

**SALT LAKE CITY**  
**WATER CONSERVATION PLAN UPDATE**

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Prepared for:

Salt Lake City Corporation  
Department of Public Utilities

Prepared by:

**A**

EWP Engineering  
3995 South 700 East, Suite 300  
Salt Lake City, UT 84107

# SALT LAKE CITY WATER CONSERVATION PLAN UPDATE

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Resolution for Water Use Ethic  
Proceedings of the City Council of Salt Lake City, Utah, Tuesday, April 6, 1999

# **SALT LAKE CITY WATER CONSERVATION PLAN UPDATE**

## **EXECUTIVE SUMMARY**

In 1998, the Utah State Legislature passed House Bill 418, which requires water conservancy districts and retail water providers to prepare and adopt, or update, a water conservation plan and file it with the Division of Natural Resources by March 31, 1999. The intent of H.B. 418 is to conserve water resources, limit or reduce per capita water consumption, and develop state-wide water conservation recommendations. A specific objective is to limit per capita consumption to 150 gallons per day. As a retail water provider the Salt Lake City Department of Public Utilities must update its water conservation plan to comply with H.B. 418.

Over the last six years, the City has adopted and implemented several water conservation measures. These include public education programs, higher water rates during peak use periods, landscape ordinances that allow drought tolerant plants, leak detection programs, comparative analyses for large water users, water reuse feasibility studies and a wise water ethic. These measures have proven to be effective at leveling the peak water demand for Public Utilities at about 200 million gallons per day, even though the number of connections has increased 8% over the last 10 years. Annual residential consumption on a per capita basis averages about 120 gallons per day, which is better than the state's goal of 150 gallons/capita/day (g/c/d). The average daily consumption for all users in 1997 was 236 g/c/d. The number of commercial and industrial customers in the city's service area is relatively large compared to the residential population; therefore, the total per capita consumption is higher than the residential.

Balancing water conservation and growth is crucial for a utility to properly manage its sources of revenue and operating expenditures. Most of the utility's expenditures are fixed and do not decrease with less water use. A major incentive to conserve water is to defer or eliminate the need to expand system capacity, which requires large capital investments. If additional water supplies are not easy to obtain, there is an additional incentive to conserve.

Even though the city's program for using water wisely is effective, new initiatives will likely be needed in the future in order to maintain that delicate balance between growth and system capacity. Projections from planning studies conducted by Public Utilities in 1992 and 1997, revealed that peak water demand could increase to 318 mgd by 2020, if no conservation measures are implemented. Meeting peak water demands becomes most difficult in periods of drought. Previous studies show that water available during drought conditions will likely be limited to 212 million gallons per day. The difference between the projected future peak water demand and available water supply must be made up through a combination of additional conservation efforts and new or alternative water supplies.

Several new initiatives were evaluated in preparation of the Water Conservation Plan Update. Secondary water use and reclaimed water use both offer opportunities to help meet future peak demands without relying on valuable potable water supplies. Another option on the supply side is aquifer storage and recovery, which would take advantage of surplus water supplies during wet periods to augment groundwater supplies, making that source more reliable during droughts. On the conservation side, education programs will have to be sustained to allow users to become aware of new water saving ideas and technologies. Leak detection programs and follow up actions will also have to be sustained to minimize water losses.

In order to obtain public input for updating the city's water conservation plan, a Public Hearing was held on April 6, 1999. The essence of the comments received at the Public Hearing were based on the findings of this report and input from the public, the final recommendations of the updated water conservation plan are:

Keep peak demands from increasing through expanded wise water use and alternative water supplies for large irrigation users.

Minimize the loss of potable water in the system through effective maintenance programs, carefully monitoring and analyzing water inventories and notifying users of unusually high usage.

Ensure that existing water supplies can be fully utilized during drought conditions by developing sufficient additional potable water supplies to prepare for drought conditions.

## **SALT LAKE CITY WATER CONSERVATION PLAN UPDATE**

### **INTRODUCTION**

Since Salt Lake City was founded in 1847, one of its most prevalent concerns has been the acquisition, preservation, and conservation of water. Salt Lake has a high desert climate and receives an average 15.3 inches of rainfall per year. However, overall per capita water consumption is very high at 220 gallons per person per day. Much of this usage is for irrigation, peaking in the hot summer months. Overall consumption is also higher because Salt Lake City has a high percentage of business and institutional relative to its permanent resident population. Commuting workers, visitors, and tourists all contribute to the City's overall water consumption.

### **BACKGROUND**

Surface water is critical to Salt Lake City. Eighty percent (80%) of the City's water supply is from the mountain streams. The mountains receive an average 500 inches of snow per season. As the snow melts, the water becomes available for use in the valley. The Wasatch Mountains, however, provide more than the water supply for the valley. They also provide an economic base, and vast recreational opportunities that enhance the quality of life in the Wasatch Front.

The mountains are our watershed and from these, 185 square miles, we provide water for 400,000 people. The concern for the quality of the watershed is not new, and we have learned some lessons along the way. When the pioneers pulled their handcarts into the valley in 1847, the first issue was water. Water from City Creek was diverted that first day so as to soften the parched soil for planting. During the first fifty years of settlement in the area, 1,000 miles of irrigation ditches were dug, irrigating 500,000 acres of land. The Mormon settlers are credited with establishing irrigation in America. So naturally, the first water rights in the valley were irrigation rights.

Salt Lake City's first effort to conserve water occurred when Salt Lake City began to grow. It was clear that additional water would have to be appropriated. Farmers in the valley were also faced with a dilemma; they had adequate water during the spring and early summer as the streams ran high but come late summer, there was inadequate stream flow to mature their crops. Hence, an exchange agreement was formed. The high quality water from the mountain streams was substituted with irrigation quality water from Utah Lake. This action appropriated

enough high quality municipal water for many years and it also established a long-term agreement for the City to provide water for irrigation.

Salt Lake City's continuing growth eventually lead to the creation of the Water Department to operate and maintain a piped water system in 1876. By 1917, all water connections within the City were metered. In the 1930's there was a need for an efficient wholesale water district to provide major water supply, conveyance, treatment and storage components. The Metropolitan Water District of Salt Lake City (MWDSL) was created in 1934. Ever increasing growth eventually resulted in the need for the Central Utah Project (CUP). Since CUP formation and implementation, water conservation planning became a focus as a result of continued growth coupled with limited water supplies and the environmental preservation movement. These factors have all necessitated wiser use of water.

## **THE WATER CONSERVATION PLAN ACT**

The preamble of House Bill 418 states the following:

“AN ACT RELATING TO WATER AND IRRIGATION; REQUIRING WATER CONSERVANCY DISTRICTS AND WATER RETAILERS TO PREPARE AND ADOPT OR UPDATE A WATER CONSERVATION PLAN AND FILE IT WITH THE DIVISION OF WATER RESOURCES; AND REQUIRING THE BOARD OF WATER RESOURCES TO STUDY THE PLANS AND MAKE RECOMMENDATIONS.”

**Salt Lake City has previously adopted and implemented extensive water conservation policies, ordinances, and programs. Hence, the focus of this document is to update existing efforts and compile them into a document to be filed in the Division of Water Resources.**

The full text of H.B. 418 is contained as an appendix of this report.

### **Legislative Intent of H.B. 418**

It is the expressed intent of H.B. 418 to accomplish the following goals:

Help conserve water resources;  
Limit or reduce per capita water consumption; and  
Develop state-wide water conservation recommendations.

### **Applicability of H.B. 418**

As stated in the preamble of H.B. 418, the Act applies to water conservancy districts and retail water providers. The term, “water retailer,” is defined in the Bill while “water conservancy district” is referenced to Title 17A, Chapter 2, Part 14 of the Utah Code.

### **Major Provisions of H.B. 418**

The following provisions make up the key provisions of H.B. 418 and hence establish guidance for the development of the City’s Water Conservation Plan Update:

Salt Lake City (the City) as a retail water provider with a previously adopted water conservation plan, must prepare an update and submit a report to the State Division of Water Resources (DWR) by April 1, 1999.

The Legislation makes no provision for the DWR to comment on or otherwise approve of the Water Conservation Plan update submitted by Salt Lake City.

The Act (H.B. 418) requires that the City make recommendations for water saving measures. Suggested measures are detailed in the legislation’s language. The only mandatory language in the Bill is the requirement to hold a public hearing and to file the plan update with DWR.

The legislation calls for the DWR to study ways to implement the water conservation plans of the water conservancy districts and water retailers and report to the Natural Resources, Agriculture, and Environment Interim Committee of the Legislature. Legislative action, as a result of the DWR report, is unknown as of the date of this update, however, several potential requirements are expressed in the text of the Bill.

## WATER CONSERVATION PLAN GOALS

Salt Lake City has adopted and continues to implement several water conservation initiatives that fulfill the intent of H.B. 418. To demonstrate compliance with the legislation, we have compiled and updated the City’s existing water conservation program elements in this report. Water conservation plan adopted by Salt Lake City include:

Keep peak demands from increasing through expanded wise water use and alternative water supplies for large irrigation users.

Minimize the loss of potable water in the system through effective maintenance programs, carefully monitoring and analyzing water inventories and notifying users of unusually high usage.

Ensure that existing water supplies can be fully utilized during drought conditions by developing sufficient additional potable water supplies to prepare for drought conditions.

The City has implemented several initiatives to accomplish the above-stated goals. These water conservation accomplishments are presented in Table 1 below.

**TABLE 1  
RECOMMENDED WATER CONSERVATION MEASURES  
AND CITY ACCOMPLISHED ACTIONS**

Water Saving Measure	City Action
Water Efficient Fixtures	Water Efficient Fixture Ordinance Adopted (1994) Public Education Program
Landscaping and Irrigation Systems	Latest UPC/IPC Adopted (1994)
	Landscape Ordinance (1995) Notification to Customers of Increased Use Public Education Program
Efficient Industrial/Commercial Use	Latest UPC/IPC Adopted (1994)
	Peak Demand Rate Restructuring (1994) Notification to Customers of Increased Use Peak Demand Rates Restructuring Comparative Use Analysis for Specific Industries Peaking Demand Analysis Metering of Large Users Large Water User Audit (1995) Public Law 102-575 (CUPCA)
Water Reuse Systems	Grant Funding of projects through CUPCA
	Customer Survey Feedback (1995) Freeway Watering Reuse Study Wetlands at WWTP Golf Course Secondary Water Use Plan Golf Course Reclaimed Water Use Plan Proposed NW Quadrant Reuse Plan
Distribution System Leak Repair	On-going Leak Detection Program
	On-going Pipeline Replacement Program
	Service Line Replacement Program Water Meter Replacement Program

UPC - Uniform Plumbing Code

IPC = International Plumbing Code

CUPCA = Central Utah Project Completion Act

**TABLE 1 (continued)**

Water Saving Measure	City Action
Public Information Programs	Web Site Water Shortage Surveys Watershed Management Surveys Inserts in Water Bills TV Public Service Announcements Customer Survey and Public Feedback Elementary School Education Program

Water Rate Structure	Hired Utah State University Extension Service Water Conservation Hotline Community Workshops on Water Conservation Hired Consultant to Perform Water Audits Water Use Audits Participated in School Calendar Program Notification to Customers of Increased Use Water Rate and Financing Workshops Peak Demand Rate Structure (1994) Water Rate Increase Ordinance (1994) Central Utah Pricing Study Water Conservation Ethic Resolution Passed by
Ordinances, Codes, Regulations, Other to Encourage Efficient Water Use	PUAC Water Efficient Landscape Ordinance (1995) Adopt UPC/IPC Sewer Rate Ordinance Linking Sewer Rates to
Incentive Programs	Water Use Central Utah Completion Act (1992) - 3000 af/yr of Water Conservation CUPCA of 1992 (PL 102-575) Water System Master Plan (1997) Water Service Line Leak Billing Adjustment Sewer Rate Adjustment for Extra Residents During Winter Sewer Rate Adjustment for Repair of Inside Water Leaks

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UPC = Uniform Building Code  
 IPC = International Plumbing Code  
 CUPCA = Central Utah Project Completion Act

## CONSERVATION PLAN UPDATE OBJECTIVES

The main objectives of the Salt Lake City Water Conservation Plan (WCP) Update include:

- Compile and update essential information from various existing sources on the past, present, and anticipated water conservation programs within Salt Lake City;
- Fulfill requirements of House Bill 418 as enacted by the Utah State Legislature in the 1998 General Session; and
- Make recommendations for further water conservation efforts that will help conserve water resources.

## PROJECT APPROACH

The following actions were taken to comply with H.B. 418.

Actions taken to comply with H.B. 418 included:

- Gather data on current supply and demand;
- Compile information on current programs;
- Conduct a workshop;
- Revise water conservation goals (as needed);
- Evaluate effectiveness of revised water conservation goals;
- Select revised programs for implementation (as needed);
- Public Hearing; and
- Submittal to Division of Water Resources (DWR).

## Schedule

The following schedule (Table 2) was developed to meet requirements identified in H.B. 418:

**TABLE 2  
WATER CONSERVATION PLAN (WCP) UPDATE  
SCHEDULE**

Milestone	Date
Executive Summary - WCP Update and Presentation to PUAC	28 January 1999
Draft WCP Update	2 March 1999
Set Public Hearing Date	9 March 1999
Final Draft WCP Update	9 March 1999
Hearing with City Council	16 March 1999
Submit Report to DWR	31 March 1999
Public Hearing on Draft WCP Update	6 April 1999
DWR Report to Legislature	November 1999

PUAC = Public Utilities Advisory Committee

## WATER CONSERVATION MEASURES

The text of H.B. 418 states that “each water conservation plan shall contain recommendations for water saving measures.” The list in the Bill contains nine (9) specific recommended water saving measures. Table 1 presents specific actions accomplished by Salt Lake City within each water saving category described in H.B. 418.

## INVENTORY OF WATER RESOURCES

### Current Water Use

Chart is not available in this format – See Department of Public Utilities for chart information.

In all cases, water use has decreased slightly while new water service connections have increased by 7.9%. The peak day value of 1998 was caused by an operational abnormality not actual demand caused by customers.

Salt Lake City annual water use is compared to consumption for the State of Utah and Salt Lake County in Table 3.

**TABLE 3  
ANNUAL WATER CONSUMPTION COMPARISON  
(gallons per capita/day)**

	91	93	95	97
State of Utah <sup>1</sup>	265	251	---	---
Salt Lake City <sup>2, 3</sup>	227	226	217	236
Salt Lake County <sup>1</sup>	249	245	---	---
Salt Lake City Residential <sup>2, 3</sup>	120	117	117	122

1 State Division of Water Rights: Water Use Report 10-1995

2 All use classifications divided by total population.

3 Salt Lake City Public Utilities water use records (by account classification, 1988-1998).

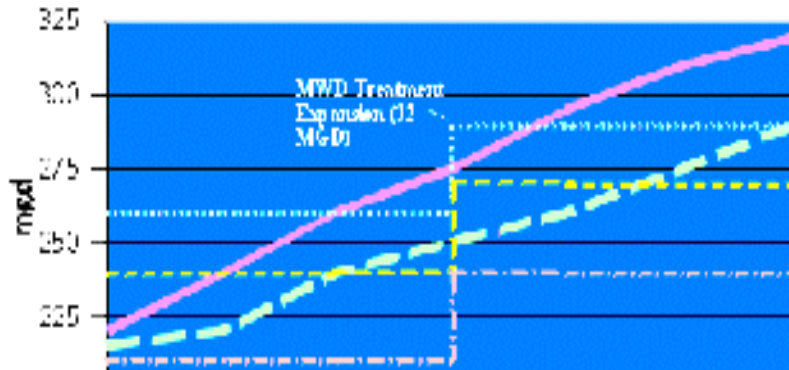
Overall per capita consumption is slightly less than the County and State taken as a whole. A goal of H.B. 418 legislation was to reduce per capita consumption below 150 gallons per day. Salt Lake residential consumption is well below the stated per capita goal.

### **Demand Forecast**

Salt Lake City recently estimated water demand through the year 2025 in their 1997 Water Master Plan Update. Figure 2 projects peak day water demand in comparison to projected population over the same period. Water demand reduction after implementation of the City's adopted goal of 10% water conservation is also shown.

**Figure 2 - Projected Peak Day Demand vs. Available Supply**

Source: Salt Lake Water System Master Plan



Peak day water supply capabilities of Salt Lake City Department of Public Utilities include scenarios for dry, normal, and wet climatic conditions. At some point, with or without conservation, demand will exceed supply. Information presented in Figure 1 is presented in tabular form in Table 4.

**TABLE 4  
PEAK DAY WATER DEMAND PROJECTIONS  
(million gallons per day)**

	Demand Scenario				2010	2015	2020	2025
High (Dry)								
No Conservation	212	216	244	266	281	296	310	318
10% Conservation	212	216	219	240	253	267	280	286
Population	--	332,600	340,300	349,100	364,400	409,100	428,900	432,900

1 Available supply during peak demand month - August.  
Source: 1997 Water Distribution System Master Plan

**Supply Sources**

The ability of existing and planned water supply sources to meet the projected water demand was evaluated in the City’s 1997 Water Distribution System Master Plan and the 1992 Water Supply and Demand Projection Study. These figures are summarized in Table 5. The supply sources are evaluated based on wet, average, and dry conditions (monthly) throughout the year.

Additional supply sources identified in the 1997 Water Supply Master Plan include:

- Conservation
- Water Reuse
- Secondary Water
- Aquifer Storage and Recovery

Groundwater Develop  
Increase Treatment Capacity

The advantages and disadvantages of each supply source, as determined from years of experience by the Salt Lake City Department of Public Utilities, are listed in Table 6.

**TABLE 5  
SALT LAKE CITY WATER SUPPLY SOURCES**

(mgd)

<b>Wet Year</b>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WTPs	97.0	97.0	97.0	97.0	95.0	95.0	80.0	66.0	41.0	41.0	97.0	97.0
Wells	46.6	46.6	46.6	46.6	55.0	55.0	55.0	55.0	55.0	55.0	46.6	46.6
MWDSLCL <sup>1</sup>	94.3	94.3	94.3	94.3	85.0	85.0	85.0	85.0	85.0	85.0	94.3	94.3
Jordan Aqueduct	42.9	42.9	42.9	42.9	50.0	50.0	50.0	50.0	50.0	50.0	42.9	42.9
Springs	1.1	1.1	1.1	1.1	5.0	5.0	5.0	5.0	5.0	5.0	1.1	1.1
Subtotal	281.9	281.9	281.9	281.9	290.0	290.0	275.0	261.0	236.0	236.0	281.9	281.9
Reduction due to well restrictions <sup>2</sup>	4.7	4.7	4.7	4.7	5.5	5.5	5.5	5.5	5.5	5.5	4.7	4.7
<b>Total</b>	277.2	277.2	277.2	277.2	284.5	284.5	269.5	255.5	230.5	230.5	277.2	277.2
<b>Normal Year</b>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WTPs	97.0	97.0	97.0	97.0	95.0	89.0	81.0	52.0	32.0	32.0	97.0	97.0
Wells	46.6	46.6	46.6	46.6	55.0	55.0	55.0	55.0	55.0	55.0	46.6	46.6
MWDSLCL <sup>1</sup>	94.3	94.3	94.3	94.3	85.0	85.0	85.0	85.0	85.0	85.0	94.3	94.3
Jordan Aqueduct	42.9	42.9	42.9	42.9	50.0	50.0	50.0	50.0	50.0	50.0	42.9	42.9
Springs	1.1	1.1	1.1	1.1	5.0	5.0	5.0	5.0	5.0	5.0	1.1	1.1
Subtotal	281.9	281.9	281.9	281.9	290.0	284.0	276.0	247.0	227.0	227.0	281.9	281.9
Reduction due to well restrictions <sup>2</sup>	4.7	4.7	4.7	4.7	5.5	5.5	5.5	5.5	5.5	5.5	4.7	4.7
<b>Total</b>	277.2	277.2	277.2	277.2	284.5	278.5	270.5	241.5	221.5	221.5	277.2	277.2
<b>Dry Year</b>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WTPs	97.0	97.0	97.0	97.0	41.0	25.0	21.0	22.0	11.0	11.0	97.0	97.0
Wells	46.6	46.6	46.6	46.6	55.0	55.0	55.0	55.0	55.0	55.0	46.6	46.6
MWDSLCL <sup>1</sup>	94.3	94.3	94.3	94.3	85.0	85.0	85.0	85.0	85.0	85.0	94.3	94.3
Jordan Aqueduct	42.9	42.9	42.9	42.9	50.0	50.0	50.0	50.0	50.0	50.0	42.9	42.9
Springs	1.1	1.1	1.1	1.1	5.0	5.0	5.0	5.0	5.0	5.0	1.1	1.1
Subtotal	281.9	281.9	281.9	281.9	236.0	220.0	216.0	217.0	206.0	206.0	281.9	281.9
Reduction due to well restrictions <sup>2</sup>	4.7	4.7	4.7	4.7	5.5	5.5	5.5	5.5	5.5	5.5	4.7	4.7
<b>Total</b>	277.2	277.2	277.2	277.2	230.5	214.5	210.5	211.5	200.5	200.5	277.2	277.2

1 MWDSLCL anticipated capacity increase of 32 mgd in the year 2010.

2 Assumed reduction in well capacity for downtime due to malfunction and routine maintenance and repair.

Source: Salt Lake City Water System Master Plan, 1997

<b>Advantages</b>	<b>Disadvantages</b>
<b>CONSERVATION</b>	
Promotes efficient water use Defers capital investment Assists water shortage management Education results in new paradigm	Decreased revenue for capital improvements Fixed costs and decreased revenue must be balanced Adverse public response Water rate increase hurts low and fixed income customers Requires high level of public education
<b>WATER REUSE</b>	
Conserves high quality water sources Large reclaimed water supply available Exchange for irrigation water attractive Proximity to users is good Fits well with NW quadrant for new development	Cost of development is high Public acceptance questions must be answered Additional wastewater treatment is needed Innovative approaches needed Water rights questions must be resolved Negative affect on water revenue Regulatory challenges
<b>SECONDARY WATER</b>	
Large source (Jordan River) available in close proximity to potential users Exchange with wastewater may solve water rights conflicts downstream Conserves high quality sources	Reliability of source quality in question Additional treatment required (solids and dissolved salts) Odors, staining and water quality negatively impact public acceptance Negative effect on water revenues Quality questions limit applicability to low value beneficial uses
<b>AQUIFER STORAGE AND RECOVERY</b>	
Can be combined with groundwater development Current demonstration project underway Innovative approaches possible Combine with advanced water reclamation Can meet peak demand cost effectively Can store high quality water	Requires land use management Research and development and siting investigations required Innovative approaches needed Long lead time needed Water rights issues Water quality degradation issues
<b>GROUNDWATER DEVELOPMENT</b>	
Groundwater rights are available for development Can combine with aquifer storage and recovery	Treatment required of some contaminated sources Power costs and well maintenance Potential restrictions on groundwater development possible
<b>INCREASE TREATMENT CAPACITY</b>	
MWDSLCL master plan underway to increase treatment capacity Exchange agreements allow conservation of high quality source Millcreek WTP Feasibility Study complete	High quality supply sources are limited Current City treatment sites constrained Surface water treatment is costly to implement Current City surface water sources are limited Negative public reaction to Millcreek WTP project

## **SYSTEM DEFICIENCIES**

Salt Lake City's water system is one of the most complex in the United States. The elevation change in the service area is from 5,800 feet in the Mt. Olympus Cove to 4,220 feet at the valley floor for a 1,580 foot difference. There are multiple sources of supply and there is high demand caused by outside residential watering in the summer. Major facilities that comprise the system are listed in Table 7.

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<b>Storage Reservoirs:</b>	Mt. Dell Reservoir - 3200 acre-feet of storage. Owned by the City
	Lake Mary Reservoir - 742 acre-feet of storage. Owned by the City
	Twin Lakes Reservoir - 934 acre-feet of storage. Owned by the City
	Little Dell Reservoir - 17,500 acre-feet of storage. Sponsored by MWDSL
	Deer Creek Reservoir - 151,000 acre feet of storage. Sponsored by the Provo River Water Users Association (61.7% reserved for MWD of SLC)
	Jordanelle Reservoir - 320,000 acre-feet of storage sponsored by CUWCD (20,000 AF reserved for MWD of SLC)
<b>Water Treatment Plants:</b>	City Creek - 15 mgd. Owned by the City
	Parleys - 45 mgd. Owned by the City
	Big Cottonwood - 42 mgd. Owned by the City
	Little Cottonwood - 113 mgd. Owned by MWDSL (85 mgd reserved for SLC)
<b>Distribution Reservoirs:</b>	Jordan Valley - 180 mgd. Owned by MWDSL (2/7) and SLCWCD (5/7)
<b>Deep Wells:</b>	34 reservoirs and tanks with 164.9 million gallons of capacity
	25 deep wells with a pumping capacity of 50 mgd and an annual yield of 20,000 acre-feet of water supply
<b>Distribution Pumping Plants:</b>	26 facilities with 80 pumping units
<b>Irrigation Pumping Plants:</b>	Lehi Pumping Plant (Utah Lake water) 1/5 City ownership
<b>Canals:</b>	6200 South Pumping Plant Jordan and Salt Lake Canal
<b>Miles of Distribution Mains:</b>	East Jordan Canal Extension 1380 miles
<b>Regulator Stations:</b>	132 stations with 184 regulators
<b>Valves &amp; Hydrants:</b>	15,049 valves and 10,405 hydrants

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Deficiencies in the City's water system have been documented in their 1997 Master Plan project. Current and potential problems identified in the master plan are listed below.

- Additional future storage needed.
- Transmission weaknesses in certain areas.
- Distribution line upsizing.
- Age of system.
- Increase capacity of pumping stations.

Major system deficiencies are described in Table 8.

**TABLE 8  
STORAGE, TRANSMISSION AND DISTRIBUTION DEFICIENCIES**

<b>Storage:</b>	Need to add 10 million gallons to meet 2025 population
<b>Transmission:</b>	Major weaknesses identified:
	- Northwest quadrant - need for north - south conduit as development occurs
	- East Bench - Lower Parleys conduit rehabilitation is needed
	- County (south end) - additional capacity is needed
<b>Distribution:</b>	Rehabilitation Program identified priorities based on age, size and condition
	Financing projects requires bonding as well as increased user charges and impact fees

**INTER-SYSTEM AGREEMENTS**

Salt Lake City is part of the vast network of water systems along the Wasatch Front. The forward thinking and proactive actions taken has resulted in a unique array of inter-system agreements. Major inter-system agreements that Salt Lake City is a party to are listed below.

- Metropolitan Water District of Salt Lake City
- Sandy City Annexation into Metropolitan Water District of SLC
- Central Utah Water Conservancy District Petitioner
- Provo River Water Users Association Member
- Surplus Sales Contracts with County Customers
- Water Development Memorandum of Understanding for Salt Lake Valley Water Agencies
- Mutual Irrigation Company Exchange Agreements

The major milestone accomplishments of Salt Lake City in the development of inter-system agreements are presented below in tabular form (Table 9).

**TABLE 9  
SUMMARY OF SALT LAKE CITY INTER-SYSTEM WATER AGREEMENTS**

Year	Water Agreements
1847	City Creek designed as Pioneer’s source of water supply.
1849	Irrigation companies are formed to divert water from canyon streams and to expand irrigation ditch systems.
1851	Salt Lake City incorporated. City controls water within corporate limits.
1882	Jordan and Salt Lake City Canal constructed from the Jordan Narrows to Salt Lake City terminating at Eagle Gate.
1888	Salt Lake City begins the process of entering into exchange agreements with irrigators.
1915-17	Mtn. Dell, Twin Lakes and Lake Mary - Phoebe dams constructed.
1924	Salt Lake City condemns into the East Jordan Irrigation Canal.

**TABLE 9 (continued)**

<b>Year</b>	<b>Water Agreements</b>
1928	Water Advisory Board formed to develop a firm water supply for 400,000 people. As a result, wells were drilled, water exchanges were completed on all the canyon streams, and the decision was made to participate in Deer Creek Reservoir.
1934	Salt Lake City forms the Metropolitan Water District of Salt Lake City (MWDSL) to build the Provo River Project (Project). MWDSL ultimately gains ownership of 61.7 percent of the Project.
1934	The Provo River Water Users Association (PRWUA) is formed to sponsor the Provo River Project. MWDSL and 5 other MWDS' along with 10 irrigation companies joined the PRWUA to sponsor and repay the federal government for the \$24 million project.
1945	Salt Lake City enters into canyon surplus water sales agreements with canyon residents.
1951	Salt Lake City, under pressure for development in its service area in unincorporated Salt Lake County, begins entering into "Surplus Sales Contracts." The City already had water resources and an infrastructure in place to serve this area. Over the years, the City has provided water sales to over 23,480 county connections under these agreements.
1951	
1967	The Salt Lake County Water Conservancy District is formed to serve water to areas outside the Salt Lake City service area. City sells them Kearns pipeline and MWDSL enters into surplus water agreement.
1986	The Central Utah Water Conservancy District (CUWCD) is formed to sponsor the \$2.5 billion Central Utah Project (CUP).
1987	MWDSL enters into an agreement with Salt Lake County and the U.S. Army Corps of Engineers to construct the Little Dell Project.
1988	Water agencies sign a Memorandum of Understanding, spelling out water development for the Salt Lake valley.
1990	MWDSL petitions for 20,000 acre-feet of water from CUP and acquires 2/7 of the Jordan Valley WTP and Jordan Aqueduct.
1992	Sandy City annexes into the MWDSL. As part of the annexation agreement, the County water agencies enter into a conjunctive management agreement.
1993	Congress passes and the President signs the Central Utah Completion Act. Contained in the Bill is Section 207, which requires water conservation programs with a goal to conserve a minimum of 30,000 acre-feet of water. The City's share is about 3,000 acre-feet.
1994	White City Community Council unsuccessfully attempted to pass legislation, which would have placed cities who service water outside their corporate limits under the Public Service Commission.
	Legislation again introduced to place cities in counties of the first class under the Public Service Commission for service outside their corporate limits. This legislation was specifically directed towards Salt Lake City and Sandy City.

A major inter-system agreement entered into by Salt Lake City is the Central Utah Project Completion Act (CUPCA). Water conservation provisions of the Act must be adopted by each petitioner of Central Utah Project. Salt Lake City has therefore adopted the CUPCA water conservation provisions as recommended in the final report of Utah Water Conservation Advisory Board. Table 10 lists conservation provisions of the CUPCA and City accomplishments.

**TABLE 10  
CUPCA WATER CONSERVATION PROVISIONS  
AND CITY ACCOMPLISHED ACTIONS**

Provision	City Action
<b><u>Utah Water Advisory Board Recommendations</u></b>	
1. Water Management and Conservation Plan	Plan implementation ongoing (see Actions in Table 1)
2. Water Conserving Landscapes	Ordinance adopted
3. Water Conservation Education	Public Information Programs (see Table 1)
<b><u>CUPCA Legislation Provisions</u></b>	
1. Metering or measuring water to all customers	City began metering all water connections 1 Jan 1917
2. Elimination of declining block rate water charges	City eliminated declining block rate water charge structure 15 Aug 1973
3. Leak detection and repair program	City has an ongoing leak detection and repair program
4. Low consumption plumbing fixture standards	City has adopted the Uniform Plumbing Code (UPC)
5. Commercial laundry and vehicle wash facility recycling	Provision adopted by reference Provision adopted by reference
6. Soil preparation for turf grass in new construction	Adopted by reference in Uniform Plumbing Code (UPC)
7. Insulation of hot water pipes in new construction	Adopted by reference in Uniform Plumbing Code (UPC)
8. Air conditioning and refrigeration system recycling	Adopted by reference
9. Standards governing water softener discharges	No evaporation treatment in Salt Lake City
10. Elimination of evaporation as a method of wastewater treatment	

## **WATER QUALITY**

The cornerstone of maintaining high quality source water is watershed management. Salt Lake City Public Utilities Committee adopted a comprehensive watershed plan on 28 January 1999. The key elements of the Watershed Plan are:

- 1) Regulation; and
- 2) Monitoring.

With the adoption of the Watershed Management Plan, the City continues a long history of protecting the quality of its water supply sources.

The problems and quality assurance issues associated with watershed management and water source protection are compared in Table 11.

**TABLE 11**  
**COMPARISON OF WATER QUALITY PROBLEMS AND QUALITY ASSURANCE MEASURES**

Problems	Quality Assurance Measures
Development and recreational pressure in canyons	Continuous water quality monitoring
Industrial sources/contamination	Watershed Management Plan
Additional high quality sources are scarce	Source Water Protection Plan
	Treatment of Surface Water
	Treatment of Groundwater

Major conclusions of the 1998 Watershed Management Plan study included the following:

- Canyon water quality is excellent;
- Increased Coliform counts are a concern; and
- Continued monitoring is recommended.

## **THE TREATMENT SYSTEM**

### **Treatment Capacity**

The capacity of Salt Lake City's treatment system was shown in Table 7. Treatment of surface water represents about 35% of the City's total current water supply capacity. Salt Lake City is scheduled to partially meet future treatment capacity needs by participation in the implementation of the Metropolitan Water District (MWD) Master Plan. This system of projects calls for construction of a major water treatment facility to serve Salt Lake County, Sandy City and Salt Lake City.

### **Safe Drinking Water**

Salt Lake City is a participant in the Partnership for Safe Drinking Water. On February 12, 1997 representatives from Salt Lake City Public Utilities, Metropolitan Water District of Salt Lake City, Salt Lake County Water Conservancy District, Central Utah Water Conservancy District and Weber Basin Water Conservancy District inked their voluntary commitment with EPA in the Partnership for Safe Drinking Water ("Partnership"). Also included are two state agencies, the Utah Department of Environmental Quality, Division of Drinking Water and Division of Laboratory Services.

The purpose of the Partnership is to survey treatment facilities, treatment processes, operating and maintenance procedures and management oversight practices. The objective is to identify and prioritize areas that will enhance the capabilities to prevent the entry of Cryptosporidium, Giardia and other microbial contaminants into the treated water, and to voluntarily implement those corrective actions that are appropriate for the system.

The Partnership implementation plan consists of four phases:

1. Eligibility requirements include compliance with the Surface Water Treatment Rule for six months and a commitment to pursue further stages of the program.
2. Collect basic plant information and plant performance data within 180 days of joining the program.
3. Undertake a self-assessment that is based on the Composite Correction Program. The self-assessment includes a performance assessment, major unit process evaluation and identification and correction of performance-limiting factors.

4. Completion of a third party assessment. Upon completion of this phase and review and approval of the completion report, the water suppliers will be presented with a Partnership for Safe Water “Administrator’s Certification of Recognition.”

### **The Distribution System**

The Salt Lake City distribution system has been extensively evaluated to establish its capacity to meet projected peak hour demand (PHD), maximum day demand (MDD), and fire requirements. The criteria used to evaluate the distribution system are as follows:

- Minimum system pressure under PHD is 40 psi.
- Minimum system pressure under MDD and fire is 25 psi.
- Minimum pipe size will meet presently proposed State of Utah standards (8-inch diameter).

The improvements recommended in the 1997 Master Plan have been prioritized based on the anticipated time period of need. The Capital Improvements Plan as presented in the Master Plan also addresses replacement and rehabilitation needs over the near term (5 years). Transmission and distribution system improvements as well as upgrades are prioritized based on the projected time period when the hydraulic capacity is reached. Storage and Auxiliary power improvements are prioritized based on the anticipated time when the additional facilities will be needed. General system upgrades are needed to replace pipe that is inadequately sized, but are in areas not likely to see a large increase in demand. These are generally pipes with diameters less than 6 inches. Improvements needed to meet growing hydraulic demand through the year 2025. The total cost of all recommended improvements are summarized in Table 12.

Category	Cost Estimate
Public Utilities Pipeline Cost	\$ 67,524,832
Private System Pipeline Cost	\$ 14,765,448
Public Utilities Maintenance Related Pipeline Replacement Cost <sup>1</sup>	\$ 15,880,308
Total Auxiliary Power Cost	\$ 797,160
Lower Parley’s Conduit Rehabilitation Transmission	\$ 3,705,000
Proposed 10 MG Storage Addition at 4500 South (Storage)	\$ 2,800,000
<b>GRAND TOTAL</b>	<b>\$105,472,747</b>

<sup>1</sup> SLCDPU pipeline replacement projects identified due to maintenance history.  
Source: Salt Lake City Water System Master Plan, 1997

### **Reuse Potential**

Several actions have been accomplished on the potential for reuse in Salt Lake City. These actions form the foundation for proposed implementation of reuse projects.

Constructed Wetlands. The largest wastewater reuse project that is currently active is the constructed wetland at the water reclamation plant. This project began operation in 1994 and continues to utilize 5 mgd of effluent.

Customer Surveys. Salt Lake City conducted customer surveys in 1995 and 1997 with very positive feedback on water reuse for residential landscape irrigation. In 1995, nearly three in five customers (57%) claimed that they strongly favored recycling treated wastewater for residential landscape irrigation. Seven in ten respondents (70%) strongly favored using treated wastewater for irrigation golf courses/parks/freeway landscaping versus (57%) that strongly favored wastewater for residential landscape irrigation. The favorable response went down 10% in each of the above reuse categories in the City's 1997 customer survey.

Golf Course Reuse. Wastewater reuse is being considered at a golf course adjacent to the Salt Lake City Water Reclamation Plant. The project is pending after appropriate study, design and construction of filtration treatment to meet State standards for reuse.

Freeway Irrigation. The feasibility of using effluent to irrigation the I-15 freeway landscape at the north entrance to Salt Lake City was studied in the early 1990's. At that time, State reuse standards were being formulated and UDOT did not support the project. Implementation of freeway landscape irrigation is possible if compatible with I-15 north construction that is scheduled to begin in Spring 1999.

Northwest Quadrant. As stated in the 1997 Water System Master Plan, SLCDPU recently completed a wastewater master plan. This plan includes a new 10 mgd wastewater reclamation plant in the northwest quadrant. This quadrant is considered a good area in which to implement water reuse because it is not heavily developed, and a dual distribution system could be installed less expensively as the area grows. As this area develops, reclaimed water could be mandated for certain uses including golf course and park irrigation.

The wastewater master plan includes a cost to provide the additional treatment needed to meet usable reclaimed water standards. Assuming 10 mgd was used for 6 months a year, the amortized annual capital cost would be \$352 per acre-foot. The distribution, operation, and maintenance costs would be additional. The total cost of the reclaimed water could be as high at \$700 per acre-foot. If conveyance and delivery systems are in place for domestic water, it is not likely that general use of reclaimed water will be cost-competitive for domestic water use for some time. However, opportunities for reuse in the northwest will be explored and used whenever proven cost-effective.

### **Environmental Aspects**

As with the wise water use ethic adopted by Salt Lake City, environmental protection is a strong component of the City water management program. Long-standing controls aimed at protection of watersheds on the east side of the Salt Lake Valley is a prime example of the City's proactive approach to the environmental aspects of water development.

Outside of the watersheds, areas served by Salt Lake City are highly urbanized and disturbance to the natural environment are not a major issue. Growth and disturbance to the natural environment is greatest in the southern part of the County.

A major water development project involving Salt Lake City is the implementation of the MWDSLCL Master Plan. Although not the main user of water from the project, Salt Lake City is a significant stakeholder. As the project is phased into operation, the City will have the opportunity to evaluate how the project effects the environment.

### **Institutional and Political Factors**

Water delivery within Salt Lake County is a complex process. Water supply and the ability to deliver it are both required to meet customer water use demand. Although people generally understand the need for a

firm supply of water, the need and cost of the infrastructure to deliver water is often misunderstood. Water infrastructure must be continuously upgraded and expanded to meet future demand.

Conjunctive water management between the major water agencies assures the public that all available capacity is utilized and water delivered efficiently throughout the entire county. Close coordination between all major water agencies is essential if the County's total water supply demand is to be met. For example, inter-agency efforts allowed the residents of the Salt Lake valley (including Salt Lake City) to avoid any water restrictions during the most recent 5-year drought.

The Partnership for Safe Water and the inter-agency agreements described previously in this report are examples of positive institutional and political factors that have facilitated development of water supply in Salt Lake City.

### **Financial Resources**

Water Rates. Although Salt Lake City has an adequate water supply, eventually it will need additional facilities to meet its future peak demand. The community was accustomed to having affordable water and enjoying it. It enjoys the amenities that affordable water brings, such as the beauty of their homes and public places and the quality of life that exists in the Salt Lake valley. Using the rate structure to manage peak demand was an alternative to constructing new facilities projected to be needed by the turn of the century.

Salt Lake City and the Public Utilities Advisory Committee (PUAC) studied water financing for two years. It was demonstrated that price elasticity could predict reductions in consumption resulting from rate increases. The PUAC recommended that water rates be restructured to place more emphasis on the commodity charge and impose a surcharge during the peak demand summer months to manage peak demand. The effect was to defer the need to construct new facilities. The surcharge is scheduled to be raised to higher values in the future.

Because water rates are synonymous with municipal government, and as a part of the cost of municipal services, every effort has been made to keep the rates down and water affordable. These paradigms had to be balanced against environmental awareness, Central Utah Completion Act conservation requirements and the need to control peak demand while adequately financing the water utility in a time of increasing regulations and infrastructure needs. For these reasons, Salt Lake City decided to change rates gradually to allow time for the customers to adapt to the new rate structure philosophy. The new water rate structure program is now in its third year.

Impact Fees Salt Lake City is currently completing a study that recommends increasing impact fees. The new impact fee structure will help meet future water demand. The 1997 Water System Master Plan developed a detailed Capital Improvement Plan (CIP). Implementation of the CIP is underway and is continuously being updated and re-prioritized.