

# **WATER CONSERVATION STRATEGIES POLICY DOCUMENT WATER CONSERVATION TASK FORCE AUSTIN, TEXAS**

**Prepared by: Water Conservation Division of the Austin Water Utility**

## **TABLE OF CONTENTS**

### **BACKGROUND**

- City Council Resolution**
- Water Conservation Task Force Process**
- Peak Day Water Use and Future Water Plant Expansions**
- Environmental Benefits of Conservation**
- Projected Peak Day Savings from the Water Conservation Task Force Recommendations**
- Decreasing Peak Day Water Use Extends Austin's Water Supply**
- Financial Impacts of Water Conservation Task Force Recommendations**
- Reclaimed Water System**

### **PROPOSAL**

- Summary of Proposed Strategies**
- Proposed Strategies**
  - Indoor Strategies**
  - Outdoor Strategies**
  - City and Utility Strategies**
- Projected Yearly Peak Day Savings**

### **APPENDICES**

- Glossary**
- Comparison to Other Major Texas Cities' Water Conservation Efforts**
- Austin Water Utility Wholesale Customer Information**

## **BACKGROUND**

### **City Council Resolution Establishing the Water Conservation Task Force**

The City Council passed Resolution #20060824-061 on August 24, 2006 that:

- Set a goal of reducing peak day water use by 1% per year for 10 years and,
- Created a Water Conservation Task Force with a goal drafting a policy document consisting of strategies and implementation plans for new water conservation initiatives to meet this goal for City Council consideration within 90 days. The policy document is to be used in drafting necessary amendments to the city code and technical manuals, as well as for budgetary considerations
- Named the members of the Task Force
  - Mayor Will Wynn,
  - Councilmember Leffingwell
  - Councilmember Sheryl Cole
  - Environmental Board Member Dave Anderson
  - Planning Commission Member Chris Riley
  - Resource Management Commission Member Chris Herbert
  - Water and Wastewater Commission Member Michael Warner

On September 28, 2006, Council extended the time for the Task Force to report back to the Council from 90 to 120 days (Resolution #20060928-071).

### **Water Conservation Task Force Process**

At the first Task Force meeting, the general process that the Task Force agreed on was as follows:

- The task force will review relevant research, hold discussions with staff, take input from stakeholder groups and individuals, hold public meetings and work sessions, and ultimately produce the policy document.
- The task force will announce and broadly publicize meeting schedules in order to maximize public education and participation. The task force will provide an opportunity for public testimony at each public meeting.
- In addition to public meetings, the task force would need several work sessions to receive briefings and analysis from AWU staff.

The Task Force adopted the following schedule to meet the 120 day timeframe.

Meeting 1: September 29, 2006 – Organizational Meeting and Overview

- Receive staff reports on suggested conservation strategies
- Adopt timetable for meeting task force milestones
- Public testimony

Meeting 2: October 13, 2006 – Indoor Strategies

- Receive staff reports on conservation strategies relating to plumbing fixtures, metering, cooling towers, etc.
- Invited Testimony
- Public Testimony

Meeting 3: October 27, 2006 – Indoor Strategies

- Deliberation and initial adoption of strategies
- Public Testimony

Meeting 4: November 3, 2006– Landscape Irrigation Strategies

- Receive staff reports on conservation strategies relating to irrigation system efficiency, landscape design, watering schedules, rainwater collection, etc.
- Invited Testimony
- Public Testimony

Meeting 5: November 17, 2006 – Landscape Irrigation Strategies

- Deliberation and initial adoption of strategies
- Public Testimony

Meeting 6: December 8, 2006 – City and Utility Strategies

- Receive staff reports on leak repair, water reuse program, rate structures, public education, etc.
- Invited Testimony
- Public Testimony

Meeting 7: December 15, 2006 – City and Utility Strategies

- Deliberation and initial adoption of strategies
- Public Testimony

Final Meeting: Scheduled for January 12, 2007

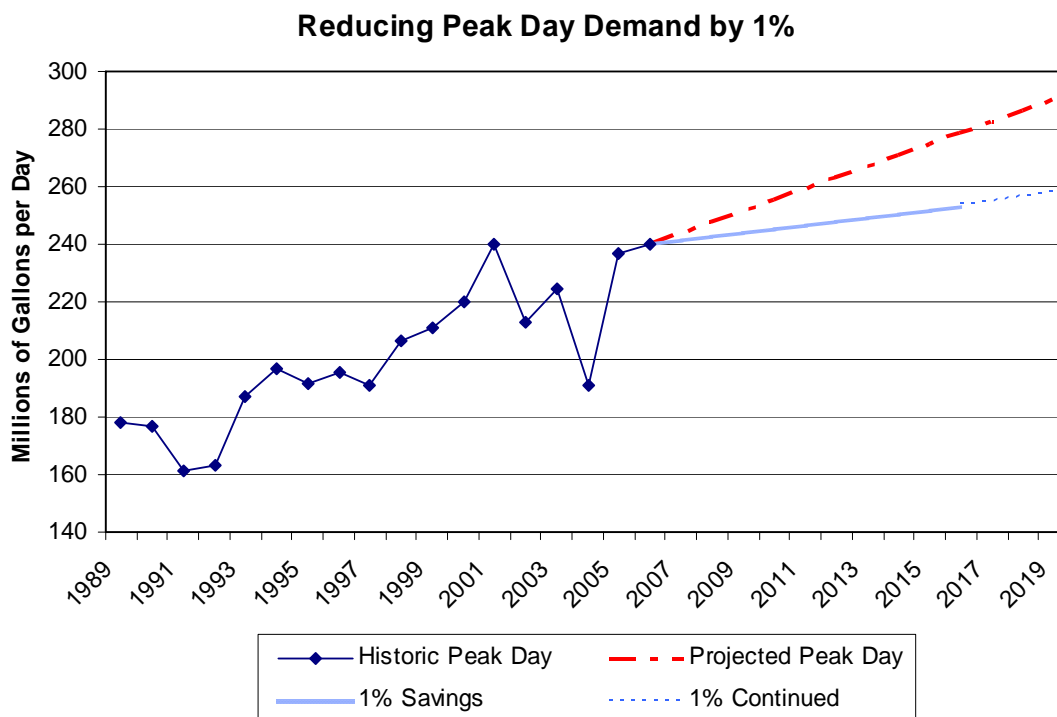
- Public Testimony
- Deliberation and Final Adoption of Strategies

## **Peak Day Water Use and Future Water Plant Expansions**

The need for additional water plant treatment capacity is, in large part, determined by amount of water projected to be demanded by customers during the peak usage days of the year. Since during the peak usage days of the summer approximately 50 percent of water use is for irrigation, there is a substantial opportunity to reduce peak day projected demand in the future, thereby delaying the need for additional water plant capacity.

Other programs such as reducing system water loss, substituting reclaimed water for potable water, and decreasing indoor usage can also have a significant impact on peak day water usage.

The graph below shows the projected increase in peak day water use based on current trends and the dotted line indicates the trend if the Task Force goal of reducing peak day water use by 1 percent per year for 10 years is achieved.



## **Environmental Benefits of Conservation**

Water conservation brings a host of environmental benefits as well. When water is conserved, energy needs for treatment and pumping are reduced, which translates into better air quality. Sound landscaping and irrigation practices help water quality by reducing runoff and the need for lawn-care chemicals. Water efficiency keeps more water in the Colorado River and lakes, thus helping to support riparian and estuarine habitats.

## **Projected Peak Day Savings from the Water Conservation Task Force Recommendations**

The estimated peak day savings from the Task Force recommendations is 32.65 million gallons per day (MGD). These savings numbers have been reviewed and confirmed by the City Auditor's Office. While the 32.65 MGD projected savings is higher than the Task Force goal of achieving 25 MGD, there is a degree of uncertainty in achieving all of the projected savings. Therefore, it would be prudent to implement all the programs as recommended by the Task Force in order to assure that the 25 MGD goal of the Task Force is achieved.

## **Decreasing Peak Day Water Use Extends Austin's Water Supply**

Austin is fortunate to have a dependable long-term water supply through water rights from the Colorado River and its 1999 Water Supply Agreement with the Lower Colorado River Authority (LCRA). During the discussions leading up to the 1999 Agreement, the City Council set a goal to make the quantity of water supply being contracted for last through at least the year 2050 through aggressive conservation and reclaimed water program. The programs that the Water Conservation Task Force recommended, if adopted

and implemented with the 17 FTEs in additional staff and other funding requirements shown below, will also have an impact on achieving the extension of Austin's water supply until 2050.

### **Financial Impacts of Water Conservation Task Force Recommendations**

The recommendations as adopted on first reading by the Task Force would require additional funding approximately \$1,889,500 for annual operating expenses including 17 FTEs; \$6,766,000 in rebate funding over ten years; \$250,000 in capital expenditures over ten years; and \$13,500,000 in accelerated Capital Improvement Project (CIP) expenditures.

### **Reclaimed Water System**

*Austin's Water Reclamation Initiative is dedicated to:*

- Conserving the drinking water supply,
- Protecting the environment,
- Providing inexpensive non-potable water for irrigation, cooling, and manufacturing.

Reclaimed water is created by reusing treated wastewater effluent that is normally discharged to the Colorado River. It is captured prior to discharge, stored in tanks, and then pumped to customers. Reclaimed water helps the citizens of Austin conserve their water supply for use into the future. It is a cost-effective way to improve the City's ability to provide water for non-drinking water purposes and will be available even during times of drought.

The Austin Water Utility has provided reclaimed water for irrigation since 1974. The reclaimed water program conserved approximately 1.1 billion gallons of water in 2006, a fraction of its potential of 8.5 billion gallons. The main reclaimed water system consists of two storage tanks, three pump stations, and 20 miles of transmission main. There are four smaller package plants that serve isolated golf courses customers. Intended uses for the reclaimed water are irrigation, cooling tower makeup, and manufacturing.

Now that the Sand Hill Energy Center and the Mueller Median strips have been brought on-line, the City is engaged in engineering design to provide reclaimed water to the Robert Mueller Airport redevelopment and the University of Texas, the Austin-Bergstrom International Airport, and the Onion Creek Soccer Complex. The City of Austin is also constructing infrastructure improvements to supplement its existing system near the Bergstrom International Airport.

## **Summary of Proposed Strategies**

PS #	Description	Applicability	Average year City cost	10-year savings (MGD)	FTEs	Cost per gallon saved	Page #
<b>Indoor Water Conservation Strategies</b>							
IN-1	Require all plumbing fixtures to perform at current plumbing code volumes.	All customers	\$542,500	2.10	2.0	\$2.77	
IN-2	Require the use of submeters to bill for water in multi-family properties.	New and some existing multi-family and mixed-use properties.	\$30,000	0.40	0.5	\$0.48	
IN-3	Make changes to Plumbing Code to prohibit inefficient fixtures.	All customers	\$30,000	0.94	0.5	\$0.32	
IN-4	Establish efficiency requirements for cooling tower management.	Commercial properties with cooling towers.	\$15,000	0.95	0.25	\$0.16	
IN-5	Establish water consumption limits for car wash facilities and equipment.	Commercial car wash facilities	\$15,000	0.15	0.25	\$1.00	
IN-6	Establish efficiency standards for commercial clothes washers.	Commercial laundry facilities	\$15,000	0.43	0.25	\$0.35	
<b>Outdoor Water Conservation Strategies</b>							
OU-1	Expand Water Use Management Ordinance.	All customers	\$187,500	6.16	3.0	\$0.30	
OU-2	Require new residential irrigation systems to meet design standards and permitting requirements.	Residential customers	\$245,000	1.32	4.0	\$1.86	
OU-3	Create additional design requirements for commercial irrigation systems and landscape design.	Commercial and multi-family customers	\$120,000	0.74	2.0	\$1.62	
OU-4	Establish soil-depth requirements for new residential landscapes.	Volume home builders	\$125,000	0.44	2.0	\$2.84	

PS #	Description	Applicability	Average year City cost	10-year savings (MGD)	FTEs	Cost per gallon saved	Page #
OU-5	Require homebuilders to offer a WaterWise landscape option.	Volume home builders	\$15,000	0.21	0.25	\$0.71	
OU-6	Require regular analyses of automatic irrigation systems.	All properties over 1 acre	\$132,000	1.47	2.0	\$0.90	
OU-7	Expand free irrigation audit program for high-volume water users.	Commercial, multi-family; high-volume residential properties	\$137,500	0.63	0	\$2.18	
<b>City and Utility Water Conservation Strategies</b>							
CI-1	Ensure funding for leak detection contract	Austin Water Utility	\$100,000	4.8	0	\$0.21	
CI-2	Assure CIP funding for reclaimed water projects.	Austin Water Utility	\$2,500,000*	5.95	0	\$2.10	
CI-3	Adjust Utility water rates to encourage conservation.	All customers	\$0	5.0	0	\$0	
CI-4	Require conservation by wholesale customers.	Wholesale customers	\$0	TBD	0	TBD	
CI-5	Explore alternative water sources	Commercial customers	TBD	TBD	TBD	TBD	
CI-6	Increase water efficiency in City facilities.	City departments	\$0	0.37	0	\$0	
CI-7	Reduce excessive water use due to high pressure.	Residential customers	\$30,000	0.29	0	\$1.07	
CI-8	Establish program to alert customers to potential leaks during winter months.	Residential customers	\$0	0.31	0	\$0	
CI-9	Expand public education program.	All customers	\$725,000	N/A	0	N/A	

\*CIP costs of \$2,500,000 a year for five-year period

All costs are estimates in 2007 dollars.

## PROPOSED STRATEGIES

### INDOOR WATER CONSERVATION

#### Proposed Code Amendments

<b>IN-1</b>	<b>Require all plumbing fixtures to perform at current plumbing code volumes.</b>
<b>Applies to:</b>	Commercial and Multi-family customers; Single-family residential properties up for sale.
<b>Implementation Method:</b>	Revisions to City Code, Chapter 6-4

Despite plumbing code changes addressing new fixtures and incentive programs for retrofits, many inefficient plumbing fixtures still exist in Austin. Water savings from fixture retrofits are very reliable, since they require only hardware replacements, not behavioral changes.

1. All plumbing fixtures, including toilets, showerheads, and faucets, in multi-family and commercial properties must perform at or below current plumbing code volumes by December 31, 2011 or upon sale of the property, whichever comes first. Properties will have to certify that they have retrofitted their fixtures. The retrofit will not apply to a property that has replaced all of its toilets under the City's programs, a property that was built after January 1, 1993, a property that can certify through inspection by a licensed plumber or City inspector that all toilets, showerheads, and faucets on the property meet the plumbing code specifications, or a property that has applied for and received a variance due to it being an existing structure that has been identified by a local, state, or federal government entity as an historical site and a historically accurate water-conserving plumbing fixture is not available.
2. All plumbing fixtures, including toilets, showerheads, and faucets, in single-family properties must perform at or below current plumbing code volumes by December 31, 2009. Enforcement will be triggered by the notification of the transfer of the title. At that time, owners must certify that their properties have fixtures that comply with the current plumbing code. The retrofit will not apply to a property that has replaced all of its toilets under the City's programs, a property that was built after January 1, 1993, a property that before the sale can certify through inspection by a licensed plumber or City inspector that all toilets, showerheads, and faucets on the property meet the plumbing code specifications, or a property that has applied for and received a variance due to it being an existing structure that has been identified by a local, state, or federal government entity as an historical site and a historically accurate water-conserving plumbing fixture is not available.
  - a. Before transfer of title for a property, seller must present a Certificate of Compliance to confirm fixtures' efficiency. The Certificate requires a verification inspection by Water Conservation staff, and may be applied for at any time. It is recommended that Certificate be obtained prior to listing properties for sale.
  - b. Upon posting of a completion bond with Water Conservation, responsibility for obtaining a Certificate of Compliance may be transferred to the buyer to accommodate remodeling.

**Additional FTEs:**

**Additional Cost:**

**Contract/Commodity Cost:**

**Peak-Day Savings:**

**Cost per gallon saved:**

2, to inspect and issue Certificates of Compliance

\$120,000 for personnel costs each year

\$25,000 for the cost of one vehicle

\$4,200,297 for toilet rebates before effective dates

\$0

2.10 MGD over 10 years

\$2.77



<b>IN-2</b>	<b>Require the use of submeters or utility meters to bill for water.</b>
<b>Applies to:</b>	All new and some existing mixed-use and multi-family properties.
<b>Implementation Method:</b>	

According to a 2004 joint study by EPA, multi-family associations and water utilities, customers in multi-family properties reduce water use by 15% when billed directly for the water they use. Tenants who pay for their water use through allocated bills or homeowners' associations do not reduce their water use. While new multi-family properties are required to be plumbed for and to install submeters, they are not required to use submetering to bill tenants for water.

All new multifamily properties, other than condominiums, must bill each tenant for their individual water use through City meters or privately-owned submeters. Tax credit properties built between the implementation date of this policy and January 1, 2008, will have until December 31, 2016 to bill for water using either individual City meters or submeters. Properties with centralized hot water systems and are above a height to be proposed by staff (such as those over 3 stories) are exempt. The Task Force did not recommend requiring that condominiums be required to bill using submeters or utility meters, but did recommend that condominiums do so. Mixed use and multiple use properties must bill each tenant for water using either individual City meters or submeters.

Where multiple duplexes, triplexes or fourplexes are constructed on a single commercial lot, individual City meters must be installed for each unit, as is currently required when there is a single structure on a lot.

<b>Additional FTEs:</b>	0.5, to monitor program and ensure compliance
<b>Additional Cost:</b>	\$30,000 for personnel costs each year
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.40 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0.48

<b>IN-3</b>	<b>Prohibit inefficient fixtures.</b>
<b>Applies to:</b>	New commercial construction
<b>Implementation Method:</b>	Revisions to plumbing code

Inefficient equipment is still being sold and installed in Austin establishments, creating a missed opportunity for water savings.

The following will apply to new construction and renovations:

1. Liquid ring surgical/dental vacuum pumps are prohibited.
2. Steam boilers must have conductivity controllers.
3. Urinals must have a maximum flush volume of 0.5 gallons per flush (gpf).
4. Commercial dishwashers must use no more than 0.9 gallons per rack or 180 gallons per hour.
5. Garbage grinders are prohibited in restaurants and cafeterias.

<b>Additional FTEs:</b>	0.5, to ensure compliance
<b>Additional Cost (per year):</b>	\$30,000 for personnel costs each year
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.94 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0.32

<b>IN-4</b>	<b>Establish efficiency requirements for cooling tower management.</b>
<b>Applies to:</b>	All customers
<b>Implementation Method:</b>	Ordinance

Cooling towers are a contributor to peak-day water use, yet many are poorly operated. Technology can improve operation, or make it easier for operators to run cooling towers efficiently. Additionally, AC condensate is not always being captured and reused although it is suitable for cooling towers or for landscape irrigation.

1. Cooling towers permitted after the effective date of this requirement must have:
  - a. makeup and blowdown meters,
  - b. conductivity controllers,
  - c. overflow alarms,
  - d. drift eliminators, and
  - e. a minimum of 5 cycles of concentration.
2. Existing cooling towers must install items 1a. through 1e. by December 31, 2010.
3. Rebates will continue to be available to encourage the use of reverse osmosis (RO) technology to increase cycles of concentration where RO reject water can be used for irrigation.
4. New large commercial properties must drain condensate from any air conditioning systems to a common drain for beneficial reuse.

<b>Additional FTEs:</b>	0.25, to ensure compliance
<b>Additional Cost:</b>	\$15,000 for personnel costs each year
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.95 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0.16

<b>IN-5</b>	<b>Establish water consumption limits for car wash facilities and equipment.</b>
<b>Applies to:</b>	Commercial car wash facilities
<b>Implementation Method:</b>	Permitting process

New and existing car washes are required to comply with the following efficiency standards:

1. Conveyor washes are limited to 40 gallons/car or less.
2. In-bay washes are limited to 55 gallons/car or less.
3. Large vehicle (bus or large truck) washes are limited to 75 gallons/vehicle or less.
4. Hand wand nozzles must use 3 gallons per minute or less.

<b>Additional FTEs:</b>	0.25, to ensure compliance
<b>Additional Cost:</b>	\$15,000 for personnel costs each year
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.15 MGD over 10 years
<b>Cost per gallon saved:</b>	\$1.00

<b>IN-6</b>	<b>Establish efficiency standards for commercial clothes washers.</b>
<b>Applies to:</b>	Commercial laundry facilities
<b>Implementation Method:</b>	Ordinance

While Department of Energy standards exist for residential clothes washers (single load soft-mount machines), there are no state or federal efficiency standards for hard-mount clothes washers or multi-load soft-mount washers.

1. New clothes washers, with the exception of single-load soft mount machines, must have a water factor no greater than 8.0.
2. All coin-operated commercial laundry equipment must have a water factor no greater than 8.0 by 2011.

<b>Additional FTEs:</b>	0.25, to ensure compliance
<b>Additional Cost:</b>	\$15,000 for personnel costs each year
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.43 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0.35

## OUTDOOR WATER CONSERVATION STRATEGIES

<b>OU-1</b>	<b>Expand Water Use Management Ordinance to limit frequency, timing and method of outdoor watering.</b>
<b>Applies to:</b>	All customers
<b>Implementation Method:</b>	Revisions to City Code, Chapter 6-4

Outdoor water use drives peak day use for the City of Austin. Irrigation accounts for more than 50% of Austin's peak-day water use, and for approximately 35% of annual water use. The City's current Water Use Management Ordinance provides for potential fines of \$500 per violation for properties found wasting water (operating sprinkler systems improperly or with broken heads), or for commercial or multi-family properties watering between the hours of 10am and 7pm between May 1<sup>st</sup> and September 30<sup>th</sup>. However, the current ordinance does not restrict properties from over watering, nor does it provide sufficient restrictions on daytime watering, when more water is lost to evaporation and wind. Additionally, the ordinance needs greater enforcement of existing penalties.

The following provisions will be added to expand the current Water Use Management Ordinance:

1. Permanent Water Use Restrictions (§ 6-4-63)
  - a. Limit commercial and multifamily properties to 2 designated watering days a week.
  - b. Automatic irrigation systems may not be operated between 10 a.m. and 7 p.m.
  - c. Require rain shut-off devices on both new and existing automatic irrigation systems that must be operational at all times and set to turn off the system after 1/8 inch of rainfall.
2. Water Conservation Stage One Regulations (§ 6-4-64), effective May 1<sup>st</sup> to September 30th
  - a. Limit residential properties with automatic irrigation systems to 2 designated watering days a week.
  - b. Outdoor watering, except with a hand-held hose or hand-held bucket, is prohibited between 10am and 7pm.
3. The use of timers on hose-end sprinklers will continue to be promoted.

<b>Additional FTEs:</b>	3 for enforcement
<b>Additional Cost:</b>	\$180,000 for personnel costs each year
	\$75,000 for the cost of 3 vehicles
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	6.16 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0.30

<b>OU-2</b>	<b>Require new residential irrigation systems to meet design standards and permitting requirements.</b>
<b>Applies to:</b>	Residential customers
<b>Implementation Method:</b>	Ordinance

Although Texas is one of the only states to license irrigators, there is still a lack of regulation, oversight and enforcement in residential irrigation system design and installation. Inefficient system design can result in water loss of 20 to 50%.

1. Anyone installing a new irrigation system at a residential property must obtain a permit prior to installation. Irrigation systems shall be designed with:
  - a. valves and circuits separated based on water use (hydro-zoned);
  - b. sprinkler heads spaced for head-to-head coverage, or heads spaced according to manufacturer's recommendations and adjusted for prevailing winds;
  - c. a benchmark distribution uniformity percentage of 0.6 or higher;
  - d. no run-off, with no direct over spray onto non-irrigated areas;
  - e. pop-up spray heads and rotors set back at least 6 inches from impervious surfaces;
  - f. no spray irrigation included on areas less than 6 feet in width;
  - g. an approved rain shut-off device set to shut off after 1/8" of rainfall
  - h. a master valve;
  - i. pressure regulation components installed where dynamic pressure exceeds manufacturer's recommended operating range (30-60 psi); and
  - j. a City-approved controller capable of dual or multiple programming, with at least several start times for each irrigation program, a water budgeting feature and programmable to irrigate with a frequency of every one to ten days.
2. Installers must present the owner with, and make available to the City of Austin, a water budget that specifies:
  - a. estimated monthly water use in gallons per application;
  - b. total irrigated area in square feet;
  - c. precipitation rates for each valve circuit;
  - d. monthly irrigation schedule for the plant establishment period (first three months);
  - e. recommended yearly watering schedule, including seasonal adjustments;
  - f. location of emergency irrigation system shut-off valve; and
  - g. the distribution uniformity percentage for the system.
3. Irrigation systems are subject to a final City inspection prior to operation. Staff will continue developing requirements for post-installation documentation.
4. Irrigation submeters with automatic readouts for customer monitoring will be required one year after the other portions of this measure take effect. A rebate program for submeters with readouts for new and existing systems will be developed and will be in place until the requirement takes effect.

<b>Additional FTEs:</b>	4, to evaluate designs, issue permits, and perform post installation inspections
<b>Additional Cost:</b>	\$240,000 for personnel costs each year \$50,000 for the cost of 2 vehicles
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	1.32 MGD over 10 years
<b>Cost per gallon saved:</b>	\$1.86



<b>OU-3</b>	<b>Create additional design requirements for commercial irrigation systems and landscapes.</b>
<b>Applies to:</b>	Commercial and multi-family customers
<b>Implementation Method:</b>	Revisions to City Code

Although there is a permitting process for automatic irrigation systems on commercial properties, new systems have the potential to waste a significant amount of water.

In addition to existing permitting and design requirements,

1. New commercial and multi-family irrigation systems must be designed so that:
  - a. the system has zero runoff;
  - b. the sprinkler arc does not pass across a paved area;
  - c. the system does not include spray irrigation on areas less than 6 feet wide (such as medians, buffer strips, and parking lot islands);
  - d. pop-up spray heads and rotors are set back at least 6 inches from impervious surfaces;
  - e. the irrigation system has a master valve;
  - f. the irrigation system must have a City approved weather based controller;
  - g. the system meets a minimum distribution uniformity of 0.6.

2. Prior to final inspection, installers must develop an as-built design plan and water budget.

For commercial landscapes, require:

1. a minimum depth of 8" of soil meeting City specifications under all new landscaping; and
2. turfgrasses included in the landscape to meet dormancy requirements.

<b>Additional FTEs:</b>	2, to evaluate designs and issue permits
<b>Additional Cost:</b>	\$120,000 for personnel costs each year
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.74 MGD over 10 years
<b>Cost per gallon saved:</b>	\$1.62

<b>OU-4</b>	<b>Establish soil-depth requirements for new landscapes.</b>
<b>Applies to:</b>	Volume home builders
<b>Implementation Method:</b>	Revisions to City Code

Native soil depth in Austin is insufficient to support the types of landscape aesthetics homeowners desire, resulting in excessive irrigation. Grasses which are inappropriate for the Austin climate and rainfall pattern continue to be installed in new residential landscape areas, requiring frequent irrigation in the summer months.

1. New homes must have a minimum depth of 6" of soil meeting City specifications.
  - a. A site with 6 inches of existing soil does not need to add any soil.
2. New turf installations must meet dormancy requirements.

<b>Additional FTEs:</b>	2, to work with home builders and inspect sites
<b>Additional Cost:</b>	\$120,000 for personnel costs each year \$50,000 for the cost of 2 vehicles
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.44 MGD over 10 years
<b>Cost per gallon saved:</b>	\$2.84

<b>OU-5</b>	<b>Require homebuilders to offer a WaterWise landscape option.</b>
<b>Applies to:</b>	Volume home builders
<b>Implementation Method:</b>	Legal Dept. is reviewing appropriate implementation method

Prospective homebuyers are not often presented with low-water use landscape options.

1. Homebuilders must offer a WaterWise landscape option in any series of landscape options offered to prospective home buyers. The WaterWise landscape option must:
  - a. be comprised of plants from the City of Austin preferred plant list or other plants with similar drought-tolerant characteristics; and
  - b. have no more than 50% of the landscape area covered in turfgrass.
2. To support this effort, Water Conservation and Watershed Protection will create a single City of Austin preferred plant list.

<b>Additional FTEs:</b>	0.25, to work with home builders
<b>Additional Cost:</b>	\$15,000 for personnel costs each year
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.21 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0.71

<b>OU-6</b>	<b>Require regular analysis of automatic irrigation systems.</b>
<b>Applies to:</b>	All non-residential properties over 1 acre
<b>Implementation Method:</b>	Revisions to City Code, Chapter 6-4

Large properties with automatic irrigation systems often over-water, especially when irrigation maintenance contracts do not provide for analysis and repair of system inefficiencies or inform property owners and managers of projected water use amounts.

1. Commercial, multi-family, and municipal properties over 1 acre with automatic irrigation systems must submit an irrigation analysis to the Austin Water Utility once every three years according to a staggered schedule.
2. Commercial or multi-family properties that have irrigation meters and use more than 125 percent of the evapotranspiration rate for irrigation must also have an irrigation analysis once every three years.
3. Analyses must be:
  - a. performed by licensed irrigators and show the irrigator's license number on the report;
  - b. submitted to the Austin Water Utility by May 1<sup>st</sup> of the year it is due; and
  - c. signed by the property manager or owner.

<b>Additional FTEs:</b>	2, to evaluate and track irrigation
<b>Additional Cost:</b>	\$120,000 for personnel costs each year
	\$12,000 for annual marketing
<b>Contract/Commodity Costs:</b>	\$0
<b>Peak-Day Savings:</b>	1.47 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0.90

<b>OU-7</b>	<b>Require water audits for high-volume residential customers.</b>
<b>Applies to:</b>	Residential customers with regular use over 35,000 gallons per month
<b>Implementation Method:</b>	Revisions to City Code, Chapter 6-4

Many residential customers are unaware about how much water their landscape requires and could benefit from irrigation audits.

1. Residential properties with automatic irrigation systems and that exceed 35,000 gallons per month at least once in each of two consecutive calendar years and are under the same ownership for that period are required to have an irrigation analysis once every three years.
2. Analyses must be:
  - d. performed by licensed irrigators and show the irrigator's license number on the report;
  - e. submitted to the Austin Water Utility by May 1<sup>st</sup> of the year it is due; and
  - f. signed by the property manager or owner.

Residential properties with automatic irrigation systems and with over 25,000 gallons per month will be eligible for irrigation analyses.

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$120,000 for personnel costs each year
	\$50,000 for the cost of 2 vehicles
	\$12,500 for annual marketing
<b>Contract/Commodity Costs:</b>	\$0
<b>Peak-Day Savings:</b>	0.63 MGD over 10 years
<b>Cost per gallon saved:</b>	\$2.18

## CITY AND UTILITY WATER CONSERVATION STRATEGIES

<b>CI-1</b>	<b>Ensure funding for leak detection contract.</b>
<b>Applies to:</b>	Austin Water Utility
<b>Implementation Method:</b>	Council resolution

Water loss could be improved with substantial system benefits. The Austin Water Utility does not currently have a comprehensive leak detection program, so underground leaks that do not surface continue to contribute to overall water loss.

1. Continue annual funding for the Leak Detection Contract approved by Council on October 19, 2006, which includes examining 600 linear miles of pipe, initially focusing on cast iron pipe, to find leaks that have not yet surfaced.
2. Support the Utility's ongoing efforts to repair leaks in a shorter time frame.

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$0
<b>Contract/Commodity Cost:</b>	\$100,000 contract annually
<b>Peak-Day Savings:</b>	4.8 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0.21

<b>CI-2</b>	<b>Assure CIP funding for reclaimed water projects.</b>
<b>Applies to:</b>	Austin Water Utility
<b>Implementation Method:</b>	Council resolution

To expand the reclaimed water program, a number of large-volume customers need to be converted from potable to reclaimed water, which in turn requires that transmission main extensions are built to bring reclaimed water to these customers.

1. Approve funding for the following projects, which will be started in 2007 and completed by 2011, as part of the Utility's Capital Improvement Plan:
  - a. UT Transmission Main – 13,000 feet of 24" main along Red River (4.0 MGD)
  - b. ABIA Transmission Main – 6,100 feet of 12" main from Hornsby Bend to Bergstrom Airport (0.6 MGD)
  - c. Smith Road Extension – 10,000 feet of 8" and 12" main (0.5 MGD)
  - d. Main to the Roy G. Guerrero Colorado River Park – 16,000 feet of 24" main (1.0 MGD)
  - e. 24" Rehabilitation (0 MGD, but necessary for the main to Guerrero Park and Smith Road Extension)
  - f. 12" Rehabilitation (0.1 MGD)
  - g. 183 Rehabilitation (0 MGD, but necessary for the Smith Road Extension)
  
2. Require new commercial and municipal customers with access to reclaimed water to use it for irrigation, cooling, and other non-potable uses, with exemptions for health, public safety, and capacity availability.

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$2,500,000 CIP costs each year for 5 years
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	5.95 MGD over 10 years
<b>Cost per gallon saved:</b>	\$2.10

<b>CI-3</b>	<b>Adjust Utility water rates to encourage conservation.</b>
<b>Applies to:</b>	All customers
<b>Implementation Method:</b>	Cost of service study and changes to the rate structure

The Utility's current water rate structure does not provide adequate conservation price signals for high use residential customers, irrigation accounts, or commercial and multi-family customers. Additionally, many customers do not know what level of water use is appropriate for their needs.

The Utility will:

1. Establish a residential fifth tier for use above 25,000 gallons per month.
2. Conduct a cost of service study to evaluate strategies to reduce water demand by at least 5 MGD, including:
  - a. the level at which to set the fifth tier for residential customers;
  - b. establishing commercial irrigation rates comparable to highest residential tiers;
  - c. water budgeting rates for commercial customers; and
  - d. conservation rate structures for wholesale customers.

It is anticipated that a fifth tier and changes to irrigation rates would be added immediately under the existing billing system. More complex rate changes would not take effect until a new billing system is in place that can accommodate the changes.

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$0
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	5.0 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0



<b>CI-4</b>	<b>Require conservation by wholesale customers.</b>
<b>Applies to:</b>	Wholesale customers
<b>Implementation Method:</b>	Contracts

Wholesale customers who receive water generated by Austin Water Utility are not participating equally in conservation efforts.

1. Follow-up on contracts that require water conservation measures to be implemented.
2. Request customers whose contracts don't require conservation to implement conservation measures.
3. Require any new, amended, or renewed contracts contain conservation measures comparable to what the City has in place.

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$0
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	TBD
<b>Cost per gallon saved:</b>	\$0

<b>CI-5</b>	<b>Explore alternative water sources.</b>
<b>Applies to:</b>	Commercial customers
<b>Implementation Method:</b>	To Be Determined

Stormwater regulations are not optimized for beneficial reuse of stormwater for irrigation, prohibiting storage longer than 72 hours in some cases. Most stormwater ponds are not required to re-irrigate, and as a result water is discharged directly to waterways or to unmaintained land areas that do not need supplemental irrigation.

1. Water Conservation and Watershed Protection staff will meet to explore other opportunities for stormwater reuse and other alternative water sources and report back to Council.
2. Water Conservation and Watershed Protection staff will explore the adoption of design standards for rainwater harvesting systems.

<b>Additional FTEs:</b>	TBD
<b>Additional Cost:</b>	TBD
<b>Contract/Commodity Cost:</b>	TBD
<b>Peak-Day Savings:</b>	TBD
<b>Cost per gallon saved:</b>	TBD

<b>CI-6</b>	<b>Increase water-efficiency in City facilities.</b>
<b>Applies to:</b>	All City facilities
<b>Implementation Method:</b>	Council Resolution to set the policy. Performance contract to implement retrofits.

Citizens look to the City to lead by example in conserving water, especially in visible areas like parks and City facilities. Additionally, there is a lack of accountability for water use by youth athletic organizations, since the City currently pays for the water used to irrigate athletic fields.

1. It is recommended that the City:
  - a. require water conservation elements as part of the LEED certification program for new City facilities;
  - b. require all athletic fields to pay for water above a pre-determined water budget; and
  - c. follow through with water efficiency recommendations from the current performance contract. These improvements include cooling tower operations, completing the retrofit of plumbing fixtures, and installing weather-based controllers under Parks Department management on athletic fields (39 athletic field properties).

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$0
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.37 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0

<b>CI-7</b>	<b>Reduce excessive water use due to high pressure.</b>
<b>Applies to:</b>	Residential properties with high pressure
<b>Implementation Method:</b>	Plumbing code amendments, incentive program

High water pressure leads to higher water use and a faster deterioration of appliances and fixtures. Current plumbing code requires a pressure reduction valve (PRV) if the pressure exceeds 80 pounds per square inch (psi). However, approximately 13% of new residential water meters are installed in areas of Austin where pressure is between 65 and 80 psi. There are approximately 30,000 residential properties with pressure over 80 psi.

1. Change plumbing code to require pressure reduction valves (PRVs) on new residential properties with pressure above 65 psi, and
2. Offer a rebate for installing PRVs at existing properties with pressure over 80 psi.
  - a. The amount of and qualifications for rebates will be determined based on a survey of average installation costs and expected water savings.

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$30,000 per year for rebates
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak- Day Savings:</b>	0.29 MGD over 10 years
<b>Cost per gallon saved:</b>	\$1.07

<b>CI-8</b>	<b>Establish program to alert customers to potential leaks during winter.</b>
<b>Applies to:</b>	All customers
<b>Implementation Method:</b>	Outreach program through direct mail

High winter water use typically signifies one of two things: A customer is continuing to irrigate during the winter, or there is a water leak on the property. Customers who do not carefully read their utility bills may be unaware of the high usage or the possibility of a leak.

1. Contact customers with high winter water use to alert them to the possibility of a leak.

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$0
<b>Contract/Commodity Cost:</b>	\$0
<b>Peak-Day Savings:</b>	0.31 MGD over 10 years
<b>Cost per gallon saved:</b>	\$0

<b>CI-9</b>	<b>Create comprehensive public education program to promote incentive programs and alert public to new requirements.</b>
<b>Applies to:</b>	All customers
<b>Implementation Method:</b>	Outreach program

Previous marketing efforts have been individual campaigns designed to increase participation in specific programs. Collateral materials, advertisements, and other marketing documents have varied in look and tone. While these often accomplish participation goals, they do not give the impression of a unified City-wide effort to conserve water.

As a result, Water Conservation will implement a marketing strategy designed to build the Water Conservation “brand.” This will include a gradual shift to a uniform look and tone to collateral materials, electronic marketing and other forms of advertising.

The advertising campaign will be used to direct customers to water conservation programs, increase awareness of changes to water use regulations, promote the importance of water conservation, and to assist customers in reducing their water use.

This campaign will supplement existing outreach efforts, including the joint LCRA/COA Water IQ campaign, utility bill inserts, the [www.WaterWiseAustin.org](http://www.WaterWiseAustin.org) website, elementary education programs, program-specific direct mailing, and the WaterWise e-newsletter.

<b>Additional FTEs:</b>	0
<b>Additional Cost:</b>	\$0
<b>Contract/Commodity Cost:</b>	\$725,000
<b>Peak-Day Savings:</b>	N/A drives participation in other programs with associated savings
<b>Cost per gallon saved:</b>	N/A

**Yearly Peak Day Savings in Millions of Gallons per Day**

		<b>FY 2008</b>	<b>FY 2009</b>	<b>FY 2010</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>	<b>FY 2014</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<b>Strategy</b>	<b>Indoor Measures</b>										
<b>IN-1</b>	Single family retrofit on resale	0.00	0.22	0.35	0.45	0.54	0.61	0.67	0.71	0.73	0.73
<b>IN-1</b>	Multi family toilet retrofit	0.18	0.34	0.48	0.63	0.79	0.79	0.79	0.79	0.79	0.79
<b>IN-1</b>	ICI toilet retrofit	0.11	0.21	0.32	0.44	0.58	0.58	0.58	0.58	0.58	0.58
<b>IN-2</b>	Submetering	0.00	0.00	0.06	0.10	0.15	0.20	0.25	0.30	0.35	0.40
<b>IN-3</b>	Plumbing code changes	0.00	0.00	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
<b>IN-4</b>	Cooling towers	0.00	0.47	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
<b>IN-5</b>	Car washes	0.00	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
<b>IN-6</b>	Commercial clothes washers	0.00	0.00	0.10	0.20	0.30	0.40	0.41	0.41	0.42	0.43
	Subtotal	0.28	1.39	3.35	3.86	4.39	4.62	4.73	4.83	4.90	4.96
<b>Outdoor Measures</b>											
<b>OU-1</b>	Enhanced water use management	0.00	2.67	5.43	5.53	5.63	5.73	5.83	5.94	6.05	6.16
<b>OU-2</b>	Residential irrigation standards	0.13	0.25	0.37	0.50	0.63	0.77	0.90	1.04	1.18	1.32
<b>OU-3</b>	Commercial irrigation standards	0.07	0.14	0.21	0.28	0.36	0.43	0.51	0.58	0.66	0.74
<b>OU-4</b>	Residential landscape ordinance	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.36	0.41	0.44
<b>OU-5</b>	WaterWise landscape option	0.00	0.04	0.06	0.08	0.10	0.12	0.15	0.17	0.19	0.21
<b>OU-6</b>	Annual irrigation analysis	0.45	0.91	1.37	1.39	1.40	1.42	1.43	1.44	1.46	1.47
<b>OU-7</b>	Enhanced irrigation audit program	0.21	0.42	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
	Subtotal	0.86	4.47	8.18	8.56	8.95	9.35	9.75	10.16	10.58	10.97
<b>City &amp; Utility Measures</b>											
<b>CI-1</b>	Reducing water loss	0.00	1.20	2.40	3.60	4.80	4.80	4.80	4.80	4.80	4.80
<b>CI-2</b>	Reclaimed water use	0.00	0.00	0.00	2.30	5.10	5.85	5.95	5.95	5.95	5.95
<b>CI-3</b>	Utility water rates	0.00	0.96	1.94	1.94	2.94	5.00	5.00	5.00	5.00	5.00
<b>CI-6</b>	City facility conservation	0.00	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
<b>CI-7</b>	Pressure reduction program	0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.25	0.28	0.29
<b>CI-8</b>	Winter leak detection	0.00	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
<b>CI-9</b>	Enhanced public education program	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Subtotal	0.03	2.90	5.11	8.64	13.67	16.51	16.64	16.68	16.71	16.72
<b>Total Peak Day Savings</b> (in millions of gallons per day)		1.17	8.77	16.65	21.06	27.02	30.48	31.13	31.66	32.19	32.65

RECOMMENDATIONS, IN ORDER OF SAVINGS	Peak Day Savings (MGD)	FTEs	Average Year City Cost	Total Cost per Gallon
Enhanced Water Use Management	6.16	3	\$187,500	\$0.30
Reclaimed Water Use	5.95	--	\$1,250,000	\$2.10
Utility Water Rates	5	--	\$0	\$0
Reducing Water Loss	4.8	--	\$100,000	\$0.21
Mandatory Toilet Retrofit	2.10	2	\$542,530	\$2.77
Annual Irrigation System Analyses	1.47	2	\$132,000	\$0.90
Residential Irrigation Standards	1.32	4	\$245,000	\$1.86
Cooling Towers	0.95	0.25	\$15,000	\$0.16
Plumbing Code Changes	0.94	0.5	\$30,000	\$0.32
Commercial Irrigation Standards	0.74	2	\$120,000	\$1.62
Enhanced Irrigation Audit Program	0.63	2	\$137,500	\$2.18
Residential Landscape Ordinance	0.44	2	\$125,000	\$2.84
Commercial Clothes Washers	0.43	0.25	\$15,000	\$0.35
Submetering	0.40	0.5	\$30,000	\$0.48
City Facility Conservation	0.37	--	\$0	\$0
Winter Leak Detection Program	0.31	--	\$0	\$0
Pressure Reduction Program	0.29	--	\$30,000	\$1.07
WaterWise Landscape Option	0.21	0.25	\$15,000	\$0.71
Car Washes	0.15	0.25	\$15,000	\$0.99
Enhanced Public Education	n/a	--	\$725,000	--
<b>TOTALS</b>	<b>32.65</b>	<b>19</b>	<b>\$3,714,530*</b>	



## **APPENDIX A**

### **GLOSSARY**

As used in this document, the following terms shall have the following meanings:

**As-built design plan:** A corrected or redrawn plan showing the actual scaled location of all major components of the system and other information the owner might require.

**Automatic irrigation controller:** A device that automatically activates and deactivates an irrigation system at times selected by the operator.

**Automatic irrigation system:** A system with fixed pipes and emitters or heads that apply water to landscape plants or turfgrass automatically or when activated.

**Blowdown meter:** A meter that tracks the amount of water discharged from a cooling tower system.

**Concentration:** Re-circulated water that has elevated levels of total dissolved solids as compared to the original make up water.

**Conductivity controller:** A device used to measure the conductivity of total dissolved solids in the water of a cooling system and control the discharge of water in order to maintain efficiency.

**Conveyor car wash:** A type of car wash where the car moves on a conveyor belt through the a series of archways that house the cleaning equipment. There are two basic technologies for the wash cycle, friction or frictionless. The friction conveyor uses brushes or other material or curtains made of strips of cloth, while the frictionless conveyor uses high-pressure nozzles for a touchless wash.

**Cooling tower:** An open water recirculation device that uses fans or natural draft to draw or force air to contact and cool water through the evaporative process.

**Distribution uniformity (DU):** The measure of the uniformity of applied irrigation water over an area expressed, as a percentage

**Dynamic pressure:** Working or operating pressure at a point within the irrigation system, expressed in pounds per square inch (psi).

**Evapotranspiration rate (ET):** Combination of water transpired from vegetation and evaporated from the soil and plant surfaces due to heat, humidity and wind. Commonly referred to as the amount of water needed to keep a plant healthy, expressed in inches.

**Head-to-head coverage:** Designing a sprinkler system so that water from one sprinkler head should spray far enough to meet the next sprinkler head, resulting in overlap.

**Hydrozone:** Grouping of plants with similar water (and environmental) requirements for irrigating with one or more common station/zone valves.

**Hand wand nozzle:** tool used in car washes that dispenses water and cleanser at varying amounts and pressures.

**Hard-mount clothes washer:** A commercial clothes washer that is bolted to the floor. There are no current federal efficiency standards for these machines.

**Impervious surface:** Patios, pathways and other areas where firm footing is desired, constructed in such a way that does not allow water to penetrate the around. Examples include but are not limited to concrete slab patios, sidewalks and driveways, asphalt streets or pavers set with mortar.

**In-bay car wash:** A type of car wash where the driver pulls into the bay and parks the car. The vehicle remains stationary while a machine moves back and forth over the vehicle to clean it, instead of the vehicle moving through the tunnel. Professional in-bay car washes use nylon brushes or other material, soft cloth strips, or touchless automatic washers.

**Individual meter:** A water meter owned and installed by the City that measures the water consumption inside a dwelling unit or business establishment for the purpose of charging the tenants for their consumption.

**Irrigation system analysis:** A zone-by-zone analysis of an irrigation system that, at a minimum, includes a review of the following elements:

- (1) design appropriateness for current landscape requirements,
- (2) type of irrigation heads,
- (3) precipitation rates expressed in inches per hour and gallons per hour (Drip)

**Irrigation submeters:** Metering technology which allows a customer to monitor their irrigation water use through an accessible read-out device outside of the meter box.

**Irrigation water budget:** Volume of irrigation water, expressed in gallons, required to maintain a functional, healthy landscape with the minimum amount of water. This should also reflect seasonal recommendations for scheduling.

**LEEDs certification program:** The Leadership in Energy and Environmental Design (LEEDs) rating system is the nationally accepted benchmark for the design, construction, and operation of high performance green building.

**Liquid ring vacuum pump:** a type of pump that has an impeller with blades attached to a center hub, located in a cylindrical body, but off-set from the center and uses water to form the seal for the vacuum. It is used to create a vacuum for any of a variety of purposes, including but not limited to medical, dental and industrial applications.

**Make-up meter:** A meter that measures the amount of water entering a cooling tower system.

**Master valve:** An automatic valve that is installed at the point where the irrigation system connects to the water supply past the backflow preventer. The purpose of the master valve is to shut off the water to the irrigation system when none of the zone valves are operating. One of the main benefits of having a master valve is if a main line develops a leak, or a valve doesn't close, the master valve will act as a back-up to shut off the water.

**Precipitation rate:** Rate at which a sprinkler system applies irrigation water in inches per hour.

**Pressure reduction valve:** A valve that reduces the water pressure to a maximum preset level downstream of the valve.

**Rain shut-off device:** A device designed to stop the flow of water to an automatic irrigation system when sufficient rainfall has been detected.

**Reclaimed water:** Domestic or municipal wastewater which has been treated to a quality suitable for a beneficial use in accordance with applicable law.

Reverse osmosis technology: A process used to purify concentrated solutions of dissolved minerals and salts by forcing water through a semipermeable membrane under high pressure, leaving the dissolved salts and other solutes behind on the surface of the membrane.

Rotor heads: irrigation heads that rotate slowly sending out one or more streams of water to cover areas larger than spray heads.

Run-off: Portion of irrigation water that leaves the target area, primarily due to slope, the precipitation rate exceeding the absorption rate, or irrigation water hitting an impermeable area.

Soft-mount clothes washer: A clothes washer that is not bolted to the floor.

Spray heads: Two main types of irrigation spray heads, pop-up heads and shrub heads, function by discharging a fine, uniform spray of water into the air. Pop-up spray heads are spring-loaded that retract when water pressure is absent; when installed properly they are flush with the ground. Shrub heads are spray heads that are installed on a stationary, rigid riser, which extends out of the ground high enough so the head can function properly.

Submeter: A water meter privately owned and installed that measures the water consumption inside a dwelling unit or business establishment for the purpose of charging the tenants for their consumption.

Turfgrass: Grasses that are adapted to regular mowing and traffic through management.

Turfgrass Dormancy: The ability of turfgrass to survive without water for a period of sixty consecutive days during the months of May through September. Turfgrass with dormancy capabilities approved for use are set forth in a City of Austin approved low water use plant list. The approved low water use plant list, as may be amended from time to time, shall be available from the City of Austin.

Water budget rates: For irrigation only meters, the rate structure would be an individual allocation rate structure based on landscape watering requirements.

Water factor: The number of gallons per cycle per cubic foot that a clothes washer uses. The lower the water factor, the more efficient the washer is.

WaterWise landscape: A landscape consisting of a maximum of 50% turfgrass, with the remaining percentage of landscape comprised of low water use plants and/or pervious hardscape. The approved low water use plant list, as may be amended from time to time, shall be available from the City of Austin.

Weather-based irrigation controller: an irrigation controller that utilizes prevailing weather conditions, current and historic evapotranspiration, soil moisture levels, and other relevant factors to adapt water applications to meet the actual needs of plants.

## APPENDIX B

### COMPARISON TO OTHER MAJOR TEXAS CITIES' WATER CONSERVATION EFFORTS

		<b>Austin Water Utility (AWU)</b>	<b>San Antonio Water System (SAWS)</b>	<b>El Paso Water Utility (EPWU)</b>	<b>Dallas Water Utilities (DWU)</b>
<b>Utility Practices</b>	System Water Audit and Water Loss	For AWU, water loss is estimated annually, and a committee has been formed to enhance water accountability efforts. A leak detection contract was put in place in 2007 to survey 600 miles of the distribution system.	SAWS has an active leak detection program in place. The Capital Improvement Plan has a goal of 2% annual replacement of existing mains so the whole system can be replaced every 50 years.	EPWU has an active leak detection program which includes the use of permalogs to detect leaks.	DWU has a leak detection and repair program in place to help control unaccounted-for water. Reducing water loss and waste is part of the DWU Water Conservation Five-Year Strategic Plan.
	Water Conservation Pricing	AWU implemented an increasing block rate structure for single-family residential water billing in 1994. Seasonal rates take effect in the summer.	SAWS implemented an increasing block rate structure for single-family residential water billing. Seasonal rates take effect in the summer.	EPWU adopted an inverted block water rate structure for all customers. Each block is based on a multiple of the customers' average winter water consumption.	DWU's water ordinance includes conservation water rates for residential and commercial customers. If residential customers use more than 15,000 gallons per month, they have to pay a surcharge on the amount according to the new ordinance.
	Prohibition on Wasting Water	An ordinance prohibits water waste anytime of the year for all City of Austin water customers, and prohibits watering during 10am and 7pm for commercial customers from May through September. Drought restrictions limit water use based on demand and treatment capacity.	An ordinance contains year-round restrictions that do not allow for landscape watering between 10am and 8pm or any type of water waste. Drought restrictions limit water use based on specific levels of the Edwards Aquifer.	An ordinance contains year-round restrictions on certain water uses and prohibits water waste. The ordinance limits watering to 3 times per week and prohibits watering between 10am and 6pm from April through September.	An ordinance prohibits water waste anytime of the year for all Dallas water customers and prohibits watering between the hours of 10am and 6pm for all customers in the summer. Also prohibits watering during a rain event.
<b>Rebates &amp; Incentive Programs</b>	Residential Ultra Low Flow Toilet (ULFT) Replacement Program	AWU offers a free toilet program and a rebate program for homes constructed prior to 1992 to replace up to three large capacity toilets with ULFT or High Efficiency Technology (HET) models.	SAWS offers a free toilet program and a rebate program for homes older than 1992 to replace up to two large capacity toilets with ULFT or HET models. SAWS recruits non-profit groups to help boost participation in the program.	EPWU rebates 75% of the purchase of a ULFT (up to a maximum of \$50) after installation of the new toilet.	DWU has a pilot toilet replacement program targeting low income and senior citizens.
	Showerheads and Faucet Aerator Distribution	AWU offers free low-flow showerheads and faucet aerators to all customers.	SAWS offers free low-flow showerheads and faucet aerators to all customers.	EPWU offers free low-flow showerheads to all customers.	DWU does not have a showerhead or aerator distribution program.

	Residential Clothes Washer Incentive Program	AWU offers a \$100 rebate in conjunction with Austin Energy and Texas Gas Service towards the purchase of efficient clothes washers classified as a Tier 2 or better model by the Consortium for Energy Efficiency.	SAWS offers a \$100 rebate for the purchase of an approved high efficiency washing machine, classified as a Tier 2 or better model by the Consortium for Energy Efficiency.	EPWU offers \$200 on the purchase and installation of a water- and energy-efficient clothes washer.	DWU does not offer a rebate for clothes washers.
	Conservation Programs for Industrial, Commercial, & Institutional (ICI) Accounts	AWU offers toilet replacement options, rebates for high efficiency washing machines, and rebates for the installation of new equipment that conserves water or the redesign of a manufacturing process that conserves water. AWU offers free pre-rinse spray valve replacements and restaurant water audits.	SAWS offers toilet replacement options, restaurant certification, cooling tower audits, and rebates for high efficiency washing machines. Large-scale retrofits allow large water users to apply on a case-by-case basis for a rebate for installation of water conserving equipment. SAWS also has requirements and/or restrictions for cooling towers, ice machines, condensate collection lines, vacuum systems, commercial dining facilities, and vehicle wash facilities.	EPWU offers \$300 for the replacement of evaporative cooling systems with a central refrigerated air conditioning system.	DWU is currently looking to start an ICI grant program, focusing on higher use ICI customers and will include grants as an incentive for installation of both indoor and outdoor water conservation measures. DWU is also looking to implement a toilet replacement for ICI customers in 2008.
	Public Information	Advertisements, bill stuffers, an electronic newsletter, workshops, presentations, tours, radio commercials, videos and other publications throughout the year.	Speaking events, regular newspaper columns and broadcasts, bill stuffers, public information events, workshops, special events, public service announcements, and information packets.	Community education, television and radio commercials, videos, conservation kit giveaways, brochures and literature.	Advertisements, bill stuffers, 5K run sponsorship, billboards, presentations, and exhibits at fairs and events. Multimedia public awareness campaign to educate about irrigation and the new ordinance.
<b>Public Outreach</b>	School Education	AWU runs three education programs that target kindergarten to 4th graders, 5th graders, and 6th graders separately.	SAWS' H2O University provides classroom curriculum and activities for teachers and students in Pre-K through high school.	EPWU has a school outreach program, games available through EPWU's website, an essay contest, and a Drinking Water Week poster contest.	DWU has textbook covers with conservation messages, poster contests, regional science fair, curriculum aids, and classroom presentations.
	Wholesale Agency Assistance Programs	The AWU wholesale customers are encouraged to comply with all conservation measures and are eligible for most AWU conservation programs (including toilet and washer rebates, rainbarrel sales, irrigation audits and rebates).	Although they only account for less than 1% of the total pumpage, the SAWS wholesale customers are encouraged to reduce leaks, stabilize pressure, and comply with conservation measures.	The EPWU wholesale customers are encouraged to comply with all conservation measures.	For DWU, wholesale sales account for nearly 40% of the total pumpage. Contracts between the DWU and wholesale customers require the customer to develop a conservation plan which incorporates loss-reduction measures and demand management practices.

	Water Use Surveys for Single-Family and Multi-Family Customers	AWU offers free multi-family and commercial audits that provide evaluations of all aspects of the customers' water consumption and make recommendations to lower their usage.	SAWS offers free residential water audits where trained auditors check customers' toilets, faucets, and spigots for any leaks. The auditor will also recommend effective ways to conserve and, if needed provide them with low-flow shower heads and aerators.	EPWU does not offer water use surveys.	DWU has the Minor Repair/Fixture Replacement Program, which targets low-income households to help reduce their water use.
Outdoor Programs	Landscape Irrigation Conservation and Incentives	AWU offers free irrigation audits to residential and commercial customers. There are also rebates for making design improvements and equipment upgrades. AWU also trains licensed irrigators on issues such as proper water use, ET, hydro-zone design, and landscape auditing. AWU also provides ET calculations to the highest residential water users to educate them on the correct amount they should be watering.	SAWS offers free irrigation audits to residential and commercial customers. There are also rebates for making design improvements and equipment upgrades. Rain sensor retrofits are required on all systems. SAWS's Seasonal Irrigation Program (SIP) is a free information service for customers who want expert advice on how to water their lawns according to the ET rate. Commercial customers 5 acres or more are required to submit an annual irrigation analysis to the department All new irrigation systems must adhere to design standards and soil depth requirements.	EPWU does not offer irrigation incentives or have requirements in place outside of their water waste ordinance.	DWU does not offer irrigation incentives or have requirements in place outside of their water waste ordinance. DWU previously rebated on the installation of rain shut-off devices and freeze sensors until they became a requirement for all operable irrigation systems in 2005.
	Water Wise Landscape Design and Conversion Programs	AWU offers rebates for Water Wise trees, bushes, and shrubs for high water use customers using 20,000 gallons per month during the summer. The Conservation Department has partnered to form the Green Garden Division that provides information to homeowners and recognizes waterwise landscapes.	SAWS has a Watersaver Landscape Rebate that gives money back for the replacement of existing landscapes to drought tolerant plants, with a maximum of 50% grass. Higher rebates are given to customers who preserve native landscape during construction or who didn't install a permanent irrigation system. Homebuilders must offer a xeriscape option to homebuyers and at least one model home must be landscaped according to a xeriscape design.	EPWU offers residential and commercial customers \$1.00 per square foot for conversion of grass areas to "environmentally sensitive and water conserving landscapes."	DWU promotes water conservation landscapes with exhibits, brochures, and xeriscape seminars, a xeriscape demonstration garden and annual xeriscape landscape recognition awards, as well as a tour of homes.

	Water Reuse	AWU has provided reclaimed water directly for golf course irrigation since 1974. All but one City owned golf course use raw or reuse water to irrigate. Austin currently uses approximately 3 MGD of reclaimed water (about 3% of its wastewater received at its wastewater treatment plants) and has plans for a reuse system expansion to provide for 5.95 MGD of additional supply.	SAWS Recycled Water Program aims to reduce demand by providing 35,000 ac-ft/yr of reclaimed water to golf courses and other ICI customers. SAWS currently has contracts for 19,000 ac-ft/yr, with about 12,600 ac-ft/yr online.	EPWU has been providing reclaimed water since 1963, currently providing more than 4 MGD directly for irrigation of golf courses, city parks, school grounds, and apartment landscapes and for industrial uses such as cooling tower makeup water. El Paso also has an indirect water reclamation program with 577 million gallons being returned to the Hueco Bolson Aquifer.	DWU completed its first direct reuse project in 2004 to provide irrigation water to a city-owned golf course. The Recycled Water Implementation Plan calls for providing reclaimed water to meet a peak day demand of 18.25 MGD by 2010. The plan also projects indirect reuse to be 120 MGD.
<b>Alternative Water Use</b>	Rainwater Harvesting and Condensate Reuse	AWU rebates rainwater harvesting systems for commercial as well as residential properties. AWU offers a rebate on newly purchased rainbarrels, in addition to selling them directly to AWU customers at a discounted price.	SAWS requires new commercial buildings installing air conditioning systems to have a single and independent condensate wastewater line to collect condensate wastewater to provide for future utilization as (i) process water and cooling tower make-up and/or (ii) landscape irrigation water.	EPWU does not have rainwater harvesting or condensate reuse programs.	DWU does not have rainwater harvesting or condensate reuse programs.

## **APPENDIX C**

### **AUSTIN WATER UTILITY WHOLESALE CUSTOMER INFORMATION**



Wholesale Customer	Contract Execution Date	Contract Expiration Date	Fiscal Year 2006 Usage	Water Conservation Programs Similar to Austin	Water Conservation Peak Management Ordinance/ Resolution	Water Conservation General Comments	Non-Compliance of Water Conservation Penalties
Anderson Mill MUD (Williamson County MUD No. 1)	June 19, 1977	December 31, 2008	573,009,900	n/a	n/a	n/a	n/a
Creedmoor-Maha WSC	November 30, 1965	November 30, 2011	51,412,000	n/a	n/a	n/a	n/a
High Valley WSC	June 25, 1992	June 25, 2017	7,179,000			Customer agrees to impose on its customers and enforce all voluntary and mandatory conservation and use restrictions imposed by the City on its own customers.	
Lost Creek MUD	July 7, 1977	July 7, 2007	344,400,000	n/a	n/a	n/a	n/a
Manor, City of	February 2, 2001	February 20, 2026	19,590,000	n/a	Requires adoption of City Water Conservation Ordinance	n/a	
Manville WSC	January 24, 2002	January 24, 2027	94,810,000	n/a	Requires adoption of City Water Conservation Ordinance	n/a	25% Surcharge
Marsha WSC	April 23, 1992	April 23, 2017	9,902,000	n/a	n/a	Customer agrees to impose on its customers and enforce all voluntary and mandatory conservation and use restrictions imposed by the City on its own customers.	
Mid-Tex	April 14, 2000	April 14, 2030	0	n/a	Requires adoption of City Water Conservation Ordinance	n/a	25% Surcharge

Nighthawk WSC (Garden Valley)	December 23, 1991	December 23, 2016	11,249,600	n/a	n/a	Customer agrees to impose on its customers and enforce all voluntary and mandatory conservation and use restrictions imposed by the City on its own customers.	
North Austin MUD #1	January 30, 1984	January 30, 2024	450,445,600	n/a	n/a	n/a	n/a
Northtown MUD	January 6, 1986	January 6, 2026	189,548,300	n/a	n/a	n/a	n/a
Pflugerville, City of	January 30, 2003	December 31, 2007	10,964,700	n/a	n/a	Pflugerville agrees to impose on its customers when receiving Austin water all voluntary and mandatory conservation and use restrictions imposed by Austin on its own customers, provided Pflugerville will not be required to impose more stringent controls than Austin imposes on its own citizens.	
Rivercrest Water Systems, Inc. (AquaSource Utility, Inc.)	January 11, 2001	October 26, 2031	109,753,400	n/a	Requires adoption of State Drought Contingency Plan	n/a	25% Surcharge
Riverplace MUD (Emergency Water Only)	May 29, 2001	May 29, 2016	0	n/a	n/a	During emergency service, Customer agrees to impose on its customers and enforce, at a minimum, all voluntary and mandatory conservation and use restrictions imposed by the City on its own customers.	
Rollingwood, City of	February 3, 2000	February 3, 2030	142,596,500	Requires adoption of City Water Conservation Program	Requires adoption of City Water Conservation Ordinance	n/a	

San Leanna, Village of (Emergency Water Service)	July 1, 2002	November 2, 2014	0	n/a	n/a	During emergency service, Customer agrees to impose on its customers and enforce, at a minimum, all voluntary and mandatory conservation and use restrictions imposed by the City on its own customers during such an emergency event.	
San Leanna, Village of (Future Wholesale Water Service)	November 2, 2004	November 2, 2039	0	n/a	Requires adoption of City Water Conservation Ordinance	n/a	
Shady Hollow MUD	November 7, 1980	November 7, 2020	313,591,300	n/a	n/a	n/a	n/a
Sunset Valley, City of	October 2, 1987	Until terminated by mutual agreement or at the option of either party with 180 days written notice	103,307,400	n/a	n/a	Sunset Valley agrees to impose on its customers all voluntary and mandatory conservation and use restrictions imposed by Austin on its own customers, provided Sunset Valley will not be required to impose more stringent controls than Austin imposes on its own citizens.	
Travis County Water District #10	August 30, 1990	August 30, 2020	1,079,202,900	n/a	n/a	The District agrees to impose on its customers and enforce all voluntary and mandatory conservation and use restrictions imposed by the City on its own customers.	
Wells Branch MUD (North Austin Growth Corridor MUD #1)	April 13, 1991	April 13, 2021	562,886,500	n/a	n/a	n/a	n/a
Windermere Utility	April 12, 2002	April 12, 2022	48,386,000	n/a	Requires adoption of City Water Conservation Ordinance	n/a	