SALT LAKE CITY
DEPARTMENT OF PUBLIC UTILITIES

2009 WATER CONSERVATION MASTER PLAN

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Acknowledgments

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Amy Clyde
Doug Dansie
Greg Graves
Wayne Green
Russ Jacobsen
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Allan McCandless
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Mark Ruff
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The successful completion of this water conservation master plan depended on the efforts of several staff members of the Department of Public Utilities, the City Council Office, the Mayor's Office, and the Division of Sustainability. In particular, we acknowledge Stephanie Duer, Jim Lewis, Mark Christensen, Nick Kryger, Laura Briefer, Brad Stewart, Lehua Weaver, Holly Hilton, and Debbie Lyons.

In addition, the Department would like to thank the community for its efforts thus far in achieving our water conservation goals. It is only through our working together that we will accomplish what we set out to do—ensure a continued supply of high quality drinking water and a meaningful quality of life now and for the future.

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Glossary of Terms, Acronyms, and Abbreviations

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.

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

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.

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.

CUP: Central Utah Project; provides water through the Utah Lake System (ULS)

CUWCD: Central Utah Water Conservancy District; operates and adjudicates the waters of the Utah Lake System delivered by the Central Utah Project

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.

Initiative: A course of action(s) designed to meet specific program objectives or goals.

JVWCD: Jordan Valley Water Conservancy District

LCWTP: Little Cottonwood Water Treatment Plant

LEED: Leadership in Energy and Environmental Design

MCS: 2007 Major Conveyance Study; referenced in 2009 WCMP

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

Mg: Million gallons

Mgd: Million gallons a day

M&I: Municipal and industrial; typically refers to municipal water supplies as compared to agricultural or private water suppliers.

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.

MWDSLS: Metropolitan Water District of Salt Lake & Sandy; a wholesale water provider established to take advantage of federal water projects developed by the US Bureau of Reclamation.

Objectives: Specific aims quantified in an action plan; statements must be specific as to who will do precisely what, by when, and at what cost, and provide measurable outcomes.

Peak Capacity: the maximum capacity of the source water without consideration of when or how the source is used.

Peak Day/Dry Year Capacity: maximum capacity of the source available to meet peak day demands in a dry year. It is the capacity that the Utility utilizes for planning purposes.

POMA: Point of the Mountain Aqueduct

POMWTP: Point of the Mountain Water Treatment Plant

Programs: An ongoing effort to achieve a goal, sometimes involving several projects; e.g., a conservation program may include actions related to education, financial incentives, or regulations.

Program Measure: A specific action or related actions intended to achieve either a behavioral or material change towards a goal. Specifically within this plan, a program measure is an action or group of related actions within one of six conservation program categories intended to conserve water.

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.

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.

Sustainability: 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.

Unaccounted-for water: A term used to describe water that does not go through meters, such as that lost from leaks or evaporations, under-registering of water through aging meters, fire suppression, and hydrant flushing; referred to also as "system leakages."

Utah Division of Water Resources: This state agency is a division of the Utah Department of Natural Resources. As the agency with the responsibility for coordinating the state-wide water conservation effort, it is to them that water conservation master plans are submitted.

WCDG: Water Conservation Demonstration Garden

WCMP: Water Conservation Master Plan

WFRC: Wasatch Front Regional Council; cited in 2007 Major Conveyance Study.

Xeriscape: A trade-marked term developed by Denver Water in 1981 to describe a seven-step process of improving water efficiency in the landscape; the seven steps include:

1. Design
2. Soil analysis
3. Appropriate plant selection
4. Practical turf areas
5. Efficient irrigation
6. Use of mulch
7. Appropriate maintenance

EXECUTIVE SUMMARY

ES-1 BACKGROUND

Producing and implementing a water conservation plan can involve the same level of commitment in both time and resources as the development of other water supply plans. Conservation or demand-side planning, like supply-side planning, increases system capacity and is a viable strategy in minimizing potential impacts from water shortages. The differences between the two lay in the types of strategies and those responsible for implementation. Supply-side plans are typically focused on infrastructure and water source, and it is generally the sole role of the water provider to implement the strategies contained within such a plan. Conservation plans, on the other hand, are focused on how, and why, water is used, and while plans are usually written by water providers, and they are held responsible for the outcomes, success lays in the hands of the water user.

A sound conservation plan is goal-oriented, cost-effective, and practical in design. Common goals include lowered peak demands, reduced waste, optimized system capacity, containment of customer costs, equity in burden of actions, and minimization of environmental burdens associated with drinking water and wastewater management.

Conservation plans are, ideally, developed with the participation of all the stakeholders—water managers, engineers, financial administrators, political leaders, the public, commercial and industrial customers, universities and medical centers, environmental interests, and subject experts. The diversity of customers and varied range of perspectives related to water use needs and values should be included in the dialogue and addressed in the plan. These stakeholders should be involved through the entire process, not just at the end of the process when documents are submitted for hearings and final approval. With that in mind, we have made every effort to include our customers, from all user classifications, as well as experts and other interests in the development of this Water Conservation Master Plan (WCMP). As importantly, we will rely on those who participated in the development process and the community as a whole to be our partners in the implementation of this plan, for without their partnership, we will be unsuccessful in achieving our long-term water conservation goals.

ES-2 DEVELOPMENT COMMITTEE RECOMMENDATIONS

The program measures outlined in this chapter were identified and selected by a subcommittee of the Public Utilities Advisory Committee (PUAC): the Water Conservation Master Plan Development Committee—a group of over thirty individuals representing our stakeholders as well as subject experts from academia and related professions, and representatives of the PUAC. It was their dedication, expertise, and vision that provided the foundation for this five-year plan. The group met as a whole and in smaller groups organized by subject area, and was charged with two tasks: evaluate the 2004 WCMP; and make recommendations for the 2009 WCMP.
There were many recommendations and suggestions that came out of meetings, emails, and dialogue with committee members and their collaborators, and those recommendations can be summarized thus:

- Enhance involvement of the City as a water customer;

- Establish ongoing relationships with professionals in targeted conservation program areas;
- Enhance classroom opportunities and programming;
- Utilize website more effectively;
- Develop meaningful standards and guidelines for water use in the landscape;
- Create incentives and/or recognition for commercial/industrial customers;
- Enhance learning opportunities for home owners and others;
- Ensure equity by developing program measures within each program category across all user categories; and
- Construct a document that has an inherent and ongoing review process.

ES-2.1 Annual Report and Evaluation Plan

Creating a process in the plan that was dynamic and responsive to changing demand behaviors and varying water supply scenarios was an important goal. It was determined that through an annual report process, plan components could be regularly evaluated and committee and public input solicited. This would also address the issue of the extensive list of potential program measures that the committee felt warranted further review and study, while providing an opportunity to regularly report on existing program measures and reevaluate their merits.

The first group of measures to be evaluated within the Water Conservation Annual Report (CAR) format will be those with the least potential for budget impacts. Table 2.2 provides of list of those program measures. The other criteria for program measure selection are measures with linkages to other city or Utility programs or actions. To coordinate with the SLC Division of Sustainability Code Review currently being undertaken, the 2010 CAR will include a review of exiting landscape and water use codes and identify gaps in code relating to water use, such as those around graywater or wasting water.

Table 2.2
Proposed 2010 Conservation Program Measures Review

No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
Education Program								
E-1	Brochures	√	√	√	√	Develop and distribute brochures relating to water conservation	√	
E-8	Landscape and Irrigation Style Guide	√	√	√	√	Develop and distribute a guide for enhancing water-use efficiencies in landscapes and for irrigation systems		√

No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
E-9	Landscape Assessment and Check-ups	√				Program partners with Master Gardeners to provide residential landscape assessments to enhance water efficiencies		√
E-10	Landscape Plant List	√	√	√	√	Develop and distribute a water-wise plant list specific to local weather and soil conditions	√	
E-11	Landscape Templates	√	√	√	√	Develop and distribute quick-guide references for commercial, residential, and parkstrip landscapes		√
E-12	Lawn Sprinkler Check-ups	√	√	√	√	Promote and conduct lawn sprinkler check-ups for residential, commercial, and institutional properties	√	
E-14	Parkstrip Plant List	√	√	√	√	Develop and distribute a water-wise plant list for park strip areas	√	
E-15	Plant list database	√	√	√	√	Convert landscape and parkstrip plant list to database format		√
E-16	Planting and Maintenance Guide	√	√	√	√	Develop and distribute a maintenance guide for non-traditional landscapes, and for water-wise lawns		√
E-19	Specialized Garden Guides and Plant Lists	√	√	√	√	Develop and distribute plants lists and guides for bio-swales, rain gardens, roof-top gardens, and riparian corridors		√

No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
Institutional Program								
F-3	Rate Structuring	√	√	√	√	Utilize a rate structure to encourage responsible use of water	√	
Institutional Program								
I-6	SLC Dept/Div Conservation Plans				√	Encourage and publish water conservation plans from City Departments and Divisions		√
Policy/Ordinance/Regulation Program								
P-1	Graywater	√	√	√	√	Research issues regarding Graywater use and establish appropriate policy		√
P-3	Irrigation Efficiency Standards		√	√	√	Develop and adopt Irrigation Efficiency Standards for all commercial and institutional properties		√
P-4	Landscape Ordinance	√	√	√	√	Amend existing landscape code to accommodate and encourage water-wise landscaping in front yards	√	
P-5	Parkstrip Code	√	√	√	√	Develop and adopt ordinance to accommodate and encourage non-traditional, lower water plantings	√	
P-6	Rainwater Harvesting				√	Research issues relating to rainwater harvesting and support appropriate legislation	√	
P-7	Rain Sensor Ordinance and Policy	√	√	√	√	Require all properties with automated outdoor sprinkler systems to be fitted with rain sensors		√
P-10	Squandered Water Ordinance	√	√	√	√	Develop and adopt ordinance prohibit-ing the squandering of water		√

ES-2.2 Program Measures Organization and Linkages

Organization of the previous plan was questioned, including the separation of program measures by customer category. This organization made program linkages less obvious, and did not encourage the perception of equity in the burden of action. For instance, in the previous plan, while the recommendation was made that the City regularly conducts sprinkler system audits, there was no such recommendation for the Utility or for general customer classes. Leak detection and repair was listed as a Utility program, but no other customer group received this recommendation, though studies indicate that an average of 13 percent of indoor water use is attributed to leaks.

Another concern expressed by the development committee was in relation to existing program measures. There was consensus that existing programs be as closely scrutinized and evaluated as those newly listed for consideration, and so it was determined that those two lists—existing and to-be-considered—would be combined.

Based on these recommendations, the water conservation program is divided into six categories: Education, Finance, Institutional, Policy, New Customers, and Research (see Table 2.1). All program measures identified by the development committee are listed in one of these six categories, in alphabetical order. Customers are divided into four categories: Multi-family Residential; Single Family Residential; Commercial and Industrial; and Government. Measures are linked to the applicable customer class, and indication is given as to whether the measure is an existing measure or one to be considered.

ES-2.3 Water Conservation, Sustainability, and Disaster Resilience

Lastly, the committee felt that in the five years since the last master plan, there occurred an awakening among the scientific community and the general public in the understanding that few things happen in isolation, and that actions can have consequences far beyond what was intended. For that reason, they felt the inclusion of a chapter on the synergies and linkages between water conservation and other topics related to sustainability was warranted.

Connections between water use and conservation with effects on water quality, climate change, and even food security may seem convoluted, or even non-existent, but no industrial process occurs, no manufacturing, no recreation, no gardens nor food, without water. Identifying and drawing those links will enable us to be certain that as we strive to meet long-term water conservation goals, we do not increase the burden in other realms. This exercise will also illuminate where the strategies of these emerging issues mesh with those of water conservation, and where there are potentials for conflict. For a summation of that effort, please see the Water Conservation and Sustainability Table (page 3.9).

ES-3 WATER CONSERVATION GOAL

Through conservation programs, the City has a goal of reducing per capita water use 25 percent from the base year 2000, by the year 2050. If the City successfully reduces water use in

accordance with their conservation goal, projected demand will be reduced to the levels shown in Table 1-2.

Table 1-2
Estimated Service Area Demand (With Conservation)

Year	Annual Demand (acre-ft)	Winter Day Demand (mgd)	Peak Day Demand (mgd)
2010	110,500	49.8	222.4
2015	113,800	53.8	227.3
2020	117,700	57.4	233.7
2025	124,400	62.0	249.9
2030	129,700	66.6	264.0

An additional goal, and the mechanism through which we will achieve the first goal, is to create a community culture that includes water conservation. In order for a water conservation plan to be effective, the community—commercial and residential customers, governments, and schools, churches and special interests—need to understand why water conservation is an essential element in sustaining our current and future quality of life. Water conservation needs to be more than a series of program measures; the efficient use of water needs to be a nearly automatic response as a result of the value we place on water. Water conservation plans, even this one, do not save water; it is people, acting on their beliefs and values, and utilizing the tools we as a water purveyors supply, that saves water.

ES-4 PLAN ORGANIZATION

This plan is divided into the following chapters:

1. **Water System Profile** tells the story of our water, from where it is collected, treated, and distributed, to how it is used and by whom; also covered are existing and anticipated water supply, demand projections, and conservation goals.

2. **Program Measures** provides information on existing conservation program measures; identifies new program measures for consideration; lists the program measures for review in the 2010 CAR; and contains the criteria for program measure inclusion and selection

3. **Integrating Water Conservation with Sustainability and Resilience** is a discussion of issues related to or affected by water conservation, disaster resilience and the ten topics identified by the SLC Division of Sustainability. Also in this chapter is a matrix providing visual cues as to program measure linkages with these eleven topics.

4. **Public Involvement Plan** outlines both how this plan will be articulated in public and the methodologies of implementing program measures. Also included is a description for soliciting public sentiment of future CARs and program measures.

Appendices

Glossary provides definitions of terms, abbreviations, and acronyms used in this plan

Water System Profile provides in chart form a summary of estimated annual water supply in wet, normal, and dry years, as reported to the Utah Division of Water Resources.

Existing Policies and Ordinances provides information or text of relevant existing code or policy. The following are included in this section:

Utah Code Title 73-10-32 which establishes the requirement for a Water Conservation Master Plan

Water Shortage Contingency Plan is a detailed plan outlining required actions during a water shortage event, and also includes the city ordinance adopting this plan and the Water Shortage Response Summary

Water Rate Structure Ordinance in its most current form

Salt Lake City Water-wise Plant List was updated in 2004 and included is the 2004 Water Conservation Master Plan. It provides an extensive listing of water-wise plants, organized by use, with expanded descriptions and watering information.

CHAPTER ONE: WATER SYSTEM PROFILE

1.1 BACKGROUND

Water storage and distribution within the Salt Lake City Department of Public Utility's (Utility) delivery area has evolved since Salt Lake City first developed its water supplies and infrastructure. For the first 150 years of history the City pioneered water development by diverting City Creek, Red Butte, and Emigration Creeks for municipal uses, constructing the Salt Lake City and Jordan Canal, entering into exchange agreements with the other canyon stream owners, building dams, forming the Metropolitan Water District of Salt Lake City (now the Metropolitan Water District of Salt Lake and Sandy) to build the Provo River Project, drilling wells, and helping form the Central Utah Project. By planning for the future and acting in the present the Utility has made good decisions throughout its history regarding water management.

As the Utility's service area population has grown to over three hundred thousand inhabitants, the need for a dependable water supply and the capacity to store and deliver that water has become crucial to the sustainability of our community. That steady supply of water depends on a complex network of storage dams, aqueducts, water treatment plants, distribution reservoirs, and pipe lines conjunctively managed by the major water supply entities to meet the greater public good. Supply, storage, and demand details are covered in section 1.3 (Supply and Demand), and are largely drawn from the 2007 Major Conveyance Study.

The 2007 Major Conveyance Study focused on strategies for maximizing utilization and conveyance of water to customers to meet their projected needs. Two important aspects of water supply management not covered in detail in the Major Conveyance Study are watershed protection, and conservation, the latter being the subject of this plan. Watershed protection is a critical component of water planning as it addresses the reliability and availability of our drinking water at the source. Details of this program may be viewed in the 1999 Watershed Management Plan. Water conservation addresses the wise and judicious use of the water resource with we so judiciously protect.

1.2 WATER CONSERVATION

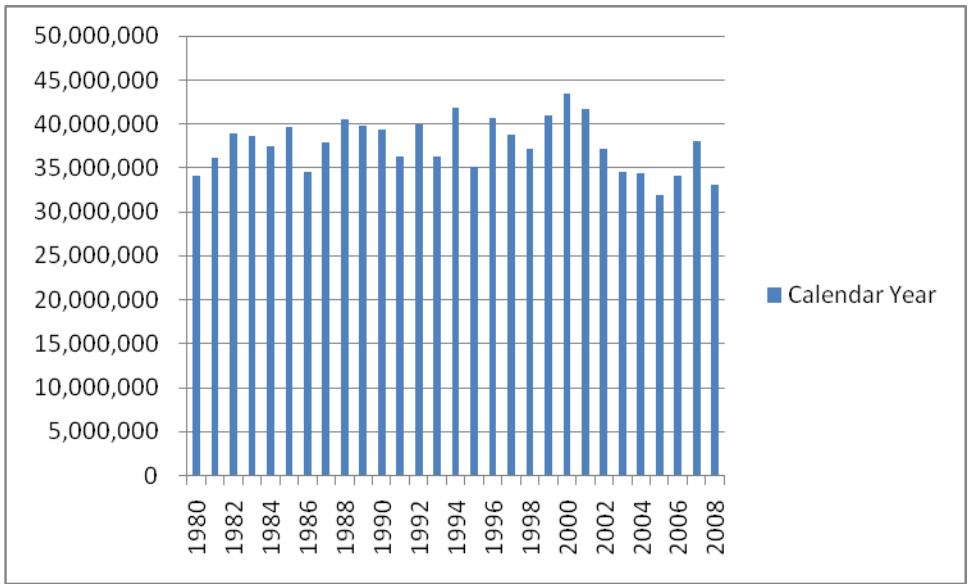
Planning for a diversity of water sources coupled with aggressive source protection has provided us with a high quality water supply. Research and study tells us improvements can be made in storage and distribution efficiencies to reduce system leakages or losses, increasing the availability of those supplies. However, regardless of how well we plan or what system efficiencies are implemented, in any given year changes in weather can affect that supply, as when we experience droughts.

Fluctuations in that supply as a result of impacts from global climate change are still unknown, but what had been thought of as fixed and dependable supplies may become less so in the future. We cannot predict or control the amount of snow or rain, or current and future weather or climate patterns, and eventually, those supplies may be inadequate to meet our needs. The one thing in this scenario we can control is our demand for water.

Water conservation planning and implementation is one of the critical strategies employed to sustain that supply in light of an ever growing population, increasing demand, and potential changes to short and long-term supply levels due to weather and climate change. In many cases, water conservation measures are the least expensive measures to extend a limited water supply, and may also be implemented more quickly in response to fluctuating water supply levels.

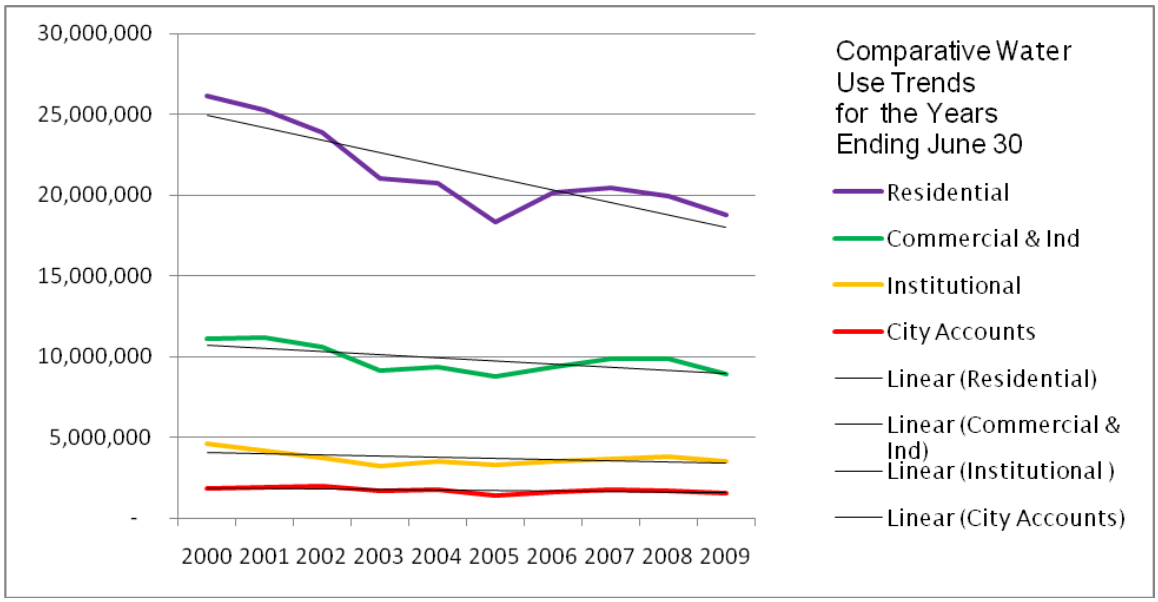
Initially established in the 1980's with a focus on commercial and industrial users, the Utility's water conservation program expanded over the last ten years to include residential and institutional customers. Since the 1980's, in general, per capita water use has seen a decline, with demand between 1980 and 1998 nearly flat, despite of a growing population. Since 2000, per capita water demand has continued to decline (Chart 1.1) at a greater rate, not withstanding that three of the hottest summers of record have been within this decade. The decrease in demand illustrates the commitment and effort of the community in working with the Utility to achieve our long term water conservation goals.

Chart 1.1
SLC Public Utilities Water Useage within Service Area as measured in 100 cubic feet



In researching program plans and measures for the development of the 2004 Water Conservation Plan, the Utility recognized the value of implementing a conservation program that approached plan measures on a variety of fronts. Implementing a three-pronged approach (education, regulation, and pricing) the Utility has successfully led the community in continuing and accelerating that twenty-year trend of water-use reduction. The goal of the 2004 plan was to implement program measures for each customer class, in each of the three approaches. It is this targeted methodology that has created the balance of tools, incentives, and policies that have helped our community to continue, and improve their conservation record. Chart 1.2 illustrates the reduction in water usage by customer category.

Chart 1.2
Comparative Water Use Trends by Customer Category as measured in 100 cubic feet



In order to facilitate the continued trend in conservation, new program measures have been identified and will be researched and evaluated for consideration over the next five years. These measures reflect the three-pronged approach articulated in the 2004 Plan. Additionally, these measures are spread through the various customer classes to ensure a continuing equity in burden of action.

Additionally, the Water Conservation Office has been working with City Divisions and community stakeholders to develop individual water conservation action plans (CAP). These CAPs are developed by a stakeholder and outline goals, actions, and measures related to water conservation which they intend to implement. This represents a more direct level of stakeholder involvement in water conservation planning and implementation than was reflected to the 2004 plan. These CAPs will be shared with the community and it is hoped that over the next five years, other stakeholders will be inspired to work on and submit plans to be included in subsequent reports.

While water use trends continue downward when viewed from the perspective of decades, year to year use fluctuates widely (see Chart 1.3). In order to continue our long-term success in conservation, it will be critical to evaluate these yearly use fluctuations, and in particular the values, behavioral attitudes, and management practices that drive those yearly demand changes. Rather than presume that increases in use are the result of hotter summer temperatures or a general perception that there is no water supply issue, research of the behaviors and attitudes of water users, as well as inventories of water fixtures and appliances will provide a more precise picture of this phenomenon.

Chart 1.3
Water Use Reduction Percentages, Utilizing the Year 2000 as the Base Year

Year	Demand ac-ft	percent 2000	Below 2000
2008	96,280	87.68%	12.32%
2007	101,702	92.62%	7.38%
2006	93,260	84.93%	15.07%
2005	87,931	80.08%	19.92%
2004	91,804	83.61%	16.39%
2003	91,020	82.89%	17.11%
2002	98,263	89.49%	10.51%
2001	109,967	100.15%	-0.15%
2000	109,804	100.00%	0.00%

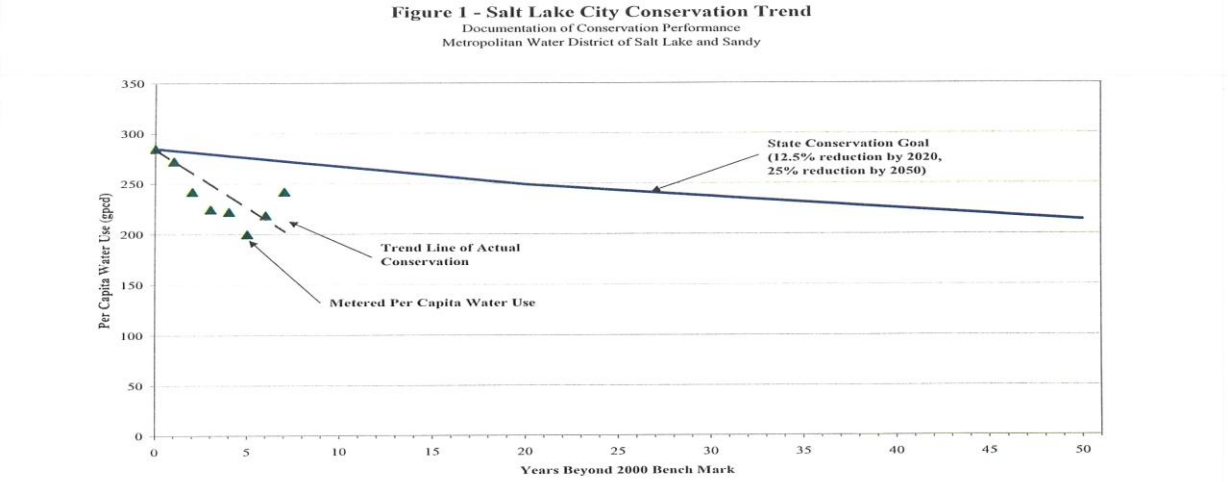
1.2.1 Per Capita Consumption Calculations

In recent years there has been greater emphasis placed on per capita consumption data as a means of setting and measuring water conservation goals and of articulating over-all conservation efforts. Per capita consumption figures have been used by Municipal and Industrial (M&I) water suppliers for many years, but with this new emphasis, particularly by the media, per capita data and its meaning have taken on greater importance.

Per capita use rate is an estimate of water usage in a community, determined by dividing the total water used by the number of persons using that water. While water use is effected by a number of variables including climate differences, household and lot sizes, and industrialization, per capita use rates do not reflect, or even account for, any of these or other variables. As a result, these indices can result in distorted per capita values when comparing one community to another, or when trying to convey accurate and meaningful information regarding water usage.

With growing attention on water conservation gains and goals, appropriate evaluation and comparison of per capita consumption figures has become more critical. For instance, as a part of the State Water Plan, there is a goal to reduce per capita water consumption by 25 percent by the year 2050. The per capita number was calculated by using statewide M&I water consumption divided by the state's population. Because per capita consumption defines the state's conservation goal, it has become the primary measurement of M&I water usage in Utah. This has resulted in a fixation on the per capita number as the sole means of describing a community's water demand, and even comparing regions and states' per capita consumptions. Yet per capita consumption numbers do not convey the entire story of water demand, and relates no information on water use behaviors.

Per capita consumption in Salt Lake City as traditionally measured has experienced a downward trend from 320 gcpd in 1988 to 240 gcpd in 2008 (Figure 1). While this is good news generally, and places Salt Lake City at the forefront of state-wide conservation efforts, this number does not tell the full story of that effort.



At issue with the typical per capita calculations, aside from the other variables affecting demand already mentioned, is that Salt Lake City is disproportionately impacted by non-resident daytime population influxes; or more simply put—commuters. According to the US Census Bureau, Salt Lake City ranks the 3rd highest in the ratio of commuter-to-residents of cities of its size or larger nationwide (Deseret News, April 25, 2006). On average, over 130,000 people are added to the City's resident population each work day. Some examples of the City's non-residential water consumption establishments are the University of Utah, Research Park, downtown hotels and businesses and the City's third largest water user, an oil refinery. Much of the City's Northwest Quadrant is businesses and manufacturers' that employ non-city residents. And those visitors, employees, and students use water. Table 1.1 illustrates the impact of worker and visitor populations on water use calculations.

Table 1.1
Salt Lake City Water Usage and Conservation Trends

	Without Consideration of Worker Population			Population Adjusted Based on worker Population Relative to WRFC Average				
Year	Population	Annual Metered Sales (gal)	Per Capita Use	Population	Employment	Total Equivalent Population	Annual Metered Sales (gal)	Per Capita Use
2000	287,431	32,479,397,940	310	287,431	255,161	312,192	32,479,397,940	285
2001	287,405	31,156,592,852	297	287,405	259,575	313,198	31,156,592,852	273
2002	287,379	27,795,222,972	265	287,379	264,066	314,221	27,795,222,972	242
2003	287,353	25,866,715,160	247	287,353	268,634	315,263	25,866,715,160	225
2004	287,327	25,709,610,476	245	287,327	275,242	316,780	25,709,610,476	222
2005	287,300	23,230,740,000	222	287,300	280,500	317,981	23,230,740,000	200
2006	288,445	25,546,829,220	243	288,445	283,762	319,748	25,546,829,220	219
2007	289,765	28,409,000,000	269	289,765	285,060	321,211	28,409,000,000	242

According to the Utah Division of Water Resources the state's Public Community System provides 70 percent of their water for resident use and 30 percent for non-resident use. Comparing this to Salt Lake City's water service area usage of 52 percent resident and 48 percent for non-resident, it is readily apparent that the non-resident water usage drastically distorts the City's per capita consumption calculation.

It is recognized that it is impossible to take into account all of the factors that affect per capita consumption without adding a level of unacceptable complexity; however, where legitimate and documented non-resident water uses drastically distort a community's per capita consumption calculation, there needs to be an acceptable process to more accurately measure and report the per capita consumption of that community.

1.3 WATER SERVICE AREA

The Utility provides culinary water to over 326,000 residential customers, and serves nearly 92,000 connections within Salt Lake City, Cottonwood Heights, Holladay, Millcreek Township, and portions of Murray, Midvale, and south Salt Lake, a service area of 135 square miles. Included in our customer base are an international airport, two universities, numerous hospitals, public schools, and over 1400 acres of irrigated public parks and golf courses.

Additionally, as covered in Section 1.2.1, the Utility service area experiences an estimated day-time population increase of over 130,000 people; a result of employment, institutions of higher education, as well as visitors to the airport, hospitals, and tourist and convention guests. A map of our service area is provided in the Appendices.

1.4 SUPPLY AND DEMAND

To prepare and plan for future growth in its service area, the Utility retained a consulting firm to prepare a master plan for its major conveyance facilities (the 2007 Major Conveyance Study). This consisted largely of two major tasks:

- Evaluate the adequacy of existing and planned Salt Lake City water supplies to meet projected demands; and

- Evaluate major conveyance and storage facilities in the City's existing transmission and distribution system to determine if these facilities can convey water supplies from their point of origin to their projected point of use.

This section of the WCMP is largely drawn from the executive summary of that report.

1.4.1 System Demand Projections

The Major Conveyance Study (MCS) developed demand projections by looking at four different factors that contribute to water demand: population, employment, industrial development, and irrigated acreage.

Growth for each of these factors was developed based on projections prepared by the Wasatch Front Regional Council (WFRC) and planning and zoning data provided by the City. These factors were then converted to system water demand based on their historic contributions. The results of this analysis are summarized in Table 1-1.

Table 1-2
Estimated Service Area Demand (Based on 2000 per Capita Use)

Year	Annual Demand (acre-ft)	Winter Day Demand (mgd)	Peak Day Demand (mgd)
2010	117,100	49.8	235.6
2015	124,400	53.8	248.1
2020	132,800	57.4	263.2
2025	143,400	62.0	282.9
2030	152,900	66.6	300.5

The demand projections summarized in Table 1-1 represent demand if customers continue to use water at the same level as they did in 2000, adjusted for estimated population growth. Through conservation programs, the City has a goal of reducing per capita water use 25 percent below the base year of 2000 by the year 2050. If the City successfully reduces water use in accordance with their conservation goal, projected demand may be reduced to the levels shown in Table 1-2.

Table 1-3
Estimated Service Area Demand (With Conservation)

Year	Annual Demand (acre-ft)	Winter Day Demand (mgd)	Peak Day Demand (mgd)
2010	110,500	49.8	222.4
2015	113,800	53.8	227.3
2020	117,700	57.4	233.7
2025	124,400	62.0	249.9
2030	129,700	66.6	264.0

It should be noted that projected demand may be significantly affected by what happens in the City's northwest quadrant. In this area of the City, there is a large area of developable land that is not covered by the WFRC's population projections. Although development of this area will almost certainly occur sometime in the future, its actual timing is largely speculative. This report conservatively assumes that development will begin in 2010 and will reach 75 percent development by 2030. Any delay or elimination of this development will result in a corresponding delay or elimination of system growth.

1.4.2 Annual Water Supply

The City's annual water supply comes from a number of different sources. Existing supply comes from the following sources:

Surface Water Sources – The Utility currently treats surface water rights at its own treatment plants in Big Cottonwood, Parleys, and City Creek Canyons. It also treats water rights it owns in Little Cottonwood Creek at the Little Cottonwood Water Treatment Plant owned by Metropolitan Water District of Salt Lake & Sandy (MWDSLS);

Ground Water Sources – The Utility owns water rights for a number of ground water sources. Some of these sources are artesian wells and springs requiring little or no pumping and are used year round. The other ground water sources are pumped wells that are generally used only during the summer months to meet peak demands; and

Preferred Rights in MWDSLS – This category of supply consists of water received by the City through its membership in MWDSLS. Prior to 2005, this only included water stored in Deer Creek Reservoir. Since 2005, additional water has been added incrementally from storage in Jordanelle Reservoir.

In addition to these existing supplies, The Utility plans to develop the following sources to meet future demands:

New Wells – The Utility has planned for the development of additional wells at various locations throughout its system. The City estimates development of current City rights could yield up to 12,000 acre-ft additional ground water;

Additional Surface Water Development – A potential new surface water supply the Utility is exploring is construction of treatment facilities to treat water from Mill Creek Canyon or from other surface water sources. Estimated production from new surface water sources is 3,300 acre-ft during dry years and 3,967 acre-ft during average water years;

Wastewater Reuse – The Utility is actively pursuing opportunities for wastewater reuse. Probable reuse opportunities currently being studied include irrigation of two large golf courses and a park area near the Utility's wastewater treatment plant. Initial plans for wastewater reuse would produce approximately 5,000 acre-ft annually and would begin deliveries in 2015; and

Utah Lake System Water – The Utility has petitioned Central Utah Water Conservancy District (CUWCD) through MWDSLS for Central Utah Project (CUP) water in the planned Utah Lake System (ULS). The total volume of water MWDSLS has petitioned for is 8,600 acre-ft, to be divided between Salt Lake City and Sandy. For this analysis, it has been estimated that the Utility's portion of this water will be 4,750 acre-ft.

The projected reliable, dry year production of each category of supply described above is summarized in Table 1-3.

Table 1-4
Projected Dry Year Production – Salt Lake City
Existing and Future Sources

Supply Category	Projected Dry Year Production – 2004 (acre-ft)	Projected Dry Year Production – 2030 (acre-ft)
SLC Surface Water Sources	42,473	43,277
Base Wells and Springs	7,353	7,353
Peaking Wells	10,547	10,547
SLC Preferred Rights in MWDSLS	22,910	42,910
New Wells	0	12,000
Additional Surface Water Development	0	3,300
Wastewater Reuse	0	5,000
Utah Lake System Water	0	4,750
Total	**83,283**	**128,763**

Table 1-3 graphically compares the dry year annual supply discussed above against projected demands through 2030. Several observations can be made from this table:

Historic dry year water supply has been inadequate to meet demand. This has resulted in the occasional need to purchase spot water from other sources;

Conservation during the past several years has been ahead of the City's conservation goal and has resulted in annual demands much less than historic averages. Future conservation levels will determine how soon additional sources will be needed earlier to meet dry year demands; and

Current plans for additional surface and groundwater development, along with petitioned water from the ULS system and wastewater reuse are not quite adequate to meet projected 2030 demands. Additional sources, improved utilization of existing sources, or increased conservation will be needed to avoid a shortfall in dry year supply by the year 2030.

1.4.3 Source Production Capacity

In additional to annual supply, it is important to consider the maximum production capacity of Salt Lake City water supplies. The existing production capacities of Utility sources are summarized in Table 1-4. Included in the table are two capacities for each source. "Peak Capacity" is the maximum capacity of the source without consideration of when or how the source is used. "Peak Day/Dry Year Capacity" is the maximum capacity of the source available

to meet peak day demands. It is the capacity that should be used for planning and considers the availability of each source during the late summer with dry year conditions.

Table 1-5
Existing Source Capacities

Source	Peak Capacity (mgd)	Peak Day/Dry Year Capacity (mgd)
LCWTP	117.8	101.25 – 118[1]
POMWTP via POMA	43.75	27 – 43.75[1]
JVWTP via Jordan Aqueduct	45.55	45.55
BCWTP	38	14
Parleys WTP	35	35
CCWTP	13	4
Wells and Springs	52.6	43.1[2]
Total	**345.7**	**286.65**

[1] Combined capacity of LCWTP and POMWTP via POMA cannot exceed 145 mgd. Actual contribution from each source may vary from the amounts shown.

[2] For planning purposes, peak day well capacity is reduced to account for wells usually used to satisfy secondary water demands (Sugar House and Dyers Inn Wells).

For planning purposes, it is recommended that reliable source capacity be based on something less than 100 percent of peak capacity to account for potential source failure. This might include events such as well failure or contamination, treatment plant upset, or transmission pipeline breaks. To account for these possible reductions in source capacity, it is recommended the Utility's peak source capacity be at least 20 percent greater than projected peak day demands. A comparison of the City's peak source production against projected demands is shown in Table 1-4. A few conclusions can be made from the figure:

1. City sources are adequate to satisfy projected peak demands through the year 2020.

2. By 2030, peak demands will grow to require over 30 mgd of additional source capacity. It is projected that this additional need for capacity will be satisfied through the development of new wells, additional surface water sources, wastewater reuse, and conservation.

1.4.4 System Storage Evaluation

A water system needs adequate storage for three purposes:

Operational Storage: Operational or equalization storage is the storage required cover the difference between the maximum rate of supply and the rate of demand during peak conditions;

Fire Flow Storage: Fire flow storage is the amount of water needed to combat fires occurring in the distribution system; and

Emergency Storage: Emergency or standby storage is the storage needed to meet demands when sources are interrupted as the result of unexpected events (power outages, equipment failure, etc.).

The projected amount of storage needed for each of these purposes is summarized in Table 1-5.

Table 1-6
System Storage Requirements (MG)

	2005	2015	2030	2050
Operational Storage	66.8	68.2	79.2	81.2
Fire Flow Storage	3.2	3.2	3.2	3.2
Emergency Storage	74.3	75.8	88.0	90.3
Total Storage Required	144.3	147.2	170.4	174.7
Existing Storage	185.25	185.25	185.25	185.25
Storage Surplus	40.95	38.05	14.85	10.55

The Utility has 185.25 million gallons of existing storage. As can be seen in the table existing, storage appears to be adequate to meet projected demands on a system wide basis. However, small amounts of storage may still be needed in some locations to satisfy deficiencies in individual pressure zones.

1.5 WATER RESOURCE RECOMMENDATIONS

Based on the analysis for the 2007 Major Conveyance Study, the following recommendations were developed for improvements relative to both supply and major conveyance:

1. **Additional Water Supply –**Salt Lake City will need additional dry year water supply to meet projected demands. It is recommended that the Utility continue to pursue opportunities to develop new water. This will likely need to include the development of additional ground water and surface water supplies, ULS water, and wastewater reuse.

2. **Source Reliability –** The development of additional supply as described above will be adequate to meet long term needs only if all sources are available and operating at capacity. To account for the potential loss of a source, it is recommended that the Utility consider securing additional sources or work to improve the reliability of its existing sources. Related to this, but not addressed in the conclusions of the Major Conveyance Study, is the need to continue source protection, especially in critical watershed areas.

3. **System Production Capacity –** It is estimated that the ultimate peak day demand in the City will be approximately 40 mgd greater than its current production capacity. If 5 mgd of additional capacity is developed through new surface water sources, it is recommended that an additional 35 mgd be developed through new ground water or other sources.

4. **Timing of Supply Development –** It is recommended that the Utility continue to monitor annual demands to optimize the timing of new source development. Variations in development patterns in the northwest quadrant of the City or other areas could delay the need for additional supply.

5. **Conservation –** All of the conclusions contained in this report are based on Salt Lake City successfully reaching its long-term conservation goal of a 25 percent reduction in per capita water use by the year 2050 using the year 2000 as the baseline. It is recommended that Salt Lake City continue to actively promote conservation to achieve this goal.

6. **Global Climate Change –** The Utility currently uses a number of surface water sources whose yields are highly dependent on snow pack. If changes in global climate result in reduced snow pack, yields from sources could be significantly diminished. The results of this report are based on historic water yields. If global climate change or other factors permanently lower the yield of existing sources, the Utility will need to develop additional storage or other water resources to meet the shortfall.

CHAPTER TWO: PROGRAM MEASURES

2.1 BACKGROUND

If the first chapter of the water conservation master plan is a description of the literal structure, or body, of our water system and how it functions, this chapter, Program Measures is the soul. This is where we decide what actions to take to achieve our goals and live our values.

Program measures are those actions we take to move us towards our water conservation goal. These measures may be indirect actions—writing brochures and handing them out doesn't in itself save water but might influence the recipient to save water; and direct actions—identifying a leak and repairing it in a timely manner saves actual water by preventing further waste. Both are important as indirect actions often motivate or instruct future direct actions.

Program measures also may be broad measures which apply to all customer classes—such as a brochure on lawn watering sent with the bill—or measures targeted at a specific customer class or category—such as commercial and industrial certifications or residential leak detection. Analysis of customer class, number of connections per class, demand within each class, and behavioral patterns will facilitate program measure selection (see Chart 2.1 and Chart 2.2).

Chart 2.1
Connections by Customer Class

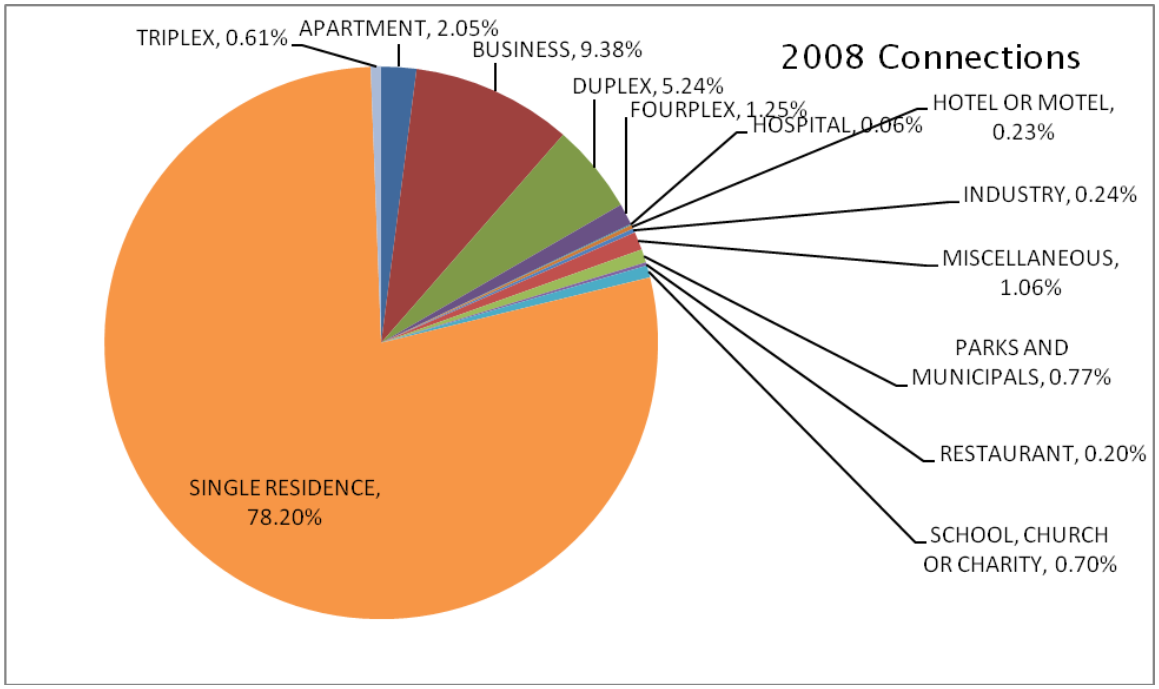
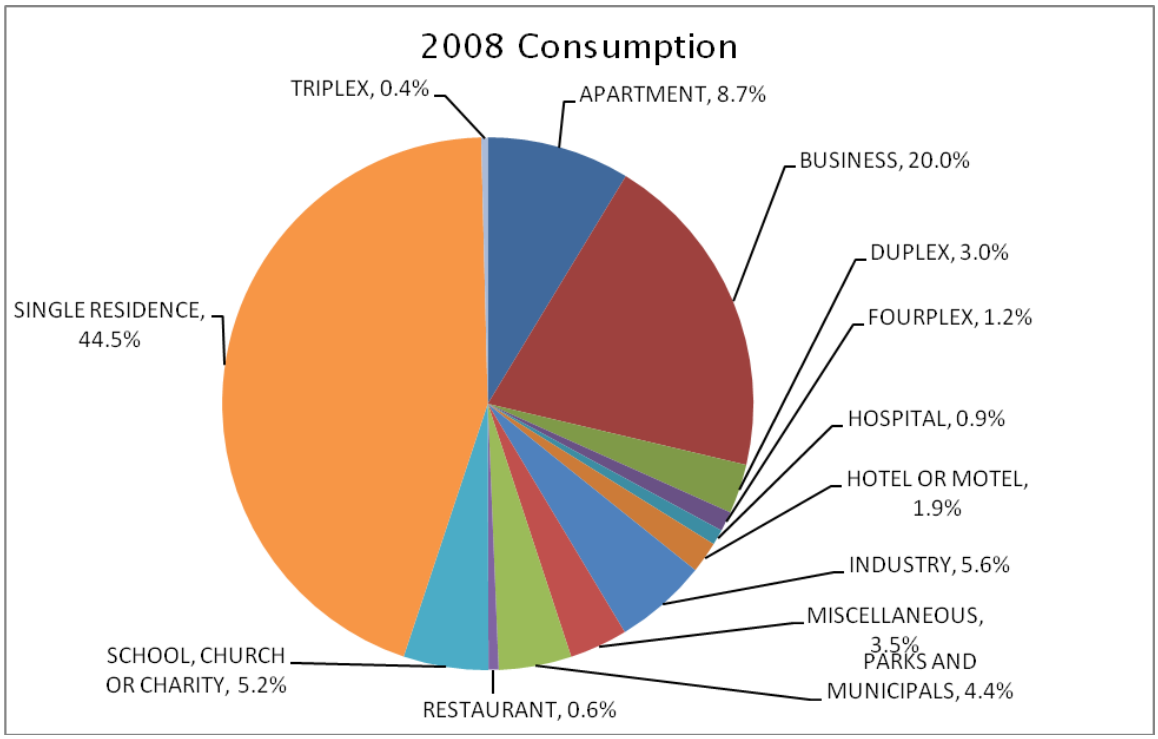


Chart 2.2
Demand by Customer Class



This chapter includes three sets of program measures: those programs and measures either implemented or guided by the Department; action plans submitted by City departments and divisions for inclusion in the WCMP; and action plans submitted by our stakeholders for inclusion in the WCMP.

The first set of measures can best be described as being generated by the Water Conservation Office. Included in this set are current measures and those measures identified as being worthy of consideration. The measures appear in two formats: 1) Table 2.1 Water Conservation Office Program Measures provides a quick reference of all measures; and 2) Program Measure Description which provides more detail of each program measure. A brief evaluation of existing measures is provided but is not intended to be a full analysis.

City and Community Based Action Plans are an opportunity for City departments and divisions, and interested stakeholders to work directly with the Utility and the Water Conservation Coordinator to develop and implement action items that promote and achieve water conservation. These plans should contain specific measures (either direct or indirect), the anticipated outcome of the measure, and how success will be determined. For a template, please see the Appendices. These plans are grouped as two separate sections: 1) City; and 2) Community-Based. These action plans can be as simple as committing to sponsor an office brown bag on water conservation, to more technical approaches such as an evaluation and upgrade of cooling system mechanisms.

2.2 Water Conservation Office Program Measures

Water Conservation Office Program Measures are those measures, both existing and for consideration, that are managed or implemented by the Utility's. Many of these programs, such as universal metering and lawn sprinkler check-ups, have been under implementation for years. Others are new since the 2004 WCMP; the EPA Residential Water Use study is one such example. Existing and new program measures are indicated as such in the far two columns of the Table 2-1. Both existing and potential measures represent internal actions such as universal metering and system leak detection and repair; and external such as workshops and demonstration gardens. There are also indirect and direct actions.

New program measure ideas are categorized as "for consideration." It is the recommendation of the 2009 WCMP Committee that these programs are worthy of evaluation. A further recommendation is that all measures, including existing measures, be evaluated over the next five years. To accomplish this, a report will be submitted annually (the Water Conservation Annual Report, or CAR), and will include, among other information, a detailed analysis with accompanying recommendations on a selection of program measures.

The measures are divided into six program categories defined as follows:

- **Education**: those measures that aim to motivate or inspire behavior change; those that provide direct information on what changes to make and techniques to utilize for change; and classroom measures
- **Finance**: measures that provide financial motivators either in the form of avoided costs or through rebates
- **Institutional**: measures aimed at infrastructure improvements, leak detection, or actions taken by the City
- **Policy, Ordinance, and Regulation**: measures that either provide incentive to change or mandate change by either allowing or prohibiting a behavior
- **New Customers**: measures that would affect all new water customers
- **Research and Evaluation**: are measures that while not providing direct conservation inform our knowledge base and in so doing enhance the opportunity for the success of other measures

To facilitate review and discussion, the Water Conservation Office Program Measures are presented in both a table and text format. The table organizes measures into the six program categories identified and defined above. Each measure is listed and a brief description provided, including whether a measure is existing or to be considered for future implementation. Additionally, it is indicated to which account classification(s) that program measure would be applied. For example, brochures can be developed for issues pertaining to each account classification, while water conservation certification may only apply to accounts in the Commercial and Industrial classification.

2.2.1 Water Conservation Program Measures Table Format

Below is a listing of program measures, both existing and those to be considered for future implementation. Program measures are divided into program categories, and are listed alphabetically within that category. Account classifications refer to a broad organization of customer accounts into four categories: Single Family Residential (SFR); Multiple Family Residential (MFR); Commercial and Industrial (C&I); and Government (Gov). Brief program measure descriptions are provided, with further description and discussion in Section 2.2.2 Water Conservation Program Measures Discussions. Check marks in the final two columns indicate if a program measure is currently being implemented, or if it is a measure to be considered for future implementation. All programs, whether existing or to be considered are subject to review and evaluation. The number reference in Table 2-1 refers to a number assigned to a specific program measure within the expanded text.

Expanded program measures descriptions follow in Section 2.2.2 Program Measures Discussions.

Table 2.1
Water Conservation Office Program Measures

Note: Account Classifications Abbreviations
SFR: Single Family Residential
MFR: Multifamily Residential
C&I: Commercial and Industrial
Gov: Institutional (some GOV measures are specific to only SLCDPU; please refer to measure description)

		Account Classifications						
No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
Education Program								
E-1	Brochures	√	√	√	√	Develop and distribute brochures relating to water conservation	√	
E-2	C&I Certification			√		Develop and implement a water-wise certification program for commercial and institutional water customers		√
E-3	C&I Conservation Plans			√		Encourage and publish water conservation plans from commercial, institutional, and non-profit customers		√
E-4	Classroom Programs	√	√			Develop package programs and activities to facilitate classroom learning focused on water conservation		√
E-5	Demonstration Gardens	√	√	√	√	Design and construct demonstration gardens throughout service area	√	
E-6	*GardenWise*	√	√	√	√	Develop and distribute water conservation-focused programming for SLC TV17	√	

		Account Classifications						
No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
E-7	*It's a No Drainer* Campaign	√	√	√	√	Educates households, restaurants, and other businesses on the importance of controlling what does into a sink drain or into a garbage disposal unit	√	
E-8	Landscape and Irrigation Style Guide	√	√	√	√	Develop and distribute a guide for enhancing water-use efficiencies in landscapes and for irrigation systems		√
E-9	Landscape Assessment and Check-ups	√				Program partners with Master Gardeners to provide residential landscape assessments to enhance water efficiencies		√
E-10	Landscape Plant List	√	√	√	√	Develop and distribute a water-wise plant list specific to local weather and soil conditions	√	
E-11	Landscape Templates	√	√	√	√	Develop and distribute quick-guide references for commercial, residential, and parkstrip landscapes		√
E-12	Lawn Sprinkler Check-ups	√	√	√	√	Promote and conduct lawn sprinkler check-ups for residential, commercial, and institutional properties	√	
E-13	Outdoor/Indoor Water-use Counter	√	√	√	√	Develop a web-site water use counter to encourage customers to monitor their water use daily/weekly		√
E-14	Parkstrip Plant List	√	√	√	√	Develop and distribute a water-wise plant list for park strip areas	√	
E-15	Plant list database	√	√	√	√	Convert landscape and parkstrip plant list to database format		√
E-16	Planting and Maintenance Guide	√	√	√	√	Develop and distribute a maintenance guide for non-traditional landscapes, and for water-wise lawns		√
E-17	Private Garden Project	√	√	√	√	Promote institutional, commercial, and residential properties to be water-wise demonstrations		√
E-18	Residential Leak Detection and Repair	√	√			Provide low or no-cost leak detection and repair to qualifying households		√
E-19	Specialized Garden Guides and Plant Lists	√	√	√	√	Develop and distribute plants lists and guides for bio-swales, rain gardens, roof-top gardens, and riparian corridors		√
E-20	Virtual Water Conservation Garden	√	√	√	√	Develop virtual garden tours on web site and link with plant data base		√
E-21	Water Savings Virtual Meter	√	√	√	√	Develop a web-based virtual water reservoir to tally water savings for		√

		Account Classifications						
No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
						individual accounts and service-area wide		
E-22	*Waterpedia*	√	√	√	√	Develop a web site pertaining to water which could be used in classroom and by water customers; pilot project to focus on water conservation with the intent of linking all utility public outreach learning		√
E-23	Workshops and Classes	√	√	√	√	Workshops on water conservation techniques and strategies		√
Finance Program								
F-1	Incentives					Promote incentive programs as available; investigate opportunities for new programs		
F-2	Irrigation Target Budgets	√	√	√	√	Establish targets for accounts with dedicated irrigation-only meters	√	
F-3	Rate Structuring	√	√	√	√	Utilize a rate structure to encourage responsible use of water	√	
F-4	Rebates					Promote rebate programs as available; investigate opportunities for new programs		
F-5	Volumetric Sewer Charge	√	√	√	√	Base sewer rates on metered winter water usage	√	
Institutional Program								
I-1	Customer Use Change Notification	√	√	√	√	Notify customers when water usage exceeds winter usage by 20 percent	√	
I-2	Landscape Upgrades				√	Inventory and assess Utility properties for water efficiencies and make necessary upgrades		√
I-3	Loss Prevention				√	Implement aggressive pipe replacement program to ensure enhanced distribution system efficiencies; identify and repair system leaks in a timely manner	√	
I-4	Monthly meter reading and billing	√	√	√	√	Provide timely and accurate information to customer to increase awareness of water use	√	
I-5	Public Utility Advisory Committee				√	Standing citizen committee to advise in conservation policy and programming	√	
I-6	SLC Dept/Div Conservation Plans				√	Encourage and publish water conservation plans from City Departments and Divisions		√
I-7	Universal metering and meter replacement	√	√	√	√	Each account is metered and each residential meter is replaced every five years	√	

		Account Classifications						
No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
I-8	Water Loss Audit				√	Complete loss audit based on new AWWA standards and implement findings	√	
I-9	Water Re-use Pilot				√	Implement a water re-use pilot project		√
Policy/Ordinance/Regulation Program								
P-1	Graywater					Research issues regarding Graywater use and establish appropriate policy		√
P-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		√
P-3	Irrigation Efficiency Standards		√	√	√	Develop and adopt Irrigation Efficiency Standards for all commercial and institutional properties		√
P-4	Landscape Ordinance	√	√	√	√	Amend existing landscape code to accommodate and encourage water-wise landscaping in front yards	√	
P-5	Parkstrip Code	√	√	√	√	Develop and adopt ordinance to accommodate and encourage non-traditional, lower water plantings	√	
P-6	Rainwater Harvesting				√	Research issues relating to rainwater harvesting and support appropriate legislation	√	
P-7	Rain Sensor Ordinance and Policy	√	√	√	√	Require all properties with automated outdoor sprinkler systems to be fitted with rain sensors		√
P-8	Squandered Water Ordinance	√	√	√	√	Develop and adopt an ordinance prohibiting the squandering of water		√
P-9	Sub-surface or Low-impact Irrigation for Small Areas			√	√	Require sub-surface or low-impact irrigation on medians, parkstrips, and in parking lots		√
P-10	Water Shortage Contingency Plan	√	√	√	√	identify specific calls for action during water shortages and emergencies	√	
New Customers Program								
NC-1	Cool-Season Turf Limit			√	√	Limit amount of cool-season turf as a percentage of total landscapeable area		√
NC-2	Irrigation-only Meters		√	√	√	Review existing policy and make recommendations		√
NC-	Sprinkler System	√	√	√	√	New customers to be required to		√

		Account Classifications						
No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
3	Efficiency Rule					have sprinkler systems that meet Distribution Uniformity as yet to be determined		
NC-4	Sub-metering on New Multi-Family Dwelling Units		√			Require all new multi-family dwelling units to be sub-metered		√
Research and Evaluation Program								
R-1	EPA Residential Study	√				Measure and evaluate water efficiency in newly constructed homes	√	
R-2	Irrigation Controller Study		√		√	Test and evaluate weather based irrigation controllers	√	
R-3	Landscape Inventory	√		√		Inventory alternative landscapes and quantify water savings		√
R-4	Plumbing Fixtures Inventory	√	√	√	√	Inventory upgrades in plumbing fixtures and calculate quantity of remaining, older fixtures		√
R-5	Technical Water Savings Study	√	√	√	√	Calculate maximum technical water savings potential		√
R-6	Water Softener study				√	Research effects on water softener use on waste stream quality and impacts on water re-use water quality		√

2.2.3 PROGRAM MEASURES DISCUSSIONS

This section provides greater detail of the Program Measures. It is organized in the same manner as the Program Measures Table, with each measure within a Program Category, in alphabetical order. To facilitate the locating of a specific measure from Table 2.1, each measure has been assigned a number that corresponds to its location in the discussion text.

Note: an asterisk indicates an existing measure; a † indicates inclusion in the 2010 CAR

Education Program Measures

E-1 Brochures * †

Currently we have produced three brochures (see appendix for samples). In order to address the needs of a diverse customer base, the brochure inventory should be expanded to include the topics listed below, though other topics ought to be considered as new needs are identified.

- Indoor Water Conservation
- Revised Landscape Ordinance
- Water-wise Commercial Landscaping
- *GardenWise*
- Demonstration Garden Guides

E-2 Commercial and Industrial Certification

Develop and implement a voluntary water-wise certification program for commercial and institutional water customers. The certification process may include: indoor and outdoor audits; identification and adoption of general or industry-specific Best Management Practices; adoption and implementation of a Conservation Plan; and support and promotion of water conservation measures. Certified businesses would be identified on www.slcsaveh2o.com and receive certificate or decal for display.

This measure features opportunities to expand into other Department interests, such as stormwater and waste water discharge, or watershed and river stewardship. Similar certification processes could be established within these areas, creating layers of certification and recognition for participating businesses.

Criteria for certification should support and encourage LEED and other similar standards for C&I construction so long as health, safety, and water protection standards established by the Department are met.

This measure has potential linkages with the e2 Business Program currently being supported by the Division of Sustainability and coordination between these programs could enhance both.

E-3 Commercial and Industrial Conservation Plans

Invite businesses to develop and implement Water Conservation Plans. Program details may include: plan templates; Best Management Practices; conservation goals; monitoring, reporting; publication or plans; water-use reductions tabulated on website. Program intent is to demonstrate to the public the commitment of the business community to act as partner in achieving our long-term conservation goals.

E-4 Classroom Measures

Currently, SLCDPU and Utah educators depend on the Utah State Division of Water Resources Office of Conservation to offer classroom programming to expand our children's understanding of what it means to live in an arid climate, how water is delivered to their homes, and how to use this previous resource wisely. Through the State's WET Program and the Living Planet Van, the Division of Water Resources provides classroom experiences to school aged children with a program focus of the water cycle and the regional water profile. Lessons and strategies for water conservation are included within these programs but are not the programs' primary focus. Because WET and the Living Plan Vans are statewide programs, they are not specific to the Salt Lake Valley or SLCDPU's service area water supply and demand issues.

Increasing demands on the State's resources for expanding these existing programs, and increasing water usage and demand along the populated Wasatch Front, has created a need to develop an educational program focused on the Wasatch Front, and specifically SLCDPU's service area. To that end, SLCDPU, the Division of Water Resources, and local educators are

working together to explore opportunities regarding the development of a local water conservation education program for school-aged children.

Proposed program objectives include a heavy emphasis on water conservation techniques and strategies, with the underlying goals of educating students and teachers on the value of our water resources, the need to protect our water sources; and the process for delivering water to SLCDPU service area. Program elements could include the development of an educational website, curriculum planning for use in Salt Lake classrooms, and specific classroom and field events.

The aim of this program measure is four fold:

1. To forge a partnership between SLCDPU and local educators, to ensure students and educators develop or deepen their understanding of water use characteristics and issues specific to Salt Lake City, and how that use affects water availability, rates, and policy implementation. An agency/educator partnership would allow the opportunity to take broad, general concepts relating to water that is found in texts and other sources and apply those concepts to the specific experiences here within our watershed and drainage basin. It would also allow for the development of classroom programming linking water conservation to other curriculum areas, such as history and the development of water in Salt Lake City; community service learning and working on neighborhood water conservation landscape projects; and the relationship between science and policy development
2. To ensure SLCDPU provides enhanced opportunities for our customers, including youth, for deeper understanding of our water supply, demand patterns, and the role of the consumer in achieving conservation goals. It is through this understanding and mutual effort that our community will be successful in achieving its long term water conservation goals. And more directly, such a partnership will increase the awareness of our youth and the role they will play now and in the future of ensuring a continuing supply of high quality drinking water.
3. To design a program specific to SLCDPU water supply and demand issues, such as the role of non-traditional sources of water; the consumer's role in minimizing the impacts of drought; the relationship between water use and other environmental issues such as energy.
4. To relieve some demands on the State's resources and allow it to focus its educational programs to a broader, statewide audience.

E-5 Demonstration Gardens *

As a means of inspiring property owners to alter landscapes, it is hard to imagine any measure as effective as the opportunity of a hands-on, living garden. Since the last WCMP, both Weber Basin and Central Utah water conservancy districts have designed and installed water conservation gardens, and Jordan Valley WCD and Sandy City have expanded and upgraded their gardens, respectively. Based on data collected by Jordan Valley WCD, 40 to 45 percent of visitors to both the garden and the garden faire events are from the Utility service area.

To meet the local demand for these garden experiences, the Utility proposes to support the creation a series of moderate sized neighborhood water conservation demonstration gardens

(WCDG) throughout its service area. As a minimum, it would be ideal to have one in each city council district and in each of the communities to which we provide water. Developing a demonstration garden in each of the community council neighborhoods is a long term goal.

A value in having many moderate sized gardens is the versatility and diversity in design and plant palette that this garden-development methodology would allow. Demonstrating that water-wise gardens need not all look alike and showing various garden styles might encourage and inspire those who might think that these gardens are typified by cactus, rock, and sparseness. To ensure that these varied gardens facilitate both behavioral and technical changes in landscape design, installation, and maintenance, criteria needs to be developed to guide in the decision-making process of garden development. While each garden may appear different, all will be built on the premises of best management practices for water-wise gardens.

These gardens can be linked through shared elements such as interpretive sign boards, brochures, and plant labeling. Additionally, the department website could play host to a virtual garden tour feature; the garden sites could also be linked to the plant database, a proposed program measure. The garden sites could be utilized for teaching opportunities, or to host other community events. As the number of these gardens grows, docent-led garden tours would create opportunities for guided comparisons in style and plant palette.

While well-designed demonstration gardens can facilitate the learning experiences of a community, creating opportunities for direct participation would enhance the experience and increase the likelihood of achieving the goals of this program measure – reducing water use in the landscape. Towards that end, a public aspect of the demonstration garden program could be developed which would encourage property owners, whether commercial or private, to build their own demonstration garden. A mechanism could be devise utilizing the web site whereby property owners could register their landscapes, submit photos and plant lists, and calculate and record water savings. The level of involvement could be flexible, with some properties choosing to be open to public visits or inclusion in garden tours, while others may choose to limit their participation to photos on-line. These sites could also be linked to the plant data base. To ensure quality and program integrity, sites would have to apply and there would need to be a review and screening process before inclusion into the garden program.

This program measure incorporates aspects of community-based social marketing, including 1) uncovering barriers; 2) creating opportunities for commitment; 3) building community support; and 4) effective communication. Another component of social marketing is an emphasis on pilot tests; completion of the Greater Avenues WCDG can provide opportunities to implement components of this measure. Web page development may also take place to test the participant-aspect of the garden program at minimal cost, presuming the pilot-phase of the site can be constructed in-house.

E-6 *GardenWise**

Salt Lake City Corporation hosts a locally broadcast television station with the call letters of SLCTV 17. During the last administration, a request was made through the Mayor's Office to develop content for SLCTV 17, as the only programs being aired were city council and planning

commission hearings. Working with the city's Information Management Services division, *GardenWise* was conceptualized and developed, and a number of segments were taped. These episodes currently air on the television station and are also available through streaming video on both the conservation website and the city's SLCTV 17 site.

The first segments focused on the parkstrip, and included information on the rules, design, plant selection, installation, and watering. More segments are planned, including a series on irrigation (design, retrofitting, and maintenance); lawn care and watering; container gardening; and vegetable gardening.

As conservation demonstration gardens are developed, segments could be filmed providing virtual tours.

Currently, viewership is limited to those with cable access or a computer with internet access. Measure expansions may include duplication of program segments onto DVD for distribution at fairs, garden centers, and city events. Additional marketing and outreach strategies will be explored to increase visibility and viewership.

E-7 *It's a No Drainer* Campaign

This program was developed nearly eight years ago and was intended to promote improved waste-stream water quality, thus reducing waste-stream load, and reducing costs associated with wastewater treatment. The program has been underutilized and supporting materials are currently being reviewed and updated for re-distribution.

Program links to pre-treatment and wastewater quality are evident; connections to water conservation are less obvious but this program has links to the re-use water project. Our communities' ability to utilize re-use water is dependent on several variables, including affordability, public acceptance, and water quality of end product.

Linking this program measure with water conservation could serve three purposes. First, it has the potential of improving waste-stream quality and therefore wastewater quality, enhancing the product quality available for re-use. Second, this measure, in improving water quality, could reduce operating and/or maintenance costs associated with wastewater treatment, thus freeing assets which could then be applied to the re-use pilot project. Lastly, the community might find it easier to relate to a program measure linked with water conservation than with wastewater quality, thereby increasing measure acceptance and participation.

E-8 Landscape and Irrigation Style Guide †

It is much easier to maintain a landscape in a manner supportive of a conservation ethic when that landscape was from its conception, designed, constructed, and commissioned with water conservation in mind. A Landscape and Irrigation Style Guide would provide landscapers, contractors, and homeowners with basic, step-by-step recommendations and standards which would assist in the design and construction of attractive and water-efficient landscapes.

The purpose of the guide would be to provide standards and guidelines for increasing water efficiency and reducing water waste through better irrigation design; appropriate plant selection and placement; turf placement and type; and other techniques.

Preparing these standards and guidelines as a style guide allows for flexibility in adopting and updating the guide as new technologies and practices come to light; a code or ordinance would be more cumbersome to update. To enhance the effectiveness of the Style Guide in achieving water conservation savings and reductions in water waste, the guide could be referenced in code or contracts with either recommendations or requirements for adherence to the standards outlined within the guide.

It is recommended that the Style Guide be crafted with input from the City's Golf and Parks Divisions, and irrigation and landscape professionals.

E-9 Landscape Assessment †

The Utility has been offering free lawn sprinkler check-ups for over a decade, and the program is well received for both its positive consumer response, and for achieving long-term water savings. Lawn isn't our only landscape, however, and more property owners are looking at the rest of the landscape and wondering what other improvements could be made to improve efficiency and reduce waste.

A landscape assessment program would provide access to knowledgeable, trained landscape and plant experts proving site-specific advice on techniques to improve water efficiencies through irrigation modifications, to plant selection and placement. This measure could be designed in conjunction with a number of existing organizations, including the local County Extension Office, professional design and landscape organizations, and Master Gardeners.

As with Lawn Sprinkler Check-ups, this could be offered for free as a service to our community. Landscape Assessment could also offer opportunities for data collection and research into behavioral and technical aspects of landscape preferences and practices; information which could assist in the understanding of those practices and beliefs, allowing for the identification of needs and the development of more meaningful programming in the future.

E-10 Landscape Plant List * †

1n 1997, Salt Lake City crafted the *Water-Wise Plants for Salt Lake City* plant list; this list was updated and expanded in 2004 as part of that year's WCMP. While the list provides a great deal of very useable, local information on plants, the list format is cumbersome and costly to distribute. As a result, it is an asset that is underutilized. To address these issues, once again *Water-Wise Plants* is undergoing a review, though this time the resulting list will be available in data-base format on the utility's web site.

Utilizing files made available from the Utah Division of Water Resources, which maintains a state-wide plant list, this project is proceeding well. Local plant experts (several of whom participated in creation of the original list) are reviewing the current City list. Modifications to

the files provided by the state will take place this fall, with the data base going "live" before the beginning of the landscape season.

To enhance consumer experience, the data base will include links to city and other public sites where plants may be viewed in landscapes. Should the Garden Project be launched, there would be additional opportunities for plant locations, and the data base could be used to promote those sites. Another program link would be in the Commercial and Industrial Certification Measure as local plant nurseries apply for and are granted certification, the plant database could also then provide information on source.

Converting the plant list into an electronic format increases access, enhances a "user-friendly" experience, facilitates cross-program linkages, and creates opportunities for measure expansion, such as design templates and site-specific water guides and calculators.

E-11 Landscape Templates †

Information gathered from surveys, classes, and the Lawn Sprinkler Check-ups make it clear that while many people would very much like to have a water efficient landscape, most homeowners, and even professionals, do not always know how to begin.

Providing simple templates for parkstrips, parking islands, and commercial and residential landscapes may be that added bit of guidance that is needed for a property owner to take that extra step to create a water-efficient landscape. Having the template might demonstrate in a meaningful way that landscapes can be attractive, useable, maintainable, and water-efficient.

E-12 Lawn Sprinkler Check-ups * †

Salt Lake City was the first community to sponsor the irrigation audit program conducted by the USU Extension Services, contracting with USU Extension to conduct irrigation audits at no cost to customers. In 1998, the City encouraged other communities and districts to participate, enabling an expansion of the Extension program with greater community participation. Besides receiving lawn water scheduling advice, auditors also provide each homeowner with a checklist for irrigation repairs and improvements.

E-13 Outdoor/Indoor Water Use Counter

This measure involves the development of a web page that allows homeowners and businesses to estimate water use through a variety of water-use reduction strategies. The site would show how much potential savings could be gained through implementation of said strategies, and calculate potential savings over a period of time.

An Additional aspect could be a calculator that assisted the user to estimate pay-back on fixture and landscape upgrades.

E-14 Parkstrip Plant List * †

A companion document to the *Water-Wise Plant List*, the parkstrip list focuses on those plants most suited for parkstrip and median areas. Plants are divided into four height categories, and characteristics are provided, including an area-value which assists the user in determining the number of plants needed to fill in the minimum area required by code.

As with the *Water-Wise Plant List*, user experience would be enhanced, and access improved if this document were converted to a database format from the current Word format.

E-15 Plant List Database †

The intent of this measure is to convert the *Water-Wise* and *Parkstrip Plant Lists* to database format, improving accessibility and enhancing the user experience. To facilitate this conversion, we have acquired the plant database program files from DWRe Conservation Office.

E-16 Planting and Maintenance Guide †

Develop and distribute a planting and maintenance guide for non-traditional landscapes, and for water-wise lawns. The guide would provide detailed instructions on site preparation, planting methods, establishment watering, and maintenance planning and scheduling. This measure could parallel a companion series on *GardenWise.*

E-17 Private Demonstration Garden Project

Outdoor water use is a large percentage of demand within the Department's service area; summer water use requires that delivery and facility systems are constructed to such a size as to accommodate peak demand, a period lasting only a few weeks. Reducing summer water use would go a long way to easing future construction and replacement costs. The Department's service area is large, and while the desire to establish moderate sized water conservation gardens throughout its delivery area is commendable, that is a very long term, and expensive goal. To facilitate the development of water conservation demonstration gardens (WCDG) throughout its service area, the Department proposes that we invite institutional, commercial, and even residential property owners to "be part of the demonstration."

Recognizing that increasing broad-based community involvement will enhance efforts to promote attractive and water water-efficient landscapes, and acknowledging public perception that government and business need to lead by example, a joint public-private demonstration garden project would achieve the layered goals of improving public image, creating public-private partnerships, increasing access to educational garden sites, increasing buy-in of water-efficient landscapes by increasing direct participation, and increasing summer peak demand reduction.

Garden sites could be selected based on established criteria through an on-going application process. Sites could be linked visually via the web and on site through interpretive materials with common, iconic features connecting the gardens together. Future program measures could include garden tours, hands-on workshops, and other events.

This measure would have natural connectivity to existing programs such as the Salt Lake City e2 Business program, and could be linked to the proposed commercial and industrial certification program. Participating businesses could receive recognition on property via plaques or other markers, and on the Department's web site.

E-18 Residential Leak Detection and Repair

According to an AWWARF study, water leaks account for over 13 percent of residential water use. Given that our average indoor use for single and multifamily residential usage is 3,202,925 ccf, the potential savings is approximately 416,380 ccf or $562,113 to $761,975 based on current Tier Two water rates. Reducing residential water leaks even by half would result in a savings adequate to provide nearly 600 single family homes with water.

Many homeowners are unaware of the impact of leaks on water use and subsequently, on their bill. Additionally, many do not know how to locate or repair water leaks. This measure could have several layers, including web-based, passive information; do-it-yourself audit kits; or professional leak detection services and repairs.
Initially, a pilot study could be implemented, focusing on publicly-owned low income housing, and for those who qualify for the Water Assist Program. This would provide an opportunity to identify measure barriers and benefits without the undue burden of applying the program service-area wide. Audit kits could be provided on a pilot basis also, with participates receiving some reward for returning surveys of value of program measure.

This program measure would have commonalities with existing Department programs (Water Assist) and provide added financial and social benefit to existing city housing programs. Partnering opportunities exist with the Red Cross, local realty boards, and plumbing associations.

E-19 Specialized Garden Guides and Plant Lists †

As awareness grows around issues of sustainability, food security, energy, and water quality, the role of the landscape in a communities' ability to achieve both short and long term goals linked to sustainability is undisputable. Rain gardens, stormwater catchments, roof top gardens, and even food gardens can play a role in making communities not only livable but thriving. These and other types of specialized gardens also have their place in a water conservation landscape strategy. Guides and plant lists can provide the needed tools to ensure that these types of specialized gardens not only achieve the desired results in cleaning stormwater run-off or cooling a building, but also reduce landscape water demand.

E-20 Virtual Water Conservation Garden

Develop virtual garden tours on web site showcasing both Department Demonstration gardens and those accepted through the Private Demonstration Garden Project. Measure has linkages with the Plant Database, *GardenWise*, and other measures.

E-21 Water Savings Virtual Meter

Develop a web-based virtual water reservoir to tally water savings for individual accounts and service-area wide. Link to Indoor/Outdoor water use counter, Private Demonstration Garden Project, and Leak Detection and Repair measures. Such a site could provide information on the dollar value of our water, and the cost of developing a comparable volume of water so that customers could see the value of their actions.

E-22 Waterpedia

Develop a web site pertaining to water use for classroom instruction and public education. This site could eventually represent all facets of the Department's public education and outreach programs, with the pilot project to focus on water conservation.

Such a site could help create and draw synergies between all facets of Department operations to enhance public understanding of the connections from watershed protection to wastewater discharge, and everything in between.

E-23 Workshops and Classes

Provide regular and on-going opportunities for homeowners and others to expand their knowledge of water conservation techniques and behaviors. Workshops could utilize a variety of teaching methods including lecture, examples, demonstrations, and hands-on experiences. Subject matter would include both indoor and outdoor strategies, and be targeted to a variety of audiences. Subject experts could be utilized to help expand perspective and subject content.

A fixed location with access to high-quality media technologies, garden area, and easy access and parking would facilitate the implementation of this measure.

Finance Program Measures

F-1 Incentives

Incentives can be defined as a reward or benefit for a specific action. Currently the Utility offers customers no direct incentives for taking any prescribed action towards water conservation. The tier-rate structure offers the indirect incentive of creating an avoided cost, and the 2008 Rate Subcommittee recommended the addition of a fourth tier to increase the impact of that incentive.

There are a variety of incentives that the Utility might consider for review, including but not limited to streamed line plan approval, reduction in meter cost for irrigation meters, and incentives for sub-metering.

With increased media attention on such programs, public interest has also increased and examining such programs, whether implemented or not, will demonstrate an openness on the part of the Utility to examining all possible strategies to achieve water conservation goals.

F-2 Rate Structure *

The Utility currently utilizes a seasonal three-tiered structure to encourage water conservation. In 2008, a citizen sub-committee of the Public Utilities Advisory Committee (PUAC), working with an independent consultant, reviewed the water utility's financial and capital needs and submitted recommendations to the PUAC for review.

It was determined that further review needed to take place and the PUAC recommended to the Mayor and City Council that no changes be made at this time; the recommendation was accepted.

F-3 Rebates * †

Rebates are typically financial incentives for buying a particular product. The most common rebates in conservation programming are for fixtures—such as toilets, washing machines, or irrigation controllers; or for actions—removing lawn or planting certain types of plants.

As a participant in the Central Utah Project, our customers are entitled to participate in an irrigation component rebate program currently being offered. Though funding varies from year to year, as long as the program is available, more outreach should be done to inform our customers of the program offerings.

As with incentives, there is growing interest in the community for these types of program measures, and it is important that the Utility continue to examine all possible conservation strategies.

F-5 Volumetric Sewer Charge *

In 1982, the Utility implemented sewer rates based on metered winter water usage. This measure resulted in a significant reduction in water waste as customers repaired leaking plumbing fixtures. During the next five years the Utility observed a 10 percent reduction in flows to the Waste Water Treatment Plant, including a 12.5 percent reduction in indoor residential use.

In 2000, the Utility launched a measure targeted to commercial, industrial, and institutional customers to reduce the BOD loading. This was accomplished through both an educational campaign, and by the enactment of an ordinance affixing additional sewer charges based on the strength of the waste discharge. This measure motivated customers to develop and implement more efficient water use and waste management practices. Ordinance No. 17.72.030, pertaining to sewer rates and load strength may be viewed on
the City's web page at www.slcgov.com, or at the Public Utility Administration Office at 1530 South West Temple.

In 2001, the Utility launched a public education campaign, "*It's a No Drainer*," to discourage the use of garbage disposals amongst residential customers. Brochures mailed in utility bills inform customers that by not disposing of waste in the sink they can save money by reducing their water and energy bills. The brochure goes on to explain that those savings are also shared by the waste treatment facility and that by extending current capacity, we can all save even more.

Institutional Program Measures

I-1 Customer Use Change Notification *

This program was developed to assist water customers in identifying and repairing leaks. Winter demand levels are monitored and usage in excess of 20 percent of average winter usage triggers notification of the customer, providing for timely repair of the system. Measure review might include an evaluation of the notification trigger level; different notification trigger levels for different customer classifications; and opportunities for summer notification.

I-2 Landscape Upgrades

In keeping with the Utility's desire to be a leader in water conservation implementation, and in recognizing the role of outdoor water use in peak demand reduction, an inventory and assessment of all Department properties and landscapes would be a step towards meeting both water conservation and sustainability goals.

Properties could be evaluated for a variety of factors including Area Landscaped Ratios, water use per area of landscape, and plant types. Recommendation could be made for upgrades.

I-3 Loss Prevention *

Maintaining distribution lines is critical to reducing water loss due to leakage and breakage. Through a combined strategy of prioritizing capital improvements, aggressive pipe replacement programs, highly trained personnel, and utilizing the latest technologies, the Utility maintains an average number of breaks per mile of pipe less than the national average, despite having one of the oldest distribution systems in the West. Since 2000, the Utility has replaced 48,443 linear feet of pipe at an average annual cost of $6,435,000.

In September of 2005 the department went through an extensive Water Audit Study by Fanner & Associates. The report details the first water audit undertaken by the city using the International Water Association (IWA) water loss management methodologies which are now the AWWA recommended methodologies for use in North America utilities. Salt Lake City was one of the first in the United States to complete a study using the new methods.

The result of the study stated that Salt Lake City Public Utilities was managing their real and apparent water losses well, when compared with both international and North America utility performance. In fact when compared with the other 12 agencies who had implemented a similar calculation of an infrastructure leakage index or (ILI), Salt Lake City's rating of 3 was the best out of the 12 agencies in North America with actual tested results.

Study conclusions identified the following areas for improvement, which the Department is currently working on:

1. Install insertion meter tapping point in the 69" Salt Lake Aqueduct mid-way between the existing multi-point ultrasonic meter and the Little Willow vault.

2. Install an insertion meter tapping point on the 36" line running east from the Metropolitan Water Treatment Plant to the Little Cottonwood Conduit.
3. Install new metering devices at Big Cottonwood Treatment Plant and the Parleys Treatment Plant.
4. Install a new permanent meters, correctly sized for current operating duty ranges, on the two effluent mains leaving City Creek plant.
5. Install an insertion meter tapping point on the Jordan Aqueduct upstream of the CUP connection on the south side of the highway.
6. Install a meter tapping point on the Downtown main at suitable location.
7. Install insertion meter tapping points at suitable locations downstream of the 82nd South, North Fortuna and South Fortuna meters.

I-4 Monthly Meter Reading and Billing *

Though not always viewed as such, monthly reading and billing can be used as a conservation measure when the information is delivered in a timely and meaningful manner. Providing property owners with the necessary data to assess not only their recent usage but comparative information can be an important strategy for achieving desired behavioral changes.

Currently, the Utility reads and bills all meters on a monthly basis; a review of the bill layout and data provided would assess if this strategy is being used to its fullness.

I-5 Public Utility Advisory Committee *

The earliest use of a public advisory committee was in 1928 to address the need for water development. The Public Utility Advisory Committee (PUAC) continues this vital role of providing public involvement in the planning process. Its voluntary members, appointed by the City Council, have been instrumental in the creation of a number of water conservation programs including the recently adopted Rate Restructuring, the Water Shortage Contingency Plan, and this Plan.

This committee periodically reviews existing conservation programs, and will be involved in the selection and review of new programs. Dedication of a portion of one meeting annually to the topic of water conservation would serve to meet a requirement identified within Utah Code 73.10.32; the review of the CAR would serve this function.

I-6 Salt Lake City Department and Division Conservation Plans †

Recognizing that it is only through our combined efforts that we will succeed in achieving our long term water conservation goals, we are inviting each city department and its' divisions to work with us in drafting the 2009 WCMP. It is our goal that each city department will develop a water conservation goal that includes both short and long term programs for achieving the goals, and plans for implementation.

Some plans already submitted are included at the end of this chapter.

I-7 Universal Metering and Meter Replacement *

The City began a universal metering program in the 1920's that was completed by the early 1950's. It was recognized that the best way to ensure financial stability for the water department and to address consumer demand, and hence be able to change it, lay in the City's ability to accurately determine the actual volume of water being used by individual customers.

The department is currently in the third year of a five year meter replacement program. Over the last two years the utility has replaced 45,920 meters which were more than 10 years old to reduce the amount of unbilled water usage. It is the intent of the department to continue the program over the next two years, replacing an additional 17,000 residential meters. By reducing water loss 1 to 2 percent, this program is expected to recover the $6 million program cost through additional revenue gained over the life of the five-year program. A one percent reduction in total use acquired through this measures provides enough water to service 1355 households.

I-8 Water Loss Audit *

During 2005 the department completed a water audit based on the new International Water Association and American Water Works Association standard. Salt Lake City Public Utilities is one of a very small group of utilities that have completed a water audit based on the new standard. The study stated that our agency has a good performance record in controlling real and apparent losses. The study was undertaken for the following reasons:

1. To determine the economic value of reducing the department's unaccountable water
2. To implement the new standard recognized as the current best practice in the industry
3. Identify real and apparent losses in our system
4. Evaluate the possible methods of managing those losses

The result of the audit indicates that Public Utilities is managing their real and apparent water losses well compared with both International and North American utility performance. Based on the preliminary report, Salt Lake City ranked third in the United States in the effective water loss management and about the middle of cities internationally. However, the 95 percent confidence limits on this analysis are currently very wide. This is because the system input metering from the City's surface water sources is poor and few of the key system input meters can be readily tested. Before Public Utilities invest any funds to find real losses, it is recommended that the following actions to taken:

- Upgrade numerous meters that measure flows from water treatment plants and turnouts from the aqueducts
- Improve the management of the large and medium customer meters and thereby reduce the level of apparent losses and increase revenue
- Improve the performance of multi register large and medium meters

Another component of the Leak Detection Program is conducted through the Geographic Information Systems (GIS) group of the Utility. Using geophones leaking pipes are discovered quickly, reducing the volume of water lost and the cost of repair.

I-9 Water Re-use Pilot Project

The Department has completed a Water Re-use Feasibility Study to determine opportunities and costs associated with a 5-million gallon per day pilot plant. Construction of a small-scale facility would allow the Department to increase understanding of utilized technologies, subsequent operation and maintenance, and gauge public acceptance of this water supply. Intended target customers include schools, parks, golf courses, and several commercial customers.

Policy, Ordinance, and Regulation Program Measures

P-1 Graywater †

Graywater is defined as untreated used water that comes from sinks, bathtubs, cooling towers or other plumbing fixtures, but not from toilets or, in some cases, kitchen sinks. Currently, the Utility does not have a policy or formal position on graywater, but with increasing interest in this as a source of water, particularly for landscapes, it would be valuable to determine a position and then to promote that within the community.

P-2 Irrigation Audit

Develop and adopt an ordinance requiring Irrigation Audits on all new commercial and institutional properties, and for accounts which exceed target or set CCF. This measure would be consistent with the findings of the code review conducted by the SLC Department of Sustainability.

P-3 Irrigation Efficiency Standards †

Develop and adopt Irrigation Efficiency Standards for all commercial and institutional properties. These standards would address design, construction, and maintenance of all irrigation systems, including drip systems. Irrigation components, controller devices, and rain sensors could also be addressed. The Utah Irrigation Professionals, a division of the Utah Nursery and Landscape Association, is interested in seeing such standards created and adopted.

P-4 Landscape Ordinance †

In 1995, Salt Lake City amended its landscape ordinances to encourage water conservation through the use of water-wise plants. However, the ordinance did not require use of these plants and still defined landscapes as being "a planted area that contains continuous turf or groundcover." In 2000, the parkstrip code was amended to remove the requirement of turf, and to not require more than one-third of the area to be planted.

After five years of effort, the Utility was successful in having the landscape definition changed, deleting the clause relating to continuous turf and groundcover. Additionally, language similar to

the parkstrip code was added, requiring that only one-third of a front yard need contain plants, with the reminder needing to be covered in mulch. This code change was necessary in order to fully utilize landscape design strategies which can result in long term water savings.

With the modifications in effect, an educational campaign needs to be developed and implemented to ensure that the community understands the current code and how these changes might benefit them and their water use.

Salt Lake City's Landscape Code is long and complex, and further review and update should be continuous. Some areas of particular interest are street medians and parking lot islands.

P-5 Parkstrip Code †

The Parkstrip Code was modified in 2000, removing the requirement for turf and allowing that only one-third of the parkstrip area need be planted.

To enhance public understanding of the code change, a brochure and video series were developed. The brochure is distributed through the community councils and at other venues, such as the Department's Administrative Office, City Hall, and on the web. The video series, produced in *GardenWise*, is available on Cable Channel SLC TV 17, or as streamed video on the city's and department's websites. Additionally, a Parkstrip Plant List was developed, providing information on the code, plant selection, and design strategies.

More could be done to distribute these materials and improve access, including providing DVDs at local nurseries. The Parkstrip Plant List is only available on the Department's website, and creation of the plant database will improve access and increase usability.

P-6 Rainwater Harvesting †

As water of the state, this water supply is regulated by Utah State Law and those laws are applied through the Office of the State Engineer. At the time of this writing, rainwater harvesting is not allowed by state water law.

During the 2009 State Legislative Session, Scott McCoy, D-Salt Lake City, submitted a bill for approval that would allow a water provided to hold an unutilized water right in abeyance for rainwater harvesting and use. The bill recommended a permit and reporting process to ensure that issues around public safety and health were met, and to enhance the volume of water use of this particular supply. The measure failed, in part due to a second bill submitted that focused on rain barrel catchment in residential applications.

The Department intends to continue to work with the State Engineers Office and the State Legislature to find a solution which adequately addresses issues of water law and public health and safety, while still allowing for large-scale and environmentally sound utilization of rainwater.

P-7 Rain Sensor Ordinance and Policy †

An important aspect of water conservation in a landscape is managing water supplied to a landscape as a function of weather and climate. To maximize water use reductions in the landscape, it is important to modify watering application schedules annually, for instance watering less frequently in the spring and the fall; and modifying that schedule with the weather, such as in response to rain events.

Rain sensors assist in that strategy in that once installed, no further action on the part of the user is necessary. There are irrigation controllers that include rain sensor devices, and there are rain sensors that can be installed retroactively to the irrigation controller. Cost for these devices is typically less than $50.00 retail.

The ordinance component of this measure might require that all new customers and all building construction projects requiring a permit would be required to install a rain sensor. This avoids issues arising from imposing such a retrofit post construction. The policy component might be that all city properties with irrigation systems be retrofitted with a rain sensor within a given period of time. This policy would be consistent with both the Department's and the City's long term sustainability goals.

While it is unclear what volume of water use reduction could be achieved through the implementation of a rain sensor ordinance and policy, what is clear is the impact such an action would have on public perception. Rain events in our valley are sporadic and frequently of little volume and may not be adequate to replacing a water cycle within an irrigation schedule. Public perception, though, is weighted without such consideration, and the practice of watering during or immediately after a rain event is perceived as wasteful. Implementing a retrofit program for city sites would enable us to avoid watering in proximity to a rain event, and therefore, avoid public ire.

P-8 Squandered Water Ordinance †

Salt Lake City has mostly depended on voluntary compliance and cooperation in achieving its water conservation goals. And, for the most part, we are and continue to meet those goals. As more people become aware of the need to conserve water and implement conservation practices in their daily routine, they also become witnesses and advocates for those practices. They see other property owners over watering, watering during rain events, operating systems with broken sprinkler heads, and these observers want something done.

The good news is that our efforts to education the public in what constitutes an efficient sprinkler system and good watering habits is to some degree successful. Those who call and complain are, for the most part, specific in their observations and objections. And in many cases there are concerns of public safety or property damage. Reporting is not enough and they want to see some level of remediation; in short, they want to know that everyone is doing their part to save water. And if they won't voluntarily, then we ought o make them.

We take all calls and emails of complaints seriously, and make every attempt to correctly identify a property in question, locate and contact the property owner, and discuss better

management practices. Most of those we call were unaware of an issue and are eager, or at least willing, to have repairs made or correct schedules. There is a percentage of those receiving calls where we are dealing with a property that answers to an absentee landowner or franchise and decisions are not made locally. Another percentage of calls are met with indifference or a flagrant disregard of the value of the resource.

It is in these latter cases that we have no recourse and our calls are ineffectual. An anti-squandering ordinance would allow steps to be taken to compel these most egregious wasters to remedy the squandering of water. Precedent exists within the Water shortage Contingency Plan, and the Department has been given authority to establish other policies and regulations around other water use.

An important premise in any effective water conservation plan is the concept of fairness. With no way to compel action when other methods fail, it is difficult to maintain a position of equity, and that erodes public faith in our efforts and eventually, our desired outcomes.

P-9 Sub-surface or Low-impact Irrigation for Small Areas

Irrigation professionals, including the Irrigation Association and the Utah Irrigation Professionals acknowledge that it is difficult to achieve reasonable levels of efficiency in small spaces. Most irrigation sprinkler heads are designed to cover large areas and attempts to design and manufacture spray and rotation heads with a spray diameter of less than ten feet have been met with mixed results.

And ordinance that requires sub-surface or low-impact irrigation on medians, parkstrips, and in parking lots would address this issue directly, and avoid problems such as overspray.

This ordinance might initially be applied to new commercial and institutional properties as a pilot phase to determine effectiveness and acceptance.

P-10 Water Shortage Contingency Plan

In the fall of 2002, the Utility began the process of drafting a water shortage contingency plan (WSCP). The purpose of the plan is to identify specific calls for action during water shortages, such as the current drought and other water shortage emergencies by anticipating the impacts of such shortages. By determining the actions and procedures for responding to a water shortage in advance of an actual emergency, the Utility and community can be better prepared and experience less disruption.

The water shortage contingency plan was written with the assistance of the PUAC, as well as a number of professional associations, including the Intermountain Turf Producers, Utah Irrigation Association, Utah Carwash Association, Tree Utah, and representatives of the hotel and lodging industry. After a review by the Administration, the WSCP was adopted by the City Council in June of 2003, and the text is included in the appendix of this document.

New Customer Program Measures

NC-1 Cool-Season Turf Limit

Many communities in the arid West are looking to limit cool-season turf under certain uses. Acknowledging that the use of cool-season turf is not in itself the problem, our insistence that it remain crisply green during the hottest summer months is the core issue, because to do that, it needs more water than some other types of landscapes.

To approach this issue, we may want to inventory and assess potential new commercial and institutional properties to determine what, if any savings might be gained. We may also consider applying this first to new city properties, excluding parks, golf courses, and play areas.

Commercial properties rarely use turf for anything other than its visual impact and there might be opportunity for savings y working to identify and alternative landscape design and plant palette that would meet their aesthetic and maintenance needs while still moving us forward towards our long term conservation goals.

The other aspect of this program measure to consider is the public response to non-turf areas. There may be value in either conducting a review of surveys or a new survey to determine public acceptance of non-turf landscapes.

NC-2 Irrigation-only Meters

The department's current policy on irrigation meters allows the installation of irrigation-only meters on properties with a total lot size of one-half acre or larger. Irrigation-only meters on smaller properties are not allowed.

Irrigation-only meter accounts receive a water budget utilizing a formula provided by Utah State University and based on the Penman-Montieth Evapotranspiration Model. These accounts are billed in Tier Two for water used within the budget, and in Tier Three for water in excess of the budget.

It is unknown how much potential water savings might be achieved were more properties fitted with irrigation-only meters, and a study to determine that might be of value. Additionally, a policy review in conjunction with a collection and analysis of the data would be valuable, in that it would either confirm the effectiveness of our current policy, or provide insight into possible modifications.

Very large new developments (for example the NW Quadrant) might be designed with higher level of planting requirements. These large new developments could also be designed to use secondary water for irrigation, which would require a secondary system of water delivery, and a separate meter. Secondary water could be supplied a re-use water or from a waste water "scalping" plant could be the source water for a secondary pipe (purple pipe) system. Designing systems for 40,000 – 60,000 new residents may make these types of projects feasible from a cost point of view.

The disincentives affecting the use of irrigation-only meters include the initial meter hardware and installation costs. Minimum monthly bills also skew a cost analysis against additional metering. To be accepted, these barriers would need to be addressed.

NC-3 Sprinkler System Efficiency Rule

There are two components of landscape watering that effect water use, or over use: the watering schedule and the sprinkler system efficiency. Targets, watering schedules, even time-of-day ordinances may influence the former. Design, construction, and maintenance effect the latter.

A measure of sprinkler system efficiency is the sprinkler audit, a physical test of the mechanical sprinkler system through its operation. One of the outcomes of an audit is the distribution uniformity, a measure of sprinkler efficiency.

While an ideal scenario would be that all sprinkler systems are checked annually, at the least, all new systems could be required to provide an independent audit report, with the provision that those that do not meet an identified minimum efficiency standard would have to be improved until a passing audit report could be submitted. This report would be a condition of being granted a permit, and bonds could be placed and held to accommodate construction schedules and the season.

A number of cities in the West, including Sandy City, have such requirements. While it is unknown what volume of water savings could be achieved, it is known through our Lawn Sprinkler Audit measure that the efficiency of lawn sprinklers in Utah average around 54 percent. A review of the number of new connections permitted annually would provide an approximate volume of water saved.

NC-4 Sub-metering on New Multi-Family Dwelling Units

Knowing how much water is used is the critical first step in knowing how much less water can be used. It has already been established that monthly meter reading and billing provides customers with vital and timely report which can then be used to make informed choices about how to use water.

Not all of our customers, though, receive a bill, or even know how much water they use. Most of those who live in apartments, condos, and other multifamily dwellings, do not have a meter, so subsequently, cannot receive a bill or be informed of their water use behaviors.

A review of the policies and codes relating to metering and sub-metering would provide insight into this issue. Department policy has been to master meter and have a single party responsible for account and bills. Requiring sub-metering could overwhelm our current process to require all renters to enter into agreements with us, and affect meter reading schedules.

Research and Evaluation Program Measures

R-1 EPA Residential Study

One of the key ways to reduce the cost for new and upgraded water and wastewater infrastructure is to reduce household water demands. It would be very helpful for planning and management of water resources if better information were available on the water use patterns in new homes. Do new homes use more or less water than existing homes? If there is a difference between new home and existing home water use, is it because of inherent differences in the efficiencies with which water is used or is it that the new homes are different in size or the number of residents? Is it possible to use advanced technologies in new homes in order to reduce water demand? Currently this information is not available. The purpose of this research project is to collect data from several large water utilities across the United States that will answer these questions and provide an empirical basis for understanding household water use.

In addition to researching baseline water use in new homes, the project will demonstrate how the use of advanced technologies can reduce water use below levels sought in the 1992 National Energy Policy Act (NEPA). Both indoor and outdoor water use patterns will be investigated using a combination of billing data, surveys, and flow trace analysis. Data from secondary sources, such as census and tax assessor databases, will also be used for the analysis. In the study, new homes will be divided into "standard" new homes, defined as those that simply comply with the NEPA, and "high efficiency" new homes, defined as those that employ water conservation measures over and above those mandated by the Energy Policy Act.

R-2 Irrigation Controller Study

This study intended to evaluate the efficiency and ease of use of innovative stand-alone and add-on irrigation control devices through site observation and water use records

The purpose of the study was to test and identify affordable irrigation controller products for homeowners or small-site managers in order to reduce landscape irrigation, minimize water waste, and reduce maintenance costs associated with irrigation controller management. Project outcomes will include product information, site considerations relating to product selection, installation instructions, and cost savings associated with water use reduction and reduced maintenance costs. This study met the goals and objectives as outlined in the 2003 Water Conservation Master Plan as adopted by the Salt Lake City Council.

Within the study proposal, a variety of limitations were identified, but one critical aspect was overlooked. The sites selected are owned and operated by different city agencies and in a variety of partnerships. As a result, dedication to adherence to study methodologies was mixed, and in some cases ignored. Without a consistent commitment from the agencies, another barrier was exposed—frequent changes in ground personnel and inconsistent skill levels. A final barrier to completion was the reorganization of the management of these properties, and in some cases, the selling of these properties.

As a result, the study has been temporarily suspended. The study purpose and methodology has merit, and several sites experienced a decrease in water use with no measurable decrease in

aesthetics or plant health. These findings would support a re-activation of this study but with other subjects.

R-3 Landscape Inventory and Analysis

The intent of this study would be to create an assessment of landscapes within the service area to determine potential water savings. Study framework would include, but not be limited to, the development of landscape classifications, through landscape identification and assignment, analysis of water use records, and the development of water use estimates. Through a variety of methods—including aerial photo analysis, surveys, reporting, and visual inspections—landscapes could be inventoried, assessed, and catalogued, with study outcomes being: 1) an understanding of landscape preferences and selection; and 2) water use as a function of landscape type; and 3) water savings potential.

An additional outcome could be an identification of modifiable landscapes for purposes of direct marketing of conservation practices.

This study would be ideally suited for a college project. It could be broken down into user classifications, such as institutional, commercial, industrial, and residential.

R-4 Plumbing Fixtures Inventory and Analysis

The intent of this study would be to inventory and assess indoor plumbing fixtures throughout the service area. The inventory could be conducted a variety of ways, including through surveys and inspections. The purpose of the study would be to identify water savings potential through the identification of inefficient plumbing fixtures.

This study is well suited for a college project and could be broken down into water user classifications.

R-5 Technical Water Savings Study

This study would look at the potential savings resulting from the installation of efficient plumbing fixtures combined with those gained by implementing the recommendations of the Water Loss Audit Report conducted by the Department in 2004 and the from the maintenance of the water system infrastructure.

R-6 Water Softener Impact Study

Conduct meta-study on waste-stream water quality effects from water softener additive products. The intent of the study would be to determine if residential or commercially used water softener appliances and their related products affect waste-stream water quality such that use of such appliances and/or related products could negatively affect water re-use opportunities.

2.3 PROGRAM OBJECTIVES

To ensure that the selected initiatives assist us in achieving our goals, a subcommittee of the Public Utility Advisory Committee (PUAC) met with the Water Conservation staff and identified, for the purposes of program selection and implementation, the following objectives:

- Ensure adequate supply of high quality drinking water for our current and future customers
- Improve the mechanisms by which the Utility and the Water Conservation Office can benchmark and monitor water usage by customer category
- Promote an awareness that water conservation is the responsibility of all water consumers
- Strive for equity among customer categories for meeting water conservation goals
- Continue to maximize opportunities for partnerships between the Utility and other organizations, agencies, and interested groups
- Utilize funds and labor hours wisely, protecting and honoring our responsibilities to the community we serve
- Plan for scarcity to ensure minimal disruption and a smooth transition to reduced consumption
- Maintain financial stability
- Defer expansion of existing facilities and the acquisition of new water sources through the wise and selective use of existing water supplies

It is the desire of the Utility that water conservation initiatives meet not only the goals expressed in this Plan, but also that they are consistent with other goals of the Utility and community relating to resource management. With this in mind, the following secondary objectives were identified:

- Promote awareness that Salt Lake City, while situated near the Wasatch watershed, is also at the edge of the Great Basin Desert and receives on the average only 15 inches of precipitation annually
- Protect our watershed and water sources
- Preserve habitat and recreational opportunities
- Demonstrate the City's commitment to responsible, environmentally sound, and efficient use of natural resources
- Establish the City as a role model for our own and other communities in implementing, practicing, and achieving water conservation
- Select solutions which do not result in the waste of other limited resources or lead to decreases in environmental quality

2.3.1 Initiative Selection Criteria

The variety of water conservation programs is extensive, and while each initiative provides an opportunity for savings, it is important that we select those that maximize our savings potential while optimizing our limited resources. Also important is that the need for each selected initiative can be conveyed; that there is fairness and equity in implementation; and that there are no legal impediments to implementation.

Criteria were identified in order to facilitate: program selection; the identification of benchmarks; and to develop a mechanism for evaluation once implemented. The criteria were then organized into the following categories: Legal and Institutional; Fiscal; Resource and Environment;

Fairness and Equity; Ease of Implementation. Initiatives will be ranked according to the extent to which it meets the criteria.

Prior to developing and implementing water conservation initiatives and as a part of evaluating those initiatives, the following criteria will be considered:

Legal and Institutional

- Ensure compliance with
    - Federal legislation
    - State statutes and administrative procedures for regulation of water supply and water use, including water rights laws, administrative regulations and procedures, environmental permits, water and energy programs, building and plumbing codes, and state legislation
    - Interstate compacts, court decrees, and local water agreements
    - City ordinances, resolutions, agreements, and programs, including current programs; rate structures and policies; land use and planning; and building and plumbing codes
- Verify Utility/Municipality jurisdiction and/or the existence of supporting ordinances

Resource and Environment

- Extends water supply
- Reduces energy usage
- Complements Watershed Master Plan
- Protects environment by diverting less water from streams, lakes, and reservoirs

Equity and Fairness

- Creates equity for responsibility among customer categories
- Provides for sustainable water savings
- Achievable acceptance of the program within applied category

Fiscal

- Defers or delays capital improvement projects relating to increased demand
- Defers or delays the need to acquire new water sources
- Implementation costs are less than the cost of acquired water
- Opportunities for outside funding

Ease of Implementation

- Measurable, positive outcomes can be achieved and documented
- Achievable with existing staff
- Opportunities for partnership

2.4 YEAR 2010 ANNUAL REPORT AND PROGRAM MEASURE REVIEW

The Water Conservation Annual Report (CAR) will allow for greater detail of program evaluation as well as enhanced public and stakeholder involvement. These reports will be compiled and submitted to the PUAC each winter. The submission of this report will also fulfill

the requirement within the State Statute 73-10-32 that the governing or advisory board of the water agency dedicate one meeting annually to the discussion of water conservation. Included in the report will be cost analysis, potential or actual savings, implementation strategies, and needed resources for program measure activation. Continuation or adoption of program measures will be included, and based on the aforementioned analysis.

The first group of measures to be evaluated within the Water Conservation Annual Report (CAR) format will be those with the least potential of budget impacts. Table 2.2 provides of list of those program measures. Another criteria for program measure selection is a measure's linkages to other city or Utility program or action. To coordinate with the SLC Division of Sustainability Code Review currently being undertaken, the 2010 CAR will include a review of exiting landscape and water use codes. Additionally, as part of the Code Review being conducted by the sustainability Division, gaps in code relating to water use, such as those around gray water or wasting water, will be examined and recommendations made.

Community interest in information and guidance for water-wise landscaping is increasing, and so those measures pertaining to landscape design and maintenance, plant selection, and irrigation will be included in the 2010 CAR.

Program measures not listed in Table 2.2 may also be included in the annual review if it is determined that public interest, opportunities in partnering, changes in budget allocations or funding, or changes in water supply or demand levels compel such review.

Table 2.2
Proposed 2010 Conservation Program Measures Review

No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
Education Program								
E-1	Brochures	√	√	√	√	Develop and distribute brochures relating to water conservation	√	
E-8	Landscape and Irrigation Style Guide	√	√	√	√	Develop and distribute a guide for enhancing water-use efficiencies in landscapes and for irrigation systems		√
E-9	Landscape Assessment and Check-ups	√				Program partners with Master Gardeners to provide residential landscape assessments to enhance water efficiencies		√
E-10	Landscape Plant List	√	√	√	√	Develop and distribute a water-wise plant list	√	

No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
						specific to local weather and soil conditions		
E-11	Landscape Templates	√	√	√	√	Develop and distribute quick-guide references for commercial, residential, and parkstrip landscapes		√
E-12	Lawn Sprinkler Check-ups	√	√	√	√	Promote and conduct lawn sprinkler check-ups for residential, commercial, and institutional properties	√	
E-14	Parkstrip Plant List	√	√	√	√	Develop and distribute a water-wise plant list for park strip areas	√	
E-15	Plant list database	√	√	√	√	Convert landscape and parkstrip plant list to database format		√
E-16	Planting and Maintenance Guide	√	√	√	√	Develop and distribute a maintenance guide for non-traditional landscapes, and for water-wise lawns		√
E-19	Specialized Garden Guides and Plant Lists	√	√	√	√	Develop and distribute plants lists and guides for bio-swales, rain gardens, roof-top gardens, and riparian corridors		√
Finance Program								
F-3	Rate Structuring	√	√	√	√	Utilize a rate structure to encourage responsible use of water	√	
Institutional Program								
I-6	SLC Dept/Div Conservation Plans				√	Encourage and publish water conservation plans from City Departments and Divisions		√
Policy/Ordinance/Regulation Program								
P-1	Graywater	√	√	√	√	Research issues		√

No.	Measure	SFR	MFR	C&I	Gov	Brief Description	Existing	Consider
						regarding Graywater use and establish appropriate policy		
P-3	Irrigation Efficiency Standards		√	√	√	Develop and adopt Irrigation Efficiency Standards for all commercial and institutional properties		√
P-4	Landscape Ordinance	√	√	√	√	Amend existing landscape code to accommodate and encourage water-wise landscaping in front yards	√	
P-5	Parkstrip Code	√	√	√	√	Develop and adopt ordinance to accommodate and encourage non-traditional, lower water plantings	√	
P-6	Rainwater Harvesting				√	Research issues relating to rainwater harvesting and support appropriate legislation	√	
P-7	Rain Sensor Ordinance and Policy	√	√	√	√	Require all properties with automated outdoor sprinkler systems to be fitted with rain sensors		√
P-10	Squandered Water Ordinance	√	√	√	√	Develop and adopt ordinance prohibit-ing the squandering of water		√

2.5 CITY AND COMMUNITY-BASED CONSERVATION ACTION PLANS

City and Community Based Action Plans (CAP) are an opportunity for City departments and divisions, and interested stakeholders to work directly with the Utility and the Water Conservation Coordinator to develop and implement action items that promote and achieve water conservation. These plans should contain specific measures (either direct or indirect), the anticipated outcome of the measure, and how success will be determined. For a template, please see the Appendices. These plans are grouped as two separate sections: 1) City; and 2) Community-Based. These action plans can be as simple as committing to sponsor an office brown bag on water conservation, to more technical approaches such as an evaluation and upgrade of cooling system mechanisms.

In December, 2008, the Utility Director invited city departments and divisions to participate with the Water Conservation Office in the development and adoption of CAPs. The Water Conservation Program Coordinator (Coordinator) followed up with interested divisions in phone calls and meetings. A number of divisions are currently working on CAPs, but only those completed are included in this plan. Over the next five years, the Coordinator will make every effort to increase the number of CAPs submitted and work with those divisions to achieve success.

Below are CAPs submitted by city divisions and a stakeholder for submission into the 2009 WCMP (Table 2.3 and 2.4). These CAPs were developed by the submitting division or group and were reviewed by the Coordinator. It is the responsibility of the submitters to meet the goals outlined within their action plan. In some cases, listed action items involve the Water conservation Office, as in the case of handing out brochures or by participating in the lawn sprinkler audit measure. In these instances, collaboration between the submitting group and the Coordinator has already begun to determine that adequate resources are available to ensure program success.

Table 2.3
Salt Lake City Department/Division Conservation Action Plans

2009 SLC WATER CONSERVATION MASTER PLAN City Departments and Divisions Action Plans			
Mayor's Office			
GOAL	ACTION	TIMELINE FOR IMPLEMENTATION	MEASURE
Distribute water conservation materials	Regularly check stock of educational materials near entrance to Mayor's office.	Monthly – pick up new materials from conservation staff after each Public Utilities Advisory Committee meeting	Keep track of how many pamphlets are going out.
	Provide updated materials to Community Council Liaisons for distribution.	Each time materials are updated	
Enhance awareness among employees of importance of water conservation	Quarterly invitation to Conservation Manager to attend Staff Meeting and focus on seasonal tips and strategies for reducing water use	Quarterly	Employees will chart home water usage throughout the year
Enhance resident awareness of importance of water conservation	Annual invitation to Conservation Manager to speak to Community Councils	Annually – every Spring	

Administrative Services / Division of Sustainability and the Environment			
GOAL	ACTION	TIMELINE FOR IMPLEMENTATION	MEASURE
Enhance awareness among employees of importance of water conservation	The Sustainability Division distributes tips and information provided by DPU via emails to staff	Currently, ongoing	Number of emails
Enhance awareness among Citizens of importance of water conservation	Provide water conservation brochures produced by DPU to residence and businesses through tabling events; E2 programs; lectures, presentation and panel discussions	Currently, ongoing	Number of events Number of brochures distributed
Work with local businesses through our e2 Business program to reduce their water use	Improve the e2 application to better address water conservations options, involve DPU to provide expertise when water conservations opportunities are identified.	December 2009	Number of gallons saved by e2 Businesses
Promote native plants in Open Space that use less water	Collaborate with DPU to plan restoration projects	Currently, ongoing	Acres planned Acres restored
Reduce water waste in irrigation systems in open space areas	Coordinate with Parks Dept for regular irrigation system checks for repairs/adjustments in open space project areas	Per-project as needed, ongoing	Coordinate with Parks Dept to conduct annual irrigation audit to determine baseline; annual audits to measure improvements
Enhance public access to conservation tools and resources	Create tips and linkages on slcgreen to send website visitors to Public Utilities website tools and resources	January 2010	Increased traffic on PU website
Help address obstacles to water conservation by updating development codes	Work with Clarion, Planning & Zoning, and PU on code revision project to remove obstacles to conservation practices and development	January 2011	Number of water conservation codes revised

Table 2.4
Community-Based Conservation Action Plans

2009 SLC WATER CONSERVATION MASTER PLAN Conservation Action Plan Salt Lake City School district			
GOAL	ACTION	TIMELINE FOR IMPLEMENTATION	MEASURE
Reduce water waste in irrigation systems	Regularly check irrigation system for repairs/adjustments	Immediately	Conduct annual irrigation audit to determine baseline; annual audits to measure improvements
Enhance awareness among employees of importance of water conservation	Hire Energy and Resource Manager and create a “Master Conservation Plan”.	Manager is already hired. Initiate program Spring 2010 preceding irrigation schedule	Chart each District building and compare consumption ’09 vs. ‘10
Reduce amount of Kentucky Bluegrass used during landscape design phase of new construction	Implement water-wise alternatives for areas not associated with playing fields	Current and ongoing	Measure irrigation consumption and compare comparable schools
Enhance awareness amongst students regarding the benefits of water conservation	Collaborate with science department, principals and teachers and identify ways to integrate exercises into curriculum	Spring 2010	Conduct annual survey and measure awareness levels. Also, measure culinary water consumption levels ongoing basis

Updates of CAPs will be provided in the CARs each year, along with any new CAP submitted during that year. Effort will be made to reach out to other city departments and divisions, as well as to community stake holders to increase the number of CAPs submitted.

CHAPTER THREE: INTEGRATING WATER CONSERVATION WITH COMMUNITY SUSTAINABILITY AND DISASTER RESILIENCE

Salt Lake City is progressing on a number of fronts with the development of plans, policies, and actions pertaining to sustainability and emergency/disaster management. Water conservation has played a significant role in water resource management and planning, and is a significant component in our response to water shortage emergencies. Given the links water conservation has with water resource management and the management and mitigation of water shortages, exploring links with other sustainability and emergency response actions seems a natural next step. Moving forward, it is important that water conservation planning efforts are integrated with the City's current holistic planning efforts for sustainability and emergency management.

This chapter is a beginning in providing definition and framework for the links that exist between water conservation and the ten key sustainability topics developed by Salt Lake City, as well as the links that exist with emergency management. In addition, this chapter provides a matrix of water conservation program measures that can be applied to each of the eleven topics (Table 3.1 Water Conservation and Sustainability Matrix).

3.1 SUSTAINABILITY

Salt Lake City Sustainability Division has outlined ten key topics as its sustainability planning evolves. The Utility works closely with the Sustainability Division in the development of sustainability planning and in ongoing dialogue regarding these topics. Parallel to this process, the Utility is currently outlining a format and process for a Salt Lake City Public Utilities Sustainability Plan.

The ten key sustainability topics developed to date by Salt Lake City include:

1. Water Quality and Supply
2. Energy
3. Air Quality and Climate Change
4. Open Space, Parks and Trails
5. Recycling and Waste Reduction
6. Mobility and Transportation
7. Urban Forestry
8. Housing Accessibility and Diversity
9. Community Health and Safety
10. Food Production and Nutrition

In evaluating each of the City's current sustainability topics, there are numerous links with water conservation. Following is the beginning of the exploration of those links.

3.1.1 Water Quality and Supply

Water conservation itself is a main subtopic under Water Quality and Supply, and it is intended that this WCMP, over the next five years, will also serve to inform the further development of

the City's sustainability planning and policy under the water conservation subtopic. Water conservation measures are also linked to other water supply and quality issues including the following: Stormwater, Surface Water, and Groundwater. In particular, landscape management practices, including the use of chemical and organic fertilizers and pesticides, and graywater use, are areas that require further study and potential policy development.

Also of interest is examining the causes of adoption of positive behavioral patterns related to water conservation and determining if links exist with the adoption of behaviors related to other water-related issues, such as watershed stewardship.

3.1.2 Energy

Water conservation has a direct link to energy use and production. In defining this link it is important to recognize that it takes a lot of energy to treat and convey water and wastewater, and it takes a lot of water to manufacture fuel and electricity. In fact, Salt Lake City Public Utilities is mapping its own "energy-water nexus" and defining how we affect and are affected by water and energy resource decisions. The water consumption and conservation link to the energy-water nexus occur on all scales, from what happens in the home (e.g., more hot water use = more energy use), to energy production processes (e.g., oil refining in our service area constitutes our largest retail water customer), and to our own operations (e.g. it takes more energy to convey more water).

The Utility is committed to energy conservation and reduction of greenhouse gas emissions to our atmosphere, making our understanding of our energy-water nexus important to planning in this regard. As part of this understanding, we are including an investigation of the relationship between water conservation and energy conservation and greenhouse gas emission reduction, both in our internal operations and within the community we serve.

Topics to be explored in the near future include the growing of crops for biofuels and the impacts on water use; and the relationship between water conservation practices and the need to sustain a healthy urban forest. Also being explored are issues relating to geothermal heat pumps and their potential impacts to the water quality of our deep aquifers; resulting impacts could affect water quality and hence supply capacity in some wells and therefore require changes in water-use patterns in those areas.

3.1.3 Climate Change

Climate change is the biggest challenge we face with respect to our water supplies and water quality. Climate models predict our region to become warmer with a shrinking snowpack; just these effects alone will likely increase water demand, while reducing the amount of water stored in the snowpack. The type and nature of precipitation may also change in our region, leading to water quality issues resulting from periodic heavy rain storms, as well as changing the timing and storage of our water supply. In short, from a water resource planning perspective, using the past as a guide to future planning (the assumption of stationarity) is no longer a good tool. Additionally, climate modeling's suggestion of hotter and drier conditions may increase demand for water.

Water conservation measures play an important role as we face water supply challenges due to climate change. In particular, public education and the establishment of conservation habits across the community can help us better adapt to a future of warmer temperatures and a changing hydrologic regime.

3.1.4 Open Space, Parks, and Trails

Open Spaces are places of natural beauty that provide important habitats, recreational and community building opportunities, and critical environmental functions. Floodplains, wetlands, farms, ranches, parks, golf courses, gardens, and trails can all be a part of an Open Spaces system.

Protected Open Spaces help the environment by combating air and noise pollution, providing erosion and wind control, moderating temperatures, and protecting habitats. They are invaluable to people's health as it protects surface and ground water resources by filtering trash, debris, and chemical pollutants before they enter a water system. This is of particular interest to the Utility given the increase dialog relating to stormwater quality.

The very nature of Salt Lake City's setting between the Wasatch Mountains and the Great Salt Lake brings both the mountain and wetland environments into urban areas. This makes open spaces, parks, and trails critical to quality of life. With continued population growth, threats to this natural setting will heighten; protecting open spaces helps mitigate this pressure by redirecting new growth to designated areas.

An important nexus to explore will be the potential water use demand resulting from increased acreage of irrigated lands, and the need to balance the desire for more open space with long-term water conservation goals. Also of interest is the impact of the implementation of best management practices in landscape design and maintenance with impacts on stormwater quality. Examination into the utilization of rain gardens or stormwater catchment landscapes will also be explored.

3.1.5 Recycling and Waste Reduction

Within the last 35 years, the amount of waste each person creates has almost doubled from 2.7 to 4.6 pounds per day1. In a sustainable community, waste is not a problem to be disposed of, but a resource to be used and reused. Responsible waste management involves:

- Reduction of waste
- Reuse of waste materials
- Recycling of goods
- Buying products made from recycled content

The biggest impact of waste reduction and recycling is that it conserves resources. The less we consume and the more we recycle, the less we have to extract from the earth. Another major

[1] http://www.recycle.slco.org/topics/topics.html

impact of waste reduction and recycling is that it consumes less energy and water and generates less pollution than making it from virgin materials. For example, recycling paper requires only about 65% of the energy required to make paper from trees, uses thousands of gallons per ton less water and produces substantially less air and water pollution. Yard waste collection programs not only keep thousands of tons of material from the landfill, but provide a valuable product in the form of compost, an integral component of water-wise landscaping practices. Leaf collection programs help support stormwater run-off quality.

Further study is needed to understand the relationship between recycling and water demand, both locally and globally. More emphasis in the future might be made on consumption reduction and re-use of materials, which may take even less water or energy than does recycling or the use of virgin materials.

And while our water conservation efforts are focused here in our own watershed, as consumers in a global market, what we buy and how we dispose of our waste affects water quality and availability far beyond our own community. There may be value in examining the impact of our consumptive and waste disposal habits to determine our impacts on the global water supply.

3.1.6 Mobility and Transportation

Americans drive almost 35 percent more miles a year than in the early 1980's. Besides burning a lot more gas—a chief source of greenhouse gases—more driving leads to more air pollution, more traffic, more accidents, and more water use. Access to personal vehicles and inexpensive gas has helped fuel the growth of sprawling suburbs. Urban sprawl adds to the nation's health problems because people are less connected by the pathways, trails, and sidewalks that could get them to destinations by foot or bike.

Aside from creating and supporting safe, highly connected and walkable neighborhoods, Salt Lake City continually works on creating a transportation system designed to move people, not just automobiles. In addition to its successful light rail and bus systems, the city has established more than 120 miles of bike and pedestrians ways, creating the backbone of the non-vehicular system.

The dependence on personal cars as a primary mode of transportation is in itself a water consumptive habit. It takes approximately 39,000 gallons to produce a car (even a fuel efficient hybrid); and it takes about 45 gallons of water to produce one gallon of automobile-grade gasoline. Producing biofuels may not be the answer as the growing of many commercial crops for biofuels production are as water and chemical intensive as is petroleum production. Even cleaning a car takes water; and while some commercial carwashes recycle and reuse water, not all commercial facilities utilize such strategies and it is a safe assumption that home car-washers do not.

Besides the obvious relationship between cars and gasoline or biofuels manufacturing, there is another link between mobility and water: walkable city streets. Studies have shown that the most appealing streets and neighborhoods for walking are those streets that contain trees and other landscape features. Greenery softens the hard urban landscape, appeals to the senses, and can

cool streets and storefronts. City sidewalks, however, are a harsh environment for plants to endure, and so good design, proper plant selection, and appropriate watering practices are necessary to ensure a healthy, attractive, walkable streetscape. Sustaining our water supplies is a critical, though maybe overlooked, component of designing and building a walkable community.

3.1.7 Urban Forestry

There can be no doubt or disagreement that, in a climate such as we find ourselves, with hot, dry summers, and bracing winter winds, the presence of trees, our urban forest, makes this environment livable and enjoyable. Our urban forest also helps to mitigate the effects of urban heat-island effect and helps to moderate temperatures, and some tree species help to combat certain types of air pollution. Salt Lake City has been blessed by the foresight of generations past in planting the trees that now provide shade, shelter, and even food for ourselves and abundant wildlife, and of the forward acting Urban Forestry Division to ensure the ongoing vitality and health of this dynamic resource.

During the decade of the 90's approximately 450 trees were removed annually. From 2000 to 2009 more than 800 trees have been removed annually. There is no new insect or disease agent during these reporting periods. But there has been a change in watering practices. Combine less water with increasing temperatures and the historic trees that comprise the city's forest decline or die. In the absence of providing the existing forest the water it requires, reference to water-wise plants and lower water use will likely continue the trend of increasing tree fatalities among older, existing .

In order to ensure that our urban forest continues to grow with us into our future, it is vital that we work with the Urban Forestry Division to identify practices that sustain both this valuable resource while respecting that other precious resource: water. Research into adaptive tree species, planning and design practices, and the use of rainwater, graywater, and re-use water are among the areas to be explored.

3.1.8 Housing Accessibility and Diversity

A sustainable community allows people the opportunity to live in various types of affordable housing that is close to work, schools, and services. During the last few decades, the demographic makeup of U.S. households has changed. These households now require new sustainable options to meet their basic needs. For example, many elderly people, single people with children, childless couples, and young families fall into lower income tiers making government programs necessary to ensure housing options are available.

Salt Lake City's goal is to make housing as safe and energy efficient as possible. Its mission is to make neighborhoods vibrant and beautiful, to preserve the existing housing stock, make home ownership affordable, and eliminate vacant and substandard housing. As land prices rise and land availability decreases in the Wasatch Region, the challenge to develop affordable housing heightens. The Housing and Neighborhood Development Division oversees numerous housing programs including low-interest housing rehabilitation loans, first-time homebuyer programs,

housing development gap financing for affordable and special needs projects, and federal grant programs.

Addressing costs associated with landscape maintenance is another aspect of affordable housing that needs to be examined. From design to plant selection, and maintenance to watering practices, these factors can affect not only the cost of a proposed landscape, but the costs associated with a landscape over its lifetime. It should be noted that these costs may not only be the responsibility of a homeowner, but in the case of public housing, are costs shouldered by a community. Developing and implementing water-wise landscape and irrigation design, construction, and maintenance guidelines will help to ensure that all housing is attractive and sustainable.

3.1.9 Community Health and Safety

Salt Lake City actively promotes human and environmental health and safety in our community. Obesity and asthma are two predominant health issues in our community. From a land use regulatory perspective, the general goal for community health is to promote healthy lifestyles. This can be addressed by:

- Providing pedestrian and bicycle pathways to connect our school, work, services and residential areas;
- Encouraging the planting of trees in new developments that help reduce air pollution;
- Assisting in the establishment of community gardens to support community interaction and food production; and
- Preventing development in fire-prone, flood-prone and other hazard areas.

Community safety programs focus on protecting citizens from crime, accidents, fires, chemical and pollutant exposures, and natural- or human-made disasters. Aside from emergency response and strengthening infrastructure, the city concentrates on prevention through education, communication, and collaboration. An interesting link between water conservation and fire suppression is the change in summer peak demand. With the reduction in summer peak demand, water pressure in some areas of the community has improved such that the ability to fire fires has been enhanced.

Each and every aspect listed above as methods of promoting a healthy lifestyle within our community relies on the availability of water. And more fundamentally, without a continued supply of high quality drinking water, we cannot guarantee the future health and vitality of our community. Water conservation and its associated tools and strategies will help to ensure that we continue to benefit from our water by ensuring that we use this limited and volumetrically variable resource in the most efficient and appropriate manner possible.

3.1.10 Local Food Production and Nutrition

The average food item in the U.S. travels 1,400 miles to get to the dinner table. As the cost of fuel sky rockets, so do food prices. Suburban sprawl consumes productive land and forces dependence on foreign food producers. For the first time, in 2005, the U.S. imported more farm

products by value than it exported. As awareness about nutrition has risen and obesity has increased, the public pressure for nutritious, sustainably grown food is on the rise.

Utah has 16,700 farms on 11 million acres, according to the Utah Department of Food and Agriculture. Many of these farms have been family-owned for several generations. In addition, a significant percentage of local food supply can be homegrown even in urbanized places such as Salt Lake City. Community gardens, urban farms, public lands, urban plots, and even roof tops are all innovative ways to address food security, environmental issues, and the need for green space in an urban setting. They also support Salt Lake City's goal of increasing direct access to fresh foods and promoting community-based food production to minimize the environmental impacts of transporting food long distances.

Increasing urban development has decreased the amount of land used for local agricultural production, and has contributed to the gradual disappearance of our local farming heritage and economic sector. Community groups and public officials are actively embarking on a progressive proposal that identifies vacant, unused publicly owned lands in Salt Lake County that could be used to produce food and other agricultural products. The elements of this proposal have many benefits, including:

- Provision of locally produced food and agricultural products to the community;
- Provision of nutritious, locally produced foods to local food banks and pantries;
- Support of local farmers and farming industry;
- Preservation of open spaces within the County;
- Local promotion of healthy lifestyle and nutrition;
- Provision of agriculturally-based economic development opportunities; and
- Opportunity for production of biofuel crops.

The sustained local production of plants, whether for commercially grown food crops, biofuel crops, or home food production will require a sustained supply of water delivered during the growing cycle, when rainfall is less likely. Conservation and our continued exploration of future new water supplies will be a critical component in the success of these ventures. It will also be important that as we consider programs involving the growing of crops for biofuels, or production of food on public lands that we consider all the benefits and the impacts, and include water use and quality in that matrix.

On a global scale, increasing opportunities for enlarging local food production means that water supplies in other regions or countries, both in quantity and quality, are less affected by our consumptive habits.

3.2. DISASTER RESILIENCE

Salt Lake City is committed to helping our community be resilient in the event we are affected by emergencies and disasters. This includes the Utility's participation in all phases of the emergency management cycle: planning, mitigation, response, and recovery. The Utility is also very active in numerous local, state, and federal emergency management and homeland security programs.

Water, wastewater, and stormwater are critical functions providing for the public's well-being. Each of these utilities can be affected by disasters and emergencies, resulting in disruption of services. Water conservation programs have an important role in our community's disaster resiliency in each phase of the emergency management cycle:

Planning: Water conservation programs help us and the community plan for ways to manage consumption of a limited resource, and as such is an important planning tool when considering disruption of water supply and services due to emergencies and disasters.

Mitigation: Water conservation programs help us and the community use water more efficiently. These programs conserve water, leaving more of the resource available to better respond when emergencies and disasters strike.

Response: The formalized response to droughts and other emergencies causing decreased water supply and disruption to water services is the *"Water Shortage Contingency Plan"*, which mandates conservation measures to reduce water use. Water conservation programs give the community many conservation tools before an emergency occurs, helping the community adapt to and excel in its critical response role in these circumstances.

Recovery: Water conservation programs can help us be flexible and adapt to changing water conditions that occur during the transition from the response phase to the recovery phase of an emergency, such as short term water disruption due to mending broken infrastructure, or adaptation to water supply issues that exist long after the immediate effects of an emergency end.

Another role of water conservation in emergency response and disaster reliance may be in the lessons we learn regarding the effectiveness of the messages we convey to the community. An analysis of water conservation messaging methodologies and impacts may provide insight into how best to convey information related to other event response needs.

3.3 WATER CONSERVATION AND SUSTAINABILITY MATRIX

In this chapter we are asking the questions and examining issues that may have a relationship to water conservation. To facilitate that process, we have created a matrix utilizing the Water Conservation Program Measures and the eleven topics identified in this chapter. The intent of developing this matrix is to illustrate the connectivity between water conservation and other areas of sustainability.

Check marks indicate intersections between specific conservation program measures and one of the eleven topics in this chapter. The mark does not indicate a positive or negative relationship, or the degree of connectivity, but merely indicates a relationship.

Program measures are listed in the same order as in Table 2.1; sustainability topics are in the order in which they appear in this chapter.

As program measures are examined in greater detail within upcoming CARs, new areas of connectivity may be identified. Conversely, or intersections currently identified may, in the future, be determined to have little or no connectivity, and the matrix will be thus amended.

Table 3.1
Water Conservation and Sustainability Matrix

		Water Quality and Supply	Energy	Air Quality and Climate Change	Open Space, Parks and Trails	Recycling and Waste Reduction	Mobility and Transportation	Urban Forestry	Housing Accessibility & Diversity	Community Health & Safety	Food Production and Nutrition	Disaster Resilience
Education Program	C&I Certification	√	√	√		√	√	√	√		√	√
	C&I Conservation Plans	√	√	√		√	√	√			√	√
	Classroom Programs	√		√	√			√		√		
	Demonstration Gardens	√	√	√	√	√		√		√	√	√
	GardenWise	√	√	√	√	√	√	√		√	√	√
	Landscape and Irrigation Style Guide	√	√	√	√	√	√	√	√	√	√	√
	Landscape Assessment and Check-ups	√	√	√		√		√	√			√
	Landscape Plant List	√	√	√	√		√	√	√	√		√
	Landscape Templates	√	√	√		√	√	√	√		√	
	Lawn Sprinkler Check-ups	√	√	√		√			√			
	Outdoor/Indoor Water-use Counter	√	√	√	√					√		
	Parkstrip Plant List	√	√	√			√	√	√	√		
	Plant list database	√	√	√	√		√	√	√	√		
	Planting and Maintenance Guide	√	√	√	√		√	√	√	√	√	
	Private Garden Project	√	√	√				√				
	Residential Leak Detection and Repair	√	√	√		√			√			
	Specialized Garden Guides and Plant Lists	√	√	√	√		√	√		√	√	
	Virtual Water Conservation Garden	√	√	√				√				
	Water Savings Virtual Meter	√	√	√								√
	Waterpedia	√	√	√	√			√		√		
	Workshops and Classes	√	√	√		√		√		√	√	√
Finance Program	Incentives	√	√	√					√			
	Rate Structuring	√	√	√					√			
	Rebates	√	√	√								
	Volumetric Sewer Charge	√	√	√								

Table 3.1
Water Conservation and Sustainability Matrix

		Water Quality and Supply	Energy	Air Quality and Climate Change	Open Space, Parks and Trails	Recycling and Waste Reduction	Mobility and Transportation	Urban Forestry	Housing Accessibility & Diversity	Community Health & Safety	Food Production and Nutrition	Disaster Resilience
Institutional Program	Customer Use Change Notification	√	√	√		√	√		√			
	Landscape Upgrades	√	√	√				√				
	Loss Prevention	√	√	√		√						√
	Monthly meter reading and billing	√	√	√		√			√			
	Public Utility Advisory Committee	√	√	√								
	SLC Dept/Div Conservation Plans	√	√	√	√	√	√	√	√	√	√	√
	Universal metering and meter replacement	√	√	√								
	Water Loss Audit	√	√	√		√						√
	Water Re-use Pilot	√	√	√	√	√	√	√				√
Policy/Ordinance/Regulation Program	Graywater	√	√	√	√	√	√	√			√	
	Irrigation Audit Program	√	√	√		√	√		√			
	Irrigation Efficiency Standards	√	√	√	√	√	√		√	√	√	
	Landscape Ordinance	√	√	√					√	√		√
	Parkstrip Code	√	√	√			√	√	√	√		√
	Rainwater Harvesting	√	√	√	√		√		√		√	√
	Rain Sensor Ordinance and Policy	√	√	√	√	√	√		√			
	Squandered Water Ordinance	√	√	√		√	√		√			
	Sub-surface, Low-impact Irrigation for Small	√	√	√		√	√	√			√	
	Water Shortage Contingency Plan	√	√	√				√		√	√	√
New Customers Program	Cool-Season Turf Limit	√	√	√			√	√	√			
	Irrigation-only meters	√	√	√					√			
	Sprinkler System Efficiency Rule	√	√	√	√	√	√		√			
	Sub-metering on New Multi-Family Dwelling Units	√	√	√					√			
Research and Evaluation Program	EPA Residential Study	√	√	√								
	Irrigation Controller Study	√	√	√								
	Landscape Inventory	√	√	√				√				
	Plumbing Fixtures Inventory	√	√	√		√						
	Technical Water Savings Study	√	√	√								

Chapter Four: Public Outreach and Program Implementation

The Utility has a long history of working closely with the community to identify and resolve issues and challenges. Even before the creation of the Public Utility Advisory Committee, the Utility sought out the voices of those we serve. The implementation and outreach of this plan is no different. In fact, the very nature of the program and the need for public involvement to achieve success and reach our water conservation goals requires a strong and consistent public outreach process.

Public outreach for water conservation has two levels: outreach regarding the development of the plan itself; outreach for specific program measure development and implementation planning; and the outreach required to convey to the community as a whole the specific action requested and the techniques and behaviors required to achieve a positive outcome. Initial Public outreach for the first two levels will be conducted through three primary mediums: the PUAC and the Water Conservation Master Plan Development Committee; the community council network, and the web site www.slcsaveh2o.com.

As the various program measures have different audiences, specific outreach plans will be developed for each measure. These plans will be completed within the Water Conservation Annual Report (CAR) process, as each measure is reviewed and evaluated. Attention will be taken to customize outreach plans to a program measure's targeted audience, and take advantage of existing modes of communication such as community councils, professional organizations, newsletters, and the internet.

Utah Code
Title 73 Water and Irrigation
Chapter 10 Board of Water Resources - Division of Water Resources
Section 32 Definitions -- Water conservation plan required.

73-10-32. Definitions -- Water conservation plan required.

(1) As used in this section:

(a) "Board" means the Board of Water Resources created under Section **73-10-1.5**.

(b) "Division" means the Division of Water Resources created under Section **73-10-18**.

(c) "Retail" means the level of distribution of culinary water that supplies culinary water directly to the end user.

(d) "Retail water provider" means an entity which:

(i) supplies culinary water to end users; and

(ii) has more than 500 service connections.

(e) "Water conservancy district" means an entity formed under Title 17B, Chapter 2a, Part 10, Water Conservancy District Act.

(f) "Water conservation plan" means a written document that contains existing and proposed water conservation measures describing what will be done by retail water providers, water conservancy districts, and the end user of culinary water to help conserve water and limit or reduce its use in the state in terms of per capita consumption so that adequate supplies of water are available for future needs.

(2) (a) Each water conservation plan shall contain:

(i) a clearly stated overall water use reduction goal and an implementation plan for each of the water conservation measures it chooses to use, including a timeline for action and an evaluation process to measure progress;

(ii) a requirement that each water conservancy district and retail water provider devote part of at least one regular meeting every five years of its governing body to a discussion and formal adoption of the water conservation plan, and allow public comment on it;

(iii) a requirement that a notification procedure be implemented that includes the delivery of the water conservation plan to the media and to the governing body of each municipality and county served by the water conservancy district or retail water provider; and

(iv) a copy of the minutes of the meeting and the notification procedure required in Subsections (2)(a)(ii) and (iii) which shall be added as an appendix to the plan.

(b) A water conservation plan may include information regarding:

(i) the installation and use of water efficient fixtures and appliances, including toilets, shower fixtures, and faucets;

(ii) residential and commercial landscapes and irrigation that require less water to maintain;

(iii) more water efficient industrial and commercial processes involving the use of water;

(iv) water reuse systems, both potable and not potable;

(v) distribution system leak repair;

(vi) dissemination of public information regarding more efficient use of water, including public education programs, customer water use audits, and water saving demonstrations;

(vii) water rate structures designed to encourage more efficient use of water;

(viii) statutes, ordinances, codes, or regulations designed to encourage more efficient use of water by means such as water efficient fixtures and landscapes;

(ix) incentives to implement water efficient techniques, including rebates to water users to

encourage the implementation of more water efficient measures; and

(x) other measures designed to conserve water.

(c) The Division of Water Resources may be contacted for information and technical resources regarding measures listed in Subsections (2)(b)(i) through (2)(b)(x).

(3) (a) Before April 1, 1999, each water conservancy district and each retail water provider shall:

(i) (A) prepare and adopt a water conservation plan if one has not already been adopted; or

(B) if the district or provider has already adopted a water conservation plan, review the existing water conservation plan to determine if it should be amended and, if so, amend the water conservation plan; and

(ii) file a copy of the water conservation plan or amended water conservation plan with the division.

(b) Before adopting or amending a water conservation plan, each water conservancy district or retail water provider shall hold a public hearing with reasonable, advance public notice.

(4) (a) The board shall:

(i) provide guidelines and technical resources to retail water providers and water conservancy districts to prepare and implement water conservation plans;

(ii) investigate alternative measures designed to conserve water; and

(iii) report regarding its compliance with the act and impressions of the overall quality of the plans submitted to the Natural Resources, Agriculture, and Environment Interim Committee of the Legislature at its meeting in November 2004.

(b) The board shall publish an annual report in a paper of state-wide distribution specifying the retail water providers and water conservancy districts that do not have a current water conservation plan on file with the board at the end of the calendar year.

(5) A water conservancy district or retail water provider may only receive state funds for water development if they comply with the requirements of this act.

(6) Each water conservancy district and retail water provider specified under Subsection (3)(a) shall:

(a) update its water conservation plan no less frequently than every five years; and

(b) follow the procedures required under Subsection (3) when updating the water conservation plan.

(7) It is the intent of the Legislature that the water conservation plans, amendments to existing water conservation plans, and the studies and report by the board be handled within the existing budgets of the respective entities or agencies.

Amended by Chapter 329, 2007 General Session

Draft

Salt Lake City
Public Utilities Advisory Committee
Minutes
October 22, 2009

The Public Utilities Advisory Committee meeting was held at 7:00 a.m. on October 24, 2009 at 1530 South West Temple, Salt Lake City, Utah. Committee members present were Dick Gaddis, Michael Polacek, Allen Orr, Larry Myers and Dwight Butler. Committee members Jan Striefel and Dixie Huefner were absent. Public Utilities employees present were Jeff Niermeyer, Tom Ward, Jim Lewis, Chuck Call, Florence Reynolds, Bob Sperling, Stephanie Duer, Patrick Nelson and Zee Smith. Also in attendance were Jeff Masters, Stanley Consultants; Mike Riddle, J-U-B Engineers; Karen Nichols, Stantec Consulting; Holly Hilton, SLC Mayor's Office; Claudia Wheeler, MWDSLS; Jim Schwing, CH2MHILL; and Rusty Vetter, SLC Attorney's Office.

Approve Minutes of September 24, 2009 Meeting

Committee member Michael Polacek moved and Committee member Larry Myers seconded the motion to approve the minutes of the September 24, 2009 meeting, which motion carried with all members present voting aye.

Financial Report – Jim Lewis

Water Rates – Jim Lewis

Committee member Michael Polacek made the motion that the Committee would like to proceed with 4th tier, with a consistent rate increase, hold block #4 at $2.20 about 10% cost wise greater than block #3or move option #1 to 7%. Committee member Larry Butler seconded the motion with all members present voting aye.

Public Outreach Plan for SLCPU Noxious Weeds Management – Patrick Nelson

Patrick Nelson presented a power point presentation to the committee informing them of the problem of Noxious Weeds in our canyons. Mr. Nelson wanted the committee's input regarding the best way to inform the public about the ways to combat noxious weeds in our canyons. The committee had the opportunity to ask questions and discuss the issue.

Some of the questions asked by the committee were:
Are there any animals that would eat the thistle?
What cost benefits would there be to put printed info in with the water bills?
Mr. Jeff Niermeyer suggested a Sub-Committee go engage more community involvement.

See Attachment: Noxious Weeds: The Problem & Potential Public Outreach

Committee member Dick Gaddis made a motion to aggressively start the process and move forward with corrections as noted. Committee member Larry Myers seconded the motion, with all members present voting aye.

Annual Open Meeting Training - Rusty Vetter

Utah Open and Public Meetings Act Requirements for the Public Utilities Advisory Committee

Statutory Obligation to Train

The "presiding officer of the public body shall ensure that all members of the public body are provided with annual training on the requirements" of the Open and Public Meetings Act (the "Act"). (Utah Code, Section 52-4-104)

A. Basic Principle (Section 52-4-201(1))

B. A "meeting" of a public body must be open to the public, unless an exception is available under the Act allowing the meeting to be closed.

B. Definitions (Section 52-4-103)

1. "Public Body" The Public Utilities Advisory Committee (the "Committee") is a public body for purposes of the Act.

2. "Meeting"

A meeting is the convening of at least a quorum of a public body for the purpose of (a) discussing, (b) receiving comments from the public about, or (c) acting upon a matter over which the body has jurisdiction or advisory power.

Chance and social "meetings" are not subject to the open meeting law. However, they may not be used to circumvent the Act. (Section 52-4-208)
Electronic meetings may be held subject to the Act and as described below.

3. "Convening"

The calling of a meeting of a public body by a person authorized to do so for the express purpose of discussing or acting upon a subject over which that public body has jurisdiction or advisory power.

C. Notice of Meetings (Section 52-4-202)
The Committee must give not less than 24 hours public notice of each meeting. The notice must include the:

1. agenda;
2. date;
3. time; and

4. place.

The notice must be:

1. posted (a) at the principal office of the Committee and (b) beginning April 1, 2008, on the Utah Public Notice Website created under Section 63F-1-701, Utah Code; and
2. provided either to a newspaper of general circulation in Salt Lake City or to a local media correspondent.

In addition, the Committee must give annual notice of its annual meeting schedule, specifying the date, time, and place of its scheduled meetings.

The Committee is encouraged to develop and use additional electronic means of providing notice of its meetings.

The notice requirement does not apply to emergency meetings, as long as the Committee gives the best notice practicable of the time and place of the emergency meeting and the topics to be considered at the emergency meeting. However, an emergency meeting may not be held unless the Committee attempts to notify all members and a majority of the members approve holding the meeting.

D. Agendas (Section 52-4-202)

1. Degree of Specificity

A meeting notice that is required to include an agenda must provide reasonable specificity to notify the public of the topics to be considered at the meeting. Each topic must be listed under an agenda item on the agenda. (Section 52-4-202(6)(a))

2. Consideration of Matters Not On the Agenda

Generally, the Committee may not take final action on a topic in an open meeting unless the topic is (a) listed under an agenda item and (b) included in the advance public notice.

At the discretion of the presiding member of the Committee, a topic raised by the public may be discussed during an open meeting, even if the topic raised by the public was not included in the agenda or advance public notice for the meeting, but final action on the topic may not be taken by the Committee at that time. (Section 54-2-202(6)(b))

E. Open Meetings (Section 52-4-201)

1. A meeting is open to the public unless closed pursuant to the Act. Closed meetings are discussed in the next section.

2. (a) An open meeting includes a workshop or an executive session in which a quorum is present, unless closed in accordance with the Act.

(b) A workshop or an executive session in which a quorum is present that is held on the same day as a regularly scheduled public meeting may only be held at the location where the Committee is holding the regularly scheduled public meeting unless:

(i) the workshop or executive session is held at the location where the Committee usually holds its regularly scheduled public meetings but, for that day, the regularly scheduled public meeting is being held at different location;

(ii) any of the meetings held on the same day is a site visit or a traveling tour and proper public notice is given;

(iii) the workshop or executive session is a properly conducted electronic meeting; or

(iv) it is not practicable to conduct the workshop or executive session at the regular location of the Committee's open meetings due to an emergency or extraordinary circumstances.

F. Closed Meetings (Sections 52-4-204, 205)

The Committee may close meetings for certain purposes if they follow the procedure set forth in the Act.

1. Purposes of Closed Meetings (Section 52-4-205)

a. Discussion of the character, professional competence, or physical or mental health of an individual;

b. Strategy sessions to discuss collective bargaining;

c. Strategy sessions to discuss pending or reasonably imminent litigation;

d. Strategy sessions to discuss the purchase, exchange, or lease of real property if public discussion of the transaction would:

(i) disclose the appraisal or estimated value of the property under consideration; or

(ii) prevent the City from completing the transaction on the best possible terms;

e. Strategy sessions to discuss the sale of real property if:

(i) public discussion of the transaction would:

(A) disclose the appraisal or estimated value of the property under consideration; or

(B) prevent the City from completing the transaction on the best possible terms;

(ii) the City previously gave public notice that the property would be offered for sale; and

(iii) the terms of the sale are publicly disclosed before the Committee approves the sale;

f. Discussion regarding deployment of security personnel, devices, or systems; and

g. Investigative proceedings regarding allegations of criminal misconduct.

2. Procedure for Closing Meetings (Section 52-4-204)

a. A quorum must be present.

b. Two-thirds of the Committee members present must vote to approve closing the meeting.

c. The meeting may be closed only to discuss a matter listed in § 52-4-205.

d. The following information must be publicly announced and entered on the minutes:

(i) the reason or reasons for closing the meeting

(ii) the location of the closed meeting

(iii) the vote, by name, of each Committee member, either for or against the motion to close the meeting.

G. Record of Meetings (Sections 52-4-203, 206)

1. Open Meetings (Section 52-4-203)

Both written minutes and a recording (i.e., an audio or an audio and video record) must be kept of all open meetings.

However, either written minutes **or** a recording is adequate if the meeting is a site visit or a traveling tour, if no vote or action is taken. Therefore, unless the body is keeping both written minutes and a recording during a site visit or traveling tour, it should not take a vote or official action during that site visit or traveling tour.

The recording and minutes must include: (a) the date, time, and place of the meeting; (b) the names of the members present and absent; (c) the substance of all matters proposed, discussed, or decided by the Committee which may include a summary of comments made by members; (d) a record, by individual member, of each vote taken by the Committee; (e) the name of each person who is not a member of the Committee and who, upon recognition by the presiding member of the Committee, provided testimony or comments to the Committee; (f) the substance, in brief, of the testimony or comments provided by the public under (e); and (g) any other information that any member requests be entered in the minutes or recording.

The recording must be a complete and unedited record of all open portions of the entire meeting and be properly labeled or identified with the date, time, and place of the meeting.

The one change in 2009 related to the Open Meetings Act concerns the written minutes of the meeting. The written minutes (not the recording) are the official record of action taken at the meeting. The Committee must establish and implement procedures for the approval of the written minutes of each meeting. Either the written minutes or the recording must retained permanently in a format that meets long-term records storage requirements.

Under GRAMA, written minutes that have been prepared but not yet approved by the Committee are public records but should be marked as "unapproved" or "awaiting approval" or something similar. Written minutes should be available to the public within a reasonable time following the meeting. The recording must be available for listening within three business days after the meeting.

2. Closed Meetings (Section 52-4-206)

Except when a meeting is closed to discuss (a) the character, professional competence, or physical or mental health of an individual or (b) the deployment of security personnel, devices, or systems, the Committee must kept a recording of the closed meeting and may keep detailed written minutes that disclose the content of the closed meeting.

The recording and any minutes must include: (a) the date, time, and place of the meeting; (b) the names of the members present and absent; and (c) the names of all others present unless disclosure would infringe on the confidentiality necessary to fulfill the original purpose of closing the meeting.

The recording and the written minutes are protected records under GRAMA.

No recording or written minutes are required for a closed meeting to discuss (a) the character, professional competence, or physical or mental health of an individual or (b) the deployment of security personnel, devices, or systems. The person presiding at such a meeting must sign a sworn statement affirming that the sole purpose for closing the meeting was to discuss those matters.

H. Electronic Meetings (Section 52-4-207)
The Committee may not hold an electronic meeting unless it has adopted a resolution or rule, or the City has adopted an ordinance governing the Committee's use of electronic meetings. For more information about electronic meetings, see Section 52.4.207.

I. Disruption of Meetings (Section 52-4-301)
The Act does not prohibit the removal of any person from a meeting if the person willfully disrupts the meeting to the extent that orderly conduct is seriously compromised.

J. Consequences of Violating the Act (Sections 52-4-302 to 52-4-305)
Any final action taken in violation of the Act is voidable by a court, if a lawsuit is commenced within 90 days (30 days in the case of action concerning the issuance of bonds) after the date of the action. A court may not void final action for failure to post notice on the Utah Public Notice Website if the failure was the result of unforeseen Internet hosting or communication technology failure and the Committee otherwise complied with the public notice requirements.
The Attorney General and county attorneys shall enforce the Act. At least annually, the Attorney General's Office must give notice to the City of any material changes to the requirements for the conduct of meetings.

A person denied a right under the Act may sue to compel compliance with or to enjoin violation of the Act, or to determine the Act's applicability to discussions or decisions of the Committee. A member who knowingly and intentionally violates or who knowingly or intentionally abets or advises a violation of the closed meeting provisions of the Act is guilty of a class B misdemeanor.

Water Conservation Master Plan - Stephanie Duer

Stephanie Duer, Water Conservation Program Coordinator, presented the draft of the 2009 Water Conservation Mater Plan, requesting the Public Utilities Advisory Committee make a motion to forward the draft to the Mayor and the City Council. The plan is in response to Utah Code 73-10-32 and meets or exceeds all provisions of that code. The plan is due to the Division of Water Resources by the end of the

year. Ms. Duer also expressed appreciation for the members of the Water Conservation Master Plan Development Committee for their efforts in creating the plan.

See Attachment: 2009 Water Conservation Master Plan

Committee member Larry Myers made a motion and committee member Michael Polaeck seconded the motion to forward the plan to the Mayor and City Council for their review and approval. All members present voted aye.

Adjourn

Committee member Allen Orr moved to adjourn the meeting, Committee member Michael Polacek seconded the motion with all members present voting aye. Meeting adjourned at 8:30.

Article II. Water Shortages

17.16.080: WATER USE MAY BE LIMITED BY PROCLAMATION:

In the event of the scarcity of water, whenever it shall be necessary, in the judgment of the mayor, the mayor shall, by proclamation, limit the use of water for other than domestic purposes, to such extent as may be required for the public good. (Prior code § 49-6-46)

17.16.090: VIOLATION OF PROCLAMATION PROHIBITED; PENALTY:

It is unlawful for any person, by himself or herself, family, servants or agents, to violate any proclamation made by the mayor in pursuance of section 17.16.080 of this chapter, or its successor chapter, and if any violation thereof shall occur, then in addition to any other penalty therefor the water supply to the premises upon which such violation occurs shall be shut off, and if shut off on that account, it shall not be turned on again until the payment of such amount for each violation of the proclamation as the mayor shall determine. (Prior code § 49-6-47)

17.16.092: WATER SHORTAGE MANAGEMENT:

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.

WATER SHORTAGE CONTINGENCY PLAN

Salt Lake City Department of Public Utilities
Last Modified June 2003

SECTION I: DECLARATION OF POLICY, PURPOSE, AND INTENT

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety, and at the same time minimize the adverse impacts of water supply shortages or other water supply emergency conditions, the Salt Lake City Department of Public Utilities (Public Utilities) hereby adopts the following Plan to address water shortages brought about by drought, service interruption, or other emergency or event.

This Plan is intended as a supplement to the Water Conservation Master Plan. For information pertaining to Public Utilities long-term water conservation plans and measures, as well as support information on water conservation, consult the appropriate section of the Water Conservation Master Plan.

SECTION II: LEGAL AUTHORITY

This Plan is adopted by Public Utilities pursuant to the direction of the City Council contained in Section 17.16.092, Salt Lake City Code (hereafter referred to as the Ordinance).

SECTION III: APPLICATION

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by Public Utilities.

SECTION IV: DEFINITIONS

For the purposes of this Plan, the following definitions shall apply:

Acre feet (AF): A quantity of volume of water that covers one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

Average Annual Demand: 105,000 AF as measured from supply to conduit.

Average Annual Supply: 126,900 AF, as of January 1, 2003. In 2005, Salt Lake City's average annual supply will increase by 4000 AF per year for five years as a result of additional Central Utah Project water, increasing the average annual supply by 20,000 AF in 2008.

Best Management Practices (BMPs): Applicable Best Management Practices for a particular industry (see Appendices for examples).

Conservation: Those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve efficiency in the use of water, or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Culinary Water: See Municipal and Industrial Water.

Customer: Any person, company, corporation, partnership, association, organization, or other legal entity using water supplied by Public Utilities through system connections, or legal or contractual agreement.

Director: Shall mean the Director of Salt Lake City Department of Public Utilities, or his or her designee.

Even number address: Street addresses ending in 0, 2, 4, 6, or 8 and locations without addresses.

Hearing Officer: Shall mean the Director of Salt Lake City Department of Public Utilities or such other employee of Public Utilities as the Director shall designate from time to time.

Hearing Review Panel: A panel designated by the Salt Lake City Council and comprised of three (3) current members of the Public Utilities Advisory Committee.

Industrial water use: The use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: Water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including lawns, gardens, golf courses, parks, rights-of-way, medians, and park strips.

Municipal and Industrial Water (M&I): Water treated by Public Utilities specifically to meet Safe Drinking Water Standards as defined by the Safe Drinking Water Act. For the purpose of this Plan, M&I water is divided into the following categories: 1) d*omestic use* is that water which is used in private residences, apartment houses, etc., for drinking, bathing, cleaning, landscape sprinkling, sanitary, and other purposes; 2) c*ommercial and industrial use* is that water used by commercial establishments and industries; and 3) *public use* includes water required for use in parks, public golf courses, civic buildings, schools, hospitals, and churches.

Odd numbered address: Street addresses ending in 1, 3, 5, 7, or 9.

Ordinance: Ordinance adopted by Salt Lake City Council, enacting Section 17.16.092 of the Salt Lake City Code, authorizing the adoption of the Plan.

Positive Pressure Nozzle: A spring-loaded nozzle attached to the end of a hose that requires positive pressure to maintain water flow.

Projected Demand: The estimated water demand at any given point in time (stated as a percentage of the average annual demand or as total gallons per day).

Projected Supply: The anticipated supply at any given point in time (stated as a percentage of the average annual supply or as total gallons per day).

Public Utilities: Salt Lake City Department of Public Utilities

Reclaimed Water: Wastewater treated by Public Utilities to levels appropriate for irrigation and industrial uses

Response Plan: Shall mean the Water Shortage Response Summary, an attachment to the Plan which identifies each Water Shortage Stage and the specific calls to action, both voluntary and restricted. This Response Summary is to be updated as the Plan is updated.

SECTION V: CRITERIA FOR INITIATION AND TERMINATION OF WATER SHORTAGE STAGES

Monitoring

All relevant components of the Salt Lake City water system will be monitored to ensure timely response to water situations by the Director. Public Utilities will monitor supply, treatment and distribution system, demand trends, and potential constraints, for the purpose of identifying potential shortages. The Director shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when specified triggers are reached.

Initiation of Water Shortage Stage

Meeting or exceeding one or more trigger conditions will be sufficient cause to initiate a corresponding Water Shortage Stage. However, the Director can decide that a stage not be initiated under these circumstances. The decision may be influenced by factors that include, but are not limited to, the time of year, weather conditions, anticipation of replenished water supplies, or anticipation that facilities will be placed on-line to meet water demand. The Director shall make a recommendation to initiate a stage or a stage change to the Mayor, who will make the final determination in accordance with the Ordinance.

It is not incumbent on the Director to implement lower steps before higher ones. If the Director judges the situation to warrant it, he can declare a higher stage of water shortage response at any time. All measures contained in the Plan for lower levels of response automatically come into action at that point.

Termination of Water Shortage Stage

Termination of the Plan stage will be announced when the trigger conditions that initiated the drought measures have subsided and the shortage no longer exists, by the determination of the Director.

Upon terminating a stage, it is not incumbent on the Director to implement the stage immediately lower. If the Director does not designate a Plan stage, then the next lower stage becomes active.

SECTION VI: NOTIFICATION AND EDUCATION

The Director shall notify the public of the initiation of the applicable Plan stage and corresponding conservation measures, or the termination of a Plan stage and corresponding conservation measures, by one or more of the following means:

- Publication of notices in a newspaper of general circulation
- Direct mail to each customer on the utility bill, as a bill insert, and/or as a special mailing
- Public service announcements
- Signs posted in public places
- Take-home fliers at schools
- Public meetings/community council meetings
- Public Utilities Water Conservation website
- Salt Lake City municipal website

Customer Agency Notification:
The Director shall endeavor to notify directly the following individuals and entities:

Salt Lake City Council
Public Utilities Advisory Committee
Fire Chief(s)
City and/or County Emergency Management Coordinator(s)
Salt Lake City Department of Public Services
State Disaster District / Department of Public Safety
Critical water users, i.e. hospitals

Additionally, Public Utilities will periodically provide customers and customer agencies with information about the Plan, including information about water conditions under which each stage of the Plan is to be initiated or terminated, the response measures to be implemented in each stage, as well as any Plan updates.

The success of any water conservation program in achieving short term and immediate water conservation targets as might be required under a water shortage is dependant on Public Utilities' ability to convey to the community the water-supply situation, the expected

response actions, and clear and measurable targets. The Response Summary and Appendices have been developed to enhance public understanding of water supply levels, response actions, and restrictions.

SECTION VII: STAGES AND RESPONSES

This Plan provides for five Water Shortage stages and responses of increasing severity, as progressively more serious conditions warrant. The triggering criteria described are based on the projected percentage of water available from a number of sources, including, but not limited to snow pack, soil moisture, surface water, ground water, stored water, and spot market water. Degrees of flexibility have been built into this Plan to allow for timely adjustments at all levels of planning and implementation.

Key elements of a successful demand management program are that the resources and hardships are shared as equitably as possible, and that customers are kept informed about the status of the shortage.

The five stages are characterized as follows:

- STAGE 1—ADVISORY Stage: the public is informed as early as meaningful data are available that a possible shortage may occur.

- STAGE 2—MILD Stage: this stage is initiated if supply conditions worsen and relies on voluntary cooperation and support of water customers to meet target consumption goals. During this stage, specific voluntary actions are suggested for all customers, and specific mandatory actions are identified for municipal customers, including parks, golf courses, schools, and other government facilities.

- STAGE 3—MODERATE Stage: this stage is to be initiated if the Mild Stage does not result in the reduction needed, or circumstances warrant its initiation as specified in Section V: Initiation. This stage increases the prohibition or limitation of certain actions and relies on both voluntary and mandatory actions.

- STAGE 4—SEVERE Stage: this stage is to be initiated if the Moderate Stage does not result in the reduction needed, or circumstances warrant its initiation as specified in Section V: Initiation. The Severe Stage has increasingly stringent prohibitions and limits on certain actions, including certain mandatory actions for residential and commercial customers.

- STAGE 5—CRITICAL Stage: this stage addresses the most critical need for demand reduction and increases the number of restricted water uses and mandatory actions. This could be used as a stage of a progressive situation, such as a drought of increasing severity, or to address an immediate crisis, such as a facility failure.

STAGE 1—ADVISORY

The ADVISORY STAGE is intended to increase the community's awareness of the potential for future water shortages. Under this stage, conservation efforts which are on-going will receive additional emphasis, and measures not pursued during normal water supply times because they are not cost-effective will be re-evaluated.

The ADVISORY STAGE triggers an increase in public education and information to assist all customers impacted by the shortage in order that those customers better understand the state of the water shortage condition and the need for voluntary action.

Trigger

- Total reservoir storage is not projected to be at standard operating capacity on or near April 1, due to exceptionally low snow pack, precipitation and/or lack or carryover storage from the previous year

- Total reservoir storage and predicted inflows are significantly below historical normal for the current time of year, and supply modeling indicates that expected demands may not be met if current trend continues or worsens

- Other water supplies are protected to be below standard operating capacity or historic levels

Objectives

- To prepare Public Utilities, the City, relevant agencies, and water customers for a potential water shortage thereby allowing all parties adequate time for planning and coordination

- To undertake supply management actions that forestall or minimize the need for later, more stringent supply or demand management actions

- To minimize the waste of water through carelessness, either intentional or accidental

STAGE 2—MILD

The conservation measures in this stage are focused on specific voluntary actions. However, some prohibitions on water waste are enforced with fines and/or flow restrictors or disconnection.

Trigger

- Supply levels identified in the ADVISORY STAGE have not improved
- Demand levels indicate the need for a more systematic response to manage the situation
- Water supply levels are projected to be eighty (80) percent of the Average Annual Supply.

Response

As outlined in the Response Summary.

Target: Achieve a five (5) percent reduction in total daily water use or Average Annual Demand.

Objectives:

- To maintain or reduce demand to meet target consumption levels by customer voluntary actions
- To forestall or minimize the need for later, more stringent actions
- To minimize disruption to customers' lives and businesses while meeting target consumption goals
- To maintain the highest water quality standards throughout the shortage

Termination of Stage

The Director may rescinded STAGE 2 of the Plan when the conditions listed as triggering events have ceased to exist for such a period as deemed appropriate and reasonable. Upon termination of Stage 2, the ADVISORY STAGE becomes active unless otherwise stated.

STAGE 3—MODERATE

Demand reduction responses are voluntary, with the exception of Park, Golf, and other Government facilities, having some mandatory response actions.

Trigger

The Director would approve progression to this stage if the goals established in the preceding stage have not been met and additional action is needed. The specific voluntary restrictions imposed during the MODERATE STAGE would be determined based on the season of year, targeted demand levels, and other considerations.

- Projected water supply is seventy (70) percent of the Average Annual Supply
- Supply levels identified in the MILD STAGE have not improved
- Demand levels indicate the need for a more systematic response to manage the situation

Response

As outlined in the Response Summary.

Target

Achieve a fifteen (15) percent reduction in total daily demand or Average Annual Demand.

Objectives

- To achieve targeted consumption reduction goals by restricting defined water uses
- To ensure that adequate water supply will be available for the duration of the situation to protect public health and safety and to balance the need for stream flows
- To minimize the disruption to customers' lives and businesses while meeting target consumption goals
- To maintain the highest water quality standards throughout the shortage

- To promote equity amongst water customers by establishing clear restrictions that affect all customers

Termination of Stage
The Director may rescinded STAGE 3 of the Plan when the conditions listed as triggering events have ceased to exist for such a period as deemed appropriate and reasonable.

STAGE 4—SEVERE

Some elements of STAGE 4 will become mandatory and be enforced, in addition to elements under previous stages. Such elements may include mandatory curtailments of water for certain types of non-essential use.

Trigger
The Director would approve progression to this stage if the goals established in the MODERATE STAGE have not been met and additional action is needed. Increasingly stringent water restrictions may be established and enforced.

- Projected water supply is sixty (60) percent of the Average Annual Supply.
- Supply levels identified in the MODERATE STAGE have not improved
- Demand levels indicate the need for a more systematic response to manage the situation, including restricted or prohibited water uses

Response
As outlined in the Response Summary.

Target
Achieve a twenty-five (25) percent reduction in total daily water use or Average Annual Demand.

Objectives
- To achieve targeted consumption reduction goals by restricting defined water uses

- To ensure that adequate water supply will be available for the duration of the situation to protect public health and safety and to balance the need for stream flows

- To minimize the disruption to customers' lives and businesses while meeting target consumption goals

- To maintain the highest water quality standards throughout the shortage

- To promote equity amongst water customers by establishing clear restrictions that affect all customers

Termination of Stage
The Director may rescinded STAGE 4 of the Plan when the conditions listed as triggering events have ceased to exist for such a period as deemed appropriate and reasonable.

STAGE 5—CRITICAL

Elements under STAGE 5 are mandatory, unless otherwise stated.

Trigger
The Director would approve progression to this stage if the goals established in the SEVERE STAGE have not been met and additional action is needed. Increasingly stringent water restrictions may be established and enforced.

- Major water line breaks, or pump or system failures, which cause unprecedented loss of capability to provide water service

- Natural or man-made contamination of the water supply source(s)

- Supply levels identified in the SEVERE STAGE have not improved

- A projected water supply of fifty (50) percent of the Average Annual Supply

Response
As outlined in the Response Summary.

Target
Achieve a thirty-five (35) percent reduction in total daily water use.

Objectives

- To achieve targeted consumption reduction goals by restricting defined water uses
- To ensure that adequate water supply will be available for the duration of the situation to protect public health and safety and to balance the need for stream flows
- To minimize the disruption to customers' lives and businesses while meeting target consumption goals
- To maintain the highest water quality standards throughout the shortage
- To promote equity amongst water customers by establishing clear restrictions that affect all customers

Termination of Stage
The Director or his or her designee may rescinded STAGE 4 of the Plan when the conditions listed as triggering events have ceased to exist for such a period as deemed appropriate and reasonable by the Director.

SECTION VIII: ENFORCEMENT
Provisions of the Plan and Response Summary shall be enforced as indicated in the Ordinance.

Penalties for violation of any portion of the Plan are defined in the Ordinance. A civil fine for a customer's first violation shall be imposed only after the issuance of a written warning to such customer. Any civil fine based on a violation susceptible to corrective action shall be imposed only after failure by the customer to take such corrective action within a reasonable period of time, as determined by the Director, taking into account the nature of the action needed and the anticipated cost. The time allowed will vary with the nature of the violation; for

instance, corrective measures can be taken more quickly for a violation of time-of-day restrictions than can be taken for a system repair or a pump retrofit for a fountain.

Subsequent violations will result in a formal violation notice, a fine, and/or water service shut off. Notification of a violation shall be as set forth in the Ordinance.

Customers violating any portion of the Plan as defined by Public Utilities shall be assessed a fine according to the following schedule. The violation level shall be based upon violation history for the preceding twelve (12) months.

The fines for a violation and each subsequent violation are as follows:
1st Violation $ 100
2nd Violation $ 250
3rd Violation $ 500
4th Violation $ 1000
5th Violation Flow restrictor or interruption of service until corrective action is taken and previous fines paid in full

If a service is disconnected, Public Utilities may assess and collect a fee before service is restored. That fee is in addition to other fines or charges imposed under a particular water shortage response measure.

Any customer subject to a civil fine shall be notified by the Director, in writing, of the date, nature, and circumstances of the violation, which notification shall be delivered by certified mail no more than 15 calendar days after the date of occurrence of the violation. The notice shall advise the customer of his/her right to protest the fine to the Director, or his or her designee, within ten business days after receipt of the notice. Any determination by the Director or designee may be appealed to the Water Shortage Appeals Panel, as established in the Ordinance. All decisions of the Water Shortage Appeals Panel shall be final.

The Director may grant written variances to persons who apply, on forms supplied by Public Utilities, for usage of water not in compliance with the Plan or for relief from a fine. Variances may be granted if it is found that such water use is necessary to prevent an emergency condition relating to health or safety, extreme economic hardship, or essential government services such as police, fire, and similar emergency services. Variances may also be considered for customers under irrigation targets who have already made every reasonable effort to reduce water use.

Monies collected from fines are not considered rates for the production of water revenue. Those monies will be placed in a special fund, to be administered by Public Utilities, and will be used for, but not limited to, meeting the expenses of enforcement of restrictions under this Plan,

producing educational materials relating to water conservation, promoting information related to the Plan, or augmenting water supplies.

SECTION IX: LIMITED EXEMPTION FOR RECLAIMED WATER

The Director may exempt certain uses and users of Reclaimed Water from any or all of the water use restriction requirements contained in this Plan. Users must apply for exemption on forms supplied by Public Utilities. Only the use of Reclaimed Water may be exempted from the provisions of the Plan. Users of both Reclaimed Water and M&I Water will not be exempt from restrictions on the use of M&I Water, and must comply with restrictions in effect during all stages of the Plan.

The Director, in the interest of equity and community acceptance of such exemption on the use of Reclaimed Water during a declared drought, water shortage, or other water emergency, may require exempt users to clearly post notices to the effect that the water being used is not from the public drinking water supply, and that the use conforms to restrictions in force at the time. Failure to make such posting in a timely fashion may, at the discretion of the Director, result in loss of exemption from the provisions of this Plan.

_____ _____

LeRoy W. Hooton, Director, Department Public Utilities Date

Water Shortage Response Summary

Advisory Stage

Follow guidelines for water conservation as presented in Water Conservation Master Plan

Mild Stage: Reduction Goal 5 to 14 Percent

General Information: Water Waste may be subject to fines and/or delivery restriction or disconnection

Single Family, Duplex, and Triplex Residential		
Lawn Watering	Recommended	Voluntarily follow schedule (see Appendix A); Irrigation accounts follow Appendix C
Trees, shrubs, perennials, annuals, and vegetables	Recommended	It is encouraged that non-turf areas are watered separately and less frequently from lawn areas; use of hand-held hoses, hand-held buckets, drip irrigation, or subterranean irrigation recommended
Time of Day (applies to over-head sprays only)	Recommended	Avoid watering between 10 AM and 6 PM
Irrigation Systems	Recommended	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscape	Recommended	No restrictions; spring and fall planting recommended
Pools, Jacuzzis, and Hot tubs	Recommended	No restrictions; utilize Best Management Practices (see Appendix I)
Fountains, Waterfalls, and Ponds	Recommended	No restrictions; the use of recirculation pumps is recommended
Hard-surface Washing	Recommended	No restrictions; the use of brooms is encouraged
Personal Vehicle Washing	Recommended	No restrictions; the use of hand held buckets or positive pressure nozzles encouraged
Commercial, Industrial, Business, Multi-family Apartments, and Home Owners Associations		
All Businesses, Industries, and Commercial Users	Recommended	Develop, adopt, and implement Best Management Practices for Water Conservation; reduce consumption 5 to 14 percent
Lawn Watering	Recommended	Voluntarily follow schedule (see Appendix A) if lawn not metered; Irrigation Accounts follow Appendix C.
Trees, shrubs, perennials, annuals, and vegetables	Recommended	It is recommended that non-turf areas are watered separately from lawn areas; use of hand-held hoses, hand-held buckets, drip irrigation, or subterranean irrigation

		recommended
Time of Day (applies to overhead or spray irrigation)	Recommended	Avoid watering between 10 AM and 6 PM
Irrigation Systems	Recommended	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscape	Recommended	No restrictions; spring and fall planting recommended
Pools, Jacuzzis, and Hot tubs	Recommended	Utilize Best Management Practices (see Appendix I)
Fountains, Waterfalls, and Ponds	Recommended	No restrictions; the use of recirculation pumps is encouraged
Hard-surface Washing	Recommended	No restrictions; brooms are recommended
Commercial Car Washes	Recommended	No restrictions; implement Best Management Practices (see Appendix E)
Commercial and Fleet Vehicle Washing	Recommended	No restrictions; use Best Management Practices (see Appendix E)
Commercial Plant Nurseries	Recommended	No restrictions; utilize Best Management Practices; Voluntarily reduce all non-essential water use (see Appendix F)
Hotels/Lodging	Recommended	No restrictions; utilize Best Management Practices (see Appendix D)
Restaurants	Recommended	No restrictions; voluntarily do not serve water except upon request; utilize Best Management Practices (see Appendix H)
Parks, Golf, Schools, and other Government Facilities		
Lawn Watering	Mandatory	Follow established water target (See Appendix C); for sites without separate meters, follow Appendix A
Trees, shrubs, perennials, annuals, and vegetables	Recommended	Water separately and less frequently from lawn areas; use of hand-held hoses, hand-held buckets, drip irrigation, or subterranean irrigation recommended
Time of Day (applies to over-head sprays only)	Mandatory	No watering between 10 AM and 6 PM
Irrigation Systems	Mandatory	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscape	Recommended	No restrictions; recommend installing in spring or fall
Fleet vehicles	Recommended	No more than once per week (emergency vehicles exempted)
Pools, Jacuzzis, and Hot tubs	Recommended	No restrictions; utilize Best Management Practices (see Appendix I)

Fountains, Waterfalls, and Ponds	Recommended	No restrictions; use of recirculation pumps is encouraged
Hard-surface washing	Recommended	No restrictions; use of brooms is encouraged
Moderate Stage: Reduction Goal 15 to 24 Percent		
General Information: Water Waste may be subject to fines and or delivery restriction or disconnection		
Single Family, Duplex, and Triplex Residential		
Lawn Watering	Recommended	Voluntarily follow schedule (see Appendix A); Irrigation accounts follow Appendix C
Trees, shrubs, perennials, annuals, and vegetables	Recommended	It is recommended that non-turf areas are watered separately and less frequently from lawn areas; use of hand-held hoses, hand-held buckets, drip irrigation, or subterranean irrigation recommended
Time of Day (applies to over-head sprays only)	Recommended	Avoid watering between 10 AM and 6 PM
Irrigation Systems	Recommended	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscape	Recommended	No restrictions; recommend installing in spring or fall
Pools, Jacuzzis, and Hot tubs	Recommended	No restrictions; utilize Best Management Practices (see Appendix I)
Fountains, Waterfalls, and Ponds	Recommended	No restrictions; installation of recirculation pumps encouraged
Hard-surface Washing	Recommended	No restrictions; the use of brooms is encouraged
Personal Vehicle Washing	Recommended	No restrictions; the use of positive pressure nozzles and hand held buckets recommended
Commercial, Industrial, Business, Multi-family Apartments, and Home Owners Associations		
All Businesses, Industries, and Commercial Users	Recommended	Reduce consumption by 15 to 24 percent; Develop, adopt, and implement Best Management Practices for Water Conservation
Lawn Watering	Recommended	Voluntarily follow schedule (see Appendix A); Irrigation Accounts follow Appendix C
Trees, shrubs, perennials, annuals, and vegetables	Recommended	It is recommended that non-turf areas are watered separately and less frequently from lawn areas; use of hand-held hoses, hand-held buckets, drip irrigation, or subterranean irrigation recommended
Time of Day (applies to over-head sprays only)	Recommended	Avoid watering between hours of 10 AM and 6 PM

Irrigation Systems	Recommended	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscape	Recommended	No restrictions; recommend installing in spring or fall
Pools, Jacuzzis, and Hot tubs	Recommended	No restrictions; utilize Best Management Practices (see Appendix I)
Fountains, Waterfalls, and Ponds	Recommended	May be filled; use of recirculation pump recommended
Hard-surface Washing	Recommended	No restrictions: the use of brooms are encouraged; use water only in cases of public health or safety
Commercial Car Washes	Recommended	Implement Best Management Practices (see Appendix E)
Commercial and Fleet Vehicle Washing	Recommended	May be washed no more often than once per week (see Appendix E) or with change in ownership or rental
Commercial Plant Nurseries	Recommended	Utilize Best Management Practices; Container and B&B stock exempted from designated watering restrictions (see Appendix F)
Hotels/Lodging	Recommended	Voluntarily do not change sheets or linens for multiple night stays; utilize Appendix D
Restaurants	Recommended	Serve water to customer only upon request; display table tents or public notice (see Appendix D)
Parks, Golf, Schools, and other Government Facilities		
Lawn Watering	Mandatory	Water target less 15 percent (see Appendix C)
Trees, shrubs, perennials, annuals, and vegetables	Recommended	Water separately and less frequently from lawn areas; use of hand-held hoses, hand-held buckets, drip irrigation, or subterranean irrigation recommended
Time of Day (applies to over-head sprays only)	Mandatory	No watering between 10 am and 6 pm
Irrigation Systems	Mandatory	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscape	Recommended	No restrictions; recommend installing in Spring or Fall
Golf Courses	Mandatory	Water target less 15 percent
Pools, Jacuzzis, and Hot tubs	Recommended	No restrictions; the use of pool covers is encouraged; lower water level by four (4) inches to minimize loss due to splashing
Fountains, Waterfalls, and Ponds	Recommended	May be filled; use of recirculation pump recommended
Hard-surface Washing	Recommended	No washing of walks, drives, patios, gutters except for health or safety

Fleet vehicle washing	Recommended	No more than once per week with equipment or at certified car wash (emergency vehicles excepted); utilize Best Management Practices (see appendix E)
Severe Stage: Reduction Goal 25 to 34 Percent		
General Information: Violation of restrictions and/or water waste may be subject to fines and or delivery restriction or disconnection		
Single Family, Duplex, and Triplex Residential		
Lawn Watering	Mandatory	Permitted two days per week (see Appendix B)
Trees, shrubs, perennials, annuals, and vegetables	Mandatory	Water with hand-held hoses, hand-held buckets, or drip irrigation only
Time of Day (applies to over-head sprays only)	Mandatory	No watering between hours of 10 AM and 6 PM
Irrigation Systems	Mandatory	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscapes	Recommended	Recommend installing in spring or fall; must follow mandatory watering practices (new lawns up to 42 days after installation may be watered more frequently but must comply with the time of day rule)
Pools, Jacuzzis, and Hot tubs	Recommended	No restrictions; the use of pool covers is encouraged; lower water level by four (4) inches to minimize loss due to splashing
Fountains, Waterfalls, and Ponds	Mandatory	Outdoor features may not be operated if water sprays or shoots into air; must have recirculation pump
Hard-surface Washing	Mandatory	No washing of walks, drives, patios, gutters
Personal Vehicle Washing	Mandatory	Only with bucket or hand-held hose with positive pressure nozzle
Commercial, Industrial, Business, Multi-family Apartments, and Home Owners Associations		
All Businesses, Industries, and Commercial Users	Recommended	Reduce consumption by 25 to 34 percent; Develop, adopt, and implement Best Management Practices for Water Conservation
Lawn Watering	Mandatory	Permitted two days per week (see Appendix B)
Trees, shrubs, perennials, annuals, and vegetables	Mandatory	Water with hand-held hoses, hand-held buckets, drip irrigation, or subterranean irrigation
Time of Day (applies to over-head sprays only)	Mandatory	No watering between hours of 10 AM and 6 PM

Irrigation Systems	Mandatory	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscapes	Recommended	Recommended installing in spring or fall; must follow mandatory watering practices (new lawns up to 42 days after installation may be watered more frequently but must comply with the time of day rule)
Pools and Jacuzzis	Mandatory	May be filled if utilizing Best Management Practices (see Appendix I)
Fountains, Waterfalls, and Ponds	Mandatory	Outdoor features may not be operated if water sprays or shoots into air; must have recirculation pump
Hard-surface Washing	Mandatory	No washing of walks, drives, patios, gutters except for health or safety
Commercial Car Washes	Mandatory	Utilize Best Management Practices (see Appendix E)
Commercial and Fleet Vehicles	Mandatory	No more than once per week unless car changes ownership; utilize Best Management Practices (see Appendix E)
Commercial Plant Nurseries	Mandatory	Utilize Best Management Practices (see Appendix F)
Hotels/Lodging	Mandatory	Utilize Best Management Practices (see Appendix D)
Restaurants	Mandatory	Required to not serve water except upon request; utilize Best Management Practices (see Appendix D)
Parks, Golf, Schools, and other Government Facilities		
Lawn Watering	Mandatory	Water target less 25 percent (see Appendix C)
Time of Day (applies to over-head sprays only)	Mandatory	No watering between 10 am and 6 pm
Irrigation Systems	Mandatory	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads; minimize spray on walks, drives, and gutters
New Landscapes	Mandatory	No new landscapes unless already under contract at time of stage implementation or if irrigated by drip system
Golf courses	Mandatory	Water Target less 25 percent
Fleet vehicle washing	Mandatory	No more than once per week (emergency vehicles excepted)
Pools, Jacuzzis, and Hot tubs	Mandatory	Utilize Best Management Practices (see Appendix I)
Fountains, Waterfalls, and Ponds	Mandatory	Outdoor features may not be operated if water sprays or shoots into air; must have recirculation pump
Hard-surface washing	Mandatory	No washing except for health or safety

Critical Stage: Reduction Goal 35 Percent or more

General Information: Violation of restrictions and/or water waste may be subject to fines and or delivery restriction or disconnection		
Single Family, Duplex, and Triplex Residential		
Lawn watering	Mandatory	Prohibited
Trees, shrubs, perennials, and vegetables	Mandatory	On permitted day (see Appendix B) using hand-held hoses, hand-held buckets, or drip irrigation only
Time of Day (applies to over-head sprays only)	Mandatory	Prohibited between the hours of 10 AM and 6 PM
New Landscape	Mandatory	No new landscapes without permit (see Appendix G)
Pools, Jacuzzis, and Hot tubs	Mandatory	May not be filled
Fountains, Waterfalls, and Ponds	Mandatory	May not be filled
Hard-surface washing	Mandatory	No washing of walks, drives, patios, gutters
Personal vehicle washing	Mandatory	Prohibited unless at a certified carwash
Commercial, Industrial, Business, Multi-family Apartments, and Home Owners Associations		
All Businesses, Industries, and Commercial Users	Mandatory	Develop a plan to reduce consumption by at least 35 percent; Develop and/or adopt, and implement Best Management Practices for Water Conservation
Lawn watering	Mandatory	Prohibited
Trees, shrubs, perennials, and vegetables	Mandatory	On permitted day (see Appendix B) using hand-held hoses, hand-held buckets, or drip irrigation only
Time of Day (applies to over-head sprays only)	Mandatory	Prohibited between the hours of 10 AM and 6 PM
Irrigation System	Mandatory	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads
New Landscape	Mandatory	No new landscapes without permit (see Appendix G)
Pools and Jacuzzis	Mandatory	May be filled if utilizing Best Management Practices (see Appendix I); no sprays or fountains
Fountains, Waterfalls, and Ponds	Mandatory	May not be filled
Hard-surface washing	Mandatory	No washing of walks, drives, patios, gutters except for health or safety
Commercial Car Washes	Mandatory	Implement Best Management Practices (see Appendix E)
Commercial and Fleet Vehicles	Mandatory	Washing of cars is prohibited (emergency vehicles and instances of public safety are excluded)
Commercial Plant Nurseries	Mandatory	Utilize Best Management Practices (see Appendix F)
Hotels/Lodging	Mandatory	Utilize Best Management Practices; request that laundry not

		be washed daily unless requested by guest; display table tents or public notice
Restaurants	Mandatory	Will not serve water except upon request; Utilize Best Management Practices
Parks, Golf, Schools, and other Public Facilities		
Lawn Watering	Mandatory	Not allowed without permit (see Appendix G)
Trees, shrubs, perennials, and vegetables	Mandatory	Hand-held hoses, hand-held buckets, drip irrigation, or water trucks only
Time of Day (applies to over-head sprays only)	Mandatory	No watering between 10 am and 6 pm
New Landscapes	Mandatory	Prohibited except by permit (see Appendix G)
Golf Courses	Mandatory	Watering greens and tees allowed by permit (see Appendix G); no watering of roughs and fairways unless from non-culinary source
Irrigation System	Mandatory	Maintain irrigation systems in good working order with no damaged, misaligned, or missing sprinkler heads
Fleet vehicle washing	Mandatory	Not allowed; emergency vehicles excepted
Pools, Jacuzzis, and Hot tubs	Mandatory	May be filled if utilizing Best Management Practices (see Appendix I); no sprays or fountains
Fountains, Waterfalls, and Ponds	Mandatory	Not allowed
Hard surface washing	Mandatory	Prohibited except for public safety and health

WATER-WISE PLANTS FOR SALT LAKE CITY

Prepared by

Salt Lake City Corporation

Salt Lake City, Utah
September 1995
Updated April 2004

Acknowledgements

The following individuals assisted in the compilation of the original document in 1995, and we wish to offer our thanks.

Robert Desmond	Utah Chapter, ASLA
Richard Hildreth	Red Butte Garden and Arboretum
Fred Liljegren	U.S. Bureau of Reclamation
Steve Linde	Utah Nursery & Landscape Association
Susan Meyer	Research Ecologist, USDA Forest Service; Chair of the Board of Directors for the Utah Native Plant Society
Larry Rupp	Utah State Horticulturist
Jan Striefel	Landmark Design, Inc.
John Swain	Salt Lake City Parks
Bill Rutherford	Salt Lake City Urban Forester
Brent Wilde	Salt Lake City Planning
Cheri Coffey	Salt Lake City Planning
Doug Dansie	Salt Lake City Planning
Craig Hinckley	Salt Lake City Planning

For this update, we are fortunate to have had the assistance of many of the original committee members and we extend our appreciation for their continued involvement. We would also like to thank the following individuals who joined us in this in the 2004 update:

Greg Graves, ASLA	Bingham Engineering
Paula Mohadjer	Water Conservation Coordinator, Jordan Valley Water Conservancy District
Mandy Self	Director of Horticultural Education, Red Butte Garden and Arboretum
Stephanie Duer	Water Conservation Coordinator, Salt Lake City Department of Public Utilities

LANDSCAPE PLANTS FOR WATER CONSERVATION

Introduction

Residential landscapes, as well as commercial, industrial, and public landscapes in Salt Lake City, have been lushly developed with water-intensive plants. Historically, residents and developers have enjoyed a generous water supply, thanks to the foresight of early settlers in the development of irrigation projects, and that water availability, coupled with a cultural predisposition toward a philosophy of landscape design unrestricted by water availability and an increasing population have lead to an increasing demand on the City's water resources. One way to reduce demand is to encourage landscape design that is sensitive to a limited water source and an arid, cool climate.

In order to make the transition to more sustainable landscape patterns and still maintain Salt Lake's legacy as an "oasis in the desert", it is important to utilize native, naturalized, and adaptive plants capable of sustaining growth with limited supplementary water. Many of these plants are as aesthetically pleasing as more traditional landscape plants but have not been widely planted in the urban landscape because of limited availability and the public's unfamiliarity with the landscape potential of water-conserving plants.

In April of 1995, Salt Lake City adopted a new Zoning Ordinance that established certain standards for landscaping and encouraged the use of "drought tolerant" plants. The intent of the drought-tolerant section of the Zoning Ordinance is to encourage sustainable design in all aspects of landscape planning, from residential and commercial, to public and institutional. The list of drought tolerant plants below is intended to introduce the wide variety of plants suitable for water-wise, sustainable landscapes in Salt Lake City, while fostering creativity in landscape design.

In 2003, after five years of continuous drought, best management practices were developed to increase water efficiency in the landscape, incorporating new opportunities in irrigation technology, and identifying measurable water-use goals and practices. The plant list was also updated to reflect current availability and clarify species identification. Additionally, sections were added to create a quick reference guide to enhance ease of use to the consumer and to the planning staff enforcing related ordinances.

It is our wish that through this reference guide, homeowners, contractors, developers, and city planners will come to recognize the value of climate-compatible landscapes and plants, encouraging more widespread use, fueling demand in the retail market, reducing the seasonal demand on Salt Lake City's water delivery system, and ensuring supplies of high quality drinking water for the future.

Water-wise Landscape Program

Water-wise landscapes begin, not with a plant list, but a comprehensive water-conserving landscape program that includes site analysis and planning, smart design, and efficient irrigation. In "*Urban and Community Forestry, a Guide for the Interior Western United States*", seven broad, fundamental, elements are described:

1. **Analysis, Planning, and Design.** The first step in creating a water-wise landscape is site analysis: identifying the specific characteristics of a site that contribute to its ecological nature and create its micro-climates. Site analysis identifies and catalogues such naturally occurring characteristics as sun, wind, and soil, as well as man-made characteristics such as structures and paving. Planning incorporates needs and uses, identifying how as space as a whole and its component areas is used. Design integrates analysis and planning to create a space that is both beautiful and sustainable. Plant selection can then take place, reflecting the ecological and physical realities of a place, along with the needs of those using or acting in the space, creating balance and enhancing our urban environment.

2. **Soil Improvement.** Urban soils do not always contain all the physical and chemical properties necessary for healthy plant growth and development. Soil improvements are often needed in order to correct poor water infiltration, percolation, and drainage, while still providing adequate water holding capacity and nutritional balance of the soil. When amending the soil, it is best to amend entire areas rather than individual holes. Additionally, when planting trees, it is best to not amend the soil unless the tree in being planted in a contained or confined space.

Please note that if you are landscaping with native plants, soil amendments may not be necessary, and in fact, might be detrimental to long-term health of the plants. For many native plants, the only preparation necessary is to loosen the soil.

Common soil amendments include compost, decomposed leaves or pine duff, manures, or utelite.

3. **Efficient Irrigation.** Matching the amount of water supplied to each plant with that plant's water requirement is the most efficient way to irrigate, and it is a good idea to plan the irrigation system at the same time as the landscape design. To eliminate waste from over-watering and runoff, plants should be grouped according to their water needs, and turf should be irrigated separately from other plantings.

4. **Limit Turf Areas.** Cool season turf grasses, such as Kentucky bluegrass and fescue, typically require 20 to 26 inches of supplemental water during the growing season to sustain a green, lush lawn. Turf should be limited in the landscape to areas consistent with core use patterns and should be irrigated separately from other plantings. In all other areas, drought tolerant or resistant species should be planted. Water use may also be reduced by replacing turf grass in high traffic areas not intended for play with patios, decks, gravel or other appropriate materials. Also, where possible, consider non-traditional turf species such as buffalo or blue grama grass, or non-turf plants such as thyme.

5. **Use of Mulch.** The function of mulch is to buffer soils against climatic extremes. In summer, mulch reduces soil heating, slows water loss from evaporation, and reduces weed growth. In winter, mulch protects shallow roots from damage by preventing the daily freeze/thaw cycle and drying of soils.

6. **Use of Low Water Demand Plants.** Many beautiful and functional plants are available that thrive with natural precipitation or only small amounts of supplemental water. The availability of plants with low water requirements permits selecting for function, beauty, and seasonal interest. However, as with all plant selections and planting, care must be taken to match specific needs of plants to the environmental conditions and the intensity of human activity at the planting site.

7. **Appropriate Maintenance.** Low maintenance is not no-maintenance; a water-wise landscape still requires the extra care required of a more traditional landscape. Once plants fill in and establish, however, maintenance demands decrease, plants require less water, and weeds are crowded out. Many native and low water plants also require less fertilizer, and have fewer pest problems than more traditional landscape plants, adding to the decrease in maintenance demands.

Integrating these seven elements in the planning, development, and maintenance of landscapes has been shown to conserve water and reduce annual maintenance costs without sacrificing function or beauty.

The Plant List

The following list of trees, shrubs, herbaceous perennials, ornamental grasses, vines, groundcovers, and annuals, has been compiled to serve as a guide to the public for selection of landscape plants that have low water requirements. It is also intended to aid Salt Lake City in the evaluation of landscape plans and, specifically, to clarify standards contained in Chapter 24 of the Salt Lake City Zoning Ordinance.

While every effort has been made to make the list as comprehensive as possible, it should not be considered definitive. As additional information becomes available over time it is likely that plants may be added, or removed, from this list. To this end, input from individuals or organizations involved in the landscape industry, as well as members of the general public, is welcomed.

Explanation of Column Headings

Water Zones identify the minimum amount of water a plant needs in order to survive after it is established in the landscape. It should be understood that, while plants will survive with the amounts of water indicated, some plants may not maintain their best appearance without some additional water. Additionally, during periods of extended droughts, even xeric plants might benefit from periodic supplemental watering. It is assumed that the establishment period will be a minimum of two years during which more frequent supplemental water may be needed. Water zones, as used in this list, are defined as follows:

0 No supplemental water is required after plants are established

1 At least 1 inch of supplemental water per month may be required after plants are established.

2 At least 1 inch of supplemental water every two weeks may be required after plants are established.

Plants requiring more than 1 inch of supplemental water every two weeks are not considered "water conserving" or "drought tolerant" plants for the purposes of this list.

Botanical name is the scientific name that identifies plants using a system called binomial nomenclature; that is, by grouping plants with more or less similar physical traits together through levels of classifications: genus, species, varieties, and cultivars. Each plant has only one botanical name, making it unique from any other plant, unlike common names, which may vary region to region. Botanical name has been abbreviated to include only the genus, species, and, if necessary, the variety; few cultivars or hybrids are named. The genus followed by "sp." (singular), or "spp." (plural) indicates that there are several different species of a plant which all have similar characteristics.

While a plant has only one botanical name it may have several **common names**. In compiling this list an attempt has been made to determine the most widely used common names.

Mature size is considered to be the average size a plant could be expected to grow with proper care and the amount of water indicated. Actual size of a given plant at a given location may vary.

Minimum size at planting is the size required by the Salt Lake City Zoning Ordinance, Chapter 24, for trees and shrubs that are planted for the purpose of establishing a visual screen. A blank in this column indicates that either there is no specific requirement or that a shrub is not generally used as a hedge or screen. When the terms "pot", "container", or "caliper" are used to describe minimum size at planting, the established American Standard for Nursery Stock shall apply. That is:

- "All container grown (deciduous or conifer) shrubs shall be healthy, vigorous, well-rooted and established in the container in which they are sold. They shall have tops which are of good quality and are in a healthy growing condition."

  "An established container grown (deciduous or conifer) shrub shall be a (deciduous or conifer) shrub transplanted into a container and grown in that container sufficiently long for the new fibrous roots to have developed so that the root mass will retain its shape and hold together when removed from the container."

- Container size may be converted to minimum height/spread as follows:

2 gallon	=	12” to 15” height or spread
5 gallon	=	18” to 24” height or spread

- “Caliper”, for the purpose of this list, is defined as the diameter of the trunk measured 6 inches above ground level.

Area Value is the area of the plant canopy. Using this number, a designer or planner can determine the total area comprised by a single plant grouping or an entire landscape. Specific spacing recommendations were not made on the list to allow for a more creative use of plants and to recognize that a plant might be used differently in various landscapes.

If you are in need of guidelines to determine an appropriate average spacing of a plant on the list, consult the Height and Width column. To create a massed effect, place plants closer together so that branches overlap and mingle. For specimen plants, keep plants farther apart so that the plants form becomes distinct.

For trees, a standard guide is to plant on centers equaling, or slightly smaller than the diameter.

For long term health and sustainability of a landscape, allow plants adequate room to meet full growth without over crowding.

The **comments** column contains qualifying statements and/or unique cultural requirements that affected the determination of water zones. This column has also been used to provide additional general information about a plant.

LIST OF WATER-CONSERVING PLANTS

Amended April 2004

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
VINES & GROUND COVERS						
0	Juniperus communis	Common Juniper	2-4' x 4-6'	20-28'	Full sun to light shade	Evergreen. Low growing junipers; color and texture varies with cultivar.
0	Mahonia repens	Creeping Oregon Grape	2' x 6'	28'	Part to full shade	Evergreen. Utah native. Dry shade
0	Rhus aromatica 'Gro-low'	Gro-low Sumac	2' x 6'	28	Sun to shade	Glossy green, three-lobed leaves have red fall color. Yellow spring flower followed by fuzzy red berries.
1	Alyssum montanum	Mountain Gold Alyssum	4" x 15"	1'	Sun to part shade	Bright yellow flowers in early spring cover gray green foliage.
1	Anacyclus depressus	Mount Atlas Daisy	2" x 18"	1.75'	Full sun	Silvery green foliage; bright white daisy-like flower mid spring
1 1	Antennaria parviflora; A. rosea	Pussy Toes Pink Pussy Toes	4" x 18"	1.75'	Sun to part shade	Utah native; silvery foliage, pink or white ball shaped flowers
1	Cerastium tomentosum	Snow In Summer	8" x 24"	3'	Full sun	Mat-forming, silvery white foliage; very white spring flower; will die out in center if over-watered. May be invasive

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Convallaria majalis	Lily-Of-The-Valley	8” x 24”	3’	Part to full shade	Dark green foliage; white bell shaped, fragrant flowers in early spring.
1	Fragaria sp.	Wild Strawberry	2” x 24”	3’	Sun to part shade	Utah Natives F. vesca and F. virginiana
1	Helianthemum nummularium	Sunrose, Rockrose	8” x 36”	7’	Sun to light shade	Mat forming green to gray foliage. Simple flowers in white, pink, yellow, and reds in early spring.
1	Juniperus horizontalis	Creeping Juniper	6-18” x 5-8’	50’	Full sun	Evergreen. Needle color varies with cultivar.
1	Rhus aromatica ‘Autumn Amber’	Autumn Amber Sumac	1’ x 3-4’	12.5’	Sun to shade	Lower growing than Gro-low; same glossy foliage and good fall color.
1	Sedum sp.	Stonecrop	1- 6” x 12-24”	1-3’	Full to part sun	Large group of low growing succulents; leaf color and shape varies with cultivar. Not tolerant of foot traffic, typically not dense enough to choke out weeds and grass.
1	Stachys byzantina	Lamb’s Ear	12-18” x 36”	7’	Sun to light shade	Velvety leaves are silvery white; spires of pink flowers mid summer. Avoid overhead watering.
1	Symphoricarpos x chenaultii	Chenault Coralberry	3-4’ x 4-6’	20’	Sun to part shade	Delicate, bluish green foliage; clusters of pinkish flowers followed by colorful purple berries that persist into winter.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Teucrium aroanium	Gray Creeping Germander	3” x 18”	1.75’	Sun to part shade	Silver gray leaves; fragrant lavender flowers in early summer.
1	Thymus pseudolanuginosus	Woolly Thyme	1-2” x 18”	1.75’	Full sun	Hairy gray foliage turns plum colored in fall; evergreen. Tolerates moderate foot traffic.
1	Thymus ssp.	Creeping Thyme	3-4” x 18”	1.75’	Full sun	Spring flowers in white, pinks, reds; green foliage; tolerates moderate foot traffic.
1	Veronica liwanensis	Turkish Speedwell	2” x 18”	1.75’	Sun to part shade	Vigorous perennial; evergreen foliage; violet blue flowers in spring. Needs afternoon shade.
1	Veronica oltensis	Thyme-leaf Speedwell	1” x 24”	3’	Sun to part shade	Tiny dark gray green leaves; azure blue flowers late spring; evergreen.
1	Veronica pectinata	Blue Woolly Speedwell	2” x 18”	1.75’	Sun to part shade	Dense mat of small dark green leaves, covered with tiny blue flowers mid spring
2	Ajuga reptans	Ajuga, Bugleweed	2-4” x 12-18”	1.75’	Part to full shade	Low-growing groundcover with spires of blue or pink flowers. Leave color varies with cultivar, from dark green, to purple, and variegated.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Arctostaphylos uva-ursi	Kinnikinnick	3-6” x 24-36”	7’	Part shade (avoid afternoon sun)	Evergreen. Dark glossy foliage; pinkish bell shaped flowers in early spring. Intolerant of soils that stay wet. Utah Native. Zone 1 if grown in shade.
2	Cotoneaster horizontalis	Rockspray Cotoneaster	2-3’ x 10-15’	113’	Sun to light shade	Stiff angled branches have small round leaves. White flowers followed by red berries.
2	Euonymus fortunei	Purple-leaf Winter Creeper	2’ x 6’	28’	Part shade	Evergreen, though sometimes semi-evergreen. Dark green leaves turn deep purple in fall. Will adhere to and climb surfaces.
2	Galium odoratum	Sweet Woodruff	4” x 18”	1.75’	Part to full shade	Whorls of bright green foliage; star-shaped flowers in late spring
2	Hypericum calycinum	Aaron's Beard, St. Johnswort	12-18” x 24”	3’	Part to full shade	Yellow spring flower; attractive blue green foliage stays evergreen in mild winters. Sometimes takes on purplish winter hue.
2	Lamium maculatum	Dead nettle	8-12” x 24”	3’	Part to full shade	White to purplish blooms late spring; foliage varies with cultivar – many variegated. Adaptable to dry shade.
VINES Note: vines, by their nature grow rapidly and require maintenance to keep them in check.						

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Parthenocissis spp.	Virginia Creeper, Boston Ivy	40’ x 15’	176’	Sun to light shade	Deciduous vine that adheres itself to nearly any surface. Large dark green leaves, red fall color. Spreads easily and can choke out other plants. Not suitable for gardens adjacent to native areas.
1	Campsis radicans	Trumpet Vine	30’ x 20’	314’	Sun to part shade	Needs a strong support. Orange to scarlet trumpet-shaped flowers mid summer; interesting winter pods.
1	Lonicera japonica	Japanese Honeysuckle	12” x 15’	176’	Sun to light shade	Creamy white and yellow flowers. Climbs with tendrils and twinning branches.
1	Polygonum aubertii	Silverlace Vine	40’ x 20’	314’	Sun to part shade	Whitish green flowers cover vine in late summer. Requires a structure to climb on, and it should be very sturdy. Not suitable for gardens adjacent to native areas.
1	Vitis spp.	Grapes	10’ x 10’	78’	Full sun	Large leaves and edible fruit provide good habitat and forage for wildlife. Needs sturdy support. Can be grown with little or no supplemental water if not grown for grape production.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Clematis ligustifolia C. hirsutissima C. occidentalis C. montana C. autumnalis	Clematis	20' x 10'	78'	Plant so that the base of the plant is in the shade and its branches are in the sun	Some may be invasive. Utah Natives include C. ligusticifolia, C. hirsutissima. C. occidentalis
2	Polygonum affine	Himalayan Fleeceflower	6-10' x 30"	5'	Part to full shade	Bright green basal foliage forms mat; spikes of pink flowers in late summer; foliage turns copper in fall. Can be aggressive when over-watered.
2	Wisteria	Wisteria	20' x 10'	78'	Full sun	Fragrant flowers in spring; leaves are soft green in color. Needs very strong support
ORNAMENTAL GRASSES						
0	Bouteloua curtipendula	Sideoats Grama	1-2' x 1'	.75'	Full sun	Popular grass for meadows and reclamation. Fine textured, Purple spikelets form on one side of stem.
0	Bouteloua gracilis	Blue Grama	8-10" x 12"	.75'	Full sun	Native plains grass suitable for turf. Warm season grass goes dormant in winter months. Suitable as a turf grass.
0	Elymus cinereus	Great Basin Rye	3-4' x 2'	3'	Full sun	Utah native. Blue gray foliage

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Festuca arizonica	Arizona Fescue	10”-2’ x 2’	3’	Sun to light shade	Clumping bunchgrass with wiry seed stalks up to 3 feet tall. Gray green to blue green leaves.
0	Oryzopsis hymenoides (also listed as Stipa hymenoides)	Indian Rice Grass	2’ x 2’	3’	Full sun	Cool-season native bunch grass with showy panicles. Provides forage and habitat opportunities for wildlife.
0	Pleuraphis jamesii (also listed as Hilaria jamesii)	Galleta grass; Curly grass; James’ grass	18” x 2’	3’	Full sun	Dense, fuzzy spikelets are angled zig-zag up 2 foot tall stalks. Foliage is gray green, aging to straw. Good choice for dry wildflower meadow. Attractive to butterflies.
0	Schizachyrium scoparium	Little Bluestem	2-4’ x 30”	4.5’	Sun to light shade	Upright, erect habit. Leaves flat and stiff, light green aging to darker green; fall color is red. Inflorescence is wispy. Tolerant of heavy clay soils. Attractive to butterflies, birds. Utah native.
0	Sporobolus contractus	Spike Dropseed	16” x 12”	.75’	Full sun	Very heat tolerant. Interesting flower spikes. Utah native. Tolerates sandy soils but is adaptive.
0	Stipa comata	Needlegrass	4’ x 1’	.75’	Sun to light shade	Slender grass with long, elegant awns.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Blepharoneuron tricholepis	Pine Dropseed; Hairy Dropseed	30” x 30”	4.5’	Sun to light shade	Upright, arching bunchgrass. Green panicles turn straw colored, and persist into winter. Provides food and shelter for butterflies and birds.
1	Elytrigia elongate	Tall Wheatgrass	4-5’ x 18”	1.75’	Full sun	A very upright grass; straw yellow stalks.
1	Festuca ovina glauca	Blue Fescue	1-2’ x 1’	.75’	Full sun	Evergreen. Bluish color. Many cultivars are available, most not as large as the species.
1	Helictotrichon sempervirens	Blue Avena grass; Blue oat grass	4’ x 2’	3’	Full sun	Gray-blue foliage; soft brown plumes mid summer
1	Koeleria macrantha	Prairie Junegrass	2’ x 1’	.75’	Sun to light shade	Clumping bunchgrass with bright green foliage and upright flower spike. Provides food and habitat for birds and large mammals.
1	Muhlenbergia capellensis	Muhly Grass	3’ x 3’	7’	Full sun	Plumes dusty pink
1	Muhlenbergia montana	Mountain Muhly	30” x 24”	3’	Sun to moderate shade	Upright bunchgrass with open panicles of green, aging to straw and persistent into winter.
1	Muhlenbergia rigens	Deergrass	3-5’ x 3’	7’	Sun to light shade	Upright and arching, coarse-textured bunchgrass; spikelets to 5 feet tall, aging to straw. Wildlife and bird habitat. Good container plant.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Muhlenbergia wrightii	Spike Muhly	1-2' x 2'	3'	Full sun	Fine textured, upright green leaf blades. Green florets age to gray black and persist into winter.
1	Poa fendleriana	Muttongrass	1-2' x 1'	.75'	Sun to shade	Upright bunchgrass; bright green foliage. Airy panicles of yellow-green florets. Attractive to birds, butterflies.
1	Panicum virgatum	Switch grass	2' x 2' Flower stalks to 5 '	3'	Full sun	Steel blue foliage; upright habit. Florets arranged on arching stem. Plant turns orange in fall. Seeds attractive to birds.
1	Sorghastrum nutans	Indiangrass	4-5' x 18"	1.75'	Full sun	Upright habit; nice fall color; habitat for ground dwelling birds
1	Sporobolus airoides	Alkali sacaton	2' x 2'	3'	Full sun	Delicate appearing foliage with pinkish inflorescence. Tolerant of saline and clay soils.
2	Calamagrostis acutiflora	Feather Reed Grass	4' x 2'	12'	Full sun	Very upright grass; plumes early
2	Calamagrostis acutiflora 'Overdam'	Overdam Reedgrass	3' x 2'	3'	Part sun	Green and white variegated foliage; whitish plumes; best in afternoon shade.
2	Calamagrostis arundinacea 'Karl Foerster'	Foerster Reedgrass	4' x 3'	7'	Full sun	Very upright grass; Oat like plumes bloom mid summer and persist well into winter.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Miscanthus sinensis	Maidenhair Grass	4-10’ x 3-7’	7-38’	Sun to light shade	Upright fountain-like habit; wide variety; white variegated forms prefer some afternoon shade; good winter presence.
2	Pennisetum alopecuroides	Fountain Grass	2-3’ x 2-3’	7’	Sun to light shade	Soft, foxtail-like plumes appear mid summer. Requires good drainage. Plumes useful for flower arrangements.
HERBACEOUS PERENNIALS						
0	Agave parryi	Parry’s Agave	12” x 18”, flower spike to 8’	1.75’	Sun to light shade	Thick, blue gray sword-like leaves form low rosette. Stem has many yellow to red tinged flowers mid summer. Flowers infrequently. Utah native.
0	Argemone munita	Prickly Poppy	24” x 12”	1’	Full sun	Utah native. Blue green foliage; papery white flowers
0	Asclepias speciosa	Showy milkweed	3’ x 3’	7’	Sun to light shade	Upright perennial with gray green leaves and clusters of pinkish white flowers appearing in mid summer. Very attractive to butterflies. May form larger colonies. Utah native.
0	Asclepias tuberosa	Butterfly Milkweed	1-2’ x 2’	3’	Full sun	Orange midsummer blooms are a favorite of butterflies.
0	Astragalus utahensis	Utah Lady finger; Utah milkvetch	4” x 10”	1’	Full sun	Utah native. Hairy, silver foliage; rose pink flowers

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Berlandiera lyrata	Chocolate flower	18” x 12”	1’	Full sun	Yellow mid-summer daisy; fragrant
0	Callirhoe involucrata	Poppy Mallow; Prairie Winecup	12” x 36”	7’	Full sun	Magenta flowers mid summer into fall. Deeply lobed foliage
0	Calylophus hartwegii	Fendler’s Sundrops	1’ x 3’	7’	Full sun	Four-petaled pale yellow flowers fade to orange and reddish pink, blooming all summer. Green foliage.
0	Delosperma cooperi	Pink Hardy Iceplant	6” x 24”	3’	Full sun	Pink flower late spring; succulent green foliage
0	Eriogonum umbellatum	Sulfur Flower	12” x 18”	1.75’	Full sun	Utah native. Early to midsummer sulfur-yellow flowers above dark green foliage
0	Gaillardia aristata	Blanket Flower	2-3’ x 2-3’	7’	Full sun	Utah native. Yellow and mahogany summer flower; reseeds.
0	Gaura lindheimeri	Gaura, Whirling Butterflies	36” x 30”	4.5’	Full sun	White butterfly-like flowers bloom all summer. Fine textured foliage. Wispy appearance.
0	Hesperaloe parvifolia	Red Yucca	5’ x 3’	7’	Sun to part shade	Similar in appearance to Yucca, but has finer foliage. Reddish flowers appear in summer.
0	Mirabilis multiflora	Desert Four O’Clock	2’ x 5’	19.5’	Full sun	Magenta flowers open in evening; thick, leathery foliage. Utah native.
0	Oenothera caespitosa	Tufted Evening Primrose	6” x 6”	.5’	Full sun	Utah native. Large white flowers; opens in evening

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Oenothera howardii	Bronze Evening Primrose	6” x 6”	.5’	Full sun	Utah native. Yellow flowers fade to bronze
0	Penstemon ambiguus	Sand Penstemon	2’ x 2’	3’	Sun to light shade	Airy clumps of grass-like foliage with many stems of pink flowers early to mid summer.
0	Penstemon cyananthus	Wasatch Beardtongue	36” x 12”	.1’	Full sun	Sky blue flowers early to mid summer. Utah native.
0	Penstemon eatonii	Eaton’s Beardtongue	36” x 12”	1’	Sun to light shade	Scarlet red flowers; dark shiny green foliage. Utah native. Will die if over-watered.
0	Penstemon palmeri	Palmer Penstemon	3’ x 2’	3’	Full sun	Tall spikes of pale pink, fragrant flowers. Utah native. Will die if over-watered.
0	Penstemon pseudospectabilis	Desert Penstemon	2-3’ x 2’	3’	Sun to part shade	Vibrant, hot pink flowers late spring to mid summer. Blue green foliage
0	Penstemon strictus	Rocky Mountain Penstemon	30” x 30”	4.5’	Full sun	Brilliant purple blue flowers early to mid summer. Rich green foliage. Utah native.
0	Ratibida columnifera	Prairie Coneflower, Mexican Hat	24” x 18”	1.75’	Full sun	Yellow and mahogany petals surround pronounced center mid summer; ferny foliage
0	Spharealcea ssp.	Globemallow	2-3’ x 1’	.75’	Full sun	True orange flowers in summer. Foliage is pale gray green. Utah native.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Tanacetum densum	Partridge Feather	6-8” x 12”	.75’	Full sun	Mats of silvery white, finely cut foliage; yellow button flowers early summer.
0	Viguiera multiflora	Showy Goldeneye	24” x 36”	7’	Full sun	Utah native. Small daisy-like yellow flowers; will naturalize. Leaves are lance-shaped.
1	Achillea ageratifolia	Greek Yarrow	4” x 18”	1.75’	Full sun	Bright white flower clusters above gray green foliage. Late spring bloom.
1	Achillea filipendula	Fernleaf Yarrow	2-4’ x 2’	3’	Full sun	Two widely used cultivars, ‘Coronation Gold’ and ‘Moonshine’
1	Achillea millefollium.	Yarrow	36” x 24”	3’	Full sun	Wide range of colors. Over watering tends to make the plants flop. Aggressive when over-watered.
1	Achillea serbica	Serbian Yarrow	4” x 15”	1’	Full sun	Tight gray mats of evergreen foliage topped by white spring flowers.
1	Adenophora latifolia	Lilyleaf Ladybells	2-3’ x 2’	3’	Part to full shade	Tall stalks of trumpet-like lavender blue flowers in early summer. Good in dry shade.
1	Aethionema schistosum	Persian Rockcress	10” x 15”	1’	Full sun	Fragrant, soft pink flowers cover plant in early spring. Tiny leaves are evergreen and powdery blue.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Agastache cana	Wild Hyssop	2-3' x 2'	3'	Full sun	Unusual colors, fragrant flowers, and aromatic gray foliage. Airy, upright habit. Late summer blooming.
1	Agastache rupestris	Licorice Hyssop	2-3' x 2'	3'	Full sun	Orange and lavender midsummer to fall flowers, fragrant needle-like foliage. Very attractive to hummingbirds.
1	Alyssum montanum	Mountain Gold Alyssum	4" x 15"	1'	Sun to part shade	Bright yellow flowers in early spring cover gray green foliage.
1	Amorpha canescens	Leadplant	2-4' x 3'	7'	Full sun	Silvery-white hairy foliage with pink pea-like flower
1	Anacyclus depressus	Mount Atlas Daisy	2" x 18"	1.75'	Full sun	Silvery green foliage; bright white daisy-like flower mid spring
1	Anaphalis margaritacea	Pearly Everlasting	2' x 2'	3'	Sun to light shade	Golden flowers in silver bracts; woolly silver foliage. Good choice for meadow mixes.
1 1	Antennaria parviflora; A. rosea	Pussy Toes Pink Pussy Toes	4" x 18"	1.75'	Sun to part shade	Utah native; silvery foliage, pink or white ball shaped flowers
1	Artemisia spp.	Wormwood	10- 36" x 36"	7'	Full sun	Silver foliage, finely cut. Size varieties with cultivar.
1	Centranthus ruber	Keys Of Heaven, Jupiter's Beard, Red Valerian	36" x 24"	3'	Sun to part shade	Pink to red flowers off and on all summer. White form is C. alba.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Coreopsis verticillata	Threadleaf Coreopsis	24” x 24”	3’	Sun to light shade	Delicate yellow daisy-like flowers all summer. Needle like foliage.
1	Corydalis lutea	Yellow Corydalis	15” x 15”	1’	Part to full shade	Yellow “snap-like” flower through out summer
1	Epimedium x rubrum	Barrenwort	12” x 12”	.75’	Shade	Small orchid-like flowers in early summer; foliage is heart-shaped and evergreen in mild winters.
1	Erodium chrysanthum	Yellow Stork’s bill	5” x 12”	.75’	Full sun	Lacy gray green foliage; soft yellow flowers during summer months.
1	Eupatorium greggii	Texas Mist Flower	30” x 36”	7’	Sun to part shade	Lavender blue flowers, like fluffy balls, bloom all summer. With less water needs more shade. Attractive to butterflies.
1	Geranium viscosissimum	Sticky Geranium	2-3’ x 2’	3’	Part shade	Utah native. Soft pink flowers; nice fall foliage color
1	Globularia cordifolia	Leather Leaf Powder Puff	4” x 15”	1’	Sun to part shade	Low mat of evergreen leaves; light blue flower puffs in late spring.
1	Helianthemum nummularium	Rockrose	6” x 18”	1.75’	Sun to part shade	Simple, five-petaled flowers in a wide range of colors; mats of green to gray foliage have fine texture.
1	Kniphorfia uvaria	Red Hot Poker	3’ x 3’	7’	Full sun	Grass like foliage, unusual bi-color flower spikes in yellow to red. Deer resistant.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Lavandula angustifolia	English Lavender (many cultivars available including Munstead, Hidcote,Nana, and Jean Davis)	15-30" x 15-24"	3'	Full sun	Aromatic green or gray foliage topped by fragrant purple spires. Mid summer bloom. Evergreen. Deer resistant.
1	Lavandula x intermedia	Lavandin	24-36" x 18-24"	1.75' to 3'	Full sun	Aromatic, evergreen foliage; flowers slightly later than English Lavender. Deer resistant.
1	Liatris punctata	Dotted Gayfeather	18" x 18"	1.75'	Full sun	Magenta pink spires in late summer; grass-like foliage.
1	Linum kingii	King's Yellow Flax	8" x 10"	.5'	Full sun	Blue-gray foliage; yellow spring flower
1	Linum lewisii (also listed as L. perenne v. lewisii)	Blue Flax; Lewis' Flax	24" x 18"	1.75'	Full to part sun	Wispy foliage; blue spring flower
1	Nepeta x faassenii	Catmint	18" x 30"	4.5'	Sun to light shade	Lavender blue flowers early summer; soft gray fragrant foliage.
1	Oenothera berlandieri 'Siskiyou'	Siskiyou Pink Mexican Primrose	12" x 12"	1'	Sun to part shade	Papery pink flowers bloom all summer; foliage is dark green. Can become invasive if over-watered.
1	Oenothera missouriensis	Missouri Evening Primrose	10-12" x 24"	3'	Full sun	Large, lemon yellow flowers open towards the end of day; glossy green foliage. Flowers all summer.
1	Oenothera pallida	Pale Evening Primrose	12" x 12"	1'	Full sun	Fast growing. Large white flowers; good choice for sandy soils. Utah native.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Penstemon barbatus.	Scarlet Bugler	2-4’ x 2’	3’	Sun to light shade	Foliage is a low mound; flowers rise on spires early summer. Utah native
1	Penstemon caespitosa	Tufted Beardtongue	2-12” x 36”	7’	Sun to light shade	Compact mat of gray green foliage covered with purple flowers from early to late spring.
1	Penstemon linarioides	Mat Penstemon	1’ x 3’	7’	Sun to light shade	Fine textured gray green leaves; lavender-blue snap-like flowers late spring.
1	Penstemon pinifolius	Pine-leaf Penstemon	12” x 12”	1’	Full sun	Fine foliage; small scarlet trumpet-shaped flowers
1	Penstemon whippleanus	Whipple’s Penstemon	2-3’ x 2’	3’	Sun to light shade	Burgundy purple flowers early to late summer. Utah native.
1	Perovskia atriplicifolia	Russian Sage	3-5’ x 3-4’	12.5’	Full sun	Small lavender blue flowers in tall spires; foliage is gray green and aromatic. Cut back to ground in spring keeps plant lush.
1	Pulsatilla vulgaris (also listed as Anemone pulsatilla)	Pasque Flower	9-12" x 12”	.75’	Sun to part shade	Magenta or purple cup shaped flowers in early spring, followed by fuzzy plum colored seed heads.
1	Salvia officinalis	Kitchen Sage	2’x 3’	7’	Full sun	Evergreen gray green foliage; edible foliage is aromatic.
1	Santolina chamaecyparissus	Lavender Cotton	12-18” x 18”	1.75’	Full sun	Gray foliage forms compact mound; yellow button flowers midsummer. Evergreen in mild winter. Aromatic.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Santolina virens	Green Santolina	12-18” x 18”	1.75’	Full sun	Bright green compact foliage; evergreen in mild winters.
1	Sedum spectabile	Showy Stonecrop	18-24” x 15”	1.75’	Sun to light shade	Fleshy blue-green leaves appear in mid spring, followed by white to pink broccoli-like flower.
1	Sempervivum tectorum	Hens And Chicks	4” x 12”	1’	Full sun	Succulent foliage forms low rosettes. Interesting specimen in rock gardens.
1	Teucrium aroanium	Creeping Germander	3” x 18”	1.75’	Sun to light shade	Mounds of silver foliage; lavender pink fragrant flowers mid summer.
1	Teucrium chamaedrys	Wall Germander	1’ x 2’	3’	Sun to light shade	Dark glossy foliage is evergreen in mild winters; spikes of lavender pink flowers in summer.
1	Zauschneria arizonica	Hummingbird Trumpet	1-2’ x 2-4’	7’	Sun to part shade	Delicate scarlet, trumpet shaped flowers in early fall. Utah native.
1	Zauschneria latifolia	Hummingbird Flower	18” x 18”	1.75’	Full sun	Brilliant scarlet trumpets late summer into fall
1	Zizophora clinopodioides	Blue Mint Bush	18” x 18”	1.75’	Sun to part shade	Blue, thyme-like flowers cover plant in summer. Foliage is dull green. Fragrant.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Alcea rosea	Hollyhocks	3-6’ x 3’	7’	Full sun	Simple flowered forms are more heat and drought tolerant. Tall spires of flowers in magenta to apricot.
2	Alchemilla mollis	Lady’s Mantle	12-18” x 15”	1’	Part shade	Round foliage with felt like texture; chartreuse flower in late spring.
2	Aquilegia caerulea	Rocky Mountain Columbine	24” x 18”	1.75’	Part shade	Blue and whit flowers. The more sun, the more water it needs. Utah native
2	Aquilegia chrysantha	Golden Columbine	2’ x 2’	3’	Sun to part shade	Yellow flower. The more sun the more water it needs.
2	Aquilegia formosa	Western Columbine	18” x 24”	3’	Full sun to part shade	Utah native. Yellow petals with orange-red sepals. More drought tolerant than most other columbine
2	Armeria maritima	Common Thrift	6” x 12”	.75’	Sun to part shade	Rose pink ball-like flowers; grass-like foliage. Might need more water in heat of summer.
2	Baptisia australis	False Indigo	3-4’ x 4’	12.5’	Sun to part shade	Indigo-blue flowers in mid to late spring on long racemes; seed pods are shiny black. Foliage is pea-like and blue green. Slow to establish.
2	Bergenia cordifolia	Bergenia, Saxifrage	12” x 12”	.75’	Part to full shade	Large, oval leaves are persistent into winter; pink spring flower

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Campanula portenshlagiana	Dalmatian Bellflower	5-10” x 15”	1’	Morning sun to light shade	Bell shaped purplish flowers mid spring; dark green heart shaped foliage.
2	Campanula rotundifolia	Bluebells-of-Scotland	6-12” x 12”	.75’	Part to full shade	Nodding, lavender blue bell-shaped flowers early summer to fall.
2	Dianthus gratianopolitanus	Garden Pinks	8” x 18”	1.75’	Sun to part shade	Gray or silver foliage; flower color varies with cultivar.
2	Dianthus pinifolius	Pine-leafed Garden Pink	24” x 12”	.75’	Full sun	Blue-green foliage, very fine. Flowers are dark red.
2	Echinacea angustifolia	Prairie Purple Coneflower	36” x 18”	1.75’	Sun to part shade	Recurved petals are long and fine; prominent cone enjoyed by birds. Deer resistant.
2	Echinacea paradoxa	Ozark Coneflower	30-36” x 15”	1’	Sun to part shade	Yellow recurved petals. Deer resistant.
2	Geranium endressii	Endress Cranesbill	16-20” x 18-24”	3’	Part shade	Deep pink flowers in early to mid summer.
2	Geranium sanguineum	Bloody Cranesbill	8” x 18”	1.75’	Sun to part shade	Magenta flowers in early summer. Green foliage turns orange in fall.
2	Hemerocallis hybrid	Daylily	1-6’ x 1-3’	.75-7’	Sun to light shade	Wide variety of flower colors, heights. Useful for massing. Foliage is grass-like.
2	Heuchera sanguinea	Coral Bells	12” x 15”	1’	Part to full shade	Round, lobed foliage; slender stems with white to pink bell shaped flowers.
2	Iberis sempervirens	Candytuft	12” x 12”	.75’	Sun to light shade	Evergreen. Bright white flowers mid spring.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Iris hybrids	Bearded Iris; German Iris	1-3' x 2'	3'	Full to part sun	Flowers late spring to early summer; sword-like foliage
2	Liatris spicata	Gayfeather	2-3' x 2'	3'	Full sun	Grass-like foliage and showy flower spikes in purple and violet.
2	Lychnis coronaria	Rose Campion	36" x 24"	3'	Sun to light shade	Magenta flowers appear along woolly white stems. Leaves are silvery gray.
2	Paeonia hybrida	Peony	36" x 24"	3'	Sun to light shade	Wide range of flower colors and styles. Blooms late spring. Foliage is deeply lobed, attractive fall color.
2	Papaver orientale	Oriental Poppy	30" x 24"	3'	Sun to light shade	Papery flowers in mid spring in a variety of colors. Hairy basal foliage goes dormant in low water situations.
2	Phlox subulata	Creeping Phlox	6" x 12"	.75'	Sun to light shade	Low, matting foliage in light green; flowers appear in spring in a variety of colors.
2	Rudbeckia fulgida	Black Eyed Susan	3' x 2'	3'	Full sun	Deep golden flowers mid to late summer. Leaves are large, oval to heart shaped and glossy green.
2	Rudbeckia nitida	Orange Coneflower	2-4' x 3'	7'	Full sun	Smaller flowers than R. fulgida; densely branched with many flowers mid summer.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Rudbeckia occidentalis	Western Coneflower	4' x 2'	3'	Full sun	Utah native. Tall spire with brown cone, very small yellow petals. Utilized by finches and other perching birds
2	Salvia chamaecyparissus	Germander Sage	18" x 24"	3'	Full sun	True blue flowers on spikes above green foliage. Foliage is evergreen during mild winters.
2	Salvia nemerosa	Plume-flowered Salvia	30" x 24"	3'	Full sun	Rosy purple flowers with fuzzy appearance, mid summer. Gray green foliage.
2	Salvia superba	Garden Salvia	2-3' x 2'	3'	Full sun	Spires of flowers mid summer; foliage typically dull green.
2	Scutellaria resinosa	Prairie Skullcap	10" x 10"	.75'	Full sun	Neat mounds of thyme-like foliage; lavender blue flowers late spring.
2	Saponaria ocymoides	Rock Soapwort	6" x 24"	3'	Sun to part shade	Pink or white spring flowers; fine textured foliage.
2	Solidago canadensis	Goldenrod	3-4' x 3-4'	12.5'	Sun to shade	Plumes of yellow flowers late summer to early fall.
DECIDUOUS AND EVERGREEN SHRUBS						
0	Amorpha fruticosa	False Indigo	4' x 6'	28'	Full sun	Attractive, pinnate foliage; dense spires of purple flowers with yellow anthers.
0	Arctostaphylos patula	Greenleaf manzanita	3' x 6'	28'	Sun to light shade	Evergreen. Pale pink spring flowers, bell shaped. Utah native.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Artemisia bigelovii	Bigelow's Sage	16" x 24"	3'	Full sun	Low growing sagebrush; light green color
0	Artemisia cana	Silver Sage	2-3' x 3'	7'	Full sun	Thicker leaves than other sages. Native to intermountain area.
0	Artemisia filifolia	Sand Sage	3' x 2'	3'	Full sun	Feathery foliage. Utah native
0	Artemisia frigida	Fringed Sage	14" x 14"	.75'	Full sun	Utah native. Silver foliage
0	Artemisia nova	Black Sage	2' x 2'	3'	Full sun	Foliage lead-gray; flower spikes dry to dark brown. Utah native.
0	Artemisia tridentata	Big Basin Sage	4' x 4'	12.5'	Full sun	Utah native. Large shrub with aromatic foliage.
0	Atriplex canescens	Fourwing Salt Bush	2-6' x 4'	12.5'	Full sun	Evergreen, silvery green foliage. Excellent for dry medians. Tolerates saline and alkaline soils. Utah native.
0	Atriplex gardneri	Gardner Salt Bush	12" x 4'	12.5'	Full sun	Evergreen. Utah native.
0	Ceratoides lanata (also listed as Krascheninnikova lantana)	Winterfat	3' x 2'	3'	Full sun	Silvery white foliage; important winter forage
0	Cercocarpus intricatus	Dwarf Mountain Mahogany	4-6' x 5'	19.5'	Full sun	Very dense, rounded form, tiny needle-like leaves.
0	Cercocarpus ledifolius	Curl-leaf Mountain Mahogany	15' x 8'	50'	Full sun	Evergreen. Dark small foliage. Feathery seed plume. Utah native.
0	Cercocarpus montanus	Mountain Mahogany	8' x 6'	28'	Full sun	Silver gray bark; thick dark green leaves. Utah native.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Chamaebatiaria millifolium	Fernbush	4’ x 3’	7’	Full sun	Green, aromatic foliage; clusters of white flowers late summer. Utah native.
0	Chrysothamnus nauseosus	Rubber Rabbitbrush	4' x 4’	12.5’	Full sun	White stems, silver foliage; spectacular yellow fall flowers. Utah native.
0	Cowania mexicana (also listed as Purshia mexicana)	Cliff Rose	2-5’ x 4’	12.5	Full sun	Semi-evergreen. Potentilla-like flowers in late spring. Utah native.
0	Ephedra viridis	Mormon Tea	3’ x 4'	12.5	Full sun	Evergreen. Unusual shrub with bright green bark and insignificant foliage. Utah native.
0	Fallugia paradoxa	Apache Plume	4’ x 4’	12.5’	Full sun	Delicate, white flowers followed by mauve colored, fluffy seed heads. Utah native.
0	Forestiera neomexicana	New Mexico Privet	15’ x 10’	78.5’	Full sun	Interesting multi-stemmed small tree. Black fruit enjoyed by birds. Utah native.
0	Hippophae rhamnoides	Sea Buckthorn	8-18’ x 12’	113’	Full sun	Informal shrub; small greenish flower; orange, edible fruit on female plants. Good for wildlife.
0	Holodiscus dumosus	Rock Spray Spiraea	3’ x 4’	12.5’	Full to part sun	Graceful shrub with arching branches covered in spring with cream blossoms. Utah native.
0	Jamesia americana	Cliff Jamesia	3’ x 5’	19.5’	Full to part sun	White flowers spring and early summer. Utah native.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Mahonia fremontii	Fremont's Mahonia	4' x 4'	12.5'	Full sun	Evergreen, holly-like foliage. Yellow spring flowers. Utah native.
0	Purshia tridentata	Antelope Bitterbrush	6' x 6'	28'	Full sun	Trilobed leaves; yellow spring flower. Very attractive to deer. Utah native.
0	Opuntia erinacea	Common Pricklypear	10" x 3-5'	19.5'	Full sun	A nice pricklypear with abundant white needles. Flowers are bright pink or yellow.
0	Rhus glabra	Smooth Sumac	8' x 8'	50''	Full sun	Bright red seed heads and red fall color.
0	Rhus glabra v cistmontana	Dwarf Smooth Sumac	4' x 6'	28'	Full sun	Insignificant flowers followed by attractive red fruit that provides winter forage. Red fall color Utah native.
0	Rhus trilobata	Oakbrush Sumac, Skunkbrush	3-6' x 5'	19.5'	Sun to part shade	Dense and wide spreading shrub. Red fruit eaten by winter birds. Fall color yellow to red. Utah native.
0	Rhus typhina	Staghorn Sumac	10' x 15'	176'	Sun to part shade	Bright green, finely dissected, pinnate leaves turn scarlet in fall. Bright red seed head in fall. Forms colonies. Attractive to wildlife.
0	Ribes cereum	Squaw Currant	3' x 5'	19.5'	Full to part shade	Nice compact form; Small leaves, whitish pink flowers, red berries.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Robinia neomexicana	New Mexico Locust	6-20’ x 10-15’	176’	Full sun	Beautiful clusters of rose pink flowers; gray green foliage; winter seedpods. Has thorns; may sucker.
0	Salvia dorrii	Dorr’s Sage	1-2’ x 3’	7’	Full sun	Small, rounded white leaves are extremely aromatic. Purple-blue flower spires.
0	Shepherdia argentea	Silver Buffaloberry	10’ x 6'	28’	Full sun	Fine, silvery foliage, small yellow flowers; red edible fruit. Valuable as habitat and forage.
0	Yucca angustissima	Narrow leaf Yucca	5’ x 2’	3’	Full sun	Narrow leaves in rosette; tall spires of creamy white flowers
0	Yucca baccata	Datil Yucca	2’ x 2’	3’	Full sun	Rosette of thick, sword-like leaves. Spires of creamy white flowers.
0	Yucca elata	Soaptree Yucca	8’ x 8’	50’	Full sun	Rosette of large, thick, grayish leaves. Waxy cream flowers produced on elongated stems. Listed as a Zone 6, so plant in a protected area.
0	Yucca glauca	Spanish Bayonet	2’ x 2’	3’	Full sun	Sword like leaves; creamy white flowers
0	Yucca filamentosa	Adam’s Needle	3-6’ x 3’	7’	Full sun	Broad, sword-like leaves; some forms are variegated. Flowers appear along tall stalk mid summer.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Yucca harrimaniae	Harriman's Yucca	12" x 12"	.75'	Full sun	Sword-like foliage has threads along edges; tall spire up to 3 feet.
0	Yucca utahensis	Utah Yucca	8' x 5'	19.5'	Full sun	Stately yucca producing multiple flower stems
1	Amelanchier utahensis	Utah Serviceberry	4'-8' x 6'	28'	Sun to shade	Utah native. Smaller leaves, denser habit than other serviceberry
1	Arctostaphylos patula	Greenleaf Manzanita	5-6' x 8-10'	50'	Sun to light shade	Green leathery leaves; urn shaped pinkish flowers in spring; deep reddish wood.
1	Caragana arborescens	Siberian Pea Shrub	10' x 6'	28'	Full sun	Yellow spring flower; lime green foliage with yellow fall color.
1	Caragana pygmaea	Pygmy Pea Shrub	3' x 4'	12.5	Full sun	Fine textured foliage; yellow spring flower.
1	Forsythia sp.	Forsythia	6' x 6-8'	50'	Sun to light shade	Early yellow flowers on arching stems. Reddish fall color.
1	Hibiscus syriacus	Confederate Rose, Rose Of Sharon	8' x 8'	50'	Sun to light shade	Late summer flowers in a variety of colors. Needs more water in full sun.
1	Juniperus ssp.	varies	varies	varies	Full sun	Evergreen. Berries provide forage opportunities for many birds. Upright forms provide nesting.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Mahonia aquifolium	Oregon Grape	10' x 10'	78'	Part to full shade	Evergreen leaves are holly-like. Fragrant yellow spring flowers followed by edible dark berries.
1	Mahonia compacta	Compact Oregon Grape	4-5' x 4'	12.5'	Part to full shade	Evergreen holly-like leaves; fragrant yellow spring flowers; dark edible berries.
1	Pachistima myrsinites (may also be listed as Paxistima)	Mountain Lover	3' x 4-5'	20'	Part to full shade	Evergreen with boxwood-shaped leaves that turn red in winter. Yellow spring flowers, green berries. Utah native.
1	Philadelphus lewisii	Lewis' Mockorange	4-6' x 5-8''	19.5 – 50'	Sun to part shade	Medium sized shrub with fragrant white flowers in early summer.
1	Philadelphus microphyllus	Littleleaf Mockorange	4-6' x 4-6'	20'	Sun to light shade	Snowy white flowers off and on all summer; dark green foliage; dense habit.
1	Pinus mugo var. mugo	Dwarf Mugo Pine	4' x 4'	12.5'	Full sun	Mounding evergreen.
1	Potentilla fruticosa	Shrubby Cinquefoil	3' x 3'	7'	Full sun	Many varieties with flower color in white, yellow, and red. Summer blooming.
1	Prunus besseyi	Western Sand Cherry	5' x 5'	19.5'	Full sun	Dull, dark green foliage, white spring flowers, edible fruit. Spreading, open habit
1	Rhamnus frangula 'Columnaris'	Tallhedge Buckthorn	10-12' x 4'	12.5'	Sun to part shade	Tall narrow shrub with glossy foliage turning yellow in fall, insignificant greenish flowers turning into attractive dark berries.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Ribes aureum	Golden Currant	4’ x 4'	12.5’	Part to full shade	Yellow spring flowers; red berries provide forage. Utah native.
1	Ribes odoratum	Clove Currant	6-8’ x 6-8’	50’	Sun to part shade	Irregularly formed shrub with arching branches. Profuse spring flowers are clove-scented. Foliage is bluish green. Alternate host for White Pine Blister Rust.
1	Rosa foetida ‘Bicolor’	Austrian Copper Rose	6-8’ x 8’	50’	Full sun	Yellow flowers turn coppery red; very hardy and very thorny.
1	Rosa glauca (also listed as R. rubrifolia)	Redleaf Rose	6-7’ x 4-6’	20’	Sun to part shade	Reddish foliage (gray green in shade); simple rose pink flower early summer; dark red hips; red-orange fall color.
1	Rosa x harisonii	Harison’s Yellow Rose	2-5’ x 4-6’	28’	Full sun	Bright yellow spring blossoms followed by showy black hips. Thorns.
1	Rosa woodsii	Woods Rose	5’ x 5’	20’	Sun to part shade	Delicate pink spring blossoms; large red hips persist into winter. Utah native.
1	Rubus deliciosus	Boulder Thimbleberry	4-6’ x 5-8’	28’	Sun to part shade	Large, single, white rose-like flower in early summer; foliage bright green with yellow fall color. Vase-shaped shrub.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Symphoricarpos x chenaultii	Chenault Coralberry	3-4' x 4-6'	20'	Sun to part shade	Delicate, bluish green foliage; clusters of pinkish flowers followed by colorful purple berries that persist into winter.
1	Symphoricarpos oreophilus	Mountain Snowberry	2-5' x 3-5'	19.5'	Full to part sun	Vase shaped shrub, light gray leaves, pink bell shaped flowers. Snowy white berries persist into winter. Utah native.
1	Syringa vulgaris	Common Lilac (many cultivars)	8-20' x 10-15'	176'	Full sun	Spring flowers, sometimes fragrant. Allow for good air circulation to reduce or avoid powdery mildew.
2	Alnus incana; A. tenuifolia	Thinleaf Alder	15' x 10'	78'	Full to part sun	Smooth gray bark; glossy leaves
2	Amelanchier alnifolia	Saskatoon Serviceberry	6-15'' x 8'	50'	Sun to shade	Utah native. White spring flowers, edible fruit, silvery bark, red fall color
2	Aronia arbutifolia	Red Chokeberry	6-8' x 4-5'	19.5'	Sun to light shade	White spring flowers, glossy leaves, red berries.
2	Aronia melanocarpa	Black Chokeberry	8' x 6'	28'	Sun to light shade	White spring flowers, glossy foliage, black berries. Red fall color and persistent fruit. Attractive hedge or foundation plant.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Berberis sp.	Mentor Barberry, Red Leaf Barberry, Rose Glow Barberry	5'-6' x 4'-6'	28'	Sun to light shade	Rounded, dense shrubs with small round leaves in yellow, red, or green depending on variety. Not well suited for south or west facing walls. Has thorns.
2	Berberis thunbergii 'Crimson Pygmy'	Crimson Pygmy Barberry	2' x 2'-4'	12.5'	Sun to light shade	Rounded dense shrub with red foliage. Not well suited for south or west facing walls. Has thorns.
2	Buddleia sp.	Butterfly Bush	4-8' x 4-10'	12.5 – 78'	Sun to light shade	Upright and arching shrubs with late summer flowers similar to lilacs. Gray to green foliage.
2	Caryopteris x clandonensis	Blue Mist Spirea	2-3' x 4'	12.5'	Full sun	Grayish green foliage; blue flowers in late summer. Most attractive when cut back hard in late winter.
2	Chaenomeles japonica	Flowering Quince	6' x 8''	50'	Sun to light shade	Very early flowers, rose to apricot; soft green foliage. Chlorosis may be a problem.
2	Cotinus coggygria	Smoke Tree	15' x 8'	50'	Full sun	Dark reddish leaves, flower plumes are smoky purple, orange fall color.
2	Cotoneaster acutifolia	Peking Cotoneaster	8-10' x 8-10'	78'	Sun to light shade	Deciduous shrub with glossy green leaves, small white summer flowers, red fall berries.
2	Cotoneaster apiculata	Cranberry Cotoneaster	3' x 4'	12.5'	Sun to light shade	Rounded dense shrub, dark glossy leaves, white flowers, red berries.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Cotoneaster divaricata	Spreading Cotoneaster	5’ x 8’	50’	Sun to light shade	White spring flower; red summer fruit; small round dark leaves have orange fall color.
2	Cytisus scoparius	Scotch Broom	4-6’ x 6’	28’	Full sun	Yellow spring flower; bright green stems provide winter interest.
2	Daphne cneorum	Rose Daphne	3’ x 4’	12.5’	Light shade	Evergree spreading shrub with narrow dark leaves. Clusters of white to pink, fragrant flowers in spring.
2	Euonymous alata	Winged Euonymous	8’ x 10’	78’	Sun to light shade	Large rounded shrub with dull green leaves and firey red fall color. Interesting corky bark. In full sun requires more water.
2	Euonymous alata ‘Compacta	Dwarf Winged Euonymous	5’ x 5’	20’	Sun to light shade	Bright green spring foliage darkens in summer; turns firey red in fall. Needs more water in full sun.
2	Kolkwitzia amabilis	Beauty Bush	8’ x 8’	50’	Sun to part shade	Pink flowers in early summer; upright, arching stems form dense round shrub
2	Prunus x cistena	Purple Sand Cherry	6-8’ x 8'	50’	Sun to part shade	Dark purple leaves; white fragrant spring flower.
2	Physocarpus opulifolius	Ninebark	5’ x 6’	28’	Sun to light shade	White May flowers followed by red pods. Yellow fall color. Attractive exfoliating bark.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Physocarpus opulifolius ‘Diabolo’	Diabolo Ninebark	8-10’ x 8-10’	78’	Sun to light shade	Dark, reddish purple foliage; white spring flower. Best color in full sun.
2	Ptelea trifoliata	Hoptree	20’ x 15’	176’	Part to full shade	Fragrant green flowers. Will grown in dense shade
2	Rosa meideland	Meideland Rose	2-3’ x 6’	28’	Full sun	Everblooming shrub roses with low profile. White, pinks and reds available. Has thorns.
2	Rosa rugosa	Rugosa Rose	4-6' x 6-8’	28 – 50’	Full sun	Tough roses in a wide range of sizes and colors. Tend to be bushier than hybrids. Many have attractive rose hips. Thorns.
2	Sambucus caerulea	Elderberry	8-10’ x 8'	50’	Full to part sun	Lacy white flowers in spring; edible blue berries in late summer; attractive to wildlife. The more sun it receives, the more water it needs.
2	Spiraea x bumalda	Bumald Spirea	2-5’ x 4-6’	12.5 – 28’	Sun to light shade	Clusters of early summer blooms, mostly in pinks and white. Some have colorful foliage.
2	Spiraea x vanhouttei	Bridal Wreath Spirea	8’ x 10'	78’	Sun to light shade	Cascades of white flowers late summer. Graceful arching habit. Red fall color.
2	Symphoricarpos albus	Common Snowberry	4’ x 5'	19.5’	Part to full shade	Tubular white flowers followed by white berries that are persistant into winter.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Symphoricarpos orbiculatus	Indiancurrant Coralberry	3’ x 6’	28’	Part to full shade	Small, soft green leaves on arching branches. Deep pink fruit forms in late summer and persists into winter.
2	Symphoricarpos occidentalis	Wolfberry	1-3’ x 5’	19.5’	Part to full shade	Tubular pinkish flowers; forms colonies. Berries are eaten by birds and small mammals.
2	Syringa patula	Dwarf Korean Lilac	3’ x 4’	12.5’	Full sun	Late spring purple flowers; leaves smaller than on S. vulgaris. Makes a nice hedge.
2	Taxus x media ‘Densiformis’	Dense Yew	3-4’ x 4-6’	28’	Part to full shade	Evergreen shrub with rounded dense form. Not suited for west of south facing walls. May need more water to reach establishment.
2	Viburnum lantana	Wayfaring Tree	10-15’ x 10-15’	176’	Sun to part shade	White spring flower clusters; leathery green leaves turn maroon in fall; summer berry attractive to birds.
2	Viburnum rhytidophyllum	Leatherleaf Viburnum	10-12’ x 10-15’	78’	Part to full shade	Yellowish flowers mid May; dark leathery foliage. Tolerates dense shade.
DECIDUOUS TREES						

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Celtis occidentalis	Common Hackberry	50’ x 40’	1256’	Full to part sun	Elm-like foliage; upright arching branches. Thick, knobby bark. Tolerates urban air pollution. Good for parking islands.
0	Celtis reticulata	Netleaf Hackberry	20-30’ x 20’	20’	Full to part sun	Utah native; interesting warty bark
0	Chilopsis linearis	Desert Willow	15-20’ x 15-20’	176’	Full sun	Small tree with open, airy form. Clusters of small, orchid-like flowers in summer. Heat tolerant, but not suited to exposed winter sites.
0	Fraxinus velutina	Velvet Ash	40’ x 30’	706’	Sun to light shade	Thick leaves finely serrated; gray furrowed bark. Tolerant of high pH soils and heat.
0	Koelreuteria paniculata	Goldenrain Tree	25’ x 25’	490’	Full sun	Tolerates alkaline and poor soils. Yellow flower clusters in midsummer followed by lantern-shaped seed pods. Do not water late into the fall as the tree will not go dormant.
0	Quercus gambelii	Gambel Oak; Scrub Oak	15-20’ x 15-20’	176’	Full sun	Native oak has persistant winter foliage. Important habitant and forage plant. Utah native.
0	Robinia ambigua	Idaho Locust	40’ x 20’	176’	Full sun	Dark green leaves; pink late spring flower. More open in form than R. pseudoacacia. History of breakage in storm events in SLC.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
0	Robinia neomexicana	New Mexico Locust	6-20’ x 10-15’	176’	Full sun	Beautiful clusters of rose pink flowers; gray green foliage; winter seedpods. Has thorns; may sucker.
0	Robinia pseudoacacia	Black Locust	50’ x 30’	706’	Full sun	Tough tree well suited to harsh sites. Fragrant white late spring flower.
1	Acer campestre	Hedge Maple	20’ x 30’	706’	Full to part sun	Dense and rounded maple with thick, dark leaves. Yellowish fall color. Tolerant of alkaline soils
1	Acer grandidentatum	Bigtooth Maple	20’ x 20’	314’	Part to full sun	Thick, dark green leaves remain attractive throughout summer. Yellow to red fall color. Utah native.
1	Acer negundo	Boxelder	25-30’ x 25’	490’	Sun to light shade	Seedless forms only, such as ‘Baron.’ Female forms are host to boxelder bugs.
1	Acer nigrum	Black Maple	60’ x 40’	1256’	Full sun	Dark green leaves, more tolerant of alkaline soils than Sugar Maples; darker bark. May be prone to wilt-like symptoms.
1	Acer tataricum	Tatarian Maple	20’ x 15-20’	176’	Sun to light shade	Shrubby maple, alternative to Amur Maple. Attractive red fruit. Orange to red fall color.
1	Amelanchier alnifolia	Saskatoon Serviceberry	15’ x 10-15’	176’	Sun to shade	White spring flower followed by black edible fruit. yellow to red fall color. Utah native

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Amelanchier arborea	Downy Serviceberry	15- x 10-15’	176’	Sun to shade	Red brown to dark gray bark; white spring flowers; edible fruit. Orange fall color. Good alternative to Aspen.
1	Amelanchier x grandiflora	Juneberry	20’ x 15’	176’	Sun to shade	Multi-stemmed tree with soft green leaves and white spring fruit. Orange to red fall color. Good substitute for Aspen.
1	Cercis occidentalis	Western Redbud	10-12’ x 12’	113’	Sun to light shade	Rosy purple spring flowers, round leaves. More heat tolerant than C. canadensis. May shed leaves in mid-summer under stress.
1	Cercis reniformis	Mexican Redbud	20’ x 20’	314’	Sun to light shade	Rosy pink flowers in spring; leaves are large, round and slightly ruffled. Reddish brown seed pods. More heat tolerant than C. canadensis.
1	Cotinus obovatus	American Smoketree	20-25’ x 15’	176’	Full sun	Bluish gray leaves have orange to red fall color.
1	Fraxinus mandshurica	Manchurian Ash	40-50’	20’	314’	Dense, oval crown. Glossy dark leaves. Yellow fall color.
1	Ginkgo biloba	Ginkgo	50’ x 30’	706’	Full sun	Upright tree with distinctive fan-shaped leaves. Yellow fall color. Slow to establish, but a worthy tree.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Gymnocladus dioicus	Kentucky Coffeetree	50’ x 25’	490’	Full sun	Erect, rounded crown. Greenish white fragrant flowers. Double pinnately compounded leaves turn deep yellow in fall. Pods provide winter interest. Tolerates alkaline, salt.
1	Maclura pomifera	Osage Orange	30’ x 20’	314’	Full sun	Dense, rounded form; stiff, spiny interlacing branches; large yellow green fruit. Very tough and durable tree. Thorns. Good for windbreaks, hedgerows.
1	Quercus bicolor	Swamp White Oak	40-50’ x 30-50’	1256’	Sun to light shade	Dark green leaves with light green to white velvety undersides. Tolerant of compacted or saline soils. Yellow to orange fall color. May retain foliage into winter months.
1	Quercus macrocarpa	Burr Oak	50-80’ x 50’	1962’	Full sun	Dark green leaves become yellow brown in fall. Broad and spreading with maturity.
1	Quercus muehlenbergii	Chinkapin Oak	40’ x 30-50’	1256’	Full sun	Tolerant of alkaline soils
1	Sophora japonica	Japanese Pagoda Tree	40’ x 40’	1256’	Sun to light shade	Pea-shaped yellowish flowers late summer; fragrant; dark green leaflets; furrowed bark. Cease water in early fall. Not suited to exposed sites. Attractive to bees.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Ulmus parvifolia	Lacebark Elm	40’ x 25’	490’	Full sun	Glossy green foliage turns orange to rust in fall. Exfoliating bark. Resistant to Dutch Elm Disease and phloem necrosis. Attractive exfoliating bark.
1	Zelkova serrata	Japanese Zelkova	40’ x 25’	490’	Sun to light shade	Vase shaped tree with finely serrated leaves turning yellow to bronze in the fall.
2	Acer ginnala	Amur Maple	15-20’ x 15’	176’	Full to part sun	Medium green leaves; yellow to red fall color. Best as multi-stemmed tree
2	Acer glabrum	Rocky Mountain Maple	15-20’ x 6-10’	78’	Full to part sun	Attractive, multi-stemmed maple has smooth gray bark and deeply lobed leaves. Deep yellow fall color.
2	Acer pseudoplatanus	Sycamore Maple	50’ x 30’	706’	Full sun	Dark green leaf with lighter underside. Gray to brown platy bark exfoliates to reveal orange bark underneath. May be subject to chlorosis.
2	Aesculus glabra	Ohio Buckeye	25’ x 25’	490’	Sun to part shade	Avoid planting where trees will be subject to reflected heat. Whitish green panicles followed by large, inedible fruit. Fruit is toxic if eaten.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
2	Catalpa speciosa	Western Catalpa	40-70' x 30'	706'	Full sun	Large, trumpet shaped fragrant flowers in early summer; large soft green leaves; yellow fall color.
2	Cercis canadensis	Eastern Redbud	25' x 20'	314'	Sun to light shade	Reddish purple pea-like flowers in spring; round glossy foliage. In full sun may need more water.
2	Corylus colurna	Turkish Filbert	20-30' x 15-20'	176'	Full sun	Fine textured leaf; dense habit of growth. Prefers well drained soils, is pH adaptable. Heat tolerant.
2	Crataegus crus-galli v inermis	Thornless Hawthorn	20' x 20'	314'	Full to part sun	White spring flowers; red fall fruit; red fall color.
2	Fraxinus anomala	Singleleaf Ash	6-10' x 10'	78'	Sun to shade	Dark green, single leaves; upright habit. Drought and heat tolerant.
2	Ptelea trifoliata	Hop Tree	15-20' x 20'	314'	Sun to shade	Fragrant, greenish white flowers in early summer; glossy green foliage; adaptive to dry shade.
2	Syringa reticulata	Japanese Tree Lilac	25' x 20'	314'	Full sun	Creamy white flowers early summer; later than other lilacs; yellow fall color. Tolerant of heat and winds.
2	Tilia tomentosa	Silver Linden	50' x 25'	314'	Full sun	Leaves are dark green on top, silvery white underneath. Yellow fragrant flower early summer.Tolerates heat and drought better than other lindens.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
EVERGREEN TREES						
0	Juniperus osteosperma	Utah Juniper	15’ x 10’	78’	Full sun	Very cold, drought, and heat resistant, and adaptive to a wide range of soils. Generally smaller than J. scopulorum.
0	Juniperus scopulorum	Rocky Mountain Juniper	20’ x 10’	20’	Full sun	Utah native. Utilized by birds for food and shelter. Do not plant near hawthorns or crabapples as they are alternate hosts for rust disease.
0	Pinus aristata	Bristlecone Pine	15-20’ x 10-15’	176’	Full sun	Utah native. Interesting pine with contorted form. Slow growing. Does not belong in lawn areas.
0	Pinus edulis	Pinyon Pine	20-30’ x 10-20’	15’	Full sun	Twigs orange to brown; edible seeds. Utah native.
0	Pinus monophylla	Single-needled Pine	30’ x 20’	314’	Sun to light shade	Utah native. Needles borne individually on twig.
0	Pinus ponderosa	Ponderosa Pine	80’ x 25’	490’	Full sun	Pyramidal to irregular habit. Needles dark to yellowish green. Bark is brownish black to cinnamon red with deep fissures. Utah native
1	Calocedrus decurrens	Incense Cedar	30-50’ x 10’	78’	Sun to light shade	Evergreen with feathery plates. Exfoliating bark. Fragrant. Fairly heat tolerant.

WATER ZONE	BOTANICAL NAME	COMMON NAME	MATURE SIZE H x W	AREA VALUE (sq ft)	LIGHT	COMMENTS
1	Cedrus atlantica glauca	Blue Atlas Cedar	40-60'x30'	706'	Sun to part shade	Pyramidal form, blue to gray green in color.
1	Pinus flexilis	Limber Pine	25-35' x 20'	314'	Full sun	Long needles; bluish green. Utah native.
1	Pinus flexis 'Vanderwolf Pyramidal'	Vanderwolf Pine	25'35' x 15'	176'	Full sun	A narrower form than the species.
1	Pinus heldreichii leucodermis	Bosnian Red Cone Pine	40-50' x 20'	314'	Sun to part shade	Glossy green needles; pyramidal form.
1	Pinus nigra	Austrian Pine	50' x 25'	490'	Full sun	Broad dense evergreen with dark green needles.
1	Pinus strobiformis	Western White Pine	40-50' x 20'	314'	Full sun	Nice blue-green color.
1	Pinus sylvestris	Scotch Pine	60' x 25'	490'	Sun to light shade	Pyramidal in youth, broad canopy in maturity. Older bark is orange.
2	Abies concolor	White Fir	60' x 15-25'	490'	Sun to part shade	Grayish blue color; stiff thick needles. Pyramidal habit. Utah native.
2	Picea abies	Norway Spruce	60' x 25'	490'	Sun to light shade	Dark green needles; pyramidal form with drooping branches.
2	Picea pungens v. glauca	Colorado Blue Spruce	30-60' x 20'	314'	Sun to light shade	Blue or green foliage; pyramidal form. Utah native.
2	Pseudotsuga menzeisii	Douglas Fir	70' x 20'	314'	Full sun	Dark green needles; branches droop slightly; fragrant foliage. Utah native

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Article IX. Rates And Payments

17.16.640: CHANGES TO REGULATIONS AND RATES:

Nothing herein contained shall prohibit the city from amending, altering or adding to the provisions of this chapter in relation to the water supply, or the rules or regulations which may be adopted in conformity therewith, provided that no alteration in water rates shall apply to any permission given or contract made for the use of water until after the expiration of such permission or contract, unless allowed thereby. (Prior code § 49-6-70)

17.16.650: SPECIAL OR TEMPORARY RATES:

Water for special or temporary uses other than named in the schedule of water rates set forth in succeeding sections may be furnished at rates to be fixed by the director of the department of public utilities. (Prior code § 49-6-50)

17.16.660: PAYMENTS REQUIRED BEFORE SERVICE TURNED ON:

Before the water is turned on, all unpaid bills for water must be paid in full, together with a turnon fee of twenty one dollars ($21.00). (Prior code § 49-6-55)

17.16.670: MINIMUM CHARGES:

Each customer shall pay the following minimum fixed charge to cover meter reading, billing, customer service and collection costs (effective July 1, 2008, and thereafter until further amended):

Size Of Connection	City Monthly Rates	City Daily Rates	County Monthly Rates	County Daily Rates
3/4 and 1 inch	$ 7 .44	$0 .2444	$ 9 .87	$0 .3243
1 1/2 inch	8 .87	0 .2914	11 .80	0 .3877
2 inch	9 .67	0 .3177	12 .88	0 .4232
3 inch	16 .54	0 .5434	22 .15	0 .7277
4 inch	17 .74	0 .5828	23 .77	0 .7809
6 inch	25 .81	0 .8480	34 .67	1 .1391
8 inch	46 .77	1 .5366	62 .96	2 .0685
10 inch	87 .11	2 .8619	117 .42	3 .8577

Fire hydrant meters	113 .01	3 .7129	152 .39	5 .0067

The minimum fixed charge for meters larger than ten inches (10") shall be based proportionately on meter capacity, as determined by the public utilities director.

Customers who are granted an abatement for taxes on their dwelling under sections 59-2-1106 through 59-2-1108, Utah Code Annotated, or successor provisions, shall be granted a four dollar forty cent ($4.40) abatement of the minimum monthly charge. (Ord. 30-08 § 1, 2008: Ord. 29-07 § 1, 2007: Ord. 45-06 § 1, 2006: Ord. 38-04 § 1, 2004: Ord. 20-03 §§ 1, 2, 2003: Ord. 48-01 § 1, 2001: Ord. 56-99 § 1, 1999: Ord. 39-97 § 1, 1997: Ord. 51-94 § 1, 1994: Ord. 83-90 § 5, 1990: Ord. 33-89 § 1, 1989: Ord. 38-88 § 1, 1988: prior code § 49-6-52)

17.16.680: METER RATES:

Each customer shall pay for each hundred cubic feet of water supplied through such customer's meter at the following rates (effective July 1, 2008, and thereafter until further amended):

RESIDENTIAL CUSTOMERS (SINGLE)

	City Water Rates	County Water Rates
Winter months (November through March, inclusive):		
All water metered	$0 .88	$1 .19
Summer months (April through October, inclusive):		
Block 1: 1 through 9 hundred cubic feet of water	0 .88	1 .19
Block 2: 10 through 29 hundred cubic feet of water	1 .35	1 .83
Block 3: Excess over 29 hundred cubic feet of water	1 .88	2 .54

RESIDENTIAL CUSTOMERS (DUPLEX)

	City Water Rates	County Water Rates
Winter months (November through March, inclusive):		

All water metered	$0 .88	$1 .19
Summer months (April through October, inclusive):		
Block 1: 1 through 12 hundred cubic feet of water	0 .88	1 .19
Block 2: 13 through 29 hundred cubic feet of water	1 .35	1 .83
Block 3: Excess over 29 hundred cubic feet of water	1 .88	2 .54

RESIDENTIAL CUSTOMERS (TRIPLEX)

	City Water Rates	County Water Rates
Winter months (November through March, inclusive):		
All water metered	$0 .88	$1 .19
Summer months (April through October, inclusive):		
Block 1: 1 through 15 hundred cubic feet of water	0 .88	1 .19
Block 2: 16 through 29 hundred cubic feet of water	1 .35	1 .83
Block 3: Excess over 29 hundred cubic feet of water	1 .88	2 .54

RESIDENTIAL CUSTOMERS (FOURPLEX OR MORE AND COMMERCIAL AND INDUSTRIAL ACCOUNTS)

	City Water Rates	County Water Rates
Winter months (November through March, inclusive):		
All water metered	$0 .88	$1 .19
Summer months (April through October, inclusive):		
Block 1: 1 hundred cubic feet of water through AWC[1]	0 .88	1 .19
Block 2: Above AWC through 300 percent of AWC	1 .35	1 .83

Block 3: Over 300 percent of AWC	1 .88	2 .54

Note:
1."AWC" means average winter consumption, and is calculated as the average amount of water used by a customer during the months of November through March, inclusive (a "winter period"), taking into account the highest number of complete winter periods available for that customer, up to a maximum of 3 winter periods. Any customer that at the time of calculation has not established an AWC will be assigned the class average AWC by meter size for such customer's classification. Customers with defective plumbing or unexplained large usage increases of more than 25 percent may be adjusted back to a prior AWC, or be assigned the class average by meter size. In cases where class average is not available or is not reasonable, the director may use other consumption information specific to such account to determine AWC.

IRRIGATION ACCOUNTS[1]

	City Water Rates	County Water Rates
Winter months (November through March, inclusive):		
All water metered	$1 .35	$1 .83
Summer months (April through October, inclusive):		
Block 2: 1 hundred cubic feet of water to target budget[2]	1 .35	1 .83
Block 3: Over target budget	1 .88	2 .54

Notes:
1."Irrigation account" shall mean an account established for applying water for irrigation and landscaping only, as determined by the public utilities director or his designee.
2."Target budget" shall mean the estimated amount of water consumed per acre, which shall be established by the public utilities director or his designee each year for each customer based on factors including, but not limited to, evapotranspiration, and considering efficient water practices. A different target budget shall be established for each month of the irrigation season.

(Ord. 30-08 § 2, 2008: Ord. 29-07 § 2, 2007: Ord. 45-06 § 2, 2006: Ord. 38-04 § 2, 2004: Ord. 20-03 § 3, 2003: Ord. 48-01 § 1, 2001: Ord. 56-99 § 2, 1999: Ord. 27-95 § 2, 1995: Ord. 51-94 § 2, 1994: Ord. 33-89 § 2, 1989: prior code § 49-6-51)

17.16.690: AVERAGE RATE CHARGED WHEN METER FAILS:

When for any reason the water meter shall fail to register, or the meter cannot be read, a bill shall be rendered at the average rate of consumption for like periods of time. (Prior code § 49-6-57)

17.16.700: BILLING PERIOD:

Bills for water used through meters shall be rendered monthly or bimonthly; the public utilities director shall determine from time to time when monthly or bimonthly meter readings shall be made and bills rendered. (Prior code § 49-6-53)

17.16.710: DUTY TO PAY UNAFFECTED BY DEPOSIT:

All bills for water rates must be paid promptly without reference to the deposit. (Prior code § 49-6-66)

17.16.720: DEPOSIT; APPLICATION TO UNPAID BILLS WHEN:

Whenever any consumer of water shall have failed to pay for water supplied or services rendered to such premises, the money deposited, or any part thereof, may be applied to the payment of such delinquent bills by the public utilities director. (Prior code § 49-6-67)

17.16.730: DEPOSIT; CERTIFICATE; REFUNDS:

The public utilities department shall issue a certificate of deposit. The amount deposited shall be refunded by the city treasurer to the holder upon the surrender of the certificate properly endorsed, provided all water bills and other charges are paid. (Prior code § 49-6-65)

17.16.740: ABATEMENT FOR NONUSE OF WATER; CONDITIONS:

Any water user to avail himself or herself of an abatement for nonuse of water on a meter shall report to the public utilities director, and have water turned off at such user's premises, and the meter may be removed at the option of the public utilities director. Before water service will again be supplied, written notification must be made to the public utilities director. Abatements will not be allowed for less than thirty (30) days. (Prior code § 49-6-59)

17.16.750: USING WATER WITHOUT PAYMENT PROHIBITED:

It is unlawful for any person, by himself, herself, family, servants or agents to use the water coming through the water mains without first agreeing to and paying for all water delivered, as provided in this chapter. (Prior code § 49-6-43)

17.16.760: NONPAYMENT; REQUIRED TURNOFF CONDITIONS:

If any bills rendered as aforesaid are not paid by the owner or other applicant within fifteen (15) days after their rendition, the public utilities director shall cause water being served to the owner or other applicant to be turned off. The uncollected amount may be transferred to any active account under the owner's or applicant's name, and upon failure to pay said bill after at least five (5) days' prior written notice, water being served to that account shall be turned off. (Prior code § 49-6-54)

17.16.770: INSPECTION; ACCESS TO PREMISES BY CITY OFFICERS:

Free access shall at all ordinary hours be allowed to the public utilities director, or other authorized persons, to all places supplied with water from the city waterworks system, to examine, maintain and operate any part of the water system, determine the amount of water used, the manner of its use, and make all necessary shutoffs for vacancy, delinquency and violations of this division. (Prior code § 49-6-49)

17.16.780: WATER TURNOFF AUTHORITY; RESTORATION OF SERVICE:

It shall be the duty of the public utilities director to cause water supply to be shut off on the premises of any water taker who shall fail to make application and pay the charges therefor for the installation of water meter within fifteen (15) days after notice in writing from the public utilities director so to do, and the water shall not be turned on for use on such premises until a meter has been installed and all charges and rates paid in full, together with the required charge for turning on the water. (Prior code § 49-6-63)

17.16.790: DELINQUENT PAYMENT; PENALTY:

In case of vacancy, where service is discontinued or meter taken out, unless delinquent bills are paid within thirty (30) days after the service has been discontinued a penalty of ten percent (10%) shall be charged in addition to the regular bill. (Prior code § 49-6-56)

17.16.792: WATER SHORTAGE CONTINGENCY PLAN; CIVIL FINES:

A. Any customer of the city's municipal and industrial water system found to be in violation of any mandatory water use restriction in effect from time to time under the water shortage contingency plan established under section 17.16.092 of this chapter, shall be subject to the following maximum civil fines:

First violation	$ 100 .00
Second violation	250 .00
Third violation	500 .00
Fourth violation and thereafter	1,000 .00

The violation level shall be based on violation history for the preceding twelve (12) months. A civil fine for a customer's first violation shall be imposed only after the issuance of a written warning to such customer. Any civil fine based on a violation susceptible to corrective action shall be imposed only after failure by the customer to take such corrective action within a reasonable period of time, as determined by the director, taking into account the nature of the action needed and the anticipated cost. "Customer", for purposes of this section and section 17.16.092 of this chapter, shall mean and include any person responsible, whether by ordinance or by contract between the city and such person, to pay the water charges on any account for use of water from the city's municipal and industrial water treatment and distribution system, whether the location at which such water is used is situated within or outside of the corporate limits of the city. It is the intent of the city that compliance with the provisions of section 17.16.092 of this chapter, as enforced pursuant to this section, by customers situated outside of the corporate limits of the city, shall be a contractual condition of continued water service.

B. Any customer subject to a civil fine under this section shall be notified by the director, in writing, of the date, nature, and circumstances of the violation, which notification shall be delivered by posting such notice at a conspicuous location on the property, and by mailing notice, by certified mail, no more than fifteen (15) calendar days after the date of occurrence of the violation. The notice shall advise the customer of his/her right to protest the fine to a hearing officer, which shall be the director or his or her designee, within ten (10) business days after receipt of the notice. The hearing officer shall have the authority to adjust the fine to take into account any extenuating circumstances. Any determination by the hearing officer may be appealed to a three (3) member water shortage appeals panel. The city council shall designate three (3) members of the public utilities advisory committee to serve on the panel; provided, however, that the director may designate other members of the PUAC to serve as alternates as needed. All decisions of the water shortage appeals panel shall be final.

C. All fines collected pursuant to this section shall be set aside in a segregated fund within the public utilities enterprise fund, and used exclusively for paying all or a portion of the costs and expenses incurred by the city in connection with the implementation and administration of the plan and other elements of the city's water conservation program. (Ord. 50-03 § 2,

2003)

Appendix A:
Lawn Watering Schedule

Salt Lake City Department of Public Utilities, Jordan Valley Water Conservancy District, USU Extension Services, Bureau of Reclamation, and Division of Water Resources jointly developed this watering schedule based on historic ET data provided by USU.

It is recommended that ½ inch of water be applied to the lawn during each interval. With average water pressure and fixed pop-up heads, this would take approximately 21 minutes. It is best that the water be applied in cycles in order to maximize penetration of water into the soil and to the root zone. For example, set the automatic timer to run for seven minutes, repeated three times, with one hour between each cycle to achieve 21 minutes or ½ inch of water per interval. But keep in mind this schedule is based on averages, and your lawn may require a different cycle time and you may need to water less frequently.

Lawn Watering Schedule	
Month	**Interval (1/2 inch of water per interval)**
Startup until April 30	Only as necessary; no watering if there is rain
May	Once every 4 to 7 days
June, July, and August	Once every 3 days
September	Once every 4 to 7 days
October to shutdown	Once every 10 to 14 days; no watering if there is rain

Watering less frequently and more deeply will save water, money, and time by reducing water consumption, decreasing the need for frequent fertilizer applications, lessening the likelihood of disease, reducing the presence of weeds, and making your lawn stronger and healthier.

It is also recommended that mowing heights be set to 2-1/2 to 3 inches. Longer grass blades mean deeper roots and shaded soil, thus reducing water demand. An added benefit to mowing higher is that weed seeds are less likely to germinate, and that translates to fewer weeds.

Regularly check your irrigation system for misaligned, broken, or missing sprinkler heads. Ideally, systems should be visually inspected after each mowing; but at the least, conduct monthly inspections. Annual irrigation audits can help you in identifying system inefficiencies and fine tuning your irrigation schedule.

Appendix B:
Limited Lawn Watering Schedule

This watering schedule is to be followed when a STAGE 3—SEVERE water shortage has been declared.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Even Addresses Single-family residential	**No Watering** Public Utilities approved exceptions only	-Home Owners Associations -Apartments -Multi-family (Duplex, 3plex, etc) -Government -Parks	**Odd Addresses** Single-family residential	**Even Addresses** Single-family residential -Parks	-Home Owners Associations -Apartments -Multi-family (Duplex, 3plex, etc) -Government	**Odd Addresses** Single-family residential

Even or Odd Addresses
Determined by the last digit of the home address

Watering Hours
6 PM to Midnight on your assigned watering day
Midnight to 10 AM on your assigned watering day

Appendix C:
Irrigation Targets

Meters that are read only during non-winter months are referred to as irrigation-only accounts. Under the Department of Public Utilities rate structure, irrigation-only accounts receive a water-use target based on a number of factors, including, but not limited to the total area being irrigated, historical evapotranspiration data (ET), landscape coefficients, and demand levels, with each account receiving a unique target. The formula used to calculate each water-use target was developed by the Utah State University, utilizing local ET data.

Water used within the target will be billed, per unit, in Tier 2; water consumption exceeding the target will be billed, per unit, in Tier 3.

All water customers receiving a water target should strive to maintain their irrigation system in optimum operating standards to maximize efficiencies and minimize water waste. During periods of declared water shortages, irrigation-only accounts may be called upon to make measurable reductions in outdoor water consumption so as to help in reducing overall water demand.

For information on how to save water in the landscape, refer to Appendix F: Best Management Practices for the Green Industry, or visit www.slcsaveh2o.com.

Appendix D:
HotelS and Lodging Water Conservation Best Management Practices

Water conservation needs to be a part of our daily activities. The hotel and lodging industry offers many opportunities to save water without compromising the quality of the visit or public health and safety. The average-sized hotel, with 150 rooms, can save about $30,000 a year if 65 percent of their guests participate in a linen-reuse program. Every employee needs to understand the importance of conservation and be educated on water saving practices and how their job affects water use. Make conservation part of their job and part of the day to day work environment.

Consider using this simple three step process

- Educate and involve all employees on water conservation
- Locate all water-using sources (dishwashing machines, wash sinks, cooling water, HVAC, etc in your facility) and examine for leaks, check for inefficiencies, and conduct repairs
- Identify and implement water conservation practices

Icemakers

- Replace old icemakers with new air-cooled, water efficient model. The useful life of an icemaker is about five years
- Use ice flake machines rather than ice cube machines
- Use softened water in ice cube machines to minimize bleed-off
- Collect spent cooling water from water-cooled icemakers and use it for non-potable purposes such as mopping floors

Laundry

- Operate laundry equipment with full loads only
- Reduce water levels, if possible, for partial loads
- Replace or modify existing conventional laundry equipment (e.g., washer-extractors) to reduce water use
- Install a computer-controlled rinse water reclamation system
- Install a wash and rinse water treatment and reclamation system
- Install a continuous-batch washer
- Install an electrically generated ozone laundry system
- Adjust chemicals or washer program to reduce the number of wash and rinse steps
- Avoid excessive backflushing of filters or softeners; backflush only when necessary
- Place “save water” notices in guest rooms
- Encourage your guests to forego daily linen changes for multiple night visits

Appendix E:
Suggested Best Management Practices for Commercial Carwash Facilities

The amount of water used by carwash facilities varies with the type of facility, the cleaning system used, and the utilization of water reclamation and recycling processes. And while recycling can greatly reduce the volume of M&I water used, there are many other ways in which carwash facilities can save water.

Commercial carwash facilities also include carwashes at service stations, carwash facilities at automobile dealerships and automobile rental outlets, fleet carwashes, mobile washes, and other commercial operations where automobile, truck, trailer, boat, airplane, or other type of equipment washing occurs as part of a normal business.

All Carwash Facilities

- Maintain all water devices and equipment to original or improved specifications at all times
- Modify existing carwashes to recycle as much water as possible
- Replace all nozzles annually
- Replace all nozzles annually
- Install automatic shutoff valves or preset timers on faucets and hoses
- Minimize dripping by replacing or maintaining positive-cutoff or solenoid valves at all control points for prewash, wash, hot wax, and rinse
- Conduct regular checks for leakage and maintenance of all water-using equipment
- Install positive shut-off valves on all wringer sinks
- Fit all hoses with positive pressure nozzles or automatic timer shut-offs; never leave open hoses unattended
- Sweep out bays before washing them; use high-pressure wands instead of hoses
- Avoid using water to wash impervious surfaces
- Install water-efficient faucets and toilets

In addition to implementing the above practices, utilize the following for specific facilities

Self-serve

- Set a maximum flow of 3.5 gallons per nozzle
- Turn off spot-free rinse or recycle reject water
- Install a weep management system

Appendix F:
Suggested Best Management Practices for the Green Industry

Of the water we use per person, it has been estimated that half of that water goes to the landscape, and of that, as much as half is wasted, or in other words, as much as 25 percent of the total volume of water used for domestic purposes. Summer water usage increases to a peak that is nearly 5 to 6 times more than the typical daily winter consumption and it is that peak which drives our need for more water. By utilizing Best Management Practices in the landscape, whether as a professional or a home or business owner, we can sustain our landscape, reduce dependence on supplemental water and chemicals, and extend the life of existing infrastructure and delay the need for new water supplies.

All Green Industries

- Educate employees on water quality and conservation practices
- Model and teach water conservation and pollution prevention to customers, the general public, and the industry
- Utilize brooms to clean walks, drives, decks, and other impervious areas
- Avoid watering, whenever practicable, between the hours of 10 am and 6 pm
- Water flowers, shrubs, and trees separately from lawns
- Utilize positive pressure nozzles on all hoses
- If utilizing an irrigation-only meter, stay within irrigation target (see Appendix C)
- If not utilizing an irrigation-only meter, follow the recommended watering schedule (see Appendix A) unless directed to follow Watering Schedule B (see Appendix B)
- Conduct regularly scheduled audits of both indoor and outdoor water appliances, features, plumping, and water-use behaviors

Landscape and Irrigation Design

- Make wise choices in the design process to reduce or eliminate water waste and to increase water use efficiency
- Select those plants best suited to a particular site, taking into account such things as soil and microclimates
- Group plants together with similar water and light requirements
- Design and install irrigation to deliver the appropriate amount of water to each plant group (i.e., “hydrozoning”); water turf areas separately from other landscaped areas
- Design, install, and maintain irrigation systems to ensure uniform distribution of water, striving for an irrigation efficiency of 80 percent
- Limit turf to functional areas, and select the appropriate turf species; use alternative groundcovers where appropriate

Appendix G:
Suggested Best Management Practices for Commercial Water Customers

It is strongly encouraged that each business, in adopting Best Management Practices (BMP), addresses water-use issues relating to that specific business, industry, or work place. The most effective BMPs result from employee involvement and provide for training and verification of implementation.

General

- Generally examine water use, both indoors and out of doors, to eliminate waste
- Educate employees, contractors, and any other facility user about the importance of water conservation; encourage contractors to implement conservation BMPs
- Conduct regularly scheduled water audits of both indoor and outdoor water appliances, features, plumping, and water-use behaviors
- Utilize positive pressure nozzles on all hoses, nozzles, or spray heads
- Avoid using water to wash or clean walks, drives, gutters, or other hard surfaces

Indoors

- Use washing machines and dish washers only when full, or adjust water levels accordingly
- When installing or replacing appliances, install water-efficient appliances
- Regularly inspect, maintain, and repair boiler systems. Consider installing a condensate return line, if it does not already have one
- Regularly inspect, maintain, and repair cooling towers systems. Increasing the cycles of concentration can significantly reduce water usage.
- Review historical water usage for your facility. Analyzing several years of consumption data will often identify undiscovered leaks or other process inefficiencies
- Identify all single-pass flows in the facility. These flows are often associated with such equipment as cooling for pumps, compressors, ice machines, air conditioners. Consider replacing these processes with ones that re-use or re-circulate process water where appropriate

(continued on reverse side)

Appendix H:
Suggested Best Management Practices for Restaurant and Food Service

Commercial and institutional kitchens use water primarily for food and drink preparation, food warming, dishwashing, ice machines, ice cream and frozen yogurt machines, garbage disposers, and scrapping troughs. Additionally, water is used for washing, cleaning, and sanitizing processes (including laundry), plumbing fixtures in restrooms, cooling and heating systems, and landscapes. For BMPs relating to water uses not directly related to food preparation, consult the index to locate the appropriate appendix.

General Practices

Water conservation will be most successful when everyone participates and shares in the responsibility. Encourage employees, contractors, suppliers, and customers to utilize water conserving measures.

- Train employees to conserve water, and post signs in the kitchen and other work areas promoting water conservation
- Serve water to your customers only when requested; Place signs, either in central locations, on menus, or on tables, informing customers of your water conservation ethic
- When fixtures wear out, replace water and energy efficient models
- Recycle water whenever feasible and consistent with regulatory requirements
- Install on-demand, point-of-use hot water dispensers to reduce the need to run faucets that are slow to produce hot water

Water Audits

Conduct regular audits on water-using fixtures, features, and behaviors, being certain to include the following:

- Record the number and type of water-using appliances or pieces of equipment, such as dishwashers, garbage disposers, ice makers, faucets, and food scrapping troughs
- Determine the average number of loads per day completed by each water-using appliance and piece of equipment
- Determine the average number of meals served per day
- Determine the amount of time faucets and other continuous-flow appliances are used each day
- Identify pipe sizes and estimate flow rates of incoming water supply lines
- Catalog dripping faucets, puddles, and leaks
- Promptly repair leaks and malfunctioning equipment

(continued on reverse side)

Appendix I:
Suggested Best Management Practices for Swimming Pools

In a desert, a pool may seem a necessity, but it really is a luxury when water is a finite resource. However, with proper management, pools can be a privilege that we may continue to enjoy. These recommended Best Management Practices are appropriate for both private, commercial, and public swimming pools and hot tubs.

- Cover the pool when not in use to control evaporation and save energy from heat loss. Up to 95 percent of water loss from evaporation can be saved through the use of a pool cover
- Reduce the temperature if possible, particularly when the pool isn't in use
- Limit the frequency of pool refilling; only fill the pool when required for water quality reasons
- Backwash pool filters only when necessary. If the backwash cycle is controlled by a timer, check and adjust the frequency of the cycle to ensure optimal efficiency. Use head loss to determine backwash frequency (8-10 psi loss)
- Where feasible, use filter backwash for irrigating lawns or plants and shrubs, or for cooling tower make-up
- Lower the pool's water level as much as possible to reduce the amount of water that can be splashed out
- Check the pool regularly for cracks and leaks, and make repairs promptly. If the pool drops more than one inch per day than investigate for problems
- Replace shower heads in the changing area to low flow fixtures and post signs to encourage pool users to limit the time spent in the shower
- Add a fence, trees, or shrubs to provide a wind break to reduce evaporation
- Utilize a pool vacuum that recycles water when cleaning the pool