens also create opportunities to bring value to neighborhoods by providing beautiful and sustainably managed landscapes to enjoy and inspire. For example, the 900 South Stormwater Wetland and Demonstration Garden is located along a former storm drain ditch and abandoned railroad corridor. The conversion of this space into a stormwater wetland and conservation demonstration garden created multiple values for the City and the neighborhood.

The Greater Avenues Conservation Garden sits on what was once an abandoned lot in the Avenues neighborhood. Its location adjacent to urban-wildland interface areas presented an opportunity to demonstrate not only water-wise techniques, but also how site sensitive landscaping can support wildlife and community aesthetic values. And lest there is concern that a formerly un-watered site is now receiving previously undelivered resources; Greater Avenues Garden has not been irrigated since 2015.

As enjoyable as actual demonstration gardens can be, weather or other impediments may discourage visitors. Learning opportunities may also be limited as it is impossible to include every plant or incorporate multiple design concepts. Slcgardenwise.com provides an alternative visitor experience, offering examples of water-wise gardens from throughout the service area. Virtual tours, landscape solutions, and an extensive and locally developed plant database makes slcgardenwise the next best thing to actual garden tours.

Future focus for the demonstration gardens and slcgardenwise is to upgrade landscape features and irrigation systems, update learning materials, and create on-site learning opportunities. SLCgardenwise is scheduled and budgeted for an update in the current fiscal year. This will included updated landscapes, expanded plant data base, and enhanced functionality.

4.5.2 Public Access, Cloud-based Portals [0-17]

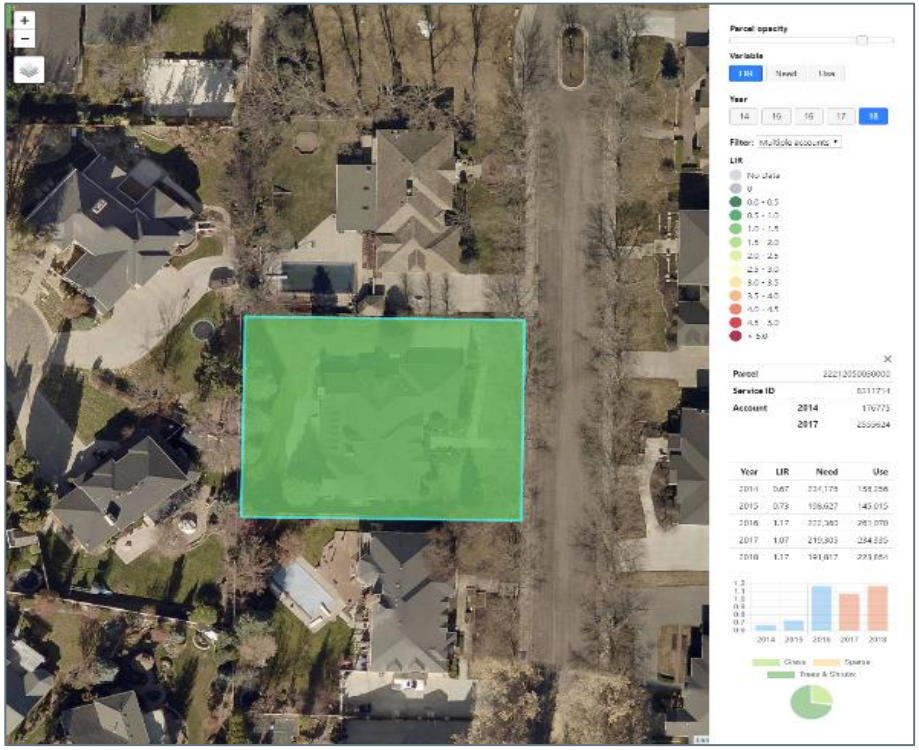
Timeline: 2021
Budget: TBD
Partners: Utah State University, EWIG
Reach: Residential and CII customers
Savings: NA

Advanced Metering Infrastructure (AMI), Water Checks, WaterMAPS™, and CII Analytics are providing data that not only informs conservation programming but offers opportunities to provide timely and actionable information directly to water customers. Older methods of communicating information, such as brochures and even web-based communication, are giving way to up-to-the-moment, customer-targeted information via cloud-based communications applications.

Water Checks, a well-established, proven program, has benefited from recent technological updates. With funds received through Extension Water Innovation Grants (EWIG), USU, conservation programming, and Department GIS/IT staff, Water Check reporting added cloud-based reporting, messaging, and mapping capabilities. Water Check participants now receive GIS-generated irrigation zone maps with site details, online reports, tips, and support via direct messaging. This portal will also support efforts to promote other conservation programing, as well as to facilitate pre-qualification and post-verification of program measure implementation, where appropriate.

Outdoor water use plays a significant role in current demand and future water use reductions. WaterMAPS™, a USU-developed program, helps identify our capacity to conserve in the landscape. Getting this information to the customer requires a cloud-based communications system.

Homeowners and landscapes are not the only customers with the capacity to conserve. Commercial, Industrial, and Institutional customers (CII) are also an important part of our water conservation strategy. While these customers' water use profiles can be more complex than that of residential users, they have the same need for timely, meaningful, and actionable information. Improving the depth and range of information to CII customers will enhance engagement in conservation programing and increase opportunities to successfully achieve stated conservation goals.



4.5.3 Conservation Learning Labs [0-14]

Timeline: 2026
Budget: TBD
Partners: USU/CWEL, UofU Lifelong Learning, EPA-WaterSense
Reach: Residential
Savings: NA

Research indicates that Utah residents, including those within the service area, believe in the need for, and are committed to water conservation. What is lacking is not the will, but the knowledge of the best, most effective ways to reduce water use. Homeowners want to know how best to water to support conservation while sustaining a landscape. They have questions: how to select plants, plan the landscape, or convert sprinklers to drip.

Homeowners also have questions about water efficiency indoors, and ask about toilets, the best way to wash dishes, and how to find and repair leaks? In short, customers have a lot of questions. We have answers.

Improving access to solid, up-to-date information and strategies to help homeowners make sensible, sustainable choices will help achieve current and long-term water use reduction goals. Lectures, hands-on labs, and how-to webinars offer up-close and personal opportunities to convey useful and relevant information.

This program will focus on maximizing existing resources to deliver high-quality learning experiences focused on water conservation. Partnerships with USU/CWEL, University of Utah's Lifelong Learning, and US-EPA WaterSense will ensure quality instruction and content.

Conservation education must be an essential, if not always quantifiable, part of any conservation plan. As noted in the State of Utah *Regional Water Conservation Goal Report*[2],

> *"When projecting future water use and conservation potential, it is important to understand that water users' choices regarding water use will be influenced by a complicated combination of factors…"*

Thus, even though specific water savings may not be directly attributable to a given conservation program or practice, conservation education and outreach through learning labs and other educational venues is a necessary component of the "combination of policies" that must be in place to motivate and facilitate the ultimate conservation action.

4.5.4 SCHOOL CLASSROOM PROGRAM [0-10]
Timeline: curriculum developed 2022. Relaunch 2026h
Budget: NA
Partners: USU/CWEL, UofU Lifelong Learning, EPA-WaterSense, AWE
Reach: Utility-wide
Savings: NA

Introduce water conservation concepts, values, and activities into a classroom setting, focusing on grades 4 and 9, to reflect state curriculum. Curriculum was developed in 2022 in partnership with Salt Lake School District 4th grade teachers, with classroom events occurring that fall and into 2023. With planned increase in conservation staff, this program has a planned relaunch in 2026.

[2] *Regional Water Conservation Goal Report,* Hansen Allen & Luce and Bowen Collins & Associates, November 2019, p. 16

4.5.5 Water Week and other Events [O-10, O-18]

Timeline: On-going.
Budget: TBD
Partners: USU/CWEL, UofU Lifelong Learning, EPA-WaterSense, AWE
Reach: Utility-wide
Savings: NA

In 2007, the State of Utah adopted the first full week in May as State Water Week, thanks to the efforts of the conservation staff and then-legislator Ralph Becker. Though inspired by American Water Works Association Water Week, the event expanded on that concept to include stormwater, waste water, watershed, and water conservation topics along with culinary water. Using art, film, poetry, and even dance to convey the complexity, value, and beauty of all things related to water, the goal of Water Week is to foster a deeper understanding and build stewardship of this incredibly critical resource.

The success of this effort is reflected in the number of water agencies across the state that celebrate Water Week with tours, library readings, and other events.

In the coming years, the conservation program will re-focus energy to promoting Water Week, as well as other nationally and internationally recognized water-related events, such as Fix-a-Leak Week, Global Water Week, and a Day Without Water. These events are also incorporated into the classroom program and general conservation messaging.

TABLE 4-2
OUTREACH

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
O-1	Brochures	√	√	√	√	Develop and distribute brochures relating to water conservation and best practices	TBD	2001 - ongoing	$14,000 per mailing/service area	Quantities mailed. Spikes in visits to related websites	NA	NA	NA
O-2	Water Stewardship Calendar	√	√		√	12-month calendar with information and tips covering a variety of water issues.	TBD	2007 - 2020	$30,000 for 25,000 copies.	Distributed to SLC schools, SL City and County Libraries	NA	NA	NA
0-3	Demonstration Gardens	√	√	√	√	Design and install demonstration gardens throughout service area	C	varied	NA	TBD		NA	NA
0-4	SLCTV 17 GardenWise	√	√	√	√	Develop and distribute water conservation-focused programming for SLC TV17	C	2001 - 2014	NC	Site visits and other web metrics	SLC-IMS	NA	NA
O-5	SLC *Gardenwise*: Virtual Water Conservation Garden tours	√	√	√	√	Develop virtual garden tours on web site, include plant data bases, design tips, watering/maintenance guidance. Incorporates several past program initiatives.	√	6/2014 (SLC Gardenwise)	$25,000 for site upgrade. $2,500 for licensing.	Site visits	Initially partially funded through a Bureau of Reclamation grant	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined – **C** - Completed

TABLE 4-2
OUTREACH

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
O-6	Water Check	√	√	√	√	Promote and conduct lawn sprinkler check-ups for residential, commercial, and institutional properties	√	(S) Estab. 1988; Partnered with USU 2007. Ongoing.	$60,000 provided by MWDSLS annually. SLCDPU one-time funding of additional components, including APP, portal, and GIS capability ($22,000)	Map and track use.	MWDSL&S	557 AF	47,000 gallons per residential participant annually
O-7	SLC Landscape BMPs: Design, Planting and Maintenance Guide	√	√	√	√	Develop guide to support best practices in landscape design, implementation, and maintenance to support conservation, stormwater protection, and riparian corridor health.	C	10/1/2011 (see E-8)	Part of in-kind contribution for BoR Grant	TBD	SLC Code Enforcement; Northern Colorado Water District; Green Industries of Colorado (GreenCO); UNLA	NA	NA
O-8	Commercial and Industrial Certification			√		Develop and implement a water-wise certification program for commercial and institutional water customers	ID	TBD, in conjunction with CII Tool and CII audits/direct installs	TBA	Audit and track use of participants	TBA	NA	NA
O-9	CII Conservation Plans			√		Encourage and publish water conservation plans	ID	TBD in conjunction with CII Tool, CII, audits/direct installs, Water Check, and WaterMAPS™	NC	Map and track use	NA	NA	TBD

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined – **C** - Completed

TABLE 4-2
OUTREACH

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
O-10	Classroom Programs	√				Develop package programs and activities to facilitate classroom learning focused on water conservation	ID	2026	TBD	Track classroom visits and students	TBD	NA	NA
O-11	Landscape Assessment and Check-ups	√				Provide residential landscape assessments to enhance water efficiencies	ID	Some landscape assessment is included in Water Check. Expansion contingent on staff capacity.	TBD	Map and track use	TBA	NA	TBD
O-12	Private Garden Project	√	√	√	√	Promote institutional, commercial, and residential properties to be water-wise demonstrations	ID	Dependent on staff capacity	TBD. Cost may involve media outreach, yard signs, and other support materials.	Map with public access	TBD	NA	NA
O-13	Residential Leak Detection and Repair	√				Provide low or no-cost leak detection and repair to qualifying households	ID	TBD	TBD	Map and track use	TBD	NA	Ave. 490 gallons/ person/ year 480 AF/year for utility
O-14	Learning Labs	√	√	√	√	Workshops on water conservation techniques and strategies	√	Intended start date of 2020; canceled due to Covid-19 outbreak. To be resumed contingent on staff capacity.	TBD	Track participation rates	TBD	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined – **C** - Completed

TABLE 4-2
OUTREACH

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
O-15	CitySourced App	√	√	√	√	Mobile app allowing users to submit notifications of observed water waste and other water issues	√	Ongoing	NC - Program supported thru GIS/IT functions	Track number of reported incidents.	NA	NA	NA
O-16	WaterMAPS™	√	√	√	√	Outreach focused on WaterMAPS™ outcomes	√	Development began in 2018. Project launch June 2023.	$100,000	Customer response; target survey; track use	USU/CWEL; EWIG grant	NA	TBD
O-17	Cloud-based Public Portals	√	√	√	√	Provide cloud-based, secure access of water use analytics to customers across sectors	TBD	In development	TBD	Visitors; customer response	TBD	NA	NA
O-18	Water Week and other Events	√	√	√	√	Utilize recognized events to promote understanding and foster stewardship	√	2011 - Ongoing	$	Participant levels	TBD	NA	NA
O-19	Strategic Communications Plan												

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined – **C** - Completed

4.6 Economics

Economic initiatives are focused on pricing, rebates, and other programs that offer financial incentives to customer participation or offer services that provide economic value to customers. These programs encourage changes in behavior or upgrades to fixtures, while generating opportunities to measure program effectiveness by monitoring and analyzing water use pre- and post-product or fixture installation, or before and after changes in pricing signals. The targeted nature of these programs will also assist in the challenges of meeting specific, short- and long-term conservation goals.

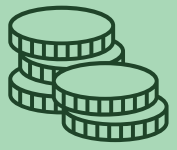
Financial incentives may either be built around avoided costs, such as inclining tiered rates leading to larger bills for more water use; or they may encourage improvements to landscapes or indoor fixtures through product or service discounts or rebates. All conservation incentives should be designed and implemented in such a way as to help to achieve water use reduction goals in a manner that is transparent, cost-effective, and fair, all while ensuring that such programs do not place any undue burdens or create unintended costs for some customers.

when creating programs with financial incentives, there are several key issues to keep in mind, whether the signal is a carrot or a stick. If using pricing signals, they need to reflect the cost of water and all that it takes to acquire, treat, and deliver that water; the structure should provide some level of revenue stability; and rates should be fairly and equitably set so as to encourage appropriate use while also making essential water affordable. It is important to note that billing messages may be as important as the bill itself in driving and reducing demand.

Rebates and cost-sharing may help reduce water use by encouraging customers to use improved technologies, install better fixtures, renovate landscapes, or otherwise change behavior. As with pricing signals, product or service rebates and cost-shares should provide incentives for a range of customer classifications, help achieve meaningful and sustainable use reductions, demonstrate measurable outcomes, and be equitable.

According to a recent Alliance for Water Efficiency (AWE) study, the most effective and efficacious rebate programs are targeted to specific user classifications or uses (residential or commercial, indoor or outdoor); and have clearly stated pre-qualifications and post-evaluation components. This is to ensure that the rebate provided achieves the desired goal for both customer and utility.

When used appropriately, incentive pricing and rebates can be highly targeted tools for achieving short- and long-term water use reductions goals while providing value and benefits to customers.



FIVE-YEAR FOCUS

Economic Programs

- CII Audits and Direct-Installs
- Rebates, Microgrants, and Other Incentives

4.6.1 CII Audits and Direct Installs [E-10]

Timeline: 2020 (proposed)
Budget: Phase I $95,000
Partners: CUWCD
Reach: CII
Savings: TBD

Though conservation practices have historically focused on outdoor single-family residential water use, that use reflects roughly one-fourth of all use. Though comprising only 12 percent of water connections, CII water use (both indoors and out) accounts for more than half of all metered water sales. With this in mind, programing in the CII sector has increased to include enhanced analytics, identification of sector-specific water use standards, and establishment of preliminary water use reduction goals.

One way to assist select CII customers in reducing water use is to identify inefficient practices or fixtures and to incentivize changes. This project proposes audits of select CII accounts including assessment of water use records and trends, review of standard practices, and inventory and measurement audits of appliances and fixtures.

Phase I of this project will focus on small hotels and motels, restaurants, and public and assisted housing. Sites have been selected through water use analytics, identifying properties that show higher than average water use within each sector. After conducting initial assessments, recommendations will be made for fixture, appliance, and practice changes. Some fixture and appliance practices may provide incentives or rebates through matched funding.

Besides directly assisting participating CII customers in reducing water waste and overall water use, this project will provide invaluable data regarding common practices within specific CII sectors, as well as building relationships between CII customers and conservation program staff.

4.6.2 Rebates, Micro-Grants, and Incentives [E-4, E-6, E-7, E-8]

Timeline: TBD
Budget: TBD
Partners: TBD
Reach: Residential
Savings: TBD

Customers within the service area have done a remarkable job reducing water use. Since 2001 and the beginning of the water conservation program, total water use has reduced nearly 28%, and residential household use has reduced by 29%. As good as these numbers are, there is still more to do as indicated in the Water Supply and Demand Study. To sustain future supplies and live within our water means, residential water users will need to reduce an additional 14% indoors, and as much as a third of our outdoor use.

Up to now, conservation has been achieved primarily through voluntary actions as home and property owners adopt better practices or make improvements to homes and landscapes. To meet new water conservation goals and to support homeowners in their efforts, a series of pilot rebate programs have been proposed. Irrigation spray heads, rain sensors, lawn trades, and low-flow fixtures are being considered. Additionally, this program will also work to increase consumer awareness of existing rebates available through partnership with Central Utah Water Conservancy District (CUP).

Recently published studies by the AWE indicate that program success depends on proper customer vetting, prequalification, and post-engagement verification. WaterMAPS™ and Water Check programs are well suited to provide the necessary quality control measures to ensure rebate program effectiveness.

Not all customers have issues with outdoor watering, but rather, need to manage general use or bill amounts. Rebate programs focused on leak detection and repair, and fixture replacement will help qualifying households reduce water use and waste, and reduce their water bills, keeping essential indoor water use affordable.

Directed at both indoor and outdoor water use, these programs should help customers achieve greater levels of efficiency and reduce waste. Following water use of participating households will provide greater insight into residential water use patterns, which will inform future programs, and building relationships within the community will further enhance conservation efforts.

TABLE 4-3
ECONOMICS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
E-1	Irrigation Meters and Budgets	√	√	√	√	Establish budgets for accounts with dedicated irrigation-only meters	√	2003-Current	NA	Map and track use. Map eligible sites not currently using irrigation meters; chart potential savings/budget impacts	NA	NA	NA
E-2	Rate Structuring	√	√	√	√	Utilize a rate structure to encourage responsible use of water	√	Periodic	NA	Track water use through various tiers over time.	NA	NA	NA
E-3	Volumetric and loading Sewer Charge	√	√	√	√	Base sewer rates on metered winter water usage	√	Periodic	TBD	Track use and discharge over time	NA	NA	TBD
E-4	Rebate: Irrigation Rain Sensors	√	√	√	√	Incentivize installation of irrigation rain sensors through rebates	ID	TBD	TBD	Pre-quality/verify through Water Check; Map locations; track/compare use	TBD	NA	TBD
E-5	Rain barrels	√				Provide for purchase rain barrels to homeowners	√	2015-Current	Potentially no cost to Utility dependent on selected vendor	Map barrel locations. Track water use. Can we identify locations of barrels purchased elsewhere?	NA	TBD	TBD
E-6	Rebate: HE Irrigation Spray Heads	√		√		Incentivize installation of high-efficiency irrigation spray heads through rebates	ID	TBD	TBD	Pre-quality/verify through Water Check; Map locations; track/compare use	USU Water Check	NA	TBD

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

TABLE 4-3
ECONOMICS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
E-7	Turf Trades	√	√	√	√	Incentivize utilization of low-water, low-input turf grasses, either as seed or sod, in new landscape or as retrofits.	ID	2022 – current	Program is direct funded by program participants	Track participant water use	USU/CWEL and TWCA	TBD	2.3 AF per acre of turf conversion
E-8	Rebate: Pressure Regulators	√				Incentivize installation of pressure regulation devises to improve indoor and outdoor efficiency and enhance product/appliance wear.	ID	TBD	TBD	Track water use	TBD	NA	TBD
E-9	Residential Leak Detection and Repair	√	√			Provide low or no-cost leak detection and repair to qualifying households; fixture replacement.	ID	TBD	TBD	Map and track use	TBD	NA	490 gallons/ person/ year 480 AF/year for utility
E-10	CII Audits and direct installs			√		Conduct audits and provide direct-installs on select CII properties. 2023 focus on City properties.	ID	2022 - Current	Pilot: $200,000	Track water use	$50,000	NA	TBD

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

4.7 Utility Operations

The City is committed to be a leader in water conservation. With that in mind, these initiatives represent adopted actions and practices that will help ensure infrastructure is built and maintained in a manner which optimizes water efficiency, minimizes or eliminates waste, and demonstrates best practices.

Salt Lake City has been fully metered since the 1920s, making it one of the earliest and longest running metered water systems in the Western United States. Historically, meters have been read monthly (or more technically, each meter is read roughly every 28 to 31 days), and from those readings' bills are generated and mailed. Until recently, meter technology has not changed a great deal; Advanced Metering Infrastructure (AMI) profoundly changes both when and the how of meter reading. Utilizing long-range radio systems, AMIs record and report water use more accurately and with much greater frequency than has been possible. Utilizing this new technology, water use can be monitored in increments as small as 15-minute intervals. Work has begun to replace all meters (roughly 92,000) with AMIs.

Outdoor water use, specifically, landscape water use and waste, is an important component of managing and reducing our water footprint. While it may seem that conservation and landscape programs focus on single-family residential customers, every landscape can be more efficient. Last year, a comprehensive audit of Department landscaped properties was conducted, with the intent to develop a strategy to increase outdoor water use efficiency. This program aims to reduce water use and greenhouse gas emissions while demonstrating best practices.

The *Residential End Uses of Water*[3] estimated that an average of 12 percent of residential indoor water use is lost to leaks. This water loss can account for as much as 10,000 gallons per year. Imagine then, how much water is lost within an entire water system. According to the *Salt Lake City Supply and Demand Master Plan*, water loss within the water infrastructure system is estimated to be between 10 to 12 percent, an amount over 11,000 AF of water annually. Implementation is planned for conducting water system audit modeled after AWWA-M36 methodologies to identify the volume of water loss, determine what proportion of this water is apparent or real loss, and identify appropriate steps and practices to address this loss.

FIVE-YEAR FOCUS

Utility Programs

- Evaluate Data-Mining Opportunities of AMI Technologies
- Landscape Upgrades and Maintenance
- Implement M36 Findings
- Implement City-Wide Water Efficiency Study Findings

[3]Footnote: DeOreo, William, Peter Mayer, Benedykt Dziegielewski, Jack Kiefer. *Residential End Uses of Water 2016.* Water research foundation. Denver, Co

4.7.1 Evaluate Data-Mining Opportunities of AMI Technologies [U-7, U-9]

Timeline: TBD
Budget: TBD
Partners: NA
Reach: Utility-wide
Savings: TBD

Utilization of water meters, coupled with regular readings and billing statements, helps to manage water supplies and convey specific and critical information to water users. Water users can then use this information to make good decisions regarding future water use. Since the 1920's, water use has been metered, read, and billed throughout the service area. Outside of the computerization of meter and billing data functions, this practice has seen little change over its history. Though this process might have been adequate, it did present shortcomings for conservation programming. Receiving regular meter billing data helps inform customers, but it is a snapshot of past behavior and lacks immediacy. The development of advanced metering infrastructure technologies (AMI) has revolutionized this process.

Currently, residential and CII mechanical meters are being replaced with AMI technology. This will provide daily information to water managers and water customers, enhancing resource management response and improving customer understanding of water use. AMI technologies are providing live-time water use data, improving leak detection, and enhancing understanding of water use patterns, all of which is informing current and future water conservation programs. A better understanding of the data available and how to use that data will enhance technology impacts.

4.7.2 Landscape Upgrades and Maintenance [U-2, U-10, U-11]

Timeline: 2020 to current
Budget: $100,000 (proposed annually)
Partners: NA
Reach: Utility-wide
Savings: 480 AF/year for upgrades to City properties including Parks and Golf properties

Approximately 55 percent of water use within the service area is used to maintain landscapes, and landscape and irrigation design, installation, and maintenance affect water use. Improving site management helps to reduce water waste. With this in mind, a comprehensive practice has been established for landscape and irrigation design and management that addresses existing properties and to-be-developed properties.

For newly developed properties, staff engineers and consultants work with water conservation staff on site design, ensuring that best practices are followed, and new landscapes are efficient, sustainable, and attractive.

Existing properties are also a component of this program. Properties have been catalogued and are being evaluated for irrigation and landscape characteristics, maintenance histories, as well as water use. After completing the WaterMAPS™ assessments, landscapes will be classified and prioritized for improvements, including irrigation and landscape improvements. In the meantime, water conservation staff are working closely with the stormwater and distribution divisions to enhance site management, ensuring reduction in water use and other inputs.

Additional to proposed and planned landscape upgrades, conservation and stormwater staff are collaborating to develop specifications and guidelines for implementation of biofiltration and other Low Impact Design (LID) infrastructure. The purpose will be to facilitate the construction of biofiltration retention and other green infrastructure in order to improve and protect stormwater quality. The synergistic collaboration between stormwater and conservation programing will ensure that future LIDs support both stormwater and conservation goals.

4.7.3 Leak Detection and M36 Audit Outcomes [U-3]

Timeline: Ongoing
Budget: TBD
Partners: NA
Reach: Utility-wide
Savings: 1,450 AF/year This assumes that system losses can be reduced from 12% to 9% (see R-19) and that 50 percent of the saved system losses come from leak detection and repair.

Public Utilities began its leak detection program in 2005 with the purchase of one correlator. Currently we have 2 full-time employees, 2 correlators, and 10 portable loggers dedicated to leak detection. The program pinpoints leaks that are surfacing away from the actual break, helping crews to identify and locate leaks more quickly. We also use a machine learning model to predict the likelihood of failure to determine the best areas to survey. We are hoping to enhance the program with new technology such as AI, more loggers, satellite, and ground penetrating radar.

In 2025, the Utility completed the AWWA M36 water audit, a robust top-down evaluation to identify and address non-revenue water. Over the next five years, the Utility will develop a strategy for evaluating and, as feasible, implementing the findings of that study. Additionally, now that the baseline has been set, the conservation office will update the findings annually

4.7.4 City-Wide Water Efficiency Study [U-2, O-7]

Timeline: 2023 - ongoing
Budget: TBD
Partners: Maddaus Water Management, USU/CWEL/ CUWCD, DWRe, Salt Lake County
Reach: City properties
Savings: At least 5 MG annually

In 2023, with support from the Utility director, Laura Briefer, Mayor Mendenhall requested the Utility to expand its CII analysis project to focus on City-owned and operated properties. An existing contract with Maddaus Water Management Inc. was amended, and other the next six months, an extensive analysis of City properties was implemented. Assistance in conducting CII audits was provided by Central Utah Water Conservancy District and Utah State Division of Water Resources staff.

The project involved evaluating water use through 757 meters, conducting Water Checks at 16 sites, applying WaterMAPS™ to 68 properties, and conducting 14 indoor audits.

The report was submitted to the Mayor's Office December 2023. Findings included:

- Identifying 350,000 square feet of un-utilized turf;
- Irrigation system issues;
- Leaking water-cooled HVAC systems;
- Leaking or poorly operating toilets and faucets; and
- Large vehicle wash-station hose issues.

Some actions have already been taken, including replacing a cooling tower with a high-efficiency air-cooled unit. Bathroom fixture repairs began upon identification, and irrigation system maintenance addressed the following irrigation season.

An estimated 5 million gallons of water could be saved annually by addressing the findings in the report; the conservation office is currently working with other city departments on implementation plans and funding mechanisms. (See https://www.slcdocs.com/utilities/2023CityWaterEfficiencyReport.pdf.)

TABLE 4-4
UTILITY OPERATIONS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
U-1	Customer Use Change Notification	√	√	√	√	Notify customers when water usage exceeds winter usage by 20 percent.	√	Currently only applied to commercial and industrial customers.	NA	Map. Compare addresses to home age, frequency of notification. Can we reduce this number?	NA	NA	TBD
U-2	Landscape Upgrades				√	Inventory and assess Utility properties for water efficiencies and make necessary upgrades.	√	Recommendations of practice scope to be derived from updated Supply and Demand Study, and WaterMAPS™ Analysis.	Varies	Map utility locations, water usage. Assess landscape change potential, ROI.	NA	NA	480 AF/year (Including Parks and Golf)
U-3	Leak Detection and Repair				√	Implement program to ensure enhanced distribution system efficiencies; identify and repair system leaks in a timely manner.	√	Utility completed AWWA M36 Assessment in 2003.	NA	Mapped through CityWorks.	NA	NA	1,450 AF/year
U-4	Monthly meter reading and billing	√	√	√	√	Provide timely and accurate information to customer to increase awareness of water use.	√	1928	NA	Track use	NA	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** - Completed

TABLE 4-4
UTILITY OPERATIONS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
U-5	Public Utility Advisory Committee				√	Standing citizen committee to advise in conservation policy and programming.	√	1930's	NA	Board support and engagement in programing.	NA	NA	NA
U-6	SLC Dept/Div Conservation and Drought Plans				√	Encourage and publish water conservation plans from City Departments and Divisions.	√	Some completed as part of 2014 Water Conservation Master Plan Update; planned for 2019 WCMP update.	2019: $75,000 + in-kind match	Track response and use levels during drought per drought plan guidelines.	2019 Update funded through Bureau of Reclamation Grant for $75,000	NA	NA
U-7	Universal metering and meter replacement	√	√	√	√	Each account is metered and meter replacement program in place.	√	2000s	Cost Varies	Map meter replacement locations? Map different types of meters? Measure pre/post change usage.	NA	900 AF for every 1% of lost accuracy recovered	900 AF for every 1% of lost accuracy recovered
U-8	Water Re-use Study				√	Study feasibility of water re-use pilot project.	C	Study completed in 2015	-	See study outcome recommendations.	NA	NA	NA
U-9	Advanced Meter Technologies	√	√	√	√	Adopt new technologies that allow for instant reading of meters while facilitating data analysis	√	Utility implementing AMI installation for residential and CII customers.	Cost Varies	Map locations; meter use analysis.	NA	NA	TBD

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** - Completed

TABLE 4-4
UTILITY OPERATIONS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
U-10	Landscape Specifications			√	√	Update landscape and irrigation specifications for inclusion in SLCPDU construction projects.	ID	2020/21	TBD	TBD	NA	NA	NA
U-11	Landscape Maintenance				√	Implement BMPs for maintaining SLCDPU properties to enhance conservation and sustainability.	√	Contract implemented 2019	Varies	Track water use on sites.	NA	NA	NA
U-12	EPA WaterSense Partnership				√	Become a partner in EPA WaterSense.	√	2025	NA	NA	US-EPA	NA	NA
U-13	AWWA/AWE Program Certification				√	Submit documentation for review and scoring of conservation program.	√	2026	NA	NA	AWWA, AWE	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** - Completed

4.8 Law and Policy

Since the inception of the conservation program, the City has depended predominantly on volunteer engagement to achieve its water use reduction goals. There are examples of ordinances and policies that support conservation, including landscape codes and the billing rate structure. In order to achieve the next level of goals, there are ordinances and policies that would support further conservation by codifying some best practices and addressing egregious water waste.

FIVE-YEAR FOCUS

Law & Policy Programs

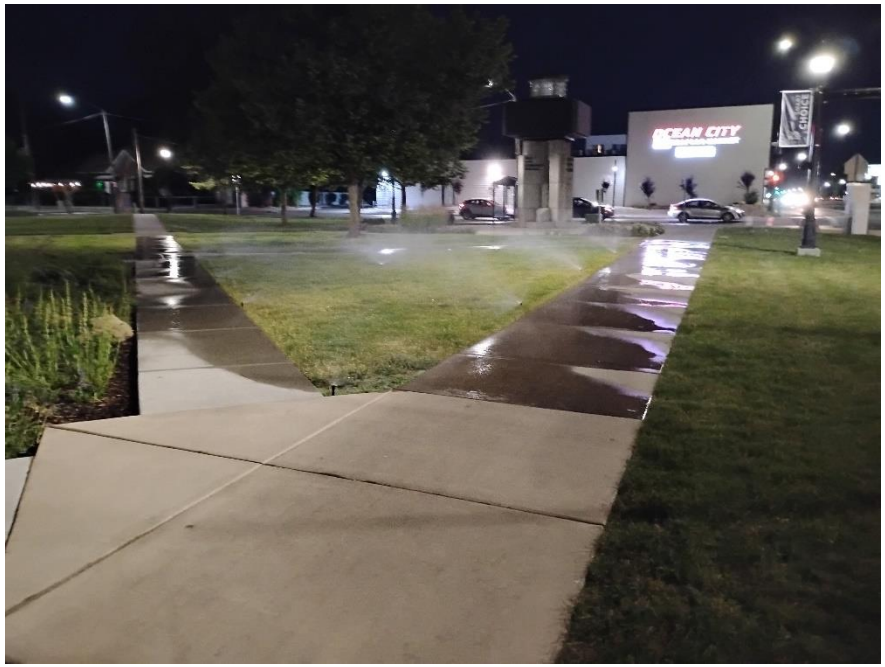
- Evaluate Ordinances and Policies
  - Squandered Water
  - Clarification of Irrigation-Only Meter Ordinance
  - Evaluation of Irrigation Only Budgets
  - Review Existing Landscape Ordinances

4.8.1 Evaluate Ordinances and Policies [LP-4, LP-7, LP-8]

Timeline: Ongoing
Budget: NA
Partners: NA
Reach: Utility-wide
Savings: NA

Squandered Water Ordinance [LP-8]

Even before the creation of the water conservation program, water customers acted promptly and appropriately to calls for temporary reductions in water use. As a result of this long history, the conservation program has come to depend on this volunteer spirit to facilitate our initial water use reductions. However, after nearly twenty years, not everyone is part of the solution. Usually, when asked to change or correct a behavior, requests are positively received; sometimes they are not. Sometimes, property owners insist on watering daily; an absentee owner won't repair a leaking swamp cooler; or a remote corporate office isn't concerned with the broken and geysering spray head at a grocery store, miles, or states away. This disregard for a limited and valued resource is the definition of squandering and is why it may be time to consider such an ordinance.



Clarification of Irrigation-only Meter Ordinance

In 2003, a seasonal tiered rate structure was adopted as a means to enhance the message of the value of water and to ensure that those who use the most water pay the most for that water. Along with establishing rates for residential and CII customers, irrigation-only meter accounts were also established. These meters are intended to service outdoor water use during irrigation season months. Each account receives site-specific, monthly water budgets based on landscapeable area and modified evapotranspiration equations. Staying in budget means water is charged in the second tier, identified as reasonable outdoor use. Occasionally, a property owner or manager doesn't turn off their irrigation system and the irrigation-only meter continues to be used. Owing to vague language in the rate ordinance, this un-authorized winter use of irrigation-only meters has been billed in the first tier, as is all other winter water use.

Evaluation of Irrigation-only Meter Budgets [LP-12]

As mentioned above, irrigation-only meters and budgets were established in 2003 to encourage responsible outdoor water use while maintaining landscape health, support efforts to sustain water supplies for necessary and beneficial uses, and to help achieve both overall water use reduction as well as reduction of peak water demand. These budgets, developed in conjunction with Utah State University Plants, Soils, and Climate Department, consider irrigated areas, reference evapotranspiration, and irrigation efficiencies of 60 percent. Since then, through continued research, understanding of actual turf water need has grown, an adequate science exists to indicate that it is time to review and reassess these budgets. It is now better understood how use plays a role in turf water demand and have newer and better forms of turf that require less water. Additionally, better technology helps deliver water more efficiently. Given the new goals as outlined in the Water Supply and Demand Study and articulated in Chapter 3 of this plan, it is important to align irrigation-only budgets with current science and long-term outdoor water reduction goals.

Review Existing Landscape Ordinances and Policies

Salt Lake City Planning Department conducted a rigorous evaluation of landscape codes over the past several years, including Salt Lake City's Code 21A.48.055: Water Efficient Landscaping establishes best practices to help reduce water waste in landscapes and park strips. This evaluation was conducted, in part, to ensure city code met the recommendations of Central Utah Water Conservancy District in order to continue participation in landscape transformation programs.

As a part of this evaluation, the City clarified the intent of existing landscape code that prohibits the use of artificial turf in park strips, front yards, buffer zones, and parking lots. The reasons for this prohibition are based on research identifying negative impacts of artificial turf on heat-island effect and storm water quality. Research conducted by the conservation office supported this review and takes the position that, while artificial turf might seem to use less water during commissioning, its manufacturing, cleaning, and disposal may negate those seeming benefits.

TABLE 4-5
LAW AND POLICY

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
LP-1	Graywater	√	√	√	√	Research issues regarding Graywater use and establish appropriate policy.	√	Initial research completed 2017	NA	Is there a way to identify where graywater is being used?	USU	NA	NA
LP-2	Irrigation Audit Policy			√	√	Develop and adopt an ordinance requiring Irrigation Audits on all new commercial and institutional properties, and accounts which exceed target or set CCF.	√	7/2014 Can be compelled through Landscape Ord	NA	Number of audits and report outcomes	NA	NA	NA
LP-3	Irrigation Efficiency Standards		√	√	√	Develop and adopt Irrigation Efficiency Standards for all commercial and institutional properties.	C	7/2014 Landscape Ord/new construction	NA	NA	NA	NA	NA
LP-4	Landscape Ordinance	√	√	√	√	Amend existing landscape code to accommodate and encourage water-wise landscaping in front yards.	C	Ongoing	NA	NA	NA	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

TABLE 4-5
LAW AND POLICY

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
LP-5	Parkstrip Code	√	√	√	√	Develop and adopt ordinance to accommodate and encourage non-traditional, lower water plantings.	C	Adopted 2004 (currently in review)	NA	NA	NA	NA	NA
LP-6	Rainwater Harvesting				√	Research issues relating to rainwater harvesting and support appropriate legislation.	C	Adopted by State 2010 (SB 32)	Initial investment of $14,000. Barrels sold at cost sustains program.	Track water use of known participating households.	NA	NA	NA
LP-7	Rain Sensor Ordinance and Policy			√	√	Require all properties with automated outdoor sprinkler systems to be fitted with rain sensors.	C	A component of 2014 water efficient landscape code	NA	NA	NA	NA	NA
LP-8	Squandered Water Ordinance	√	√	√	√	Develop and adopt ordinance prohibiting the squandering of water.	ID	TBD	NA	NA	NA	NA	TBD
LP-9	Sub-surface or Low-impact Irrigation for Small Areas			√	√	Require sub-surface or low-impact irrigation on medians, park strips, and in parking lots.	C	Landscape code prohibits standard irrigation in these areas	NA	NA	NA	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

TABLE 4-5
LAW AND POLICY

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
LP-10	Water Shortage Contingency Plan	√	√	√	√	Identify specific calls for action during water shortages and emergencies.	√	2025	$75,000 WaterSmart grant with $78,000 in-kind match.	See Plan for monitoring details.	Funded through grant from Bureau of Reclamation	NA	NA
LP-11	Irrigation-only Meters		√	√	√	Review existing policy and make recommendations.	√	Review existing policy	NA	Map: locations, meters that exceed target/frequency by user class; potential sites not currently metered	NA	NA	NA
LP-12	Sub-metering on New Multi-Family Dwelling Units		√			Explore requiring all new multi-family dwelling units to be sub-metered and address metering in mixed use development	ID	TBD	TBD	Identify and map submeters	NA	NA	NA
LP-13	Alternative Water Sources Use Recommen-dations				√	Establish guideline for implementation pertaining to alternative water sources, including secondary water	C	Study on secondary water sources for park sites was completed 2018.	$62,500	See study	NA	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

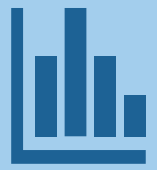
4.9 Research and Metrics

Successful conservation programs require an understanding of the community served, including the relationship of the end water user to their water use. Continuing research helps to identify the ways in which water is used; how it may be over- or misused; and the best means for altering behavior or practices to improve use efficiencies and reduce or eliminate waste. It is also crucial to understand program efficacy and effectiveness. In this regard, identifying meaningful benchmarks and metrics is key to program evaluation, review, and improvement.

The value of research and establishment of metrics should not be underestimated; the Governor's Strategic Water Master Plan devotes an entire chapter to the role of science and technology in enhancing our understanding as well as to develop practical and actionable steps to meet our future water needs. According to the strategic plan, science, technology, and innovation are crucial components of meeting water needs, now and in the future.

Fortunately, conservation staff have developed collaborative and cooperative relationships with many academic institutions and professional organizations that offer opportunities to extend knowledge, build understanding, and devise meaningful strategies to move towards water conservation goals. Internally, the water conservation program works with team members from GIS/IT, finance, billing, metering, and engineering to identify areas of study and meaningful benchmarks.

For example, through the Water Check program, we know that, while residential property owners tend to apply nearly twice as much water as is necessary to support lawns, commercial and institutional users may irrigate three to four times as much as needed. Though the overall footprint of landscaped areas of non-residential property is less than that of residential property, this represents a great opportunity to reduce water waste, given the degree of overwatering. Applying WaterMAPS™ to commercial and institutional properties will help to quantify the potential water savings, while surveys and focus groups will identify how best to capture that savings. Research into emerging technologies and practices will continue as a critical component of effective conservation programing in order to achieve newly established water use reduction goals.



FIVE-YEAR FOCUS

Research & Metrics Programs

- Conduct AWWA M36 Study
- Establish Metrics, Benchmarks, & Goals
- 5- and 10-year Program Budget
- CII Analytics
- SLCDPU/USU Collaborative Research

4.9.1 Conduct AWWA M36 Study [R-19]

Timeline: 2020-2025
Budget: $125,000
Partners: NA
Reach: all
Savings: 2,900 AF (900 million gallons) per year if system losses are reduced to 9%. Note that these savings are not associated with the audit alone, but with the actions taken to eliminate system loss as a result of the audit.

Currently, a leak detection program and water data analysis programs are underway. The water conservation office led undertaking the *AWWA Manual of Water Supply Practices: M36 Water Audits and Loss Control Program*. This comprehensive study will facilitate improvements in water resource management, optimize revenue recovery while promoting equity among rate payers, minimize distribution system interruptions, enhance system integrity, and reduce water waste through identification of metering and system losses. Over the last five years, system losses have averaged approximately 12 percent. While it is not reasonable to expect zero system losses, it is believed that system losses could be reduced to somewhere between 8 to 10 percent with proactive leak detection and repair. Thus, potential water savings could be estimated to be in the hundreds of millions of gallons per year.

Next steps include evaluating study recommendations for feasibility of implementation.

4.9.2 Establish Metrics, Benchmarks, and Goals for Conservation Programing [R-1, O-6]

Timeline: Ongoing
Budget: TBD
Partners:
Reach: all
Savings: TBD

Over the lifetime of the conservation program, 16,000 acre-feet of water have been saved annually. Establishing metrics, benchmarks, goals, and potential water savings for conservation programing will facilitate understanding how those savings were achieved, and how best to sustain and enhance those savings. Not all metrics and benchmarks will be identical; for instance, the impact of a brochure or demonstration garden cannot be measured in the same manner as would the effectiveness of rain sensor rebates or Water Checks. Reliance on industry best practices, research by AWE, US-EPS, and AWWA, as well as efforts by other conservation programs to identify benchmarks and metrics will facilitate this program measure.

4.9.3 5- and 10-Year Proposed Water Conservation budget

Timeline: 2020-2030
Budget: NA
Partners: Internal
Reach: Utility-wide
Savings: NA

Continued program continuity and success depends on the ability to plan ahead. The establishment of 5- and 10-year budget proposals will facilitate program planning, support partnership arrangements, and optimize grant opportunities. Past budget and program performance, future stakeholder and partnership opportunities, outside conservation program examples, and AWE and AWWA program estimate costs will be consulted in establishing proposed budgets.

4.9.4 CII Analytics

Timeline: 2017-2022
Budget: $135,000
Partners: NA
Reach: CII
Savings: TBD

The service area is comprised of a diverse customer base, from suburban residential properties to high-density urban core dwellings, and from art spaces to tattoo parlors, health food stores to hospitals, model toy stores to airports, and gas stations to oil refineries. While our residential base is rich in its diversity, understanding water demand, use patterns, and barriers to behavioral change seem straightforward when compared to the diversity and complexity of our CII customers.

Conservation staff began working on CII analytics in earnest in 2015. Since that time and working with a team of consultants, we have developed a method for gathering, analyzing, and assessing water use within the CII sector. With tools developed by Radian Inc., we can now begin to develop realistic water efficiency targets for commercial, industrial, and institutional (CII) clients through better understanding of demand patterns, specific CII sector analysis, and comparisons to newly developing national standards data. Through this process advanced

and automated reporting queries, automatic updates for consumption, weather, GIS, and AMI data with usage and other predefined alerts have been developed to provide valuable information to conservation program staff.

By integrating existing commercial billing data and established NAICS codes with external data sources including GIS, AMI, and weather, a clearer picture of water demand emerges. This in turn helps support water use reduction efforts in the CII sector in a meaningful, actionable way.

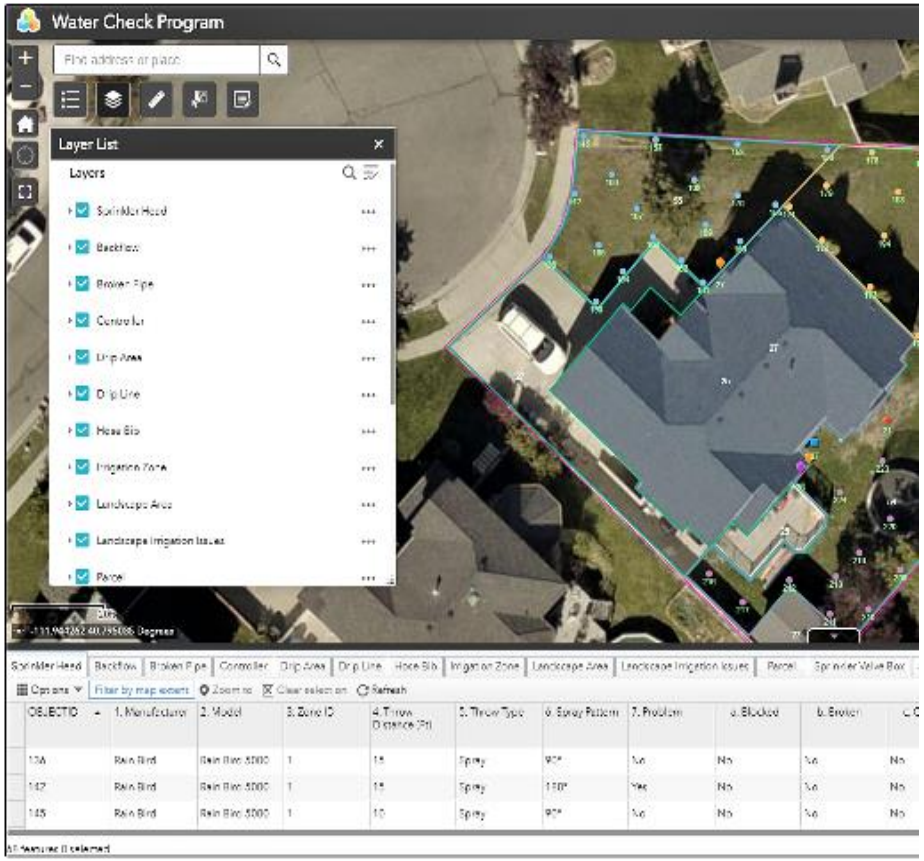
CII customers comprise roughly 12 percent of the connections within the service area, and their total water demand accounts for half of water use. In order to more fully integrate CII customers with conservation planning, it is necessary to understand how water is used in order to drive sustainable conservation within this sector to achieve long-term water reduction goals while still maintaining a vibrant, healthy economy.

4.9.5 SLCDPU/USU Collaboration [R-1, R-5, O-6, O-16]
Timeline: Ongoing
Budget: Varies
Partners: Varies
Reach: Service-wide
Savings: TBD

Water Check [R-1, O-6]
Timeline: Ongoing
Budget: $18,000 (proposed)
Partners: USU, MWDSLS, Sandy City
Reach: Residential, CII
Savings: 577AF To Date

Landscape irrigation accounts for almost 25% of water use within the service area. Understanding how water is used and communicating better practices to home and property owners supports long-term water use reduction goals. The Water Check irrigation audit program was created in 1999 and is provided by Utah State University and the Center for Water Efficient Landscaping, with financial and technical support from department conservation staff and Metropolitan Water District of Salt Lake & Sandy (MWDSLS).

Typical Water Check participants know they have a problem but don't know what to do about it. The Water Check program provides recommended site-specific irrigation schedules as well as irrigation system and landscape action items to help increase their landscape irrigation efficiency.



By comparing pre and post water check water usage, we know that having a water check typically results in a 30% reduction in water use in subsequent years. It's important to note that audits need to be done regularly to maintain efficiency.

Water check will also be incorporated into future landscape incentive programs. Studies indicate landscape program success depends on pre-qualification and post-verification to ensure landscape interventions are appropriately implemented. Water Check will assist in providing those functions, ensuring that program goals for incentives are met.

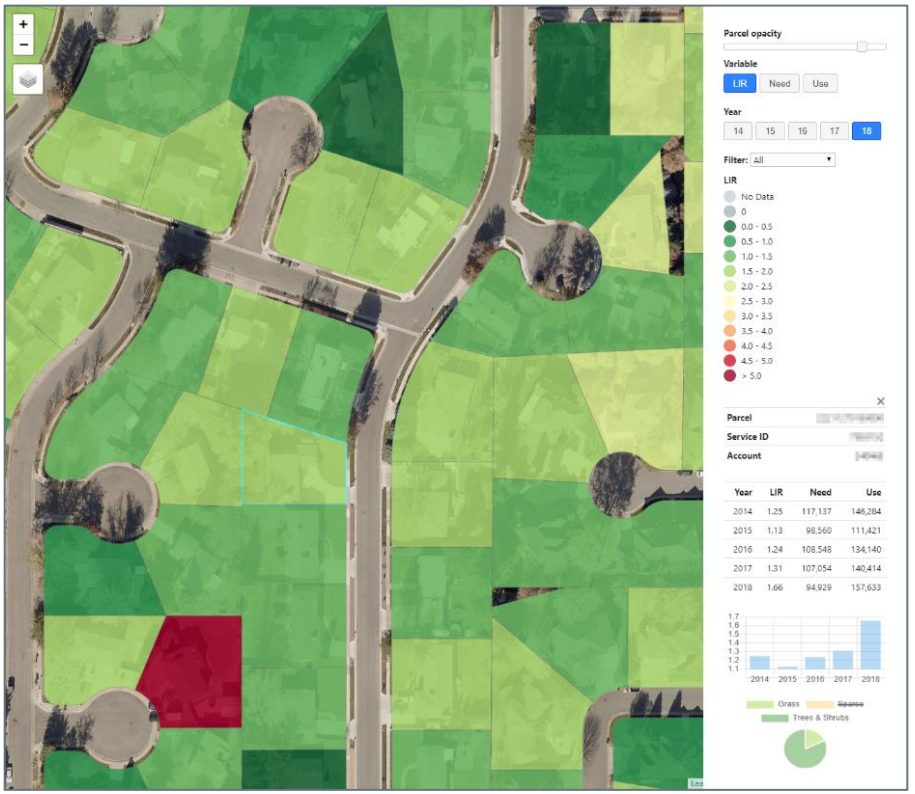
GIS technology has been integrated with the Water Check application for enhanced data accuracy including use area, asset location, attributes (nozzle spray pattern, etc.), and condition (broken, tilted, etc.). A further benefit is that property owners now receive, along with an electronic report, a site map indicating location, zone, and condition of spray heads.

Water MAPS™ [R-5, O-16]
Timeline: 2018-current
Budget: $75,000 annually
Partners: USU/CWEL, EWIG
Reach: Utility-wide
Savings: TBD

WaterMAPS™ is a collaboration between the WaterMAPS™ team in USU's Center for Water Efficient Landscaping (CWEL) and the Water Conservation Program of SLCDPU. WaterMAPS™ provides SLCDPU with technical assistance and science-based analysis to locate and quantify additional landscape water conservation potential so it can determine when, where, and how to deliver current and future outdoor-focused water conservation programs. Besides providing detailed information on outdoor water use to customers, this project will help to effectively utilize existing programs such as Water Check and optimize implementation of new programs such as landscape incentives.

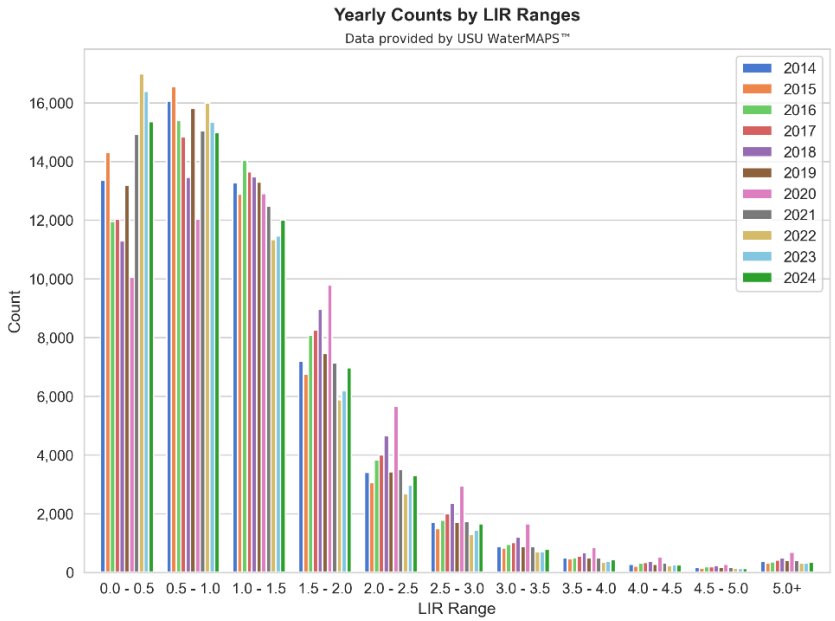
How much water conservation potential exists within the landscapes of the service area and how are those potential savings captured? What tools are most effective with any given group of water users to eliminate waste, increase efficiency, and reduce use? The answers to these questions will enable SLCDPU to prioritize delivery of future outdoor water conservation programs and help the community to be adaptive and responsive in its relationship with water in order to create a more sustainable water supply now and for the future. However, we do not know how much water is actually being wasted on existing landscapes. Analysis of city meter data can provide clues as to watering practices, but the question remains: How much irrigation water currently being applied is not necessary to support existing urban landscapes?

Application of USU Water Management Analysis and Planning Software (WaterMAPS™) addresses this specific information need. WaterMAPS™ is a custom software application that has been developed by an interdisciplinary team of USU researchers for the purpose of promoting urban landscape water conservation (visit watermaps.usu.edu). WaterMAPS™ integrates water meter data with property records, weather data, and landscape classifications into one database, then enables different time-step calculations of site-specific Landscape Irrigation Ratios (LIRs) that compare landscape water use to landscape water need. The LIRs represent an efficiency standard, with values under 1 indicating efficient use and increasingly higher numbers indicating "capacity to conserve" (or water waste). Various patterns in how LIRs change over time can signal the need for delivery or refinement of conservation messaging and programming. In this project, several different innovations will be implemented in the application of WaterMAPS™ to help SLCDPU meet the challenge of refining and focusing outdoor water conservation programs in the future.



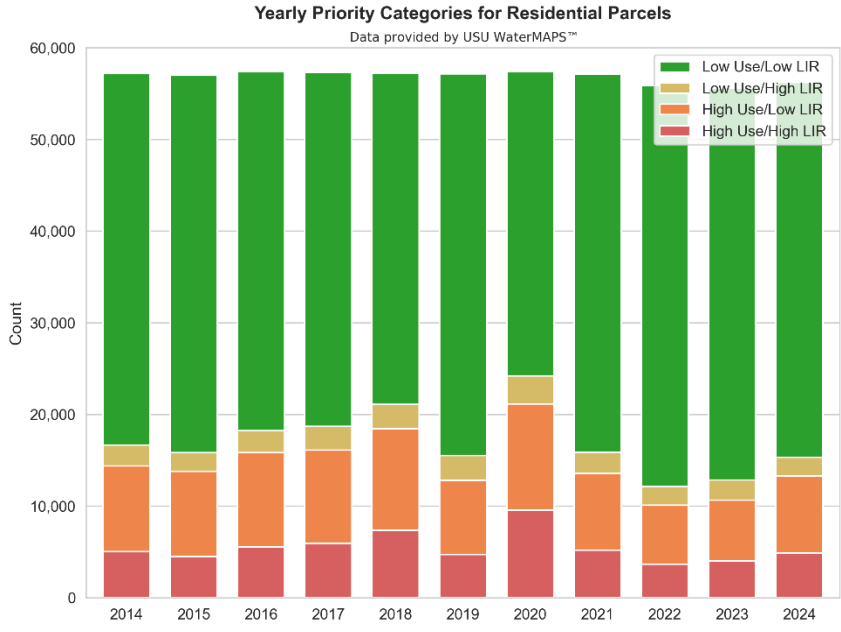
From water meter data and Water Checks reports, we "know" many households over water their landscapes. And now, through their WaterMAPS™ reports, homeowners can also understand how they water and identify their own capacity to conserve. But WaterMAPS™ also performs analytics that helps to inform conservation programming. Figure 4.1 shows the number of households in each LIR over a ten-year period, the majority of which are within the lowest LIRs.

FIGURE 4-1
AVERAGE RESIDENTIAL LIR RANGES



Within the WaterMAPS™ analysis, we came to recognize four distinct categories of water users: low use and low LIR; low use and high LIR; high use and low LIR; high use and high LIR (see Figure 4.2). This helps in directing programming to more specifically address water use patterns. For example, a house with a low LIR but high use might have completed a landscape transformation but haven't yet adjusted the watering schedule to reflect the new landscape; they may just need information on watering a new plant palette. Conversely, a house with a high LIR and high-water use might be a good candidate for the landscape transformation program.

FIGURE 4-2
RESIDENTIAL CATEGORIZATION BY LIR AND WATER VOLUME



Golf Course Turfgrass Study
Timeline: 2018-2022
Budget: $45,000
Partners: USU/CWEL
Reach: CII
Savings: 30-80% Reduction

In 2018, conservation programs began working collaboratively with Salt Lake City Golf (SLC-Golf); Utah State University Department of Plants, Soils, & Climate (USU/CWEL); and the United States Department of Agriculture-Agricultural Research Service Forage and Range Research Laboratory (USDA-FRRL) to find solutions that reduce water demand and eliminate water waste while supporting the golf division in enhancing long-term sustainability of its courses by managing fiscal impacts of increasing water costs, all while supporting playability and economic viability of City courses.

Conservation staff, SLC-Golf, USU/CWEL, and USDA-FRRL devised field-based research in the areas of drought tolerant grass research, soil surfactant application, water conditioning evaluations, and soil temperature measurement. Outcomes from these studies will not only provide actionable information for SLC-Golf but is already influencing landscape management decisions at department sites and is helping to inform incentive and rebate program planning.

This study has been recommended for an additional two-year extension.

Alternative Turfgrass Study
Timeline: 2020-2023
Budget: $25,000 (proposed)
Partners: USU/CWEL
Reach: Utility-wide
Savings: 1.67 AF/43,500SF

Outdoor water use has been an important focus of water conservation efforts locally and statewide over the last twenty years, and in the center of this focus sits Kentucky Blue grass.

Over the last fifteen years, USU has conducted field studies of *Poa* species (blue grass), as well as other grass species and varieties with the intent of identifying alternative turfs to traditional lawn grass. The outcome of these studies has been the identification of turfs requiring fewer inputs while still delivering on the aesthetic and environmental qualities that make lawns so compelling a landscape choice.

Conservation staff propose to work with USU and other partners to increase the use of these turf grasses within the service area as well as regionally, through a number of strategies. These will include turf demonstration areas, installation of these turfs on department properties, development of educational and promotional materials, collaboration with seed and sod growers, and consideration for inclusion in incentive programming.

An outcome of these ongoing studies was the identification of a low-water residential quality turf grass that requires 30 to 40% less water than the typical Kentucky bluegrass Lawn. In 2022, the Utility launched the SLC TurfTrade program, making available a low-water seed mix at cost to customers within the service area. The success of this project was immediate, with over 2,000 households purchasing and planting SLC TurfTrade grass seed. The program has now spread to Colorado, Arizona, California, and even to communities in Ontario, Canada.

Synthetic Grass Study
Timeline: 2026
Budget: $25,000 (proposed)
Partners: USU/CWEL
Reach: All
Savings: NA

It is commendable that we strive to identify new ways to reduce water use and eliminate water waste. As part of this search for solutions, however, it is also important that impacts to other areas of environmental concern are incorporated into decision making. It is also important that as best as possible, unintended consequences are also considered.

Synthetic grass has been presented as a solution to reducing water use in landscapes. When lifecycle water use is calculated, this premise seems more tenuous. Research provides information regarding impacts to human health, urban heat island effects, and water quality.

USU, working with conservation staff, conducted a metastudy on research pertaining to artificial turf, with a desire to identify any potential negative impacts to soil health, surrounding landscape health, surrounding landscape water demand, and insect populations. Study outcome indicates there is little or no scientific research pertaining to these questions. As a result, a collaborative research study is being designed and proposed to conduct field and modeling studies to measure impacts, if any, of synthetic turf on landscape, soil, and beneficial insect health.

Irrigation-Only Meter Budgets Review
Timeline: 2026
Budget: $4,000
Partners: USU/CWEL
Reach: utility-wide
Savings: TBD

In 2003, a seasonally tiered rate structure was adopted. A component of those rates was the establishment of rates specific for those properties with meters that serviced only outdoor, landscape water needs. Those accounts are referred to as Irrigation-Only Meter Accounts. In conjunction with USU, budgets based on square footage of landscaped areas and evapotranspiration were established for each property with irrigation-only meters. Improvements in best practices, irrigation system technologies (including irrigation controllers and sensors), and turfgrass may allow for revisions of established budgets without negatively affecting landscapes. Additionally, new conservation goals articulated in *the Salt Lake City Water Supply and Demand Plan* indicate a greater level of outdoor water conservation is necessary to achieve short- and long-term water use reduction goals. Accordingly, a review of the landscape water budgets is in order.

TABLE 4-6
RESEARCH AND METRICS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
R-1	Water Check	√	√	√	√	Promote and conduct lawn sprinkler check-ups for residential, commercial, and institutional properties	√	(S) Estab. 1988; Partnered with USU 2007. Ongoing.	$60,000 provided by MWDSLS annually. SLCDPU funds additional components, including APP, portal, and GIS capability ($45,000)	Map and track use.	MWDSL&S, USU/CWEL		47,000 gallons per participating residential customer annually
R-2	EPA Residential Study	√				Measure and evaluate water efficiency in newly constructed homes.	√	Completed 2011[4]	$20,000/ $360,000 grant and partners	Map participating households.	EPA Grant; Aquacraft, Inc., 8 participant cities	NA	NA
R-3	Irrigation Controller Study	√		√	√	Test and evaluate weather-based irrigation controllers.	√	On-going (USU)	NA	Study outcomes inform recommend-dations	USU/CWEL	NA	NA
R-4	Irrigation Intervention Study	√				Investigate impediments and barriers for homeowners in correcting irrigation system defects.	√	Initial studies conducted 5/2015, 2018	Funded in FY2013-14 cons. budget; matched by USU	NA	USU	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

[4] DeOreo, William, and Salt Lake City Department of Public Utilities. *Analysis of Water Use in New Single-Family Homes*. Boulder Co. January 2011

TABLE 4-6
RESEARCH AND METRICS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
R-5	WaterMAPS™	√	√	√	√	Utilize technology developed by USU to analyze potential water-use savings in landscape settings.	√	Phase1: Study began August 201#. Phase 2: begin implementing WaterMAPS™ software over service area.	Phase 1: $49,000; Phase 2: $50,000 with EWIG match grant	Monitor LIR by parcel, sector	USU/CWEL; EWIG	NA	TBD
R-6	Landscape Inventory	√	√	√	√	Inventory alternative landscapes and quantify savings.	√	2019	NA	Identify, map, measure, compare	USU, SL Co Master Gardeners, community citizen scientists	NA	TBD
R-7	Residential Plumbing Fixtures Inventory	√	√		√	Inventory upgrades in plumbing fixtures and calculate quantity of remaining, older fixtures.	TBD	TBD	TBD	Compare water use between sites; refer to End Water Use Study	TBD	NA	TBD
R-8	Water Softener Study	√	√	√	√	Research effects on water softener use on waste stream quality and impacts on water re-use water quality.	TBD	TBD	TBD	TBD	TBD	NA	TBD

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

TABLE 4-6
RESEARCH AND METRICS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
R-9	Supply and Demand Master Plan				√	Analyze the impacts of conservation on the assumptions pertaining to storage and capacity.	√	Component of 2020 Water Conservation Master Plan and Storage and Conveyance Master Plan	SLCDPU Engineering	-	Consultant: Bowen Collins	NA	Since 2007 projected peak demand 270 MGD; current projection 200 MGD
R-10	Climate Change, and Resiliency	√	√	√	√	Review existing research on climate change; evaluate impacts of conservation on risk reduction and mitigation.	√	Study currently being conducted		-	-	NA	NA
R-11	Secondary Water Irrigation Master Plan	√	√	√	√	Study availability, quality, and opportunity to use non-culinary water sources.	C	2019	Water Resources Division budget and SLC Public Services	Map locations using non-culinary water: by customer class and water source.	SLC Public Services Consultant: Bowen Collins	NA	NA
R-12	Commercial and Industrial Water Demand Study			√		Evaluate C&I was use patterns and water-use reduction innovations.	√	2015 - Ongoing	Phase 1 & 2: funded $10,000 each budget cycle 2015/16 and 2016/17 Phase 3 & 4: $50,000 funded in 2017/18	Analysis and monitor CII water use sector, account	-	NA	TBD

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

TABLE 4-6
RESEARCH AND METRICS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
R-13	Behavior and Policy Study	√				Conduct studies linking consumer behavior and policy development.	C	Completed	2017/18:	Can we map participant locations?	USU Consumer study and iUtah study.	NA	NA
R-14	Incentives	√	√	√	√	Study incentive programs; investigate.	ID	TBD	NA	Survey/audit to determine reach/interest/ product. Map and track use.	USU/CWEL, AWE, US-EPA, IA	NA	TBD
R-15	Turf Study	√	√	√	√	Turf bluegrass and alternative turfs to identify best qualities/applicatio ns.	√	2017/18; Golf Turf Study completed summer 2019 – recommend contract extension. Mapping begun Fall 2019. SLC TurfTrade launch 2022.	$50,000 for study. No cost for SLC TurfTrade program	Comparative water use	Funded $25,000 in 2017/18 budget, with $25,000 match from USU. USDA-FRR	NA	TBD
R-16	Program Effec-tiveness	√	√	√	√	Where appropriate, develop methodology to measure practice impact.	ID	Ongoing	TBD	varies	USU/CWEL	NA	NA
R-17	Projected Demand Reduction	√	√	√	√	Develop baseline and projected customer-class water demand.	C	Water Supply and Demand Master Plan Study (2022)	SLCDPU Engineering	WaterMAPS™, CII tool	Consultant: Bowen Collins	-	16,100 AF/ Annually

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

TABLE 4-6
RESEARCH AND METRICS

No.	Practice	Classification				Brief Description	Practice Timeline		Cost/Funding	Reach/Metric	Partnership	Savings	
		Res	Ind	Com	Inst		Active	Implementation				To Date	Projected
R-18	Artificial Turf Study	√	√	√	√	Study impacts of artificial turf on landscape water need and soil health	√	Metastudy completed 2019; field study proposed	TBD	-	USU/CWEL	NA	NA
R-19	Water Loss Control Study				√	Complete loss audit based on AWWA M36 standards and implement findings.	C	Completed 2025, to be updated annually	$70,000	Track percentage loss after implementation of plan components.	NA	-	TBD
R-20	CII Water Depletion Evaluation		√	√	√	Research and evaluate methodologies for determining CII depletion levels.	TBD	TBD	TBD	TBD	TBD	NA	NA
R-21	GSL	√	√	√	√	Evaluate and estimate water demand reductions related to Great Salt Lake	TBD	TBD	TBD	TBD	TBD	NA	NA

ID - In Development **NA** - Not Applicable **NC** - No Cost **TBD** - To Be Determined **C** – Completed

3.2.5 ADDITIONAL CONSERVATION POTENTIAL FOR GREAT SALT LAKE

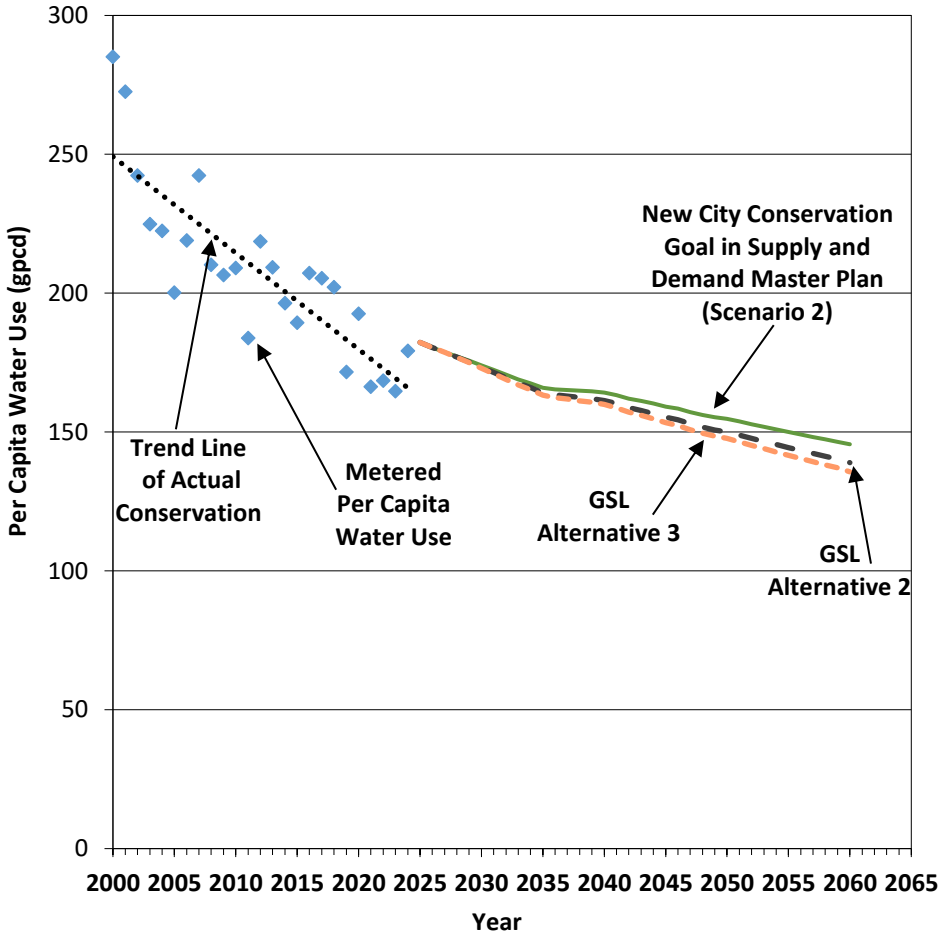
The Utility recognizes that more water conservation than the proposed conservation goals may be needed in the future to maintain and improve water levels of Great Salt Lake. With this perspective, two additional conservation scenarios have been developed for consideration which would reduce outdoor water demands by 10% and 15% more than the proposed conservation scenario. These additional water demand savings would allow the Utility to dedicate more water to bolstering the health of Great Salt Lake. These additional scenarios are referred to as GSL Alternative 2 and GSL Alternative 3. The resulting water reduction requirements of these alternatives are shown in Table 3-6. Additionally, the estimated impacts to long-term water demands are shown in Figure 3-13.

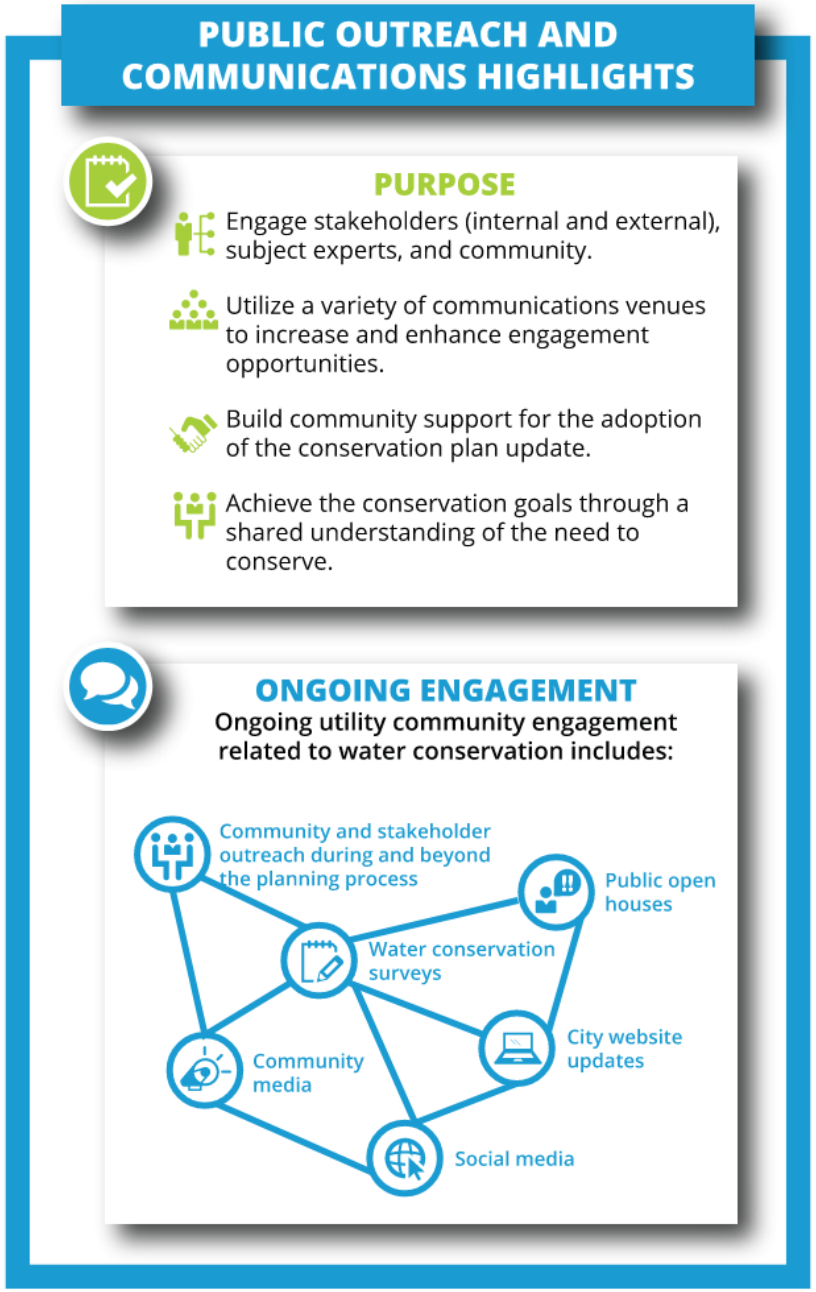
TABLE 3-7
LONG-TERM GSL CONSERVATION ALTERNATIVE GOALS

	2024	Proposed Goal	GSL Alternative 2	GSL Alternative 3
Per Capita Use (gpcd)	179	146	139	136
Indoor Per Capita Use (gpcd)	82.0	79.5	79.5	79.5
Outdoor Irrigation Application Rate (inches/yr)*	24.1	22.8	20.5	19.4
Percent Reduction Outdoors from Existing	-	5.3%	15.3%	20.3%
Percent Reduction from Total use	-	18.7%	22.4%	24.3%

**Represents the reduction in outdoor irrigation application rate*

FIGURE 3-13
CONSERVATION ALTERNATIVES





CHAPTER 5: PUBLIC OUTREACH AND COMMUNICATION PLAN

5.0 Introduction

This Communications and Outreach Plan (COP) serves two primary purposes: first, to actively gather input and feedback from customers and stakeholders during the development of the 2025 Water Conservation Plan; and second, to establish a clear, inclusive process for informing and engaging the community throughout the plan's implementation.

The COP outlines strategies designed to promote meaningful participation, transparency, and trust. Engagement efforts will include both in-person and digital tools to ensure broad accessibility. These efforts will be coordinated with key milestones to encourage feedback that can directly shape the plan and its implementation.

While digital platforms—such as social media, surveys, and virtual meetings—will play a major role, we recognize that not all community members have reliable internet access. To ensure equitable participation, outreach will also include printed materials and postings at high-traffic public locations such as libraries, recreation centers, parks, and golf courses.

By combining modern communication tools with trusted, community-based engagement methods, this plan ensures that all voices have the opportunity to be heard and that the final Water Conservation Plan reflects the shared values and priorities of the community it serves.

5.1 Goals and Objectives

To ensure the desired outcomes, the communications and outreach goals are to:

- Create meaningful opportunities for community feedback during the development of the Water Conservation Plan;
- Identify and involve a wide range of stakeholders, ensuring that all community voices are represented;
- Facilitate the transfer of technical information to educate and encourage public engagement;

- Provide timely and transparent responses to public questions and feedback;
- Establish credibility and build trust in the planning process;
- Build partnerships with municipalities within the service area;
- Achieve public understanding and support for the plan's adoption and implementation.

5.2 Stakeholders and Special Interests

Stakeholder engagement is a cornerstone of this plan. In addition to the general public, special outreach will be made to:

- Internal Stakeholders: SLC Parks and Public Lands (Forestry, Open Space, Parks), SLC Golf, SLC Planning, SLCDPU Engineering, Sustainability, etc.
- Municipal Partners: Millcreek, Holladay, Murray, South Salt Lake, Cottonwood Heights, Salt Lake County.
- Advisory and Oversight Bodies: Public Utility Advisory Committee (PUAC), Metropolitan Water District of Salt Lake & Sandy.
- Political Leadership: SLC Mayor's Office, City Council, and mayoral offices of partner cities.
- Other Agencies and Advocacy Groups: Utah Division of Water Resources, Jordan Valley Water Conservation District, AWWA, USU Extension, environmental nonprofits, and community advocacy organizations.

Meetings, presentations, surveys, and regular updates will be tailored to fit the interests and level of involvement of each stakeholder group. A full stakeholder matrix is available in the project documentation.

5.3 Media and Social Platforms

A multi-channel media strategy will ensure outreach is inclusive, engaging, and far-reaching:

- Website: All project information, including draft plans and FAQs, will be posted at slc.gov/utilities/water-conservation-plan-2025, with links provided on other City pages.
- News Releases: Coordinated with the SLC Mayor's Office to announce project milestones, draft releases, and public comment periods.
- Blogs: Stories and updates will be posted on City and partner blogs to provide both technical content and human-interest narratives.
- Facebook / Instagram / X (formerly Twitter):
    - One post per week over a six-month period.
- Content includes project updates, meeting notices, water-saving tips, and community stories.
- Interactive Q&A formats and reposting from partner organizations will extend reach.
- YouTube / SLCtv Media: Short video vignettes and a 2-minute animated video will communicate plan highlights. A recorded virtual townhall will be posted here.
- Community Media: Outreach will include local radio, the Salt Lake Chamber's "Building Utah" podcast, and communications through schools, libraries, and partner organizations.

5.4 Avenues of Communication

Community input will be collected via:

- Digital surveys (including QR codes on fliers and signs)
- Public meetings (in-person and virtual)
- Email, phone, and social media messaging
- Comment cards and signage at events and public locations

All feedback will be compiled, analyzed, and shared with the project team. A final outreach summary will include an executive summary of community feedback, a record of comments received, and a list of outreach activities conducted.

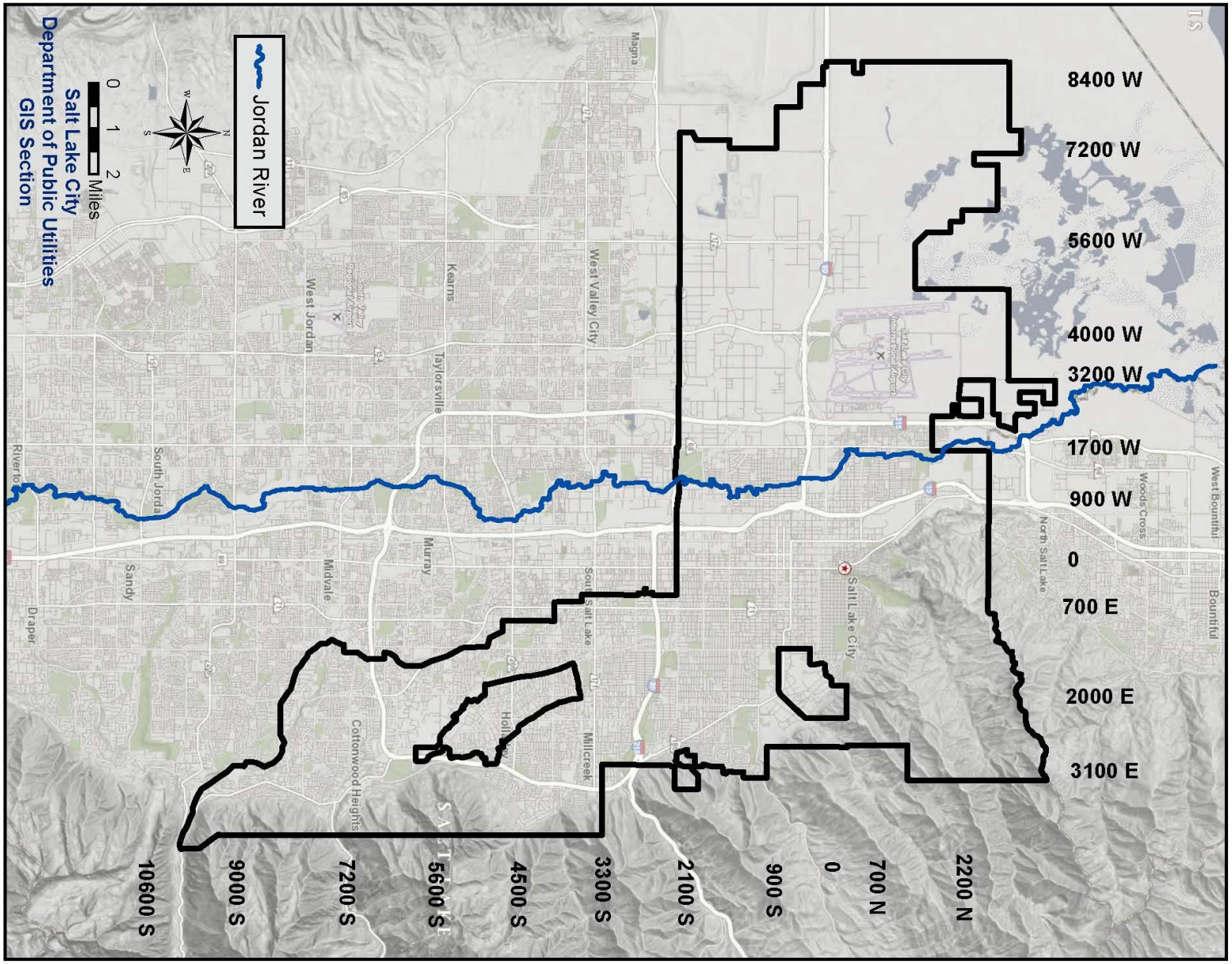
5.5 Ongoing Communications and Outreach

Strategies employed during plan development will continue over the duration of the plan implementation to enhance public understanding, program acceptance, and active engagement.

APPENDICES

A.

PUBLIC UTILITIES
SERVICE AREA



B. MWDSLS ULS Report 2024, Table 4: Salt Lake City Water Usage and Conservation Trends

Table 4 - Salt Lake City Water Usage and Conservation Trends

Documentation of Conservation Performance

Metropolitan Water District of Salt Lake & Sandy

	Without Consideration of Worker Population			*Population Adjusted Based on Worker Population Relative to WFRC Average*									
Year	Population	Annual Metered Sales (gallons)	Per Capita Use (gpcd)	Population	Employment	Average Employment Based on Population	Worker Population Above Averages	Total Equivalent Population	Annual Metered Sales (gallons)	Per Capita Use (gpcd)	ULS Goal (gpcd)	State Goal (gpcd)	New State Goal (gpcd)
0	287,431	32,479,397,940	310	287,431	255,161	148,889	106,272	312,192	32,479,397,940	285	285	285	
1	287,405	31,156,592,852	297	287,405	259,575	148,876	110,699	313,198	31,156,592,852	273	283	282	
2	287,379	27,795,222,972	265	287,379	264,066	148,862	115,204	314,221	27,795,222,972	242	281	279	
3	287,353	25,866,715,160	247	287,353	268,634	148,849	119,785	315,263	25,866,715,160	225	280	276	
4	287,327	25,709,610,476	245	287,327	275,242	148,835	126,407	316,780	25,709,610,476	222	278	274	
5	287,300	23,230,740,000	222	287,300	280,500	148,821	131,679	317,981	23,230,740,000	200	276	271	
6	288,445	25,546,829,220	243	288,445	283,762	149,415	134,348	319,748	25,546,829,220	219	274	268	
7	289,765	28,409,000,000	269	289,765	285,060	150,098	134,962	321,211	28,409,000,000	242	273	265	
8	290,671	24,713,538,800	233	290,671	285,951	150,568	135,383	322,215	24,713,538,800	210	271	262	
9	291,312	24,339,970,111	229	291,312	286,582	150,900	135,682	322,926	24,339,970,111	207	269	259	
10	291,953	24,684,871,280	232	291,953	287,213	151,232	135,981	323,637	24,684,871,280	209	267	257	
11	309,664	22,851,774,007	202	309,664	283,183	160,406	122,777	338,271	22,851,774,007	185	265	254	
12	310,387	27,244,926,535	240	310,387	283,844	160,780	123,064	339,061	27,244,926,535	220	264	251	
13	310,516	26,132,150,545	231	310,516	284,292	160,847	123,444	339,279	26,132,150,545	211	262	248	
14	311,066	24,536,287,605	216	311,066	284,740	161,132	123,608	339,867	24,536,287,605	198	260	245	
15	312,281	23,694,971,212	208	312,281	286,633	151,144	135,489	343,850	23,694,971,212	189	258	242	210
16	316,028	24,524,178,919	213	316,028	290,072	152,958	137,115	347,976	24,524,178,919	193	257	239	209
17	319,820	25,515,449,124	219	319,820	293,553	154,793	138,760	352,152	25,515,449,124	199	255	237	207
18	323,658	25,371,120,280	215	323,658	297,076	156,651	140,425	356,377	25,371,120,280	195	253	234	206
19	327,542	22,597,819,761	189	327,542	300,641	158,530	142,110	360,654	22,597,819,761	172	251	231	204
20	331,473	25,648,647,896	212	331,473	304,249	160,433	143,816	364,982	25,648,647,896	193	249	228	203
21	335,450	22,407,825,138	183	335,450	307,899	162,358	145,542	369,362	22,407,825,138	166	248	225	201
22	324,022	22,654,139,073	192	324,022	401,343	147,754	253,589	376,008	22,654,139,073	165	247	222	200
23	325,683	21,327,273,801	179	325,683	407,806	148,511	259,294	378,838	21,327,273,801	154	246	219	198
24	327,352	25,384,118,751	212	327,352	411,821	149,273	262,548	381,174	25,384,118,751	182	245	217	197

C. State Division of Water Resources 2025 Water Conservation Plan Checklist

State Div of Water Resources 2025 Water Conservation Plan Checklist		
Section	**Requirement**	**Documentation**
System Profile		
1 Population, Serive Area, Existing Water Users		
1.1	Provide map of current service area.	*Page 1-2 and Appendix B*
1.2	List number of M&I water connections, categorized by type: (Residential/Domestic, Commercial, Institutional, Industrial, Unmetered)	*Table 2-3*
2 Supply		
2.1	Chart current water supply, categorized by source (Wells, Springs, Surface, Purchased, Exchanged)	*Section 1.3.1 and 1.3.2*
2.2	Describe when applicable, occurrences of groundwater depletion, aquifer recharge (artificial and natural) and storage and recovery practices.	*No groundwater depletion has occurred. Aquifer Recharge and Recovery program discussed on page 1-5 and 1-6.*
2.3	Provide comparison graph, which includes a) reliable supply through 2050, b) current water use projections and c) efficient use.	*Figure 1-4*
2.4	If after reaching conservation targets, use exceeds supply, list future water sources and cost projections.	*Not applicable. Please see the SLC Water Supply and Demand Master Plan.*

State Div of Water Resources 2025 Water Conservation Plan Checklist		
Section	**Requirement**	**Documentation**
3 Water Measurement and Billing		
3.1	List current water measurement methods and practices. (percent of metered connections by type, reading frequency, calibration schedule, new development laws & replacement schedule)	*1) 100% of connections are metered;* *2) Meters are read roughly every 30 days;* *3) Solid-state multijet and ultrasonic meters are sealed in factory and calibrated to AWWA Standards and not calibrated in field. Flow tests may be conductyed in field. when meters do not perform to AWWA standards they are replaced ; Non-AMI meters 1.5" and up are field tested at a rate of appox 1000 meters per year.* *4) All new connections are required to be metered per code;* *5) All 3/4" and 1" meters within SLCPU service area are scheduled to be replaced with AMI within next 6 years.Larger meters are replaced as needed, though 85% of 1.5" meters and up are OMNI C1 or OMNI F2.*
3.2	List water (by volume: Acre-Feet or M Gallons) and revenue losses and the control practices implemented to minimize both. If utilizing the AWWA Free Water Audit Software© please list water audit validity grade.	*See M36 Summary in Appendices L. Current system loss is estimated to be 11% of production volume, or 8,036 AF. Water audit validity grade is 65/100. Implementation of M36 was completed 2022, 2023, and 2024.*
3.3	Include a copy of the system's water rate structure in the WCP. For a retail water supplier, as defined in Section 19-4-102, the retail water supplier's rate structure that is: (A) adopted by the retail water supplier's governing body in accordance with Section 73-10-32.5; and (B) current as of the day the retail water supplier files a water conservation plan	https://www.slc.gov/utilities/what-new-rates-mean/
3.4	List leak detection and repair methods, include details on a loss prevention plan if applicable	*See M36 Water Audit summary pages (Appendices L)*
4 Water Use		
4.1	Gather 2005-current records of potable and non-potable water use by sector and service area population. Please check for accuracy and consistency with what is submitted to Water Rights at: www.waterrights.utah.gov/wateruse/WaterUseList.asp	*Table 2-1 and Table 2-4.*

State Div of Water Resources 2025 Water Conservation Plan Checklist		
Section	**Requirement**	**Documentation**
4.2	List current total potable and non-potable water deliveries by volume (please specify volume: Acre-Feet or M Gallons) categorized by type: (Residential/Domestic, Commercial, Institutional, Industrial, Wholesale and Un-metered).	*Table 2-1 and Table 2-4.*
4.3	Chart current per capita water use in gallons per capita per day (GPCD) by type and use: (Total water deliveries/365/Total service area population=GPCD).	*Table 2-6 and Figure 2-14.*
4.4	Graph your water efficiency progress: Take 2005-today, total potable and non-potable water use by sector and population records and go to www.conservewater.utah.gov/compliance.html for a Conservation Goal Calculator and Graph. Then input data and produce graph for WCP.	*Figure 2-1 and Figure 3-2.*
Conservation Practices		
5 Conservation Practices		
5.1	Provide update on ongoing practices and list and detail all ongoing and new conservation practices. When implementing new practices provide costs, partnerships and implementation timeline. (BMP options at www.conservewater.utah.gov/compliance.html)	*See Chapter 4, Tables 4-2, 4-3, 4-4, 4-5, 4-6*
5.2	Provide names and contact information for those responsible for meeting efficiency goals. (i.e. Administrative staff, conservation coordinator(s), conservation committee members, Mayor, town council and/or board members.)	*Stephanie Duer, SLCPU Water Conservation Program Manager stephanie.duer@slc.gov 801.483.6860*
5.3	Share evaluation of existing water conservation best management effectiveness	*Over the past 18 years of active program implementation, SLCPU has seen a 24% reduction in total water use; 26% reduction in peak demand (see Chapter 2 Highlights). Achievements have exceeded goals set by Gov's Office, State regional goals, and CUP Contract. See Figure 3-2.*
5.4	List new Best Management Practice(s) and implementation plan(s).	*See Tables 4-2, 4-3, 4-4, 4-5, 4-6.*
5.5	List and detail all Conservation Public Awareness practices implemented.	*See Table 4-2 .*

State Div of Water Resources 2025 Water Conservation Plan Checklist		
Section	**Requirement**	**Documentation**
5.6	List and detail all Education/Training practices implemented.	*See Table 4-2 .*
5.7	List and detail all Rebates/Incentives/Rewards currently implemented.	*See Table 4-3 .*
5.8	List and detail conservation Ordinances & Standards currently implemented.	*See Table 4-5 .*
5.9	List water waste prohibition and model landscape ordinances.	*See Appendices G.*
5.10	Include a copy of the system's drought contingency plan.	*See Appendices F and O.*
5.11	List Reviews or Updates to City Codes/Requirements pertaining to Water Waste Prohibition, Model Landscape Ordinance, Water Shortage Plan, Climate Resiliency Plan	*See Table 4-5.*
Next Steps		
6 Public Meetings and Adoption		
6.1	After receiving approval from DWRe to move forward with Public/Board/Council Adoption. Following adoption, please email the follwoin to waterwise@utah.gov: * Final approved Water Conservation Plan * Water Conservation Plan Resolution/Adoption signatures * Public meeting notice & approved meeting minutes	*See Appendices J and K.*
6.2	Post the water conservation plan on a public website.	*See Utility website: www.slc.gov/utilities/water-conservation-plan-2025*

D. ANSI/AWWA G480-13 WATER CONSERVATION PROGRAM OPERATION AND MANAGEMENT STANDARD, FIRST EDITION. JULY 1, 2013

Section	Requirement	Documentation	To Do	Date Completed
4.1 Regulatory Requirements				
4.1.1	Demonstrate meet or exceed applicable regulatory requirements for jurisdiction: 1) Utah Water Conservation Plan Act 73.10.32: Submit Water Conservation Plan to State DWRe every five years 2) Utah Governor's Conservation Goal (non-mandatory): reduce water use by 25% from baseline year 2001 (Exceeded) 3) CUP Conservation Goal (Exceeded)	1) Have submitted Water Conservation Master Plans (WCMP) as required and to standards 2) have consistently exceeded State-wide conservation goals (see 2020 WCMP Chapter 3, Figure 3-2) 3) Have consistently exceeded ULS Contractual Conservation Goal (see 2020 WCMP Chapter 3, Figure 3-2)	1) 2025 Water Conservation Master Plan in process	1) 1999, 2004, 2009, 2014, 2020 2) See Figure 3-2 3) on-going
4.2 Top Level Organizational Functions				
4.2.1 Staff for conservation initiatives				
4.2.1	Assign dedicated water conservation coordinator	Provide job description of staff person assigned duties, Appendices O		June, 2001. Last update 2/15/2024.
4.2.2 Water conservation planning				
4.2.2	Create, implement, and maintain a water conservation plan	*www.slc.gov/utilities/water-conservation-plan-2025*	2025 Plan Update to be completed by Oct 2025	1999, 2004, 2009, 2014 , 2020
	Plan guided by AWWA M52 – *AWWA Water Conservation Programs – a Planning Manual* or some other guidance	Refer to this list and corresponding references.	See Appendices L.	2022, 2023, 2024
	Plan must: 1. Address water conservation across all relevant customer categories	See 2020 WCMP Chapter 3, and in particular Table 3-3. See Chapter 4, Tables 4-2, 4-3, 4-4, 4-5, 4-6.	See 2025 Water Conservation Master Plan	Completed 2025

Section	Requirement	Documentation	To Do	Date Completed
	Plan should include: 1. Clearly defined and measurable program performance goals 2. A suite of benchmarks that can be used to assess progress in implementation of the program 3. A supply assessment 4. Water conservation strategy 5. Water conservation goals 6. Plan evaluation 7. Ongoing plan maintenance	*See 2025 WCMP* 1. Chapter 3, 2. *Chapter 3, Table 3-3* 3. *Chapter 2* 4. *Chapter 4, Tables 4-2, 4-3, 4-4, 4-5, 4-6* 5. Chapter 3 6. Chapter 4 7. Chapter 4		Ongoing with each Plan implementation
4.2.3 Water conservation in integrated resources planning				
4.2.3	Treat conservation equally to other water supply options	Water Conservation participated in or led development of the 2022 Major Conveyance Study, Supply and Demand Study, Water Resources Data Study, 2025 Water Shortage Contingency, 2023 40-Year Water Supply Plan, Growing Water Smart (2025)		The years these studies were updated or completed varies; engagement in implementation is ongoing.
	Where appropriate, include water made available through conservation as part of the supply portfolio when conducting supply and demand forecasting analyses	See SLC Water Supply and Demand Master Plan, and 2022 WCMP Chapter 2, Figure 1-5		2022
4.2.4 Public information and education program				

Section	Requirement	Documentation	To Do	Date Completed
4.2.4	Develop or incorporate into existing programs information efforts aimed at: • raising awareness • fostering a culture of conservation and behavior change	www.slc.gov/utilities/water-conservation-plan-2025, Chapter 4, Section 4.5		On-going
	Components of program should include: • Effectively communicating the value of water • Information on methods and opportunities for reducing consumption • Deliver consistent and persistent messages	www.slc.gov/utilities/water-conservation-plan-2025, *Chapter 5.*		On-going
4.2.5 Water waste ordinance				
4.2.5	Develop or support creation, implementation, and maintenance of an enforceable water waste ordinance	www.slc.gov/utilities/water-conservation-plan-2025, Chapter 4, Section 4.8.1	Proposed in 2025 Water Conservation Master Plan.	
4.3 Internal Utility Actions and Requirements				
4.3.1 Metering Practices				
4.3.1	Implement metering practices that promote conservation, including metering of: • All water sources • All service connections	Salt Lake City has been fully metered on the user side since the 1920s. Monthly billing to all of its customers commenced shortly after. Computerized billing began in the 1970s. Bills are now available as mailing or electronically. Most source waters are metered at treatment locations.		Completed 1920, On-going

Section	Requirement	Documentation	To Do	Date Completed
4.3.1.1 Universal metering	Move towards implementing universal metering of all service (private and public) connections	*Metering completed in 1920s. Currently converting to AMI technology.*	Remaining AMI conversion expected to take 4 to 6 years	Fully metered, 1920; On-going for AMI implementation
	Establish goal to meter 100 percent of all service connections	*SLCPU has been fully metered since 1920's.*		1920s
4.3.1.2 Source water metering	Implement metering of all sources including: • Groundwater • Surface water • Reclaimed water	*Water sources are metered.*		On-going
4.3.2 Rate structures				
4.3.2	Use a nonpromotional water rate that provides incentive for customers to reduce water use	http://www.slcdocs.com/utilities/PDF%20Files/UtilityRates/WaterrateswebCurrent.pdf		2003
4.3.3 Billing practices				
4.3.3	Bill customers based on metered use	http://www.slcdocs.com/utilities/PDF%20Files/UtilityRates/WaterrateswebCurrent.pdf		1920's
4.3.3.1 Billing frequency	Bill at least bi-monthly	*Billing occurs on monthly basis (see above attachment)* http://www.slcdocs.com/utilities/PDF%20Files/UtilityRates/WaterrateswebCurrent.pdf		1920's
4.3.3.2 Reporting Consumption	Clearly indicate units for consumption	See example bill: 2025-05_UtilityBill-Explanation-presentation-r2		Bills have shown consumption since 2003; Updated 2025.

Section	Requirement	Documentation	To Do	Date Completed
4.3.4 Landscape efficiency program				
4.3.4	Establish a program to improve and maintain water efficient landscapes and irrigation	*(See Chapter 4 for program details) Many programs support landscape water efficiency, including:* Water Check WaterMAPS SLC Landscape Best Practices Manual Landscape Code 21A.48 Landscaping and Buffers		Water Checks since 1998; WaterMAPS since 2023; Landscape code updated 2023.
4.3.4.1 Design, installation, and maintenance practices	Develop program intended to maximize water efficiency through proper design, installation, and maintenance of new and existing landscapes and irrigation systems. Programs may include: • Audits • Financial incentives • Design information • Ordinances • Development standards • Education • Examples of how to properly design and operate irrigation systems	Water Check WaterMAPS SLC Gardenwise (www.slcgardenwise.com) 21A.48 Landscaping and Buffers, parkstrip and front yard codes SLC Landscape Best Practices Manual SLC TurfTrade	Learning Labs Rebates	Water Checks since 1998; SLC TurfTrade since 2022; WaterMAPS since 2023; Landscape code updated 2023.
4.3.4.2 Irrigation scheduling	• Encourage customers to water based upon plant needs • Discourage customers from overwatering or watering during the times of day when water loss to evaporation and wind drift is greatest	Plant and Hydrozone list SLC Gardenwise (www.slcgardenwise.com) Code 21A.48 Landscapes and Buffers, hydrozoning Lawn watering guide Water Checks WaterMAPS	Water Waste ordinance	Water Checks since 1998; SLC TurfTrade since 2022; WaterMAPS since 2023; Landscape code updated 2023.
4.3.4.3 Landscape water budgets	• Where appropriate, implement landscape water budgets to address water use and encourage efficiency	See Attachment: Irrigation-Only Meters and Rates https://www.slc.gov/utilities/what-new-rates-mean/		2003

Section	Requirement	Documentation	To Do	Date Completed
4.3.5 Distribution system and pressure management				
4.3.5.1 Water utility audit	Conduct an annual audit of the system using AWWA/IWA Water Audit Method, including AWWA Water Audit Reporting Worksheet	See Appendices L.		2022, 2023, 2024
4.3.5.2 Water loss control program	Develop a water loss control program	Leak detection and repair program implemented 2025. See Chapter 4, Section 4.7.3 and Tables 4-3 and 4-4.		On-going
4.4 External Policy Requirements				
4.4.1 Water efficiency in building codes and standards				
4.4.1	Encourage: • adoption of water efficient codes and standards • adoption at both state and local level	**Provide evidence that water efficiency is addressed in local building codes for new buildings. (5.1.8)** 21A.48 Landscapes and Buffers		2023
4.4.2 Promote water efficient products and services				
4.4.2	Promote the use and maintenance of water efficient: • Products • Practices • Services	Water Stewardship Calendar Water Check program CUP Rebates partner		On-going
4.5 Wholesale Agency Requirements				
4.5	Directly implement: • 4.1 Regulatory Requirements • 4.2.4 Public Information and Education Program • 4.3 Internal Utility Actions and Requirements	N/A		
	May provide: • Regional coordination on conservation issues and program • Technical assistance to their retail agencies	N/A		
	May manage conservation activities that are more effectively implemented on a regional scale	N/A		

E. WATER CONSERVATION BUDGET 2025/26

Program		Cost center	Contract Number	24/25 Budget	25/26 Budget	Notes
Budget Total (excluding personnel)		51701			$ 671,598.00	
Public Relations		51701		100,000	$ 100,000	Water Week, plumbing repair how-to guides, Wyland Foundation Mobile Water Learning Lab (grades 3-5), conservation strategic plan, conservation messaging, etc.
Other Prof Services		51701			$ 207,000.00	
	Water Check support team		CA-004072 (2024 Water Check Season)	22,000	$ 22,000.00	Agreement with MWDSLS. Perform full audits on all golf sites; ground truth mapping; post-verify SLC TurfTrade; other CI sites.
	WaterMAPS		CA-003891 (Dec 2026)	70,000	$ 70,000.00	Perform updated imagery analysis; areas approx. 10sq mi. based on customer tier, customer LIR, or other criteria. Goal is to update all residential properties with updated imagery. Contract is for 140,000, to provide two years of WaterMAPS updates.
	CII Tool		In progress	0	$ 45,000	Analytics dashboard upgrades.
	Conservation Plan		In progress	$90,000	$25,000	Will also close up M36 and drought plan with parallel data.
	Conservation Plan		In progress		$50,000	Funds to hire a consultant to support and facilitate public outreach of conservation plan and water shortage plan.
	USU/Golf Turf Study		CA-003369 (Dec 2025)	50,000	$ 50,000.00	Turf trials; GCSAA grant opportunity. Contract extended one year.
	GardenWise Website update			0	$12,000.00	Increase functionality; update images; add sites; etc.
	USU/Climate Center Weather Station Calibration		signed, awaiting recording	0	$8,500.00	USU Weather Station Calibration for 5 sites. Completing 10-year contract; these funds will need to be allocated annually for duration on contract. Previously part of the WaterMAPS contract.
Other Expenses		51701			$ 63,200.00	
	Grass seed			50,000	$ 23,000.00	1400– 2000 grass seed. Cost returned to utility.
	Rain barrels			0	$ 40,200.00	600 barrels. This item may not need to be funded if we continue agreement with Upcycle Products as they collect payment and there is no Utility expense.
	Landscape Transformation Grants				$100,000	To facilitate landscape transformations and indoor fixture upgrades for qualifying households.
Out Ground Maintenance Supplies		51701			$ 268,000.00	

Program		Cost center	Contract Number	24/25 Budget	25/26 Budget	Notes
	Landscape Transformations	51701		100,000	$100,000.00	Landscape upgrades to improve efficiencies. Utility sites: 50K sqft of lawn that could be replaced. 20K lawn that could be converted to alternate vegetation (current 100K for lawn and irrigation), and $100K for addition vegetation transformations
	Landscape Maintenance Contract		Completing bid packet for contract	25,000.00	$ 68,000.00	Maintenance for Greater Ave and 900 South (1/2) including mulch and gravel. Line items in Stormwater, Water, and WR for additional sites
	Landscape Repairs				$25,000.00	For unanticipated irrigation and landscape repairs.
	900 South Wetland				$60,000.00	To remediate damage to site due to unauthorized occupancy
Licensing Fees		51701			$ 26,398.00	
	GardenSoft			2500	$ 2,500.00	License, upgrades, maintenance
	AWE Home Audit			7500	$ 7,500.00	License, upgrades, maintenance
	CII Tool Service and Upgrades			12,798	$ 12,798.00	License, upgrades, maintenance (FY21/22 paid thru Scotts Grant) This is not currently under contract and there has been no expenditure.
	AWE Sales Force Platform			3600	$ 3600.00	Platform to support rebate programs.
Small tools and Equipment		51701		500 (also cii audit kits)	$ 500.00	Hand tools, audit supplies (measuring cups, flow gauges, etc)
Memberships		51701		2300	$ 2,500.00	AWE, UWCF
In City Conventions and Workshops		51701		500	$ 500.00	
Out of town travel		51701		3500	$ 3500.00	Typically WaterSMART Innovations

F. 17.16.092: WATER SHORTAGE ORDINANCE

A. Declaration Of Policy: Given the prevailing semiarid climate of the region, the limited water resources available to Salt Lake City, and the vitally important role an adequate supply of municipal and industrial (M&I) water plays in maintaining a healthy and safe environment in the community, it is hereby declared to be the policy of Salt Lake City that, during times of water shortage caused by drought, facilities failure or any other condition or event, M&I water usage within the city's water service area shall be managed, regulated, prioritized and restricted in such a manner as to prevent the wasteful or unreasonable use of water, and to preserve at all times an adequate supply of M&I water for essential uses.

B. Water Shortage Contingency Plan: The director of the department of public utilities shall cause to be prepared and implemented a water shortage contingency plan (the "plan"). Such plan may be included as part of, or prepared separately from, the water conservation master plan provided for in section 73-10-32, Utah Code Annotated, and shall be revised from time to time as conditions and circumstances warrant. The plan shall, among other things: 1) establish graduated stages of water shortage severity, and 2) establish appropriate M&I water use restriction response measures for each stage. The plan shall include guidelines and criteria for determining the appropriate stage to be implemented under various water supply, delivery, and demand conditions. Each plan stage of water shortage, and the accompanying use restrictions, shall be implemented by declaration of the mayor, upon the advice and recommendation of the director pursuant to the plan guidelines.

C. Compliance: Compliance with the water use restriction response measures called for under any applicable plan stage may be either recommended or mandatory, as specified in the plan. The plan may not provide for mandatory restrictions on residential or commercial customers until either: 1) the projected water supply from all sources is sixty percent (60%) or less of the average annual water supply, or 2) the director otherwise determines that, in the exercise of his or her best professional judgment, the city is unable to meet anticipated essential water needs without implementing such mandatory measures.

D. Enforcement: The director shall enforce compliance with all mandatory response measures set forth in the plan through the imposition and collection of civil fines, as provided in section 17.16.792 of this chapter. Nothing herein or in section 17.16.792 of this chapter shall prevent the city from exercising any other available means, either in law or equity, of enforcing compliance with the plan.

E. Plan Nonexclusive: The creation and implementation of the plan shall be in addition to, and not exclusive of, any other steps taken by the city from time to time to conserve water or manage limited water supplies, including mayoral proclamations issued pursuant to section 17.16.080 of this chapter. (Ord. 50-03 § 1, 2003)

G. SALT LAKE CITY CODE 21A-48-055 WATER EFFICIENT LANDSCAPING STANDARDS

Link to most current code:
https://codelibrary.amlegal.com/codes/saltlakecityut/latest/saltlakecity_ut/0-0-0-70284

H. PUBLIC UTILITY ADVISORY COMMITTEE MINUTES/WATER CONSERVATION PLAN DISCUSSION

[PLACEHOLDER]

I. MINUTES OF THE XXXTH MEETING OF THE METROPOLITAN WATER DISTRICT OF SALT LAKE & SANDY BOARD OF TRUSTEES

[PLACEHOLDER]

J. MINUTES OF THE SALT LAKE CITY COUNCIL FORMAL MEETING

[PLACEHOLDER]

K. SALT LAKE CITY COUNCIL TRANSMITTAL, MINUTES, AND RESOLUTION

[PLACEHOLDER]

Water and Loss Control Audit

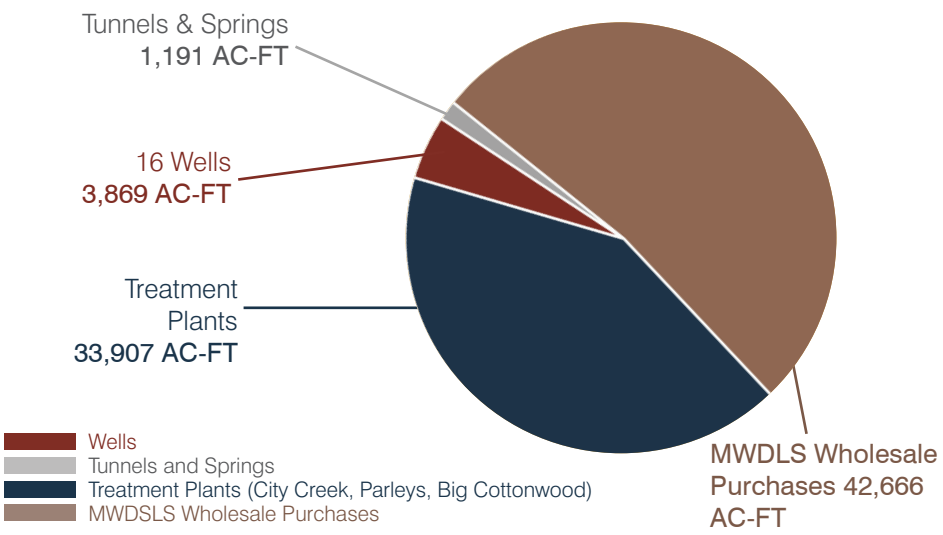
2022 DATA SET

THE WATER AND LOSS CONTROL AUDIT IS A COMPREHENSIVE EVALUATION OF HOW WATER IS ACCOUNTED FOR IN SALT LAKE CITY'S CULINARY WATER DISTRIBUTION SYSTEM.

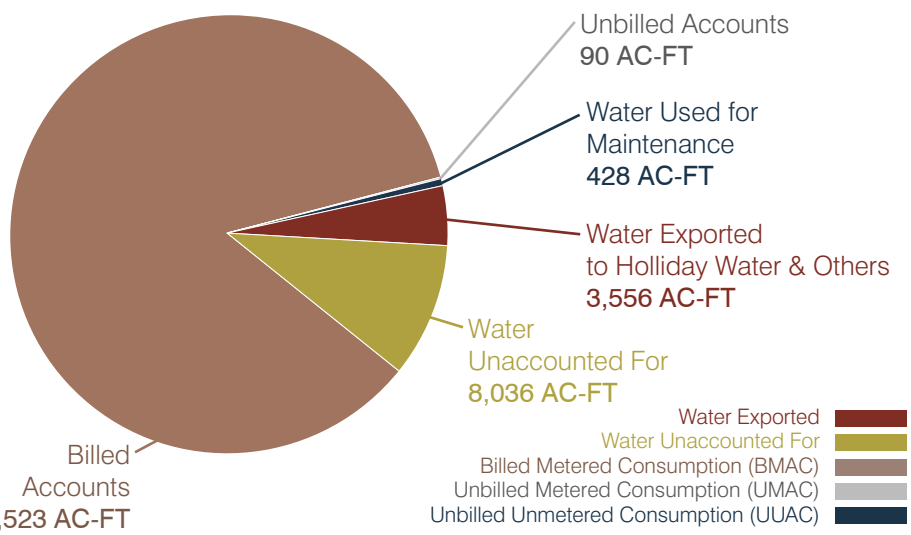
As part of the City's overall conservation efforts, understanding how water is accounted for is a priority. An audit was completed using methodology established in Manual M36 – Water Audits and Loss Control Programs from the American Water Works Association (AWWA). Completing this audit will help the City understand the performance of their water system and what inefficiencies may be present. The audit also helps estimate the revenue impacts of identified system losses and develops recommended actions to reduce losses.

SALT LAKE CITY'S WATER:

WHERE DOES IT COME FROM?



AND WHERE DOES IT GO?



TOTAL SYSTEM INPUT: 81,633 AC-FT

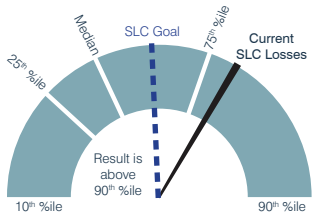
TOTAL WATER USAGE ACCOUNTED FOR: 73,597 AC-FT

TOTAL WATER UNACCOUNTED FOR: 8,036 AC-FT

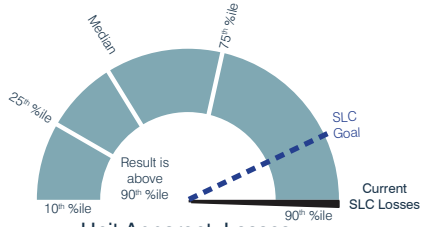
WATER UNACCOUNTED FOR IS EQUAL TO THE VOLUME USED BY 14,000 RESIDENTIAL HOUSEHOLDS

HOW DO SALT LAKE CITY SYSTEM LOSSES COMPARE TO OTHER SYSTEMS?

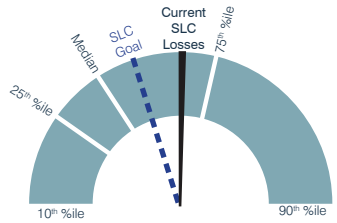
Performance Indicator



Unit Total Losses:
85.1 gal/conn/day



Unit Apparent Losses:
26.5 gal/conn/day



Unit Other Losses:
58.6 gal/conn/day

When compared to available AWWA data, SLC is about at the 75th percentile for system loss. This would suggest that SLC is performing poorly. However, it should be clarified that this percentile is based on an AWWA data set consisting of only entities with a Level 1 validated water audit. As a result, the data being used for comparison is coming from entities that have had several years to minimize water loss and work on developing high quality data.

Many of these utilities provide indoor water only and consequently have much smaller systems (per capita) than SLC. For comparison, a target goal for system losses of 8 percent (a good initial goal for utilities beginning to work on reducing system loss) has been added to the data comparison graphic. As can be seen, this target ends up around the 60th percentile, verifying the aggressive nature of the AWWA dataset.

HOW VALID IS SALT LAKE CITY'S DATA?

What does that mean?

Once data was gathered and input into the AWWA software, a data scoring matrix was completed to give SLC a sense of this audit's data validity. Data gradings are user-selected ratings of the validity—or trustworthiness—of the individual volumetric and system data inputs. SLC's data validity score (DVS) was calculated to be 65/100, thus landing in Tier III, an intermediate level of data validity. At this level, AWWA indicates that the data is sufficiently trustworthy that an entity may begin to launch loss control interventions in specific areas, use performance indicators to track its ongoing loss control performance, and compare its data with other water utilities.

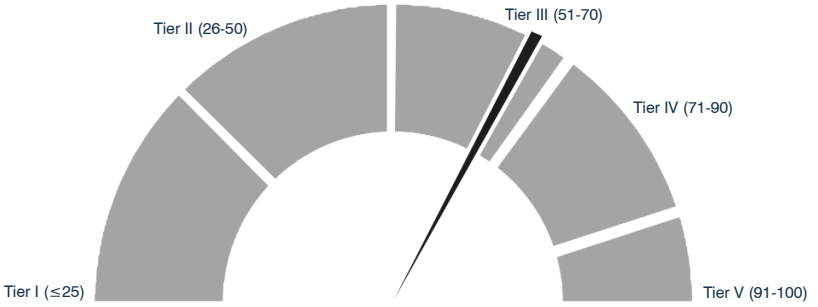
Despite this moderate data validity score, there are still some reservations about the City's data. Most of these reservations center on the City's metering data. During the audit process there was some difficulty pulling consistent data from the City's system. On several occasions, it was discovered that the data included multiple duplicate records or was missing records provided as part of previous requests. The database is also missing clear identifiers of certain important types of water use. Improving the documentation of records will allow the City to have more confidence in the remainder of the conclusions contained here.

Data Validity

Data Validity Score: **67**

Data Validity Tier: **Tier III (51-70)**

See Loss Control Planning for Tier Details



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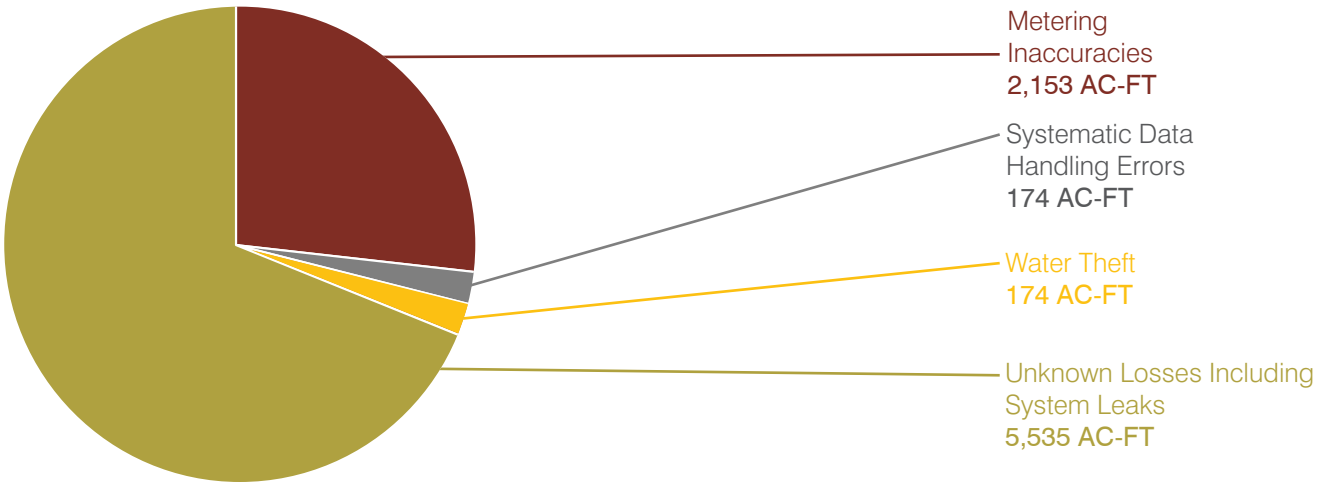
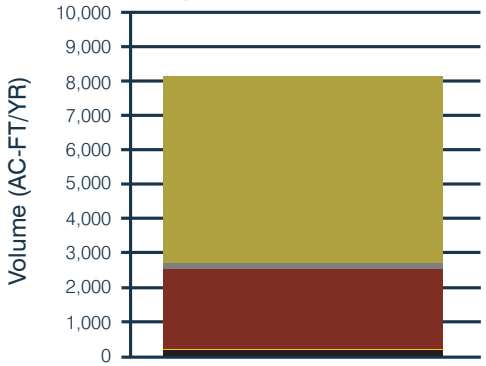
WHAT IS THE POTENTIAL VALUE OF UNACCOUNTED FOR WATER IN SALT LAKE CITY?

UNACCOUNTED FOR WATER

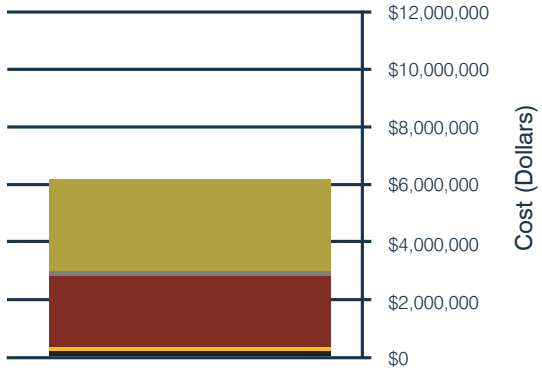


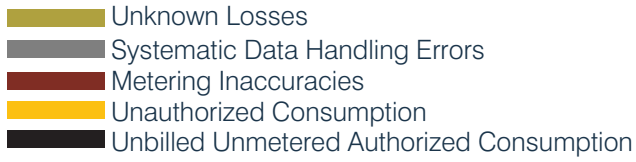
UNACCOUNTED FOR WATER COMPONENTS SUMMARY

Total Volume of Unaccounted For Water = 8,554 AC-FT/YR



Total Value of Unaccounted For Water = $6,389,058/YR





	Volume AC-FT/YR	Value $/YR	Basis of Valuation*
Meter & Data Handling Losses	**2,501**	**$2,586,947**	CRUC
Other Losses	**6,053**	**$3,802,111**	VPC
Non-Revenue Water	**8,554**	**$6,389,058**	Blended

**Based on Customer Retail Unit Charge (CRUC) or Variable Production Cost (VPC) per AWWA M36 methodology.*

UNACCOUNTED FOR WATER IN SALT LAKE CITY HAS A VALUE OF ABOUT $6 MILLION.

ALTHOUGH ONLY A PORTION OF THIS REPRESENTS REAL WATER THAT CAN BE RECOVERED, THIS IS STILL A SUBSTANTIAL ASSET THAT SHOULD BE BETTER UNDERSTOOD.

DRAFT

WHAT CAN SALT LAKE CITY DO TO REDUCE WATER LOSSES?

A number of potential actions have been identified to make improvement relative to the system audit. This includes potential actions in three separate categories: gathering improved data to provide better understanding of system losses, improving processes to increase confidence in the validity of the collected data, and making physical improvements to minimize real losses in the system. Potential impact on both real and apparent losses, relative cost, and priority for the City to implement the actions are summarized below.

Category	Identifier	Action	Potential Impact on Losses[1]		Cost	Priority
			Apparent	Real		
Improved Data	ID1	Improve category identification in billing system	****		$$	High
	ID2	Review supply data to confirm only water into the culinary system is being reported	*	-	$	Medium
	ID3	Improve unbilled unmetered consumption tracking	*	-	$$	Low
	ID4	Initiate a proactive residential meter testing program	*	*	$$	Low
	ID5	Assess meter replacement program	**	*	$$$	Low
Data Validity	DV1	Implement source meter calibration and accuracy testing	**	-	$$	Medium
	DV2	Add annual calibration and accuracy testing requirement to water purchase agreements	*	-	$	Medium
	DV3	Develop process for systematic annual review of billing data to identify handling errors	*	-	$	Medium
	DV4	Collect additional system pressure data	-	*	$$	Low
Physical Facilities	PF1	Proactive and integrated leak detection program	-	**	$	High
	PF2	Increased pipeline replacement and rehabilitation budget	-	****	$$$$	Medium
	PF3	Pressure reduction program	-	**	$$$$	Low
	PF4	Reduce joints and fittings	-	*	$$$	Low

[1] The number of stars (" *") indicate the relative potential impact the recommendation could have on reducing losses in the SLCDPU system. The more stars, the greater the potential impact.

Our hope is that this information will provide a better understanding of the water system loss control in the Salt Lake City culinary water distribution system. If you have questions about the information in this document, or if you just want to know more, please drop us a note at stephanie.duer@slcgov.com.

BOWEN COLLINS & ASSOCIATES
1545 E 14075 S
Draper UT, 84020
801.495.2224
wwww.bowencollins.com

DRAFT

Water and Loss Control Audit

2023 DATA SET

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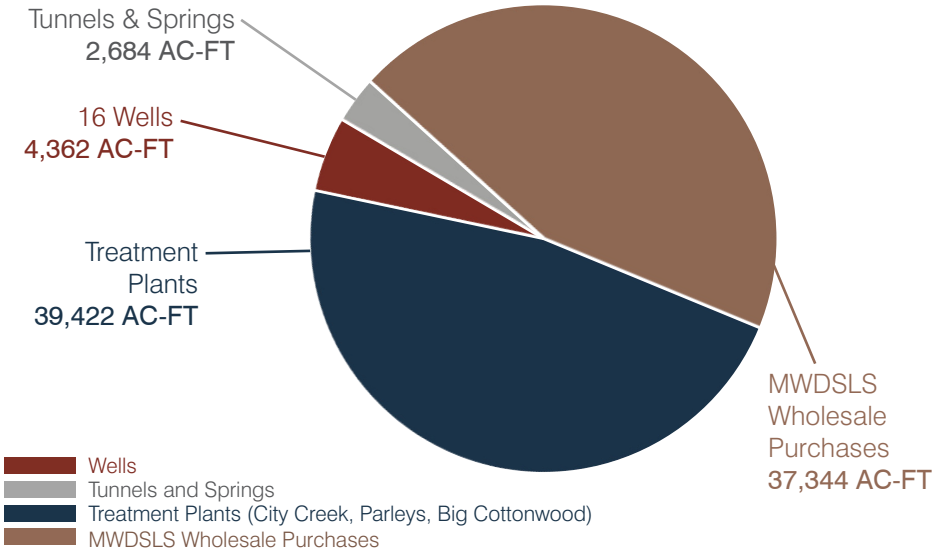
SALT LAKE CITY'S WATER:

WHERE DOES IT COME FROM?



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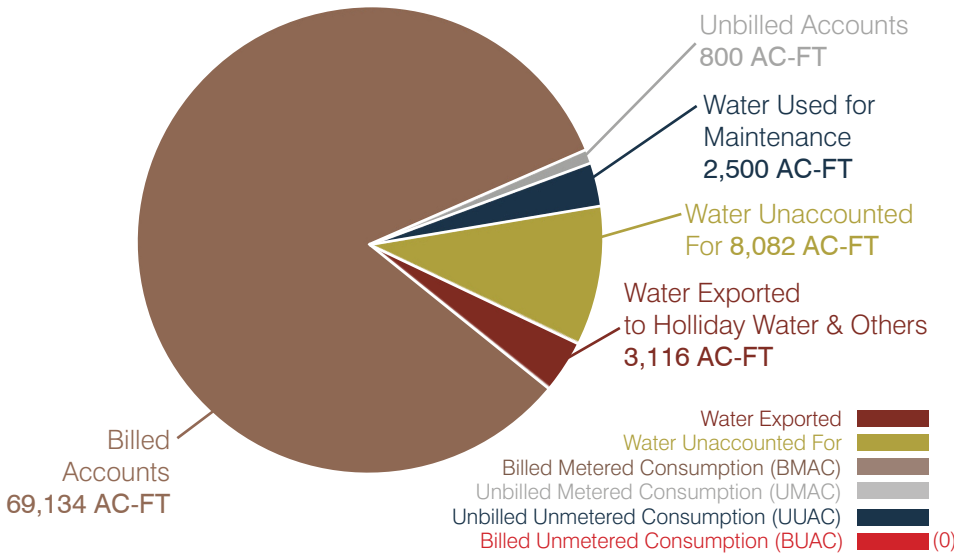


TOTAL SYSTEM INPUT: 83,813 AC-FT

TOTAL WATER USAGE ACCOUNTED FOR: 75,731 AC-FT

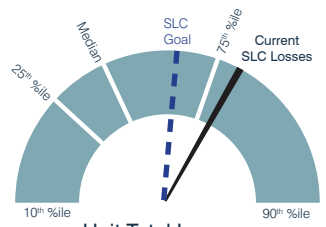
TOTAL WATER UNACCOUNTED FOR: 8,082 AC-FT

WATER UNACCOUNTED FOR IS EQUAL TO THE VOLUME USED BY 14,100 RESIDENTIAL HOUSEHOLDS

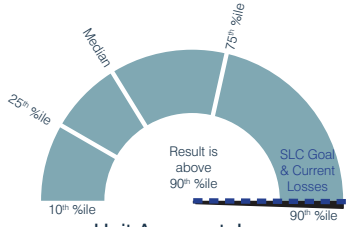
DRAFT

HOW DO SALT LAKE CITY SYSTEM LOSSES COMPARE TO OTHER SYSTEMS?

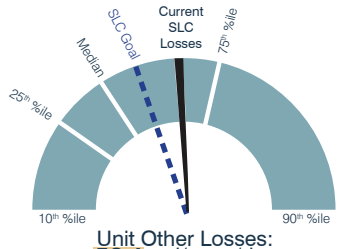
Performance Indicator



Unit Total Losses: **81.4** gal/conn/day



Unit Apparent Losses: **25.3** gal/conn/day



Unit Other Losses: **56.1** gal/conn/day

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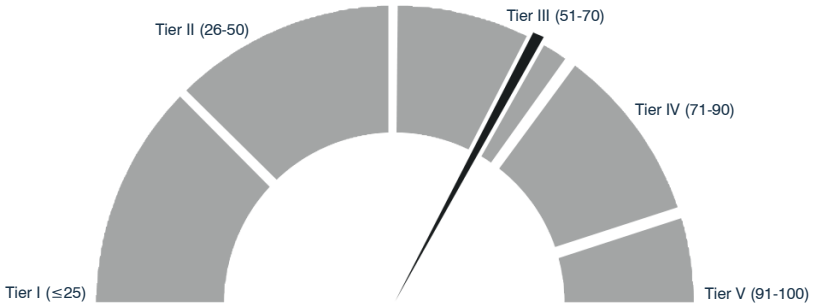
Data Validity

Data Validity Score: **64**

Data Validity Tier: **Tier III (51-70)**

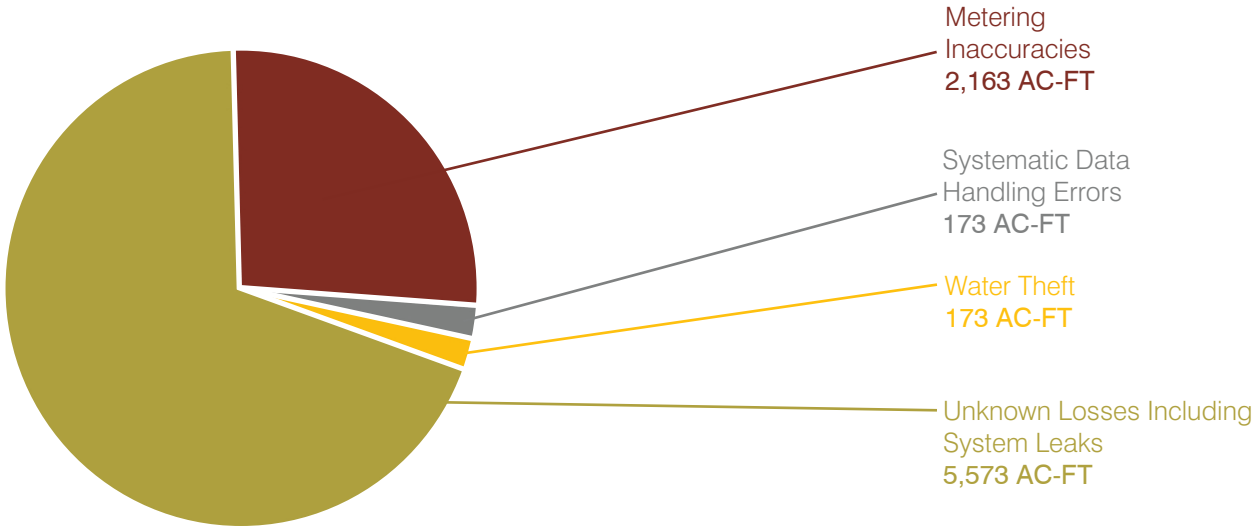
See Loss Control Planning for Tier Details



DRAFT

WHAT IS THE POTENTIAL VALUE OF UNACCOUNTED FOR WATER IN SALT LAKE CITY?

UNACCOUNTED FOR WATER

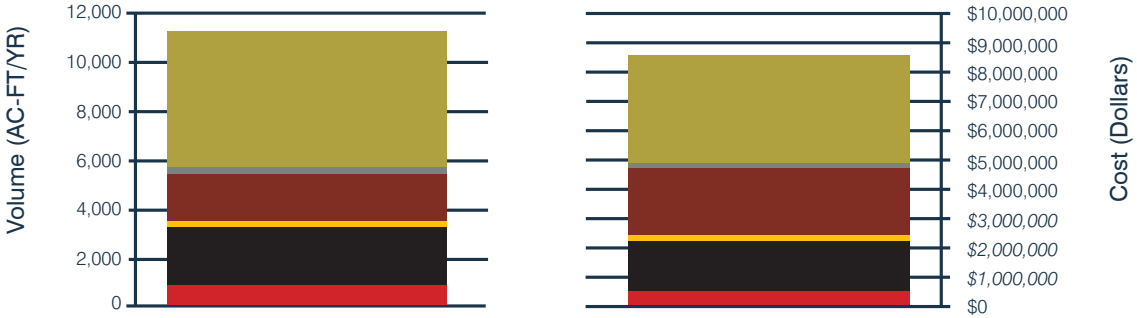


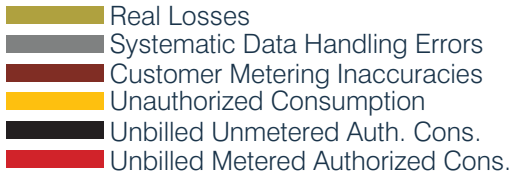
UNACCOUNTED FOR WATER COMPONENTS SUMMARY

NRW Components Summary

Total Volume of NRW = 11,357 ACRE-FT/YR

Total COST OF NRW = $8,607,563/YR





	Volume AC-FT/YR	Value $/YR	Basis of Valuation*
Meter & Data Handling Losses	**2,509**	**$2,699,730**	CRUC
Other Losses	**8,873**	**$5,907,832**	VPC
Non-Revenue Water	**11,382**	**$8,607,562**	Blended

**Based on Customer Retail Unit Charge (CRUC) or Variable Production Cost (VPC) per AWWA M36 methodology.*

UNACCOUNTED FOR WATER IN SALT LAKE CITY HAS A VALUE OF ABOUT $8.6 MILLION.

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DRAFT

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Category	Identifier	Action	Potential Impact on Losses[1]		Cost	Priority
			Apparent	Real		
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	ID2	Review supply data to confirm only water into the culinary system is being reported	*	-	$	Medium
	ID3	Improve unbilled unmetered consumption tracking	*	-	$$	Low
	ID4	Initiate a proactive residential meter testing program	*	*	$$	Low
	ID5	Assess meter replacement program	**	*	$$$	Low
Data Validity	DV1	Implement source meter calibration and accuracy testing	**	-	$$	Medium
	DV2	Add annual calibration and accuracy testing requirement to water purchase agreements	*	-	$	Medium
	DV3	Develop process for systematic annual review of billing data to identify handling errors	*	-	$	Medium
	DV4	Collect additional system pressure data	-	*	$$	Low
Physical Facilities	PF1	Proactive and integrated leak detection program	-	**	$	High
	PF2	Increased pipeline replacement and rehabilitation budget	-	****	$$$$	Medium
	PF3	Pressure reduction program	-	**	$$$$	Low
	PF4	Reduce joints and fittings	-	*	$$$	Low

[1] The number of stars (" *") indicate the relative potential impact the recommendation could have on reducing losses in the SLCDPU system. The more stars, the greater the potential impact.

Our hope is that this information will provide a better understanding of the water system loss control in the Salt Lake City culinary water distribution system. If you have questions about the information in this document, or if you just want to know more, please drop us a note at stephanie.duer@slcgov.com.

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Water and Loss Control Audit

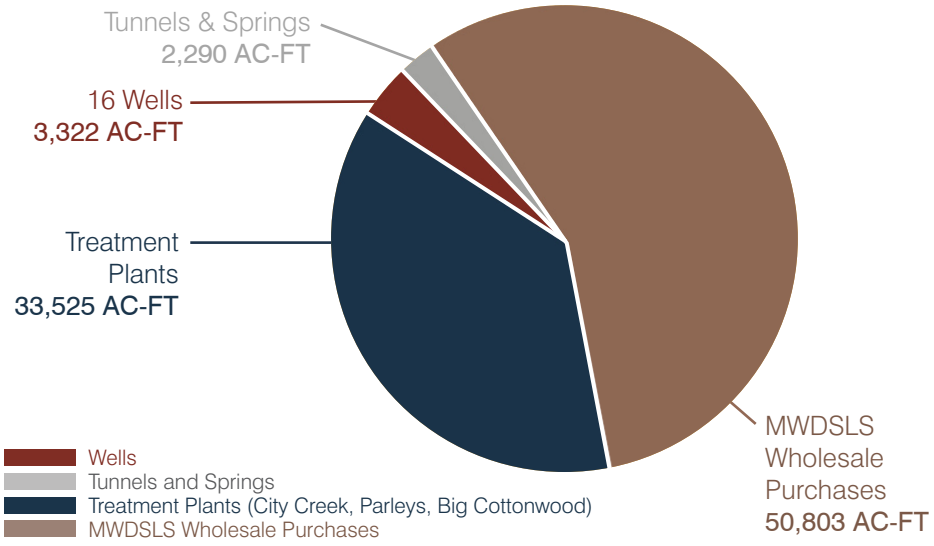
2024 DATA SET

THE WATER AND LOSS CONTROL AUDIT IS A COMPREHENSIVE EVALUATION OF HOW WATER IS ACCOUNTED FOR IN SALT LAKE CITY'S CULINARY WATER DISTRIBUTION SYSTEM.

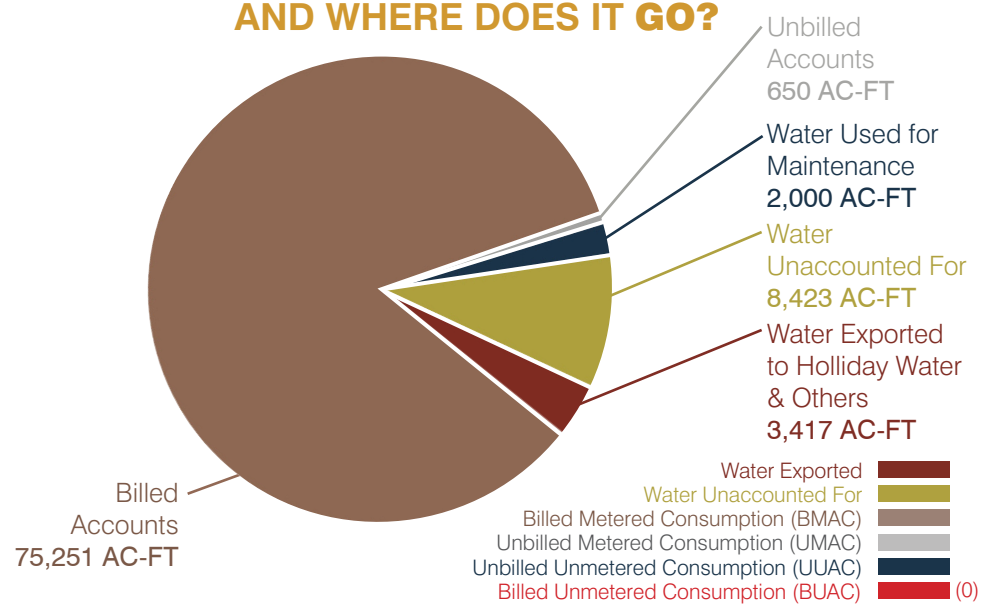
As part of the City's overall conservation efforts, understanding how water is accounted for is a priority. An audit was completed using methodology established in Manual M36 – Water Audits and Loss Control Programs from the American Water Works Association (AWWA). Completing this audit will help the City understand the performance of their water system and what inefficiencies may be present. The audit also helps estimate the revenue impacts of identified system losses and develops recommended actions to reduce losses.

SALT LAKE CITY'S WATER:

WHERE DOES IT COME FROM?



AND WHERE DOES IT GO?



TOTAL SYSTEM INPUT: 89,939 AC-FT

TOTAL WATER USAGE ACCOUNTED FOR: 81,517 AC-FT

TOTAL WATER UNACCOUNTED FOR: 8,423 AC-FT

WATER UNACCOUNTED FOR IS EQUAL TO THE VOLUME USED BY 14,600 RESIDENTIAL HOUSEHOLDS

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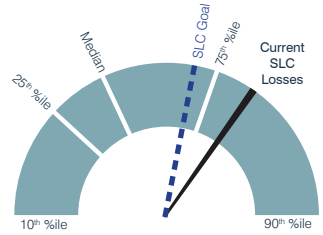
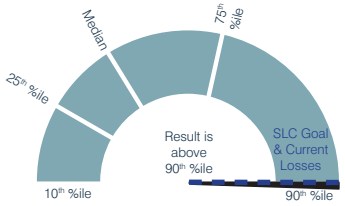
HOW DO SALT LAKE CITY SYSTEM LOSSES COMPARE TO OTHER SYSTEMS?

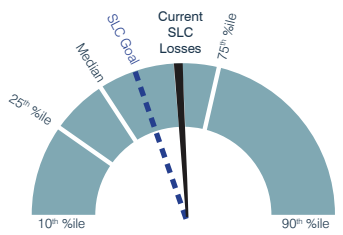
Performance Indicator



Unit Total Losses:
87.7 gal/conn/day



Unit Apparent Losses:
28.4 gal/conn/day



Unit Other Losses:
59.4 gal/conn/day

When compared to available AWWA data, SLC is about at the 75th percentile for system loss. This would suggest that SLC is performing poorly. However, it should be clarified that this percentile is based on an AWWA data set consisting of only entities with a Level 1 validated water audit. As a result, the data being used for comparison is coming from entities that have had several years to minimize water loss and work on developing high quality data.

Many of these utilities provide indoor water only and consequently have much smaller systems (per capita) than SLC. For comparison, a target goal for system losses of 8 percent (a good initial goal for utilities beginning to work on reducing system loss) has been added to the data comparison graphic. As can be seen, this target ends up around the 60th percentile, verifying the aggressive nature of the AWWA dataset.

HOW VALID IS SALT LAKE CITY'S DATA?

What does that mean?

Once data was gathered and input into the AWWA software, a data scoring matrix was completed to give SLC a sense of this audit's data validity. Data gradings are user-selected ratings of the validity—or trustworthiness—of the individual volumetric and system data inputs. SLC's data validity score (DVS) was calculated to be 65/100, thus landing in Tier III, an intermediate level of data validity. At this level, AWWA indicates that the data is sufficiently trustworthy that an entity may begin to launch loss control interventions in specific areas, use performance indicators to track its ongoing loss control performance, and compare its data with other water utilities.

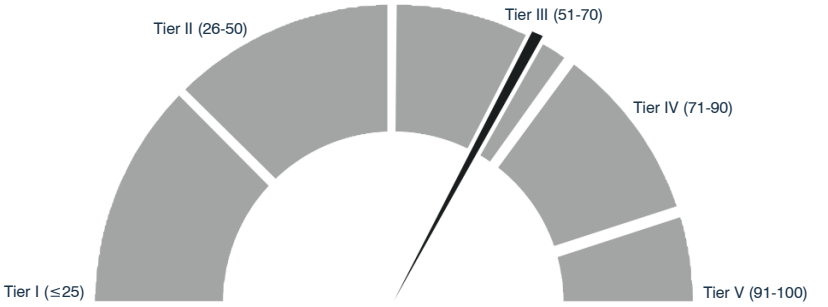
Despite this moderate data validity score, there are still some reservations about the City's data. Most of these reservations center on the City's metering data. During the audit process there was some difficulty pulling consistent data from the City's system. On several occasions, it was discovered that the data included multiple duplicate records or was missing records provided as part of previous requests. The database is also missing clear identifiers of certain important types of water use. Improving the documentation of records will allow the City to have more confidence in the remainder of the conclusions contained here.

Data Validity

Data Validity Score: **66**

Data Validity Tier: **Tier III (51-70)**

See Loss Control Planning for Tier Details



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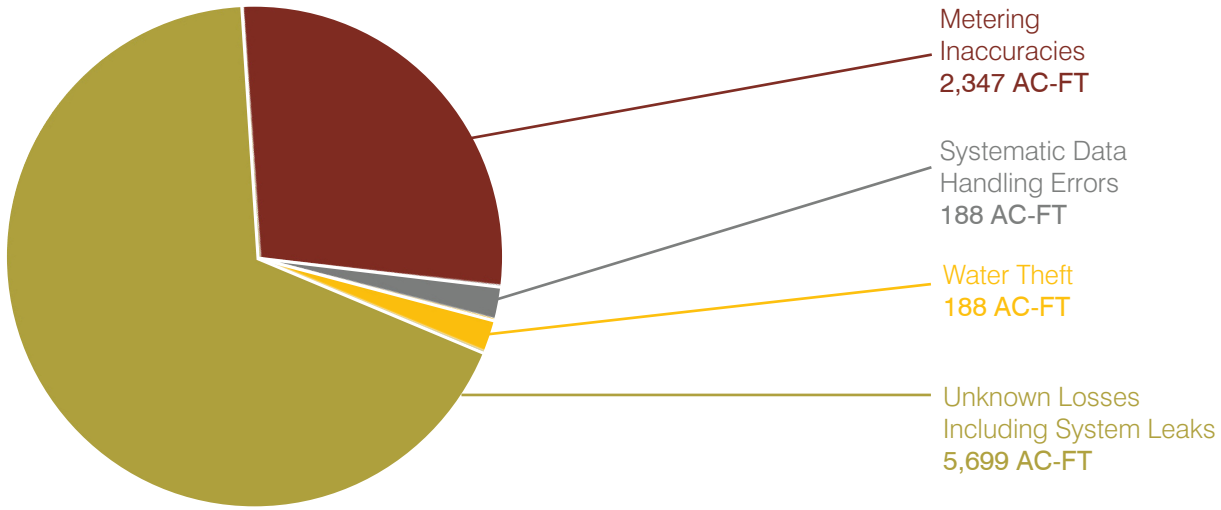
WHAT IS THE POTENTIAL VALUE OF UNACCOUNTED FOR WATER IN SALT LAKE CITY?

UNACCOUNTED FOR WATER

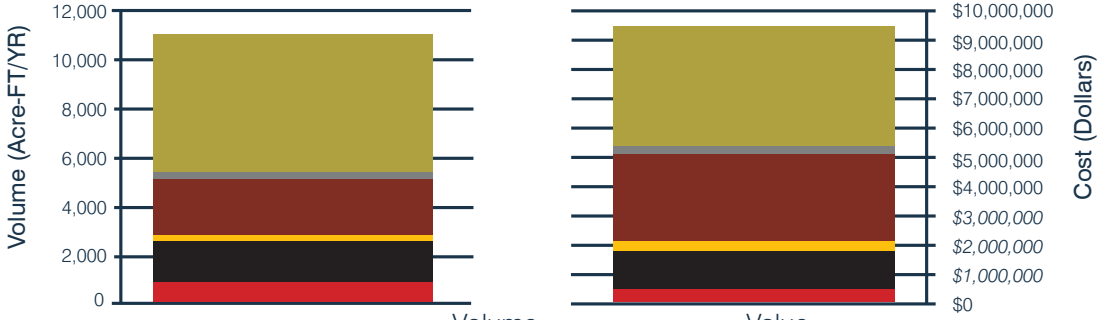


UNACCOUNTED FOR WATER COMPONENTS SUMMARY

NRW Components Summary

Total Volume of NRW = 11,052 ACRE-FT/YR

Total COST OF NRW = $9,348,274/YR



	Volume AC-FT/YR	Value $/YR	Basis of Valuation*
Meter & Data Handling Losses	2,724	$3,511,795	CRUC
Other Losses	8,349	$5,836,479	VPC
Non-Revenue Water	11,073	$9,348,274	Blended

**Based on Customer Retail Unit Charge (CRUC) or Variable Production Cost (VPC) per AWWA M36 methodology.*

- Real Losses
- Systematic Data Handling Errors
- Customer Metering Inaccuracies
- Unauthorized Consumption
- Unbilled Unmetered Auth. Cons.
- Unbilled Metered Authorized Cons.

UNACCOUNTED FOR WATER IN SALT LAKE CITY HAS A VALUE OF ABOUT $9 MILLION.

ALTHOUGH ONLY A PORTION OF THIS REPRESENTS REAL WATER THAT CAN BE RECOVERED, THIS IS STILL A SUBSTANTIAL ASSET THAT SHOULD BE BETTER UNDERSTOOD.

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WHAT CAN SALT LAKE CITY DO TO REDUCE WATER LOSSES?

A number of potential actions have been identified to make improvement relative to the system audit. This includes potential actions in three separate categories: gathering improved data to provide better understanding of system losses, improving processes to increase confidence in the validity of the collected data, and making physical improvements to minimize real losses in the system. Potential impact on both real and apparent losses, relative cost, and priority for the City to implement the actions are summarized below.

Category	Identifier	Action	Potential Impact on Losses[1]		Cost	Priority
			Apparent	Real		
Improved Data	ID1	Improve category identification in billing system	****		$$	High
	ID2	Review supply data to confirm only water into the culinary system is being reported	*	-	$	Medium
	ID3	Improve unbilled unmetered consumption tracking	*	-	$$	Low
	ID4	Initiate a proactive residential meter testing program	*	*	$$	Low
	ID5	Assess meter replacement program	**	*	$$$	Low
Data Validity	DV1	Implement source meter calibration and accuracy testing	**	-	$$	Medium
	DV2	Add annual calibration and accuracy testing requirement to water purchase agreements	*	-	$	Medium
	DV3	Develop process for systematic annual review of billing data to identify handling errors	*	-	$	Medium
	DV4	Collect additional system pressure data	-	*	$$	Low
Physical Facilities	PF1	Proactive and integrated leak detection program	-	**	$	High
	PF2	Increased pipeline replacement and rehabilitation budget	-	****	$$$$	Medium
	PF3	Pressure reduction program	-	**	$$$$	Low
	PF4	Reduce joints and fittings	-	*	$$$	Low

[1] The number of stars (" *") indicate the relative potential impact the recommendation could have on reducing losses in the SLCDPU system. The more stars, the greater the potential impact.

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PLAN SUMMARY

The Wasatch Front has experienced several drought periods over the past 100 years with typical drought periods extending between 3-5 years. In more recent decades, the frequency and intensity of drought has increased with 2021 being an Exceptional Drought year (highest category of drought conditions) for the area according to the National Integrated Drought Information System. Salt Lake City Department of Public Utilities (SLCDPU) recognizes that it has become increasingly important to protect current water sources, plan for future water supply during periods of drought and other water shortage, and improve water reliability.

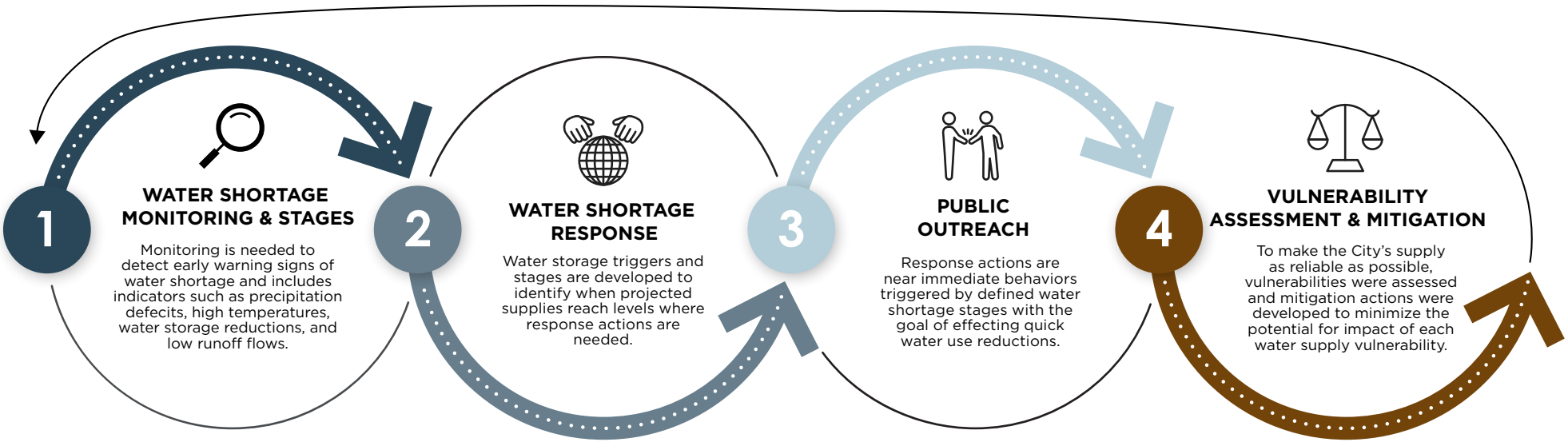
Water shortage may result from a variety of circumstances such as climate change, regular climate variability, water supply contamination, system disruption or interruption, and even unanticipated surges in demand. This Drought and Water Shortage Contingency Plan is intended as a guide for monitoring, measuring, mitigating, and responding to water supply shortages or disruptions as a result of any of these or other scenarios.

DROUGHT & WATER SHORTAGE CONTINGENCY PLAN

Understanding the potential impact of drought on the Salt Lake City water supply and establishing a plan to meet customer needs during periods of drought and water shortage.

DROUGHT AND WATER SHORTAGE PLAN COMPONENTS

This drought and water shortage plan consists of four major components.

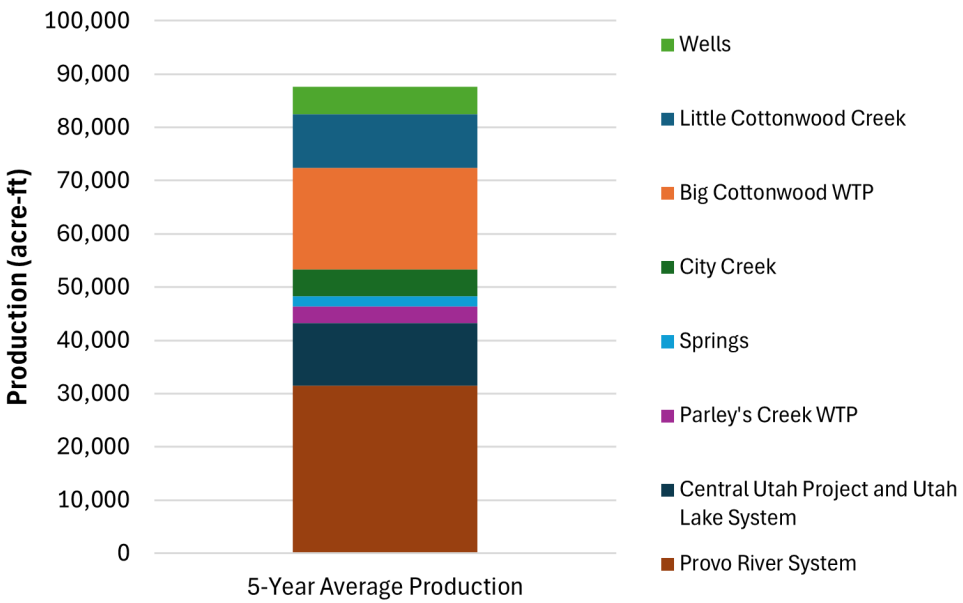


WATER SHORTAGE MONITORING & STAGES

WATER SHORTAGE MONITORING & SUPPLY VULNERABILITY

The purpose of water shortage monitoring is to assess and determine projected surface and ground water supply, available storage water volumes, and current and projected water demand in order to predict times of water shortage and initiate response efforts when necessary. It should be emphasized that SLCDPU staff have been tracking and evaluating drought and water shortage for many years. SLCDPU has a number of supplies that contribute to its overall water portfolio and that are included in the City's water shortage monitoring process. These supplies are shown in Figure 1 along with a typical year's production. While we may think water supply shortages only relate to drought, each of the supplies shown in Figure 1 is vulnerable to water shortages caused by climate change, water supply contamination, system disruption or interruption, etc. Because of these vulnerabilities, it is important that each supply is continually monitored and measured to ensure that the City's demands can be met. If a water shortage is determined, then demand reduction efforts will be needed.

Figure 1: Typical Year Supply



WATER SHORTAGE TRIGGERS & STAGES

Water shortage monitoring results can be used to establish and implement water shortage triggers and stages. SLCDPU's water shortage stages are primarily defined based on projected available supply as a percent of demand. These stages are summarized in Figure 2 and Table 1.

Figure 2: Water Shortage Stages

Table 1: Water Shortage Triggers

Stage	Projected Available Supply as a Percent of Demand	Projected Available Stream Flow Yield as a Percent of Historical Average
Stage 1 - Watch	>100 but NIDIS indicates Drought	87 - 100%
Stage 2 - Mild	94 - 100%	<87%
Stage 3 - Moderate	86 - 94%	-
Stage 4 - Severe	76 - 86%	-
Stage 5 - Critical	<76%	-

As shown in Table 1, a secondary criterion has been included for when stream flows are below average. This criterion is needed for dry years in which storage or other source water may be available to meet demands but management of demand is prudent to prepare for potential extended drought.

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WATER SHORTAGE RESPONSE PLAN

The City has identified actions at each level needed to achieve reductions in demand that will ensure water is available for users in times of shortage. The recommended actions for each water shortage level for outdoor and indoor water use are summarized below.

Water Shortage Stages	Daily Reduction Goal	Water Shortage Response Summary: Outdoors			Water Shortage Response Summary: Indoors		
		Single Family Homes	Commercial, Industrial, Other Institutional, Business, Multi-Family, & HOAs	Parks, Golf, Schools, & other Government Facilities	Single Family Homes (per household)	Commercial, Industrial, Other Institutional, Business, Multi-Family, & HOAs (percentage across all customers)	Parks, Golf, Schools, & other Government Facilities (percentage across all customers)
Stage 1 – Watch	Avoid Entering Mild Stage	• Avoid wasting water	• Avoid wasting water	• Adhere to best practices	• Avoid wasting water	• Avoid wasting water	• Reduce indoor use by 5%
Stage 2 – Mild	10 mgd	• Water lawn less often	• Water lawn less often	• Adhere to best practices • Required to adhere to budget • No lawn watering between 8 AM & 8 PM	• Voluntary reduce average gallons per house hold by 3 gallons per day (2%)	• Voluntary reduce indoor use by 5%	• Reduce indoor use by 10%
Stage 3 – Moderate	25 mgd	• Water no more than two times per week • No lawn watering between 8 AM and 8 PM • Mandatory: Adherence to water budget for irrigation-only meters	• Water no more than two times per week • No lawn watering between 8 AM and 8 PM • Mandatory: Adherence to water budget for irrigation-only meters	• Adhere to best practices • No lawn watering between 8 AM and 8 PM • Mandatory: Reduce outdoor water use by 15%	• Reduce average gallons per house hold by 8 gallons per day (5%)	• Reduce indoor use by 10%	• Reduce indoor use by 14%
Stage 4 – Severe	40 mgd	• Water no more than one time per week • No lawn watering between 8 AM and 8 PM • Mandatory: 25% reduction of water budget	• Water no more than one time per week • No lawn watering between 8 AM and 8 PM • Mandatory: 25% reduction of water budget	• Adhere to best practices • No lawn watering between 8 AM and 8 PM • Mandatory: Reduce outdoor water use by 25%	• Reduce average gallons per house hold by 11 gallons per day (7.5%)	• Reduce indoor use by 16%	• Reduce indoor use by 21%
Stage 5 – Critical	65 mgd	• Lawn watering prohibited • No new landscapes • No filling pools, jacuzzies, or hot tubs, etc.	• Lawn watering prohibited • No new landscapes • Reduce consumption by at least 35%	• Lawn watering not allowed without permit • No new landscapes	• Reduce average gallons per house hold by 15 gallons per day (10%)	• Reduce indoor use by 21%	• Reduce indoor use by 28%

Should greater reduction be necessary within a stage, more actions may be required than indicated. For specific guidelines to achieve necessary reductions visit slc.gov/utilities/conservation

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PLAN EXECUTION

Executing the plan will be under the direction of the SLCDPU Director and will occur in three basic steps:

1 WATER SHORTAGE MONITORING

The Director uses drought monitoring tools and water supply data to determine if the City is experiencing a water shortage.

2 STAGE IDENTIFICATION & DECLARATION

Once a water shortage is determined, the Director and Mayor will identify and declare which water shortage stage the City is experiencing and required response actions.

3 COMMUNICATION & OUTREACH

In order to protect the City's water supply, the Director will lead efforts to notify the community of the water shortage stage and inform them of ways that they can conserve water and contribute to the success of this plan.

PUBLIC OUTREACH

Notifying and educating SLC water users is critical to the success of this Drought and Water Shortage Contingency Plan. To do this efficiently and effectively, SLC will email customers and send out flyers in the mail requesting voluntary water reduction. Additionally, SLC will request reductions via social media, on their website, and various other digital platforms.

VULNERABILITY ASSESSMENT & MITIGATION

Beyond defining water shortage responses, this plan has also proactively looked for ways to reduce the City's vulnerability to drought and other water shortages.

VULNERABILITY ASSESSMENT: Several potential water supply vulnerabilities were identified and assembled into the following five categories:

- Surface Water Vulnerabilities
- Well Water Vulnerabilities
- Transmission Vulnerabilities
- Increased Water Demand Vulnerabilities
- Drought Consequences

Vulnerability definitions and impacts associated with each were assessed along with consideration of issues such as probability of occurrence, magnitude of effect on water supply, cost of consequence, and potential mitigations. .

MITIGATION ACTIONS: Mitigation actions will become the foundation of the City's plan to prepare for and respond to future water shortages For each vulnerability included in the categories discussed above, one or more mitigation actions were identified that may be used by SLCDPU to help protect its service area against water shortage. Mitigation activities the City is pursuing to minimize water shortage vulnerabilities are summarized on the City's conservation website at www.slcgov.com/conservation. Below are a few examples of City Projects that have been completed to help protect against water supply vulnerabilities.

WATERSHED PROTECTION

GREATER AVENUES WATER CONSERVATION DEMONSTRATION GARDEN

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N. Impacts of Water Conservation on Rates Techincal Memorandum, 2025

[PLACEHOLDER]

Overview

Overview

Inactive	No
View As Of	07/17/2025
Date of Last Change	02/15/2024 07:20:04.091 PM
Job Profile Name	Water Conservation Program Manager
Job Code	002784
Include Job Code in Name	No
Job Profile Summary	Reporting to the Water Resource Manager, incumbent plans, develops, organizes, coordinates and executes department water conservation programs and activities. Regularly interfaces with outside agencies, media, and consultants. Provides technical expertise and assistance in landscaping, irrigation, residential, commercial, industrial, and institutional water use and other approaches to cultivate and foster water conservation. Develops and coordinates dissemination of public education information and materials. Regularly represents the Department at public meetings, technical conferences, and at local, State, and regional stakeholder workshops, panels, etc.
Job Description	

TYPICAL DUTIES:

- Working with department leadership, plans and implements the department's water conservation program. Monitors water-use records and evaluates program effectiveness. Collects, analyzes, interprets and presents information on water conservation activities to department management, local community leaders, elected officials, special interest groups and customers. Recommends program direction responsive to landscape, horticulture, commercial and industrial needs.
- Researches and reports up-to-date information regarding current legislation and/or ordinances related to water conservation issues. Organizes and coordinates a volunteer docent program, workshops, promotional activities, educational tours, and field days to teach and encourage appropriate water conservation methods. Coordinates development of interpretive signs and printed informational materials to reflect proper gardening, landscape and conservation program objectives. Attends and/or participates in meetings and represents the department on water conservation issues. Acts as coordinator to and advisor for citizen advisory committees on special projects pertaining to water conservation issues and program initiatives.
- Develops educational and informational brochures, articles, and other media. Provides input for water conservation web site and assists in page maintenance. Coordinates activities with other city departments in providing public information programs, including presentations covering general conservation, residential and commercial programs to schools, civics and other groups. Works with other city departments in developing and implementing water conservation best practices.
- Drafts correspondence on behalf of the Department regarding water-conservation-related inquiries and policies. Attends, participates, or conducts meetings representing the Department to the public on a variety of issues. Conducts research to provide information essential for staff decision making on critical issues and existing programs. Assists in the preparation of the Department annual report. Assists in the development of materials for the Department web page and assists in page maintenance.
- Reviews interim and final reports for water conservation projects submitted by outside agencies and makes recommendations. Oversees development and administration of a certification program for commercial and industrial

customers in conjunction with specialists in the community. Assists in development and implementation of model water conservation ordinances. Works with outside agencies and City planning departments in providing training and support for staff, contractors and residents. Assists in research, testing and reporting of new water conservation technologies and joint projects with other agencies and universities. Monitors and advises on landscape conservation research, including research on water conserving plants.

- Interfaces with others in commercial, industrial, institutional and residential water conservation projects. Participates in pre and post field verifications of landscape water conservation projects. Provides technical review and assistance in landscape water conservation project design and development, and in particular the use of advanced irrigation technology and incentive programs. Reviews irrigation design documents, specifications and ordinances.
- Hires, trains, and supervises seasonal, intern or other conservation program staff as needed. Conducts internal training programs to enhance customer service related to water conservation.
- Assists in the preparation of annual budget and updates to the department's conservation plan.
- Performs other duties as assigned.

MINIMUM QUALIFICATIONS:

- Bachelor's degree from an accredited university in landscape architecture, horticulture, plant or water sciences, environmental planning, education, public relations or related field. Four years' job-related, paid experience, including two years in public relations type work.
- Advanced knowledge of horticulture principles, plant identification, irrigation design, and water-conserving landscaping practices. Also, considerable knowledge of basic conservation methods and techniques, including related engineering, mathematical and economic analytical methods.
- Ability to apply common sense, analyze data and interpret results yielding varying outcomes. Ability to communicate and interact effectively with the public, and with employees and representatives of both inside and outside agencies. Ability to operate basic office machines such as computers, copiers, adding machines, printers, phones, and fax.
- Demonstrated ability to exercise independent judgment and make sound, logical, well thought out decisions.
- Possession of a valid driver's license or driving privilege card.
- Must be able to obtain within 6 months of hire the Irrigation Landscape Auditor certification as administered by the International Irrigation Association.

WORKING CONDITIONS:

- Work is generally performed in a comfortable office environment. Frequent sitting, walking, standing, stooping and lifting of light to moderately heavy weights. Frequent driving and setting up education materials for informational meetings. Occasional minor climbing. Exposure to outdoor elements, cold, heat, dust and noise. Occasional exposure to hazards associated with construction areas, toxic or caustic chemicals, fumes or airborne particles. May be required to wear a respirator and may occasionally be exposed to wet or humid conditions.
- Irregular and extended work hours required to prepare for and attend committee and public information meetings, including

P. LINKS AND REFERENCES

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Q. Glossary of Terms, Abbreviations, and Acronyms

Acre Feet (af): A measurement to describe a volume of water; One acre-foot is the amount of water which would cover one acre of land to a depth of one foot; 325,851 gallons.

Action Plan: A more detailed, analytical course of action to implement programs, initiatives, or measures outlined in the Master Plan to achieve specific objectives, typically including information relating to time-lines for implementation, evaluative measures, and costs relating to staffing and/or materials; a component of the Annual Report.

Annual Report: This report will provide an evaluative update on existing programs, as well as outlining new conservation initiatives for the coming year, providing initiative timelines, estimated costs, participating groups, and responsible parties.

ASR: Aquifer Storage and Recovery

BCWTP Big Cottonwood Water Treatment Plant

Best Management Practice (BMP): For the purposes of Salt Lake City, a BMP is defined as a policy, program, practice, rule, regulation, or ordinance, or the use of devices, equipment, or facilities that meets either of the following criteria:

- An established and generally accepted practice among water suppliers that results in the more efficient use of water; or
- A practice for which sufficient data are available to indicate that significant conservation or conservation related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water suppliers to carry out

CAP: Water Conservation Action Plan; these are plans submitted by City Divisions and community stakeholders and reflect commitments of actions and goals towards achieving further water conservation.

CCF: one hundred cubic feet; a unit of volume equivalent to 748 gallons of water and is the standard of measure used by the Department for billing purposes.

CCWTP City Creek Water Treatment Plant

Conservation: A set of strategies to solve the dilemma of providing water to people, both through supply and demand management; wise, efficient use of water by suppliers and customers.

CUP: Central Utah Project

CUWCD: Central Utah Water Conservancy District

Demand Management: Methods to encourage customers to reduce water demand, whether through a change in behavior, the implementation of water-saving technologies, or through the reduction or elimination of waste.

Evaluation: An overall determination of a conservation program or measure's effectiveness in achieving an articulated objective.

GPCD Gallons per capita per day; a unit of measure typically used to express the average number of gallons of water used by the average person each day in a water system. The calculation is made by dividing the total gallons of water used each day within a water system by the total number of people identified as residing within that water system. This calculation does not account for nor describe the industrial or commercial base within a community, nor does it account for individuals using water within the system, but not counted as residing within the system delivery area, such as commuters.

Goals: General statements of purpose for a measure or program; goals should compliment and reinforce other community and Utility goals.

Gray Water: wastewater generated in the household or at a place of work, excluding toilet wastes (black water), and including wastewater from bathroom sinks, baths, showers, laundry facilities, dishwashers, assuming there is no fecal material present.

JVWTP via Jordan Aqueduct Jordan Valley Water Treatment Plant via Jordan Aqueduct

LCWTP Little Cottonwood Water Treatment Plant

LEED Leadership in Energy and Environmental Design

Major Conveyance Study: A study conducted by Salt Lake City Department of Public Utilities to provide a report on existing and future supplies; major conveyances and storage facilities; and demand projections.

Master Plan: A conceptual framework to show direction of intent.

Measure: A device, incentive, or technology targeted at a particular type of end user or water use that, when implemented, will save water

Metrics: a systematic method of measurement or comparison; in relationship to the Water conservation Master Plan, a method to assess program need and effectiveness

mg Million gallons

mgd Million gallons a day

Monitoring: An ongoing process to assess results of an effort; steps in the process might include identifying what will be measured, what assumptions will be held, what estimates are agreed on, and what measuring tools will be used.

Multi-family Residential: A planning term used to describe a building where two or more families live in separate units under one common roof; for example, duplexes, apartments houses, townhouses, and condominiums.

Parleys WTP Parleys Water Treatment Plant

POMWTP via POMA Point of the Mountain Water Treatment Plant via Point of the Mountain Aqueduct

Practice: An action or system that is beneficial, empirically proven, cost-effective, and widely accepted in the professional community.

Program: A set of conservation practices and measures planned to be implemented together and intended to support water conservation efforts.

Project: Systemized efforts to achieve an objective.

Projected savings: An estimate of the amount of water which will be conserved because suppliers and/or customers are implementing certain practices.

Public Utilities: Refers to the Salt Lake City Department of Public Utilities

Retrofit: An umbrella term that refers to the modification of something; in the case of water conservation, retrofit refers to modifications to plumping fixtures or processes to increase efficiencies.

Supply Management: Methods by which a utility maximizes the use of available untreated water.

S**ustainability**: A decision-making concept describing development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

ULS: Utah Lake system

Unaccounted-for water: A term used to describe the various ways water is difficult or impossible to measure due to such issues as the evaporation of water in canals and reservoirs, under-registering of water through aging meters, leaks, fire suppression, and hydrant flushing.

Watershed: The major canyons of the Wasatch Mountain Range (the Wasatch Canyons), and their drainages that are a critical source of water for the communities served by the Salt Lake City Department of Public Utilities.

WCMP: Water Conservation Master Plan