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City of Austin

Water Conservation Plan

May 2005

***Developed to Meet Requirements
Outlined in 30 TAC § 288.2***

Water Conservation Division
Austin Water Utility

City of Austin, Texas

Table of Contents

<u>Executive Summary</u>	vi
<u>1.0 Introduction</u>	1
<u>2.0 Water System Profile</u>	1
<u>Water Supply</u>	1
<u>Water Treatment Capacity</u>	1
<u>Wastewater Treatment Capacity</u>	2
<u>Reclaimed Water System</u>	3
<u>Raw Water Use</u>	4
<u>3.0 Water Conservation Goals</u>	5
<u>4.0 Water Use</u>	6
<u>5.0 Utility Management</u>	7
<u>5.1 Record Management System</u>	7
<u>5.2 Water Rate Structure</u>	7
<u>Single-family Residential</u>	7
<u>Multi-family, ICI and Golf Courses</u>	8
<u>5.3 Metering</u>	8
<u>Universal Metering</u>	8
<u>5.4 Water Loss</u>	9
<u>Leak Detection</u>	9
<u>Unaccounted-for Water Uses</u>	9
<u>6.0 Water Conservation Programs – Current Programs</u>	10
<u>6.1 Single-family – Indoor Programs</u>	10
<u>Toilet Replacement Programs</u>	10
<u>WashWise Program</u>	10
<u>Showerhead Distribution Program</u>	10

<u>Leak Detection Kits</u>	10
<u>6.2 Single-family – Outdoor Programs</u>	11
<u>Free Irrigation System Audits</u>	11
<u>Irrigation System Rebate Program</u>	11
<u>Rain Shutoff Sensor Distribution Program</u>	11
<u>WaterWise Landscape Rebate Program</u>	11
<u>Rainwater Harvesting System and Rainbarrel Programs</u>	12
<u>Rainwater Rebate Program</u>	12
<u>Rainbarrel Distribution Program</u>	12
<u>Watering With Evapo-Transpiration (WET)</u>	13
<u>ET Calculator and Aerial Photography</u>	13
<u>Soil Depth Initiative</u>	14
<u>6.3 Single-family Promotional Programs</u>	15
<u>6.4 Multi-family – Indoor Programs</u>	15
<u>Toilet Programs and Showerhead Distribution</u>	15
<u>Free Toilet Program</u>	15
<u>Toilet Rebate Program</u>	15
<u>WashWise Program</u>	15
<u>Whole System Water Conservation Audits</u>	16
<u>6.5 Multi-family – Outdoor Programs</u>	16
<u>Free Irrigation System Audits</u>	16
<u>Irrigation System Rebate Program</u>	16
<u>Rainwater Harvesting System and Rainbarrel Rebate Program</u>	16
<u>Rain Shutoff Sensor Distribution Program</u>	16
<u>6.6 Institutional, Commercial, and Industrial (ICI) – Indoor Programs</u>	17
<u>Special Commercial Rebates</u>	17
<u>Whole System Water Conservation Audits and Surveys</u>	17
<u>Toilet Replacement Programs</u>	17

<u>Free Toilet Program</u>	17
<u>Toilet Rebate Program</u>	17
<u>WashWise Program</u>	18
<u>Dental / Medical Dry Vacuum Rebate</u>	18
<u>Car Wash Certification</u>	18
<u>Ice Machine Rebate</u>	19
<u>6.7 ICI – Outdoor Programs</u>	19
<u>Free Irrigation System Audits</u>	19
<u>Irrigation System Rebate Program</u>	19
<u>6.8 Children's Educational Programs</u>	20
<u>Dowser Dan Show</u>	20
<u>5th & 6th Grade Waterwiser Partnership with the Austin Independent School District</u>	
<u>(AISD)</u>	20
<u>6.9 Continuing Public Education Programs</u>	20
<u>Advertisements / Program Marketing</u>	20
<u>Electronic Newsletter</u>	20
<u>ICI Water Conservation Newsletter</u>	21
<u>Workshops, Presentations and Outreach Programs</u>	21
<u>Professional Irrigator's WaterWise Training Course</u>	21
<u>Xeriscape and Rainwater Harvesting Home Tour</u>	21
<u>Videos & Other Publications</u>	21
<u>Web Page</u>	22
<u>Peak Day Management Campaign</u>	22
<u>6.10 Municipal Programs</u>	22
<u>Municipal Swimming Pool Retrofit Program</u>	22
<u>Raw Water Pump Station</u>	22
<u>Rainwater Harvesting Demonstration Projects</u>	23
<u>City-Wide Water Efficiency</u>	23

<u>7.0 Best Management Practices</u>	23
<u>8.0 Proposed Water Conservation Programs for the Next Five Years</u>	26
<u>8.1 Single-Family – Indoor Programs</u>	26
<u>New Toilet Initiatives</u>	26
<u>Local or State Clothes Washer Standards</u>	26
<u>Winter Leak Detection</u>	27
<u>8.2 Single-Family – Outdoor Programs</u>	27
<u>Irrigation Permitting</u>	27
<u>Remote Control of Automatic Irrigation Controllers</u>	28
<u>Rainwater Harvesting Incentives for New Construction</u>	29
<u>Graywater Recycling</u>	29
<u>Soil Depth Ordinance</u>	30
<u>Parkway Strips</u>	30
<u>Swimming Pool Filter Rebate</u>	31
<u>8.3 Multi-family and ICI– Indoor Programs</u>	31
<u>Apartment Submetering</u>	31
<u>Restaurant and Food Service Initiative</u>	31
<u>Car Wash Ordinance & Rebate</u>	32
<u>Prohibition of Once-through Cooling Equipment</u>	32
<u>Central Cooling Plants</u>	32
<u>Commercial Clothes Washer Standards</u>	33
<u>8.4 Multi-family and ICI – Outdoor Programs</u>	33
<u>Rainwater and Stormwater Harvesting Incentives for New Construction</u>	33
<u>Graywater Recycling – Multi-Family Properties</u>	33
<u>Graywater Recycling - Commercial Properties</u>	34
<u>Parkway Strips</u>	34
<u>Alternative Water Sources</u>	34
<u>8.5 City Water Use Programs</u>	34

<u>Setting Water Restriction Triggers</u>	34
<u>8.6 Other Public Education Programs</u>	34
<u>Block Leader Program</u>	34
<u>Swimming Pool Maintenance</u>	35
<u>9.0 Strategies Under Evaluation</u>	35
<u>Water Budgeting / Conservation Rate Structures</u>	35
<u>Collection of Air Conditioner Condensate</u>	36
<u>Collecting Fuel Cell Water Vapor</u>	36
<u>Energy and Water Conservation</u>	36
<u>10.0 Public Involvement in Planning Process</u>	37
<u>11.0 Implementation and Enforcement</u>	37

Five-year Water Conservation Plan

City of Austin Water Conservation Program

Executive Summary

The Five-year Water Conservation Plan provides an overview of current water conservation initiatives undertaken by the City of Austin and proposes new or expanded conservation measures for the future. Implementation of these programs will help the City meet the water conservation goals set by the City Council, and will also allow the City to save money by delaying the construction of new treatment plant capacity and purchase of additional water supply.

This Plan includes a profile of the Austin Water Utility system, which describes the City of Austin's water supply, water and wastewater treatment capacity, and water demand projections.

The City Council has established two goals for the Water Conservation Program. In 1990, the City Council established water conservation goals to reduce peak day demand by 10 percent and average daily demand by 5 percent by the year 2005. In 1999, as part of the water supply agreement with the Lower Colorado River Authority (LCRA), the Council committed to using conservation and reuse to extend the City's water supply from 2040 to 2050. Based on utility projections, 25,000 to 50,000 acre feet (AF) in yearly demand reduction through conservation or substitution of potable water with reclaimed water would need to occur to extend the water supply until 2050. In addition, the City has prepaid for water up to 201,000 AF per year; however, once the City's annual demand for water reaches 201,000 AF, the City must pay an additional \$8 to \$14 million a year. Therefore, the Water Conservation Program is striving to reduce demand sufficient to extend the 201,000 AF trigger to 2021.

The Plan describes current programs that have been implemented to meet these conservation goals and projects additional water savings achievable through new and expanded water conservation programs. It considers two planning horizons: a five year horizon, which looks at currently planned programs; and a 2015 horizon, to examine the amount of water that can be conserved to delay reaching the 201,000 acre feet trigger. These timeframes are designed to satisfy the requirements of Title 30, Part 1, Chapter 288.2 of the Texas Administrative Code.

Currently, the City of Austin offers its customers a wide variety of programs for all customer classes designed to develop awareness of the need for water conservation. These programs include incentives to conserve water, services to reduce demand, educational programs and regulatory measures.

Programs designed to reduce residential indoor water use include free water efficient toilets and toilet rebates, free water-efficient showerheads and sink aerators, high efficiency clothes washer rebates, and free leak detection kits. Programs designed to reduce residential outdoor water use include free irrigation system audits, reduced price hose timers, WaterWise landscape rebates, rebates for water saving repairs or upgrades of irrigation systems, reduced price rainbarrels and rainbarrel rebates, and rainwater harvesting system rebates.

The Conservation Program also offers a number of free services and incentives for industrial, commercial and institutional (ICI) customers. Programs designed to reduce indoor consumption by ICI customers include helping them modify special equipment and processes to reduce water use or reuse water internally, as well as free water-efficient toilets and toilet rebates, free water-efficient showerheads and aerators, high efficiency clothes washer rebates, medical dry vacuum pump rebates, and free pre-rinse spray valves for food service establishments. Programs designed to reduce outdoor water consumption by ICI customers include free irrigation system audits, free whole system water audits, rebates for water saving repairs or upgrades of irrigation systems, and rebates of up to \$40,000 for large water saving projects. The City also offers awards and recognition to ICI customers for achievements in water conservation.

The Conservation Program also administers several water conservation education programs. There are two programs designed to educate school children about water conservation: the Dowser Dan Assembly Program for kindergarten through 4th grades; and the 5th and 6th grade Water in Our World programs administered in partnership with the Austin Independent School District. Other educational efforts include conservation brochures, booklets, videos, radio, television and newspaper ads, an electronic newsletter, and the water conservation web page. In addition, the Program organizes rainwater harvesting and WaterWise landscape tours, produces an ICI water conservation newsletter, and offers a WaterWise training course for professional irrigators and ICI workshops. During the summer months, a substantial effort is made each year to educate customers about efficient water use in the landscape.

The Five-year Water Conservation Plan proposes new or expanded conservation measures to be considered in the future. Examples of possible initiatives for future consideration include:

- setting minimum standards for soil depth and composition when new landscapes are installed;
- implementing an irrigation permit system to be sure efficient irrigation equipment is installed properly and maintained; and
- providing incentives for the inclusion of rainwater harvesting equipment in new construction.

Chapter six of this report describes the existing water conservation programs, while chapter eight provides a detailed analysis of all currently proposed new water conservation initiatives. Chapter nine discusses several potential initiatives for possible future development and implementation. Chapter ten reviews public involvement that contributed to this planning process, and chapter eleven previews the steps needed to implement and enforce the elements of this plan.

1.0 Introduction

The objective of the Five-year Water Conservation Plan is to provide an overview of current water conservation initiatives undertaken by the City of Austin and propose new or expanded conservation measures for the future. Implementation of these programs will help the City meet the 2010 conservation goals and will also allow the City to save money by delaying the construction of expensive new treatment plant capacity and purchase of additional water supply.

2.0 Water System Profile

Water Supply

The City holds permitted water rights granted by the State of Texas to divert a maximum of 293,703 acre-feet per year (AF/yr) from the Colorado River for municipal and industrial use.¹ Through a contractual arrangement with the Lower Colorado River Authority (LCRA), 325,000 AF/yr of the City's water supply is made firm by stored water in the LCRA-managed Highland Lakes reservoirs. Further description of the reservoir systems operation plan is available through the LCRA.

According to its Water Management Plan for the Lower Colorado Basin (1999), LCRA will ensure that there is no shortage of stored water for firm demands during a repeat of the Drought of Record (DOR). LCRA will not invoke mandatory curtailments of firm water demand unless it can be demonstrated that a particular drought event is more severe than the DOR or some other water emergency that drastically reduces the available firm water supply. LCRA has developed a procedure for identifying a drought worse than the DOR and routinely monitors the Highland Lakes watershed. If drought conditions are worse than the DOR, LCRA may impose mandatory restrictions on firm water rights. The City has adopted an Emergency and Peak Day Water Use Management Ordinance that outlines the City's Drought Contingency Plan (Appendix A). Provisions in Section 4-2-71 of the plan would authorize the City to consider and implement emergency conservation measures if the City was required to curtail water use during a drought worse than the DOR.

The City's firm municipal water supply of 325,000 AF/yr (from Austin's water rights backed by storage by contract with LCRA) exceeds current demand levels (approximately 156,000 AF/yr). This firm supply is projected to meet demand through approximately 2040 based on current usage trends, including current levels of conservation and reuse. However, it is Austin Water Utility's goal to extend this quantity of firm water supply to be sufficient through 2050 (see Figure 1) by implementing a more aggressive conservation and water reuse program.

Water Treatment Capacity

The City supplies water to customers within and outside the corporate city limits of Austin, as well as the communities of Rollingwood, Sunset Valley, San Leanna, and Pflugerville, one water control and improvement district, five water supply corporations, seven municipal utility districts, and three private utilities. The Austin Water Utility currently serves approximately 188,000 connections with approximately 3,000 miles of water mains. In 2004, the Austin Water Utility served an approximate population of 735,000 and a wholesale customer population of 52,000, for a total service population of approximately 787,000. Water is drawn from the Colorado River into three water treatment plants (WTP) with a combined capacity to treat and distribute 260 million gallons per day (MGD). The next increment of capacity that will be added is an expansion at the Ulrich Water Treatment Plant, which will increase the plant's capacity to approximately 167 MGD in 2005. Table 1 provides a summary of water treatment capacity. Austin Water Utility is currently conducting a planning assessment study of the Green WTP, the City's oldest water treatment plant, built in 1925. The study will examine various options for retiring the existing facility and replacing it on the current site or at an alternate site on Town Lake.

¹ Trans-Texas Water Program: North Central Study Area Phase II Report. Volume 1, Integrated Water Supply Plans. HDR Engineering, Inc. February 1998.

AWU is currently concluding the planning phase for its next water treatment plant. The plan is for Water Treatment Plant #4 to have an initial capacity of 50 MGD to 75 MGD by the year 2011.

Figure 1. Water demand projection, City of Austin Water Utility, 2005

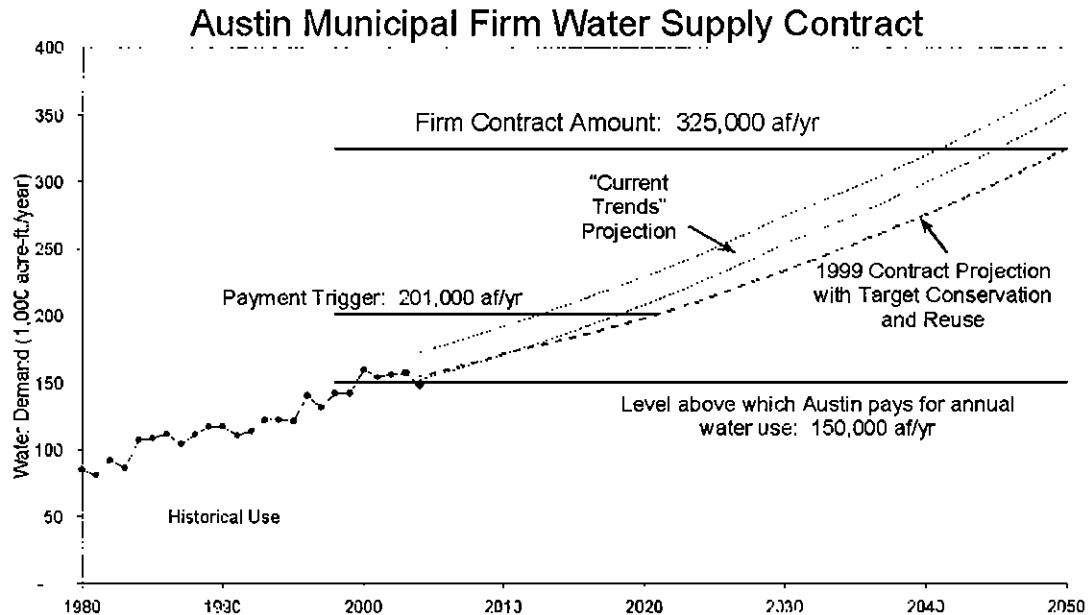


Table 1. City of Austin Water Treatment Plants and Capacity

Plant Name	Year Constructed	Treatment Capacity (million gallons/day)
Green	1925	42 ^a
Davis	1954	118 ^b
Ullrich	1969	100 ^c
Total		260

a) Modernized in 1935, 1938, 1949, 1985, and 1999.

b) Expanded in 1963, 1977, 1987, and 1999.

c) Modernized in 1993 to meet the higher standards of the Safe Drinking Water Act and expanded in 1987 and 2000. Currently being expanded to increase the capacity from 100 to 167 MGD, expected to be completed in 2005.

Wastewater Treatment Capacity

The City operates three wastewater treatment facilities with a combined capacity of 130 MGD. Wastewater facilities serve 168,159 connections with 2,316 miles of sewer lines and 104 lift stations. In 2004, the Austin Water Utility served an approximate population of 705,000 and a wholesale customer population of 26,000, for a total wastewater service population of approximately 731,000.

The three wastewater facilities discharge a total of 80 MGD of highly treated effluent into the Colorado River. A combined 610,000 gallons of sludge per day are transferred from the three facilities to the Hornsby Bend Biosolids Management Facility for composting and subsequent production of an EPA-approved, nutrient-rich soil compost known as Dillo Dirt.™ Dillo Dirt is used in Austin parks and sold to the general public by more than 20 local retailers.

Table 2. City of Austin Wastewater Treatment Plants and Capacity

Major Plant Name	Year Constructed	Effluent Treated (MGD)	Sludge Produced (gallons/day)	2005 Treatment Capacity (MGD)	Near Term Capacity (MGD)
Govalle	1937	11	150,000	10 ^a	d
Walnut Creek	1977	45	300,000	75 ^b	75
South Austin Regional	1986	24	160,000	50 ^c	75
Total		80	610,000	135	150

^a) Expanded in 1953, 1959, 1969, 1986, and 1988.

^b) Expanded in 1986, 1989 and 2005.

^c) Expanded in 1987, 1988, and 1998. Current expansion to be completed in 2006.

^d) Plans are to take Govalle off line in the near future.

Reclaimed Water System

The Austin Water Utility's reclaimed water program began in 1974 when the Williamson Creek Wastewater Treatment Plant provided effluent for irrigation of the adjacent Jimmy Clay Golf Course. The program took off in earnest when, in 1990, the City Council established it as a key program aimed at long-range water resource protection and conservation. Today, Austin uses more than one million gallons of reclaimed water per day, predominantly for landscape irrigation and has plans for system expansion. Additionally, reclaimed water is used as process water at Austin's wastewater treatment plants and the award winning Hornsby Bend Biosolids Management Facility. An electric power utility will soon be a major customer, and computer microchip manufacturers have expressed an interest in reclaimed water. Other potential customers, such as the University of Texas, will use reclaimed water once distribution lines are extended to their property.

Austin developed a series of master planning documents identifying large potential institutional, industrial, commercial, and recreational customers. The planning documents describe areas to be served and necessary transmission main extensions in the northern and southern parts of the City. In brief, the North System will ultimately consist of 52 miles of transmission main, four pump stations, and three storage tanks to be built in phases. The South System will ultimately consist of 66 miles of transmission main, four pump stations, and four storage tanks, also to be built in phases.

North Reclaimed Water System

In 2000, the Austin initiated a plan that will serve reclaimed water customers north of the Colorado River. That fall construction began on Phase 1A, a water reclamation pumping and storage facility at the Walnut Creek Water Wastewater Treatment Plant and a transmission main to the central part of town. This phase of the project was completed in the spring of 2002 at a cost of \$14 million. The pumping and storage facility, and transmission main serve as the backbone for future extensions to:

- the downtown area;
- the University of Texas;

- the Morris Williams Public Golf Course;
- the First Tee Golf Course;
- the Hancock Public Golf Course;
- redevelopment of the old airport;
- two high tech manufacturing facilities: Samsung and Applied Materials; and
- other potential large volume customers in the central part and northeast part of Austin.

According to the master planning documents, these customers will use an estimated 5.8 to 7.3 billion gallons of reclaimed water per year. Future transmission mains and facility locations for the North System are located to implement the system as larger customers come on line. Build out of the North System will be implemented in several phases at an additional cost of approximately \$46 million.

South Reclaimed Water System

In May 2003, construction began on a pump station and elevated storage tank at the South Austin Regional Wastewater Treatment Plant. These facilities will serve as the source of supply and initial infrastructure for the South System. The estimated cost for these facilities is \$5 million.

The master planning documents identified numerous potential customers south of the Colorado River and delineates a service area that could be served by the South Austin Regional Wastewater Treatment Plant. The documents estimated that potential large volume customers would use approximately 2.9 billion gallons of reclaimed water per year. Potential customers include:

- a power generation plant;
- manufacturing facilities;
- golf courses;
- schools and athletic fields;
- apartment complexes; and
- additional City of Austin parks.

As in the North System, transmission mains, storage tanks, and pump stations are designed to be built in several phases to allow for implementation of the system as large customers come on line. The South System will have approximately sixty-six miles of transmission main ranging in size from eight to forty-two inches in diameter, four pump stations, and five storage facilities. The estimated cost to construct the remaining phases of this system is \$53.4 million.

Raw Water Use

For several years the City of Austin has used raw water, pumped directly out of Town Lake for landscape irrigation at Zilker Park. There are several such opportunities to take raw water from Town Lake for landscape irrigation and cooling tower makeup. One opportunity currently being investigated involves the installation of a pump to provide raw water for irrigating the Colorado River Park. The pump, like those used at golf courses, would provide an inexpensive source of water for which Austin has unused water rights.

In addition, raw water lines could be installed along the shores of Town Lake from the Colorado River Park to Mansfield Dam. Raw water from this system would be used to supplant potable water irrigation systems serving parks, ball fields, schools, and businesses in the area. Raw water from this line could be used as makeup water for central cooling plants in the area, including cooling towers for Austin High School and the Computer Sciences Corporation central cooling plant, installed by the City of Austin at 4th and San Antonio streets. In time, this raw water delivery system could be integrated into the City's reuse water delivery system.

3.0 Water Conservation Goals

The following savings goals are based on the continuation of average annual average day goals set for the Water Conservation Program of 590 acre/feet per year, which translates to 0.53 MGD. The goals are established yearly when the Water Conservation Program budget is developed. The savings will be achieved through the continuation of existing conservation efforts and the development of new efforts as discussed above.

Over the 5-year period of 1999-2004, whole system pumpage divided by population for the entire service area (wholesale customers included) yields an average gpcd of 185. Using Austin Water Utility service area population projections, average day savings of 0.53 MGD per year will result in a gpcd of 181.98 in 2010 and 178.48 in 2015.

Table 3. Projected Average Day Savings from Water Conservation

Year	Projected Population	Pumpage without Conservation (MGD)	Projected Conservation (MGD)	Pumpage with Conservation (MGD)	GPCD
2005	803,281	148.61	0	148.61	185.00
2006	817,823	151.3	0.53	150.77	184.36
2007	832,628	154.04	1.06	152.98	183.73
2008	847,701	156.82	1.59	155.23	183.12
2009	863,046	159.66	2.12	157.54	182.54
2011	894,547	165.49	3.18	162.31	181.44
2012	910,711	168.48	3.71	164.77	180.92
2013	927,167	171.53	4.24	167.29	180.43
2014	943,920	174.63	4.77	169.86	179.95

System water loss in Austin, as defined as total pumpage minus (billed consumption + estimated authorized unbilled water) was projected to be 9.5 percent in 2004. The Austin Water Utility has a task force that is working on long-term recommendations to reduce water loss. Until those recommendations are complete, the utility is projecting the reduction of water loss by approximately one half percent by 2010, and by one percent by 2015. The resulting savings will be offset as average day pumpage increases, but the overall percentage of total water loss will decline.

Table 4. Projected Water Loss in 2005, 2010, and 2015

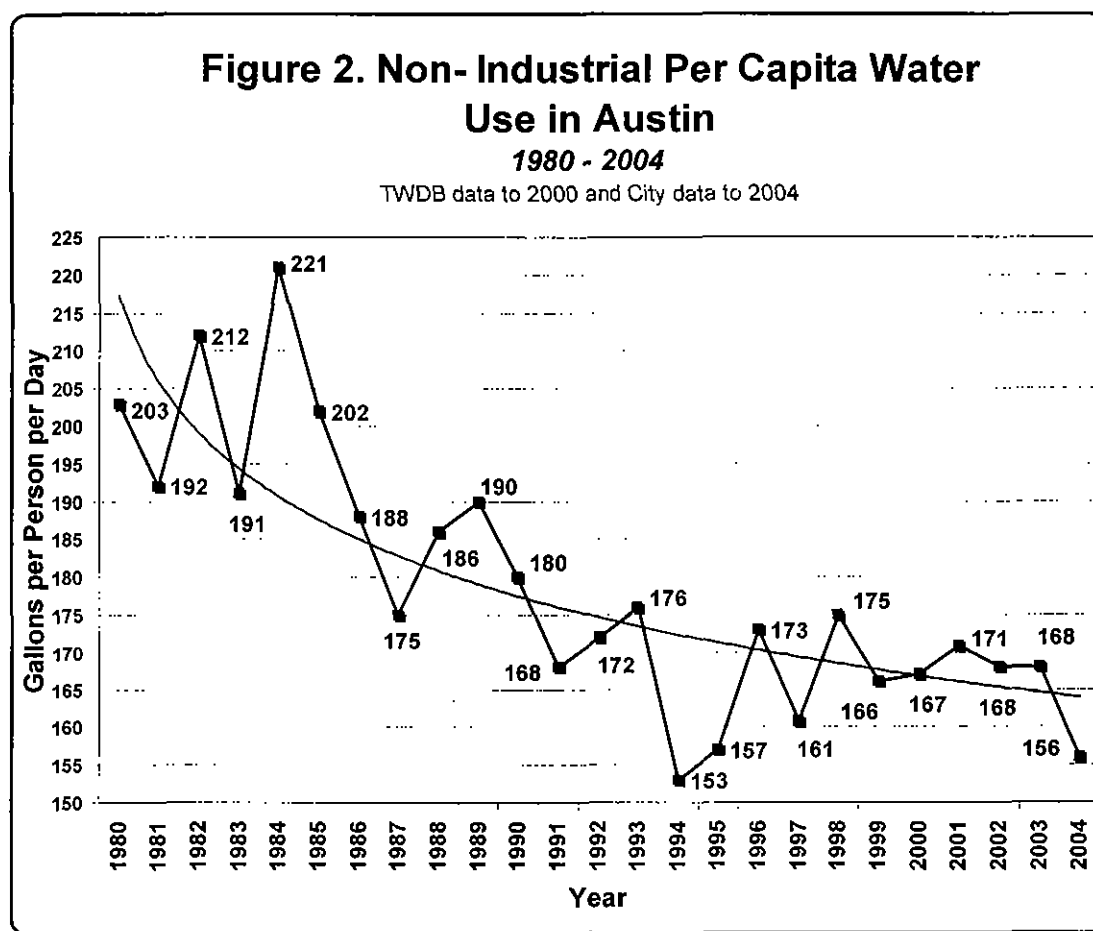
Year	Projected Population	Pumpage after Water Conservation	Consumption and Estimated Authorized Unbilled Water After Conservation (MGD)	Unaccounted for water (MGD)	Percent Loss	Loss GPCD
2005	803,281	148.61	134.49	14.12	9.5%	17.58
2010	878,670	159.90	145.51	14.39	9.0%	16.38

2015	960,976	172.48	157.82	14.66	8.5%	15.26
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4.0 Water Use

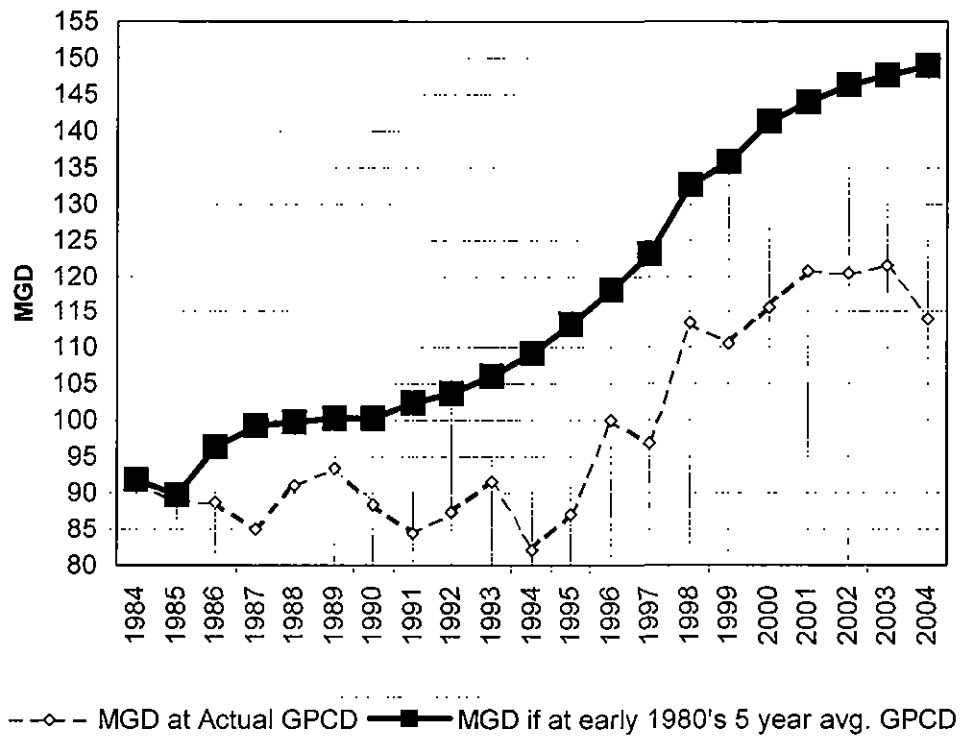
The City of Austin has been growing steadily over the last few decades. Over the period from 1984 to 2004, the population of the Austin service area grew from approximately 466,100 to 789,000, a 69 percent increase. Total water pumpage from 1984 to 2004 increased 35 percent, from 35,071,000,000 to 47,519,000,000 gallons.

Although there is a significant amount of annual variation due to weather condition variations, system wide per capita water use has decreased between 1980 and 2001, as seen in Figure 2. Per capita water use figures are calculated based on unaccounted-for water and water consumption by single-family residential, commercial, and institutional customers.



When the decline in water consumption is tracked cumulatively by taking the gpcd average for the five years before the water conservation program was begun and applying it to the increasing service population (Figure 3), the magnitude of the savings that have been achieved become apparent.

Figure 3. Conservation Savings Since 1984
(Excludes wholesale and industrial sales)



5.0 Utility Management

5.1 Record Management System

The City maintains records of water distribution and sales through a central billing system which segregates water sales and water uses into Single-family Residential, Multi-family, Commercial, Large Volume Industrial, Public and Institutional, and Golf Course user classes which are then charged different rates for water. The Water Customer Billing System provides a central location for water billing information.

5.2 Water Rate Structure

Single-family Residential

Committed to providing a conservation incentive through water rates, the City began implementation of an increasing block rate structure for single-family residential water billing in 1994. The residential rate is an increasing block rate that increases as more water is used. The rate is set so that customers who use the citywide average of approximately 8,500 gallons per month pay a very reasonable rate. The higher blocks are set at a substantially higher rate to encourage customers to limit the amount of water that they use for landscape watering, as seen in Table 5.

Table 5. FY 2004-05 Single-family Residential Water Rates.

Monthly Consumption	Charge per 1,000 gallons	
	Inside City	Outside City
0 - 2,000 gallons	\$0.86	\$0.86
2, 001 – 9,000 gallons	\$2.29	\$2.29
9,001-15,000 gallons	\$3.70	\$3.85
Over 15,000 gallons	\$6.42	\$6.63

Multi-family, ICI and Golf Courses

Water rates for Multi-family, ICI and Golf Course customers do not increase with the volume of water used; however, these customers do have a higher rate in the summer called the peak rate. These non-residential rates account for seasonal differences in demand, setting an off-peak rate for November through June and a higher peak rate for July through October. These rates are illustrated in Table6.

Table 6. FY 2004-05 Multi-family, Commercial, Industrial, and Golf Course Water Rates

Type of Customer	Charge per 1,000 gallons			
	Off Peak Rate		Peak Rate	
	<i>Inside City</i>	<i>Outside City</i>	<i>Inside City</i>	<i>Outside City</i>
Multi-family	\$2.60	\$2.82	\$2.82	\$3.03

Commercial	\$3.24	\$3.24	\$3.47	\$3.47
Large Volume / Industrial	\$2.82	N/A	\$3.07	N/A
Golf Courses	\$3.24	\$3.24	\$3.47	\$3.47

Wholesale customers have an average rate of \$2.03 per 1,000 gallons. Each wholesale customer has a separate rate.

5.3 Metering

Universal Metering

The Austin Water Utility universally meters all of its customers including municipal uses. Wholesale customers are metered at one or more master meter points, which are routinely tested as part of their contract with the City. The meters that the City of Austin uses are estimated to measure the flow within a ± 5 percent accuracy range. Each Austin Water Utility meter of 1½ inch or larger is tested before installation, and 5 percent of the smaller meters are tested.

5.4 Water Loss

Leak Detection

The Austin Water Utility operates a leak detection program to locate leaks in the water transmission and distribution mains so they can be repaired. Reported leaks are located using sounding equipment. Once located, the required repair information is entered into a computerized utility maintenance database system for tracking through the repair phase.

Unaccounted-for Water Uses

The Austin Water Utility goal is to keep unbilled-for water uses below 15 percent. Table 7 illustrates unaccounted-for water from FY 1993 to FY 2004.

Table 7. Unbilled Water in Billions of Gallons, FY 2004

System Pumpage	Consumption	Total Unbilled Water	Estimated Authorized Unbilled Water*	Unaccounted for Water**	Unaccounted for Percentage
48.5	41.5	6.9	4.8%	4.6	9.5%

All numbers may reflect some degree of rounding error.

* Estimated authorized unbilled water includes authorized uses such as plant operations, fire fighting, line flushing, and water for other City departments.

** Unaccounted for water includes line losses, leaks, slow or stopped meters, and theft.

According to a 1994 report from the Utilities Finance Manager,² approximately 6.77 percent of the unbilled 1992-93 water could be accounted for from various authorized City uses such as line maintenance, construction, meter

² Report on the Results of the Unbilled Water Study. Eric Rothstein, Utilities Finance Manager, City of Austin Water and Wastewater Utility. February 18, 1994.

problems, waste water maintenance, hydrant flushing, and fire protection. Assuming that the percentage of such City-related uses has not changed significantly over the years, truly unaccounted-for water ranges from approximately 6 to 8.5 percent, depending on the fiscal year. There may be an opportunity for improvement in reducing the amount of unaccounted for water and water being lost due to delays in repairing leaks.

Water Accountability Committee

In order to adhere to HB 3338, which requires in-depth water loss audits to be conducted and submitted to the TWDB, the Austin Water Utility formed a Water Accountability Committee in late 2004. The committee, comprised of various Water Utility employees with backgrounds such as data management, field operations, water conservation and system planning, are in the process of developing the most comprehensive strategy to reduce unaccounted for water. The committee is currently focusing on a number of important issues including:

- periodic large meter testing;
- water theft and the unauthorized use of water in construction and elsewhere;
- leak detection program enhancement;
- unmetered uses such as fire flow tests, fire department trainings, and pipeline maintenance; and
- meter errors and billing inaccuracies within the Austin Water Utility.

6.0 Water Conservation Programs – Current Programs

The City has developed a wide variety of water conservation programs that target all customer classes, including single-family, multi-family, industrial, commercial, and institutional. Participation in, and estimated water savings from each program are included in Appendix C.

6.1 Single-family – Indoor Programs

Toilet Replacement Programs

The City offers two single-family residential toilet replacement programs for homes constructed prior to the plumbing code change in 1991. Participants in the Free Toilet Program receive a toilet from a local vendor at no charge. Participants in the Toilet Rebate Program receive rebates after purchasing a model from a list of toilets provided by the Water Conservation Program. A requirement of these programs is for customers to have water efficient showerheads installed at the time of the verification inspection. Showerheads are available free of charge and may be obtained from the City's Water Conservation Program. The residential toilet replacement program guidelines are discussed in more detail below.

Single-family customers can receive up to three free water-efficient toilets per household through the City's water conservation program to replace old, large capacity toilets. Following submission of an application, customers receive a voucher for redemption at a local plumbing supply company contracted by the City. Currently, the local contractor is supplying the Niagara "Flapperless" model. In addition, there is a \$30 per toilet installation rebate if the toilet is installed by a licensed plumber.

Single-family customers can receive rebates for replacing up to three large capacity toilets from a select list of water-efficient toilets. The eligible toilets were selected on the basis of flush performance and retention of low flush volumes after the flappers are replaced. Rebates of up to \$100 are available to cover the purchase price of the toilet and installation by a licensed plumber.

WashWise Program

Under this program, residential customers can receive a rebate of up to \$100 towards the purchase of an efficient clothes washer. The rebate is made up of two parts: a \$50 water rebate and a \$50 energy rebate. The energy portion of the rebate is funded by either Austin Energy or Texas Gas Service, dependent upon which type of energy is used to heat the water. To determine which clothes washers qualify for rebates the City relies upon rankings assigned to washing machines by the Consortium for Energy Efficiency (CEE). CEE evaluates clothes washers for water and energy efficiency. To qualify for a rebate, the washer must meet CEE's high-efficiency specifications, under which a washing machine must use 9.5 gallons of water per cubic foot of capacity or less and have a Modified Energy Factor of 1.42 or greater. These efficient machines save an average of 15 gallons of water per cycle. The City maintains a list of qualifying machines based upon these CEE standards.

Showerhead Distribution Program

Water-efficient showerheads are available free of charge to all City customers. As mentioned above, participants in the toilet programs must have water-efficient showerheads installed to receive the rebates.

Leak Detection Kits

Leak detection kits are distributed at public information fairs and special events as well as mailed to customers on a request basis. Each kit includes bilingual (English/Español) leak detection instructions and two dye tablets for detecting leaks in toilets.

6.2 Single-family – Outdoor Programs

Free Irrigation System Audits

The City offers free irrigation audits to owners of in-ground sprinkler systems who use more than 25,000 gallons per month in the summer. Seasonal watering is the driving factor in the City's peak day water usage. Customers often have a poor understanding of how their controllers work, have multiple programs or start times that they are unaware of, lack a backup battery in their controller, or have heads that mist due to pressure that is too high. The City auditor will check the system for leaks, water application rates, and adequate coverage and will help determine an efficient watering schedule. The auditor will also assess the adequacy of the equipment and will recommend replacement of components if appropriate. Finally, the customer will be provided with an application rate for their system so that they can follow the evapotranspiration recommendations.

Irrigation System Rebate Program

Rebates for irrigation system upgrades are available to City customers who have had irrigation audits. Customers can receive rebates of up to \$250 for upgrading existing in-ground irrigation systems with water conserving features. The incentives are designed to encourage water customers to upgrade existing irrigation systems to increase the efficiency of the irrigation system, reduce the quantity of water needed and assist the customer in following the City's recommended summer watering schedule of every five days. New irrigation heads must be matched precipitation, adjustable radius, and the proper nozzle type, and the controllers must be 5-day cycle programmable, multi-programmable, and have multiple start times. The irrigation rebate amount is calculated according to Table 8, below, for a maximum rebate of \$250.

Table 8. City of Austin Irrigation System Rebate Amounts

Irrigation System Product	Amount of Purchase to be Rebated
Irrigation Controller	Up to \$100
Installation of Rain Shut-off Device	Up to \$25

Matched Precipitation Rate Sprinkler Heads or Nozzles	Up to \$25
Valves	Up to \$25
Pressure Reducer Valve	Up to \$100

Rain Shutoff Sensor Distribution Program

The installation of a rain shutoff sensor can decrease water consumption of a typical irrigation system by approximately 11,000 gallons a year. The Water Conservation Program gives these devices free to customers with existing irrigation systems. The devices are ordered from vendors with a preset trigger to shutoff the irrigation system after 1/2 inch of rain. To get a shutoff device, customers can either stop by the Water Conservation office or send \$2 for shipping and handling and Water Conservation staff will mail them a device.

WaterWise Landscape Rebate Program

Owners of new homes less than one year old and existing homes where water use has been at least 20,000 gallons a month over the previous three summers, or for as long as they have owned their home, can receive a rebate of up to \$500 for installing water-efficient trees and shrubs. Plantings must take place in areas that receive at least six hours or more of direct sun during the months of May through September. Proposed areas must also have less than a 3:1 slope (3 parts run to 1 part rise) or be terraced to less than a 3:1 slope and have at least 6 inches of soil. Landscape plans must consist of qualifying plants, and not more than 50 percent square footage of the landscaped area in turfgrass.

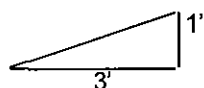


Figure 4. Slope of 3' run to 1' rise

To participate, customers must purchase enough plant material to qualify for a minimum \$50 rebate. A list of qualifying plants is maintained by the City and included in the program application. Customers must submit a scaled drawing of the site-plan with their application. The City conducts pre- and post-inspections of the landscape and offers advice to customers in designing water-efficient landscapes and choosing appropriate plants. Rebate amounts are provided in Table 9.

Table 9. Landscape Rebate Amounts Based on Plant Type

Plant Type	Rebate Amount
Shrub, 1 gallon	50% of cost, up to a maximum of \$ 15 each
Small tree, at maturity	50 % of cost, up to a maximum of \$ 50 each
Large, shade-providing tree, at maturity	50 % of cost, up to a maximum of \$ 100 each

Rainwater Harvesting System and Rainbarrel Programs

To encourage the use of collected and stored rainwater for landscape irrigation, the City of Austin offers a 30% rebate on the cost of rainwater collection systems for non-potable uses. Rebate incentives range from \$75 to \$500 and are based on 15¢ per gallon of storage capacity for a complete, operational system. Gravity or pumps may be used for distributing the collected rainwater to the landscape. Customers applying for a rebate must submit a drawing of the proposed system, a site plan, a detailed contractor's bid (if applicable), a maintenance plan, and an estimate of reduced need for potable water. Participants in the Rainwater Harvesting Rebate Program must also agree to open their site to the public for at least two demonstration tours. This provides a great opportunity to share the successes of such systems with the public and give examples for people considering such a system.

Rainwater Rebate Program

The City offers a \$30 per barrel rebate for the purchase of up to two rainbarrels. Water storage capacity of rainbarrels ranges from 50 to 200 gallons. Although a list of approved rainbarrels and distributors is provided to customers, the City will evaluate additional models at the customer's request to determine eligibility. Customers installing rainbarrels under the rebate program agree to have an on-site inspection to verify installation and pledge that the system will remain operational for five years.

Rainbarrel Distribution Program

The City instituted a program in 2001, under which it purchases rainbarrels in bulk and sells them at a discount to City water customers. The rainbarrels have a storage capacity of 75 gallons and are made of sturdy dark green polyethylene. The rainbarrel sales take place periodically, and have been well attended since the program's inception. Moreover, since the program began in April 2001, over 6,000 barrels have been sold to City of Austin water customers.

Watering With Evapo-Transpiration (WET)

In 2001, the City of Austin Water Conservation Program staff began a program encouraging area homeowners to limit the water they apply to their lawns to the amount sufficient to replenish the water lost by the lawn in the last five days. This proscribed quantity, known as the Evapo-Transpiration (or ET) amount is determined by weather station observations taken in central Austin, which measure temperature, wind, humidity and rainfall. ET amounts are rounded up to the nearest quarter inch and are intended to be used in conjunction with the City's five-day watering schedule.

In order to follow the recommended ET amounts customers must first determine the application rate of their sprinkler. The application rate of a sprinkler can be calculated by simply setting out shallow cans under the sprinkler area, running the sprinkler for 15 minutes, and averaging the amount of water collected. For example, if you have four cans that collect $\frac{1}{4}$, $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{1}{8}$ inches of water in 15 minutes, the average is $\frac{1}{4}$ inches, or 1 inch an hour. Daily ET amounts are published from May 1 to September 30 on the City's web site (www.ci.austin.tx.us/watercon), through the Austin American Statesman and television media outlets, and are available by phoning "home" at 974-"HOME" (4663).

ET Calculator and Aerial Photography

In 2004, the Austin Water Utility's Water Conservation Department initiated a program that will provide certain residential customers with an approximation of how much outdoor over-watering is occurring at their property. The program is designed to specifically target the top 1,000 water users in Austin, providing each of these customers with a detailed accounting of how much outdoor over-watering has occurred for the past three years at their residence.

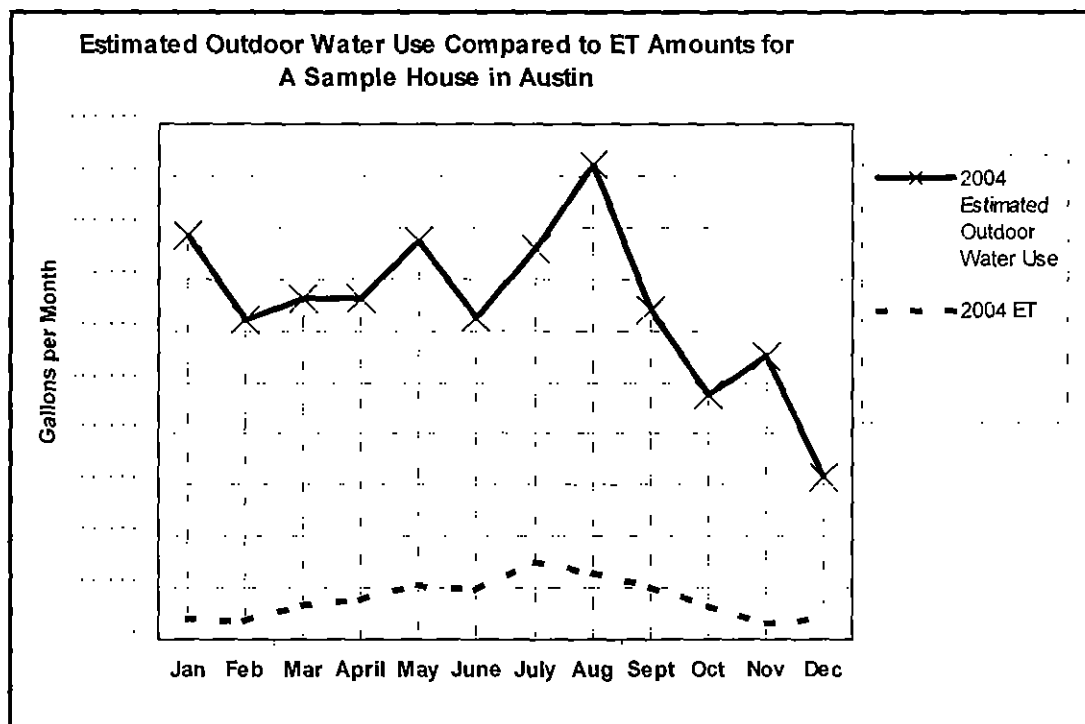
The outdoor water use numbers are calculated using address-specific aerial photographs available online through the Austin Water Utility GIS Access Site. By using a polygonal measurement tool, the total irrigated area is calculated and sorted accordingly depending on the amount of shade (sunny, moderate shade, and full shade) and the type of plant (cool season turf grass/annual beds, warm season turf grass, drought tolerant

shrubs/groundcover). After the areas are measured, the numbers are entered into an ET calculator spreadsheet that determines the specific ET requirements for the residence's irrigated area for the past three years based on historical weather station data.

The outdoor water use for a residential customer is then calculated by subtracting an estimated indoor use amount (70 gallons/day/person) from the monthly billed water use over the past three years. Subtracting the property's ET water requirements from the calculated outdoor water use then provides a measure of how much water has been wasted on irrigation each month. The homeowner is presented with that information in a spreadsheet format, a graph depicting their water use versus the ET rate (see Figure 5), as well as a recommended irrigation schedule based on ET trends. Customers also receive estimates of potential dollar savings for both water and wastewater. For the top users, these savings can reach into the thousands of dollars.

On-site irrigation water auditing can be a time-consuming process. Aerial photography offers a cost-effective way of determining the total irrigated area of a residential property, without devoting an overwhelming number of hours to on-site audits. The project is only in the first phase at this time, with the intention of sending out the finished calculations to homeowners in the late spring of 2005.

Figure 5: Sample Graph from ET Calculator



Soil Depth Initiative

Many home lots in west Austin sit on limestone shelves with thin layers of topsoil. Builders on these lots generally have minimal amounts of topsoil around two inches, and offer no guarantees as to its quality. When landscapes, and particularly turf grasses, are planted on soils that are too thin and poorly balanced, they require more irrigation and fertilization in order to survive. When watered, thin layers of topsoil quickly become saturated, causing excess water to run off of sloped lots. Many home lots west of the Mopac Expressway will hold little more than $\frac{1}{4}$ " of water before becoming saturated. The remainder of this water is lost to runoff and can amount to thousands of gallons over the course of the summer. This runoff frequently carries fertilizers and pesticides into area creeks resulting in increased nitrate and phosphorus levels.

The City of Austin offers builders up to a \$1000 rebate to increase the depth and quality of the soil, and to increase the percentage of water efficient trees and shrubs planted on the lot. The \$1000 rebate represents \$500 towards the cost of additional amended soil and \$500 towards the cost of additional water-efficient plants. To qualify for the soil rebate, residential lots must begin with less than six inches of topsoil, and amended soil consisting of 20 to 25 percent compost (such as Dillo Dirt³) and 75 to 80 percent high quality sandy loam must be added to increase the soil depth to six inches. The resulting landscapes require less water and fertilizer to stay healthy and result in less runoff from over-watering. The reductions in fertilizer use and runoff also reduce the amount of non-point pollution in Austin area water sources.

6.3 Single-family Promotional Programs

³ *Dillo Dirt* is a high-quality organic compost produced by City of Austin Water and Wastewater Utility. It is made from City wastewater sludge and recycled tree trimmings and yard waste collected from City Solid Waste customers. *Dillo Dirt* is used in Austin parks and sold to the general public by more than 20 local retailers.

In 2003, Water Conservation instituted a promotional program to boost participation in single-family conservation programs. Working with First Texas Honda, Water Conservation has given away a Honda Civic Hybrid in 2004 and 2005 to customers who participated in the rainbarrel, toilet, clothes washer, landscape rebate, or irrigation audit programs. First Texas Honda donated the cars in exchange for clearly advertising their contribution to the promotion. Thus, at no additional cost to the City, the Water Conservation program has boosted its program participation rates as well as promoted cleaner air with fuel-efficient cars. This upcoming year will be the third year the program will give away a car to Water Conservation participants.

6.4 Multi-family – Indoor Programs

Toilet Programs and Showerhead Distribution

As with the single-family residential programs, the City also offers both the Free Toilet and the Toilet Rebate Programs to multi-family customers. Managers and owners of multi-family complexes are eligible to participate. Participants in the Free Toilet Program receive vouchers for the Niagara "Flapperless" toilet. Participants in the Toilet Rebate Program receive rebates of up to \$100 toward the purchase and installation price of a model from a list of toilets provided by the Water Conservation Program. Installation rebates of \$30 per toilet are also available to multi-family customers if a licensed plumber installs toilets obtained through the free toilet program.

To participate in these programs, multi-family customers must schedule both pre and post-replacement inspections with City auditors. At the post-replacement inspection, participating properties must also have water-efficient showerheads installed in each unit. Showerheads are available free of charge and may be obtained from the City's Water Conservation Program. Although there is no limit on the number of toilet replacements per property that can be made under this program, managers or owners of multi-family complexes may choose to implement the upgrades in phases. The City will work with each complex on an individual basis to establish a suitable timeframe for the replacements. Each program is discussed in more detail below.

Free Toilet Program

Managers and owners of multi-family complexes can receive free water-efficient toilets for each apartment unit through the City's Water Conservation Program. Following submission of an application, applicants receive vouchers for redemption at a local plumbing supply company contracted by the City. After the installation is complete, a City auditor verifies that the units have been retrofitted with the new water-efficient toilets and authorizes the installation rebate, if applicable.

Toilet Rebate Program

Managers and owners of multi-family complexes can receive rebates for replacing large capacity toilets with a select list of water efficient toilets. The eligible toilets were selected on the basis of flush performance and retention of low flush volumes after the flappers are replaced. Rebates of up to \$100 are available to cover the purchase price of the toilet and installation by a licensed plumber.

WashWise Program

Under this program, multi-family customers can receive a rebate of up to \$250 per machine towards the purchase of efficient coin-operated clothes washers. Coin-operated machines in laundromats average 6 cycles per day and machines in apartment laundry rooms average 3 cycles per day. The Water Conservation Program and Texas Gas Service jointly fund the rebate. To qualify for the \$150 water portion of the rebate, the customer must get City of Austin water. To qualify for the \$100 energy portion of the rebate, the customer must have gas water heat fueled by Texas Gas Service and have a rate code that is supported by their conservation programs. To determine which clothes washers qualify for rebates the City relies upon rankings assigned to washing machines by the Consortium for Energy Efficiency (CEE). To qualify for a rebate, the washer must meet CEE's high-efficiency standards, under which a washing machine must use 9.5 gallons of water per cubic foot of capacity or less and have an Energy Factor of 3.25 or greater. These efficient machines save an average of 11 gallons of

water per cycle. The City maintains a list of qualifying machines based upon these CEE standards.

Whole System Water Conservation Audits

Multi-family customers are eligible for a free system-wide water conservation audit of their property. The city auditor will check the water capacity of toilets and washing machines, the flow rates of showerheads and faucets, for leaks in pools and, if applicable, will conduct a cooling tower audit. Irrigation system audits are available to multi-family customers as well, and are discussed in more detail below.

6.5 Multi-family – Outdoor Programs

Free Irrigation System Audits

Properties with in-ground sprinkler systems are eligible for a free irrigation system audit. The City auditor will check the system for leaks, water application rates, and adequate coverage and help determine an efficient watering schedule.

Irrigation System Rebate Program

Rebates for irrigation system upgrades are available to City multi-family, commercial and industrial customers who have had irrigation audits. Customers can receive a bill credit of up to \$1,000 for upgrading an existing underground irrigation system with water conserving features. The incentives are designed to encourage water customers to upgrade existing irrigation systems to increase the efficiency of the irrigation system, reduce the quantity of water needed and assist the customer in following the City's recommended watering schedule of every five days. A list of products approved for the irrigation system rebate is provided in the application materials. The rebate amount is calculated in the same way as the single-family program (listed in Table 8), except that the rebate is based upon the greater of (1) \$150 per irrigated acre or (2) product and service rebates with a cap of \$1,000 per water account.

Rainwater Harvesting System and Rainbarrel Rebate Program

Special rainwater harvesting rebates are available to multi-family as well as commercial customers. Rainwater harvesting by multi-family and commercial customers typically involves the use of rainwater from roofs, or stormwater collected for flood control or water quality reasons to provide water for landscape irrigation, cooling tower makeup, and other non-potable uses.

Multi-family and commercial customers can receive up to \$5,000 per project toward the cost of new and innovative technologies for the capture and reuse of rainwater and stormwater. The technology or system proposed must demonstrate a new and potentially significant advance. The amount rebated will be determined on a case-by-case basis based upon the potential future application of the new technology. The program is limited to no more than two projects per year.

Multi-family customers applying for a rebate must submit a drawing of the proposed system, a site plan, a detailed contractor's bid (if applicable), a maintenance plan, and an estimate of reduced need for potable water. Participants in the Rainwater Harvesting Rebate Program must also agree to open their site to the public for at least two demonstration tours.

Rain Shutoff Sensor Distribution Program

The installation of a rain shutoff sensor can decrease water consumption of a typical irrigation system by approximately 11,000 gallons a year. The Water Conservation Program gives these devices free to customers with existing irrigation systems. The devices are ordered from vendors with a preset trigger to shutoff the irrigation system after approximately ½ inch of rain.

6.6 Institutional, Commercial, and Industrial (ICI) – Indoor Programs

Special Commercial Rebates

The City offers commercial and multi-family customers rebates of up to \$40,000 for the installation of new equipment and re-designing of manufacturing processes that conserve water. Programs qualifying for this rebate must save at least 300 gallons per day and must remain in place for at least five years. Some examples of commercial equipment changes eligible for a rebate are replacing single pass cooling with re-circulating or air cooling, reusing high quality rinse water, improving cleaning processes, reusing rinse water for the wash cycle in laundry equipment, and installing other equipment changes that improve water efficiency. In the multi-family setting these rebates would typically go to large water conserving projects such as the repair or replacement of central cooling towers. The rebate amount is based upon the lesser of (1) half the price of the purchase cost of the equipment or (2) \$1.00 for each gallon saved per day up to 30,000 gallons and then \$.50 (fifty cents) per gallon saved per day for the next 20,000 gallons, up to a maximum rebate of \$40,000. Operation and maintenance measures are not eligible. Participants must seek pre-approval of the project and agree to a post-installation inspection by City staff to verify installation and operation.

Whole System Water Conservation Audits and Surveys

ICI customers are eligible for a free system-wide water conservation audit of their property. The city auditor will check: water capacity of toilets and washing machines, flow rates of showerheads and faucets and for leaks in pools. Auditors will also conduct cooling tower audits and review water use in production processes where appropriate. Irrigation system audits are available to ICI customers as well.

Toilet Replacement Programs

As with the single-family residential and multi-family programs, the City also offers both the Free Toilet and the Toilet Rebate Programs to ICI customers. Included in this customer class are area hotels and motels, restaurants, office buildings, large industries and other institutions and businesses. Participants in the Free Toilet Program receive vouchers for Niagara "Flapperless" or Crane flush valve toilets or for Crane flush valve toilets and Sloan flush valves. Participants in the Toilet Rebate Program receive rebates of up to \$100 toward the purchase and installation price of a tank type model from a list of toilets provided by the Water Conservation Program and \$110 for the purchase and installation of a flush valve and toilet for flush valve toilets. Installation rebates of \$30 per toilet are also available to commercial customers if a licensed plumber installs toilets obtained through the free toilet program.

If shower facilities are available, participants must also agree to install water efficient showerheads throughout the facility. Showerheads are available free of charge and may be obtained from the City's Water Conservation Program. Although there is no limit on the number of toilet replacements per property that can be made under this program, companies and institutions may choose to implement the upgrades in phases. The City will work with each ICI customer on an individual basis to establish a suitable timeframe for the replacements. Like the multi-family residential toilet programs, a pre-inspection is required prior to replacement of toilets and a verification inspection is required once the retrofits are complete. Each program is discussed in more detail below.

Free Toilet Program

ICI customers can receive free water efficient toilets for each facility through the City's Water Conservation Program. Following submission of an application, customers receive vouchers for redemption at a local plumbing supply company contracted by the City. After installation is complete, a City inspector verifies that the units have been retrofitted with the new water efficient toilets and authorizes the installation rebate, if applicable.

Toilet Rebate Program

ICI customers can receive rebates for replacing large capacity toilets with a select list of water efficient toilets (i.e., 1.6 gallons per flush). The eligible toilets were selected on the basis of flush performance on retention of

low flush volumes after the flappers are replaced. Rebates of up to \$100 are available to cover the purchase price of a tank type toilet and installation by a licensed plumber, and \$110 for the similar purchase and installation of a flush valve and toilet.

WashWise Program

As in the multi-family sector, ICI customers can also receive a rebate of up to \$250 per machine towards the purchase of water-efficient coin-operated clothes washers. Commercial machines must meet the same specifications as machines eligible for the Multi-family WashWise program. See Section 5.3 Multi-family – Indoor Programs above. Customers in this class may include the owners or operators of commercial clothes washing facilities or clothes washer leasing companies. Some ICI customers also qualify for rebates of up to \$100 on non-coin operated water efficient washers.

Dental / Medical Dry Vacuum Rebate

Austin's medical professionals can receive a rebate towards the purchase of dry medical vacuum pumps. To qualify for the rebate, newly purchased pumps must replace older liquid ring vacuum pumps. City auditors must inspect both the old pumps prior to replacement and the new pumps after installation. Customers who receive the rebate must also agree to keep the new dry vacuum pump installed and operating for five years.

The rebate consists of two parts: a water savings rebate and an energy savings rebate. The amount of the water rebate depends on the horsepower of the dry vacuum pump that replaces the liquid vacuum ring pump. For dry vacuum pumps less than 2.5 horsepower the rebate is \$500 per system installed. For dry vacuum pumps of 2.5 or more horsepower the rebate is the lesser of: (1) half the cost of the purchase price of the equipment, or (2) \$1.00 for each gallon per day saved up to 30,000 gallons, and then \$.50 (fifty cents) for each gallon per day saved up to 20,000 gallons up to a maximum rebate of \$40,000. The amount of the energy rebate is based on the net reduction in horsepower of the dry vacuum system as compared to the liquid ring system it replaces.

Car Wash Certification

On April 26, 2001, the Austin City Council passed revisions to the water waste and peak day water use ordinance dealing with commercial car wash facilities. For the purposes of the ordinance, commercial car washes are defined to include all commercially related vehicle washing including commercial operations in which vehicles are normally washed such as fleet management, vehicle rental, car dealership, and transportation providers. In order to remain in operation during Stage 2, facilities now need to be certified as having met certain water efficiency standards by the City of Austin's water conservation staff. The efficiency standards for each type of commercial car wash system are shown in Table 10. Facilities that do not meet these standards or do not apply for certification will not be allowed to operate if Stage 2 mandatory water use provisions enter into effect.

Table 10. City of Austin Commercial Car Wash Efficiency Standards

Type of System	Minimum Standard
Self Service Wand Type	3.0 gpm nozzle & trigger with weep
In-bay Automatic Rollover	45 gallons per car
Conveyor (Touchless)	40 gallons per car
Conveyor (Friction)	40 gallons per car
Portable Spray Equipment and Equipment for Large Trucks and Buses	3.5 gpm nozzle & trigger

In addition to the standards in Table 10, all chamois wringers must have positive shutoff valves and if reverse osmosis is used for a spot-free rinse, the RO reject water must be reclaimed and reused on site so that none of it is discharged into the sanitary sewer. Uses could include car washing, landscape irrigation or any other beneficial purpose.

Commercial car washes have two certification options - Year-round certification and Stage 2 Only Certification. Under Year-round certification car washes state their intent to meet Stage 2 efficiency standards throughout the year. This type of certification is good for three years, during which the City water conservation staff may make spot checks at any time. Following the three years, the City of Austin's water conservation staff will contact these car wash facilities to determine if they wish to renew their certification. Stage 2 Only certificates are granted annually to car wash facilities who plan to meet Stage 2 efficiency standards only in the event that Stage 2 mandatory water use provisions enter into effect. Car wash facilities interested in Stage 2 Only certification may pre-certify their facilities during May of each year, or they can wait until Stage 2 provisions are declared. Waiting until Stage 2 provisions are declared is not advised however, as they the facility will be required to cease operations once Stage 2 provisions are announced, until a City of Austin water conservation staff member is able to schedule a site visit and measure for compliance.

Ice Machine Rebate

Commercial ice machines commonly rely on once-through cooling for the production of ice. Though more efficient air-cooled ice machines have been available for several years, many once-through cooling ice machines are still in use. For every 100 pounds of flake ice produced, once-through ice machines will use between 91 and 232 gallons of water for cooling alone. Air-cooled ice machines use between 12.1 and 41 gallons of water to produce the same amount of ice. In almost all cases, the savings between older once-through machines and new air-cooled models will be at least 110 gallons of water saved per 100 pounds of ice, or 1.1 gallons of water per pound of ice. With the exception of small soda dispensers, ice machines typically produce between 200 and 1500 pounds of ice per day. Replacing once-through ice machines with more efficient air-cooled machines will therefore save between 220 and 1,650 gallons of water per day, depending upon the amount of ice produced.

A rebate program has been established to encourage commercial customers to replace their older once-through cooling ice machines with more efficient air-cooled models. The ice machine rebate is based on the capacity of the existing water cooled ice machine and is set at fifty cents per pound of ice making capacity measured in pounds per day up to a maximum of \$500. Other once-through cooling equipment can be retrofitted or replaced based on the standard ICI rebate process.

6.7 ICI – Outdoor Programs

Free Irrigation System Audits

Properties with underground sprinkler systems are eligible for a free irrigation system audit. The City auditor will check the system for leaks, water application rates, and adequate coverage and help determine an efficient watering schedule.

Irrigation System Rebate Program

Rebates for irrigation system upgrades are also available to City of Austin multi-family, commercial or industrial customers. See Section 6.5: Multi-family Outdoor Programs above for program details.

Alternative On-Site Water Resources

The Rainwater Harvesting System and Rainbarrel Rebate Programs are offered to ICI customers as well as single-family and multi-family customers (described above in Section 6.5). In addition, rebates are offered for the

capture and use of other sources of on-site water such as air conditioner condensate, water from once through cooling equipment, French drain systems, and other similar sources. To date, such projects are collecting as much as 200,000 gallons of water a day for reuse in these facilities. Another for of incentive is that if all of the outdoor water needs are met by alternate sources and no potable water will ever be needed, the facility can apply for an exemption from having to install a separate irrigation meter.

6.8 Children's Educational Programs

Dowser Dan Show

Targeting kindergarten through 4th grade students, the Dowser Dan Show is an original and highly popular assembly program that teaches kids (and teachers) about water conservation and how they can help conserve water. The City of Austin first designed the program in 1992 and has modified and updated the program each year. Booked throughout the school year, the program reaches approximately 30,000 students each year. In addition to the show itself, students receive supplemental education materials such as calendars, magnets, stickers, and bookmarks with water conservation tips and lessons.

5th & 6th Grade Waterwiser Partnership with the Austin Independent School District (AISD)

The City of Austin and AISD have developed a water wise educational curriculum program. Originally designed for 5th grade students, the program was expanded to include 6th grade students beginning in 2003. The 5th grade Water in Our World curriculum includes information about water conservation, water source protection, and water treatment. Hands-on exercises and experiments allow the students to install water-conserving devices (such as water efficient showerheads, etc.) in their own homes and measure the conservation results. This not only teaches the students the value and impact of water-efficient devices, but also provides a real water savings benefit to the City. The 6th grade Down the Drain program was launched in 2003, introducing students to wastewater collection and treatment.

6.9 Continuing Public Education Programs

Advertisements / Program Marketing

Bill stuffers and media advertising are used regularly to provide citizens information about water conservation and programs available to encourage water conservation. Water conservation bill stuffers are inserted into customer's monthly utility bills approximately 8 times each year. In addition, advertisements are regularly placed in the Austin-American Statesman, and on local radio and television stations. Local celebrities in the past have appeared in several television commercials in the past promoting the 5-day watering schedule and the Watering with Evapotranspiration (WET) program and discouraging the waste of water.

To help facilitate a regional approach and water conservation throughout the Austin service area, the City also makes bill stuffers available to all wholesale customers interested in distributing the information to their customers.

Electronic Newsletter

In March 2004, the Water Conservation Division of Austin Water Utility began the "WaterWise Newsletter," an attempt to communicate more regularly with our customers and increase participation in water conservation initiatives. Each month a new issue of the newsletter is created and distributed electronically to a database of customers.

Customer email addresses are collected from program applications and information requests, and visitors to the Austin Water Conservation website are encouraged to self-subscribe by providing an email address and optional personal information. The newsletter facilitates cross-promotion of City programs by informing customers who have participated in one program about other programs available, and by alerting all subscribers to upcoming events and special offers. The newsletter also includes related topics that may be of interest to customers, including

material on gardening, energy conservation, and water quality.

Tracking data provides important information on which topics are of interest to customers, outlining areas for potential future conservation programs. Further, such data allows staff to develop targeted mailing lists for special events: For example, customers who had read gardening-related articles in the last two months were recently sent emails encouraging them to attend a "Gardening for Homeowners" training session. Through the WaterWise Newsletter, customers are also given an additional outlet for program feedback; each article allows customers to post letters (subject to staff review) responding to the topic or offering personal experiences with City programs. To minimize unwanted emails, customers can unsubscribe at any time, and only email addresses voluntarily provided by customers are included in the mailing database.

In the year since the newsletter has been operational, feedback has been overwhelmingly positive, and the customer database has grown to over 9,200 individual addresses. Roughly 40 percent of emails are successfully delivered and opened each month (in HTML format; the service does not track emails opened in plain-text readers). Each WaterWise Newsletter issue gathers an average click-through rate of about 32 percent, impressive compared to the industry average of 24 percent for similar electronic newsletters and to the 1-7 percent response rate expected from traditional direct mail campaigns.

ICI Water Conservation Newsletter

The staff of the City's Water Conservation Program publishes and distributes a newsletter to all ICI customers. The newsletter reminds ICI customers of the ordinances governing commercial irrigation and waste of water. The newsletter also updates ICI customers on rate changes, available rebates and free services, publicizes upcoming water conservation workshops and highlights successful water conserving programs by local ICI customers.

Workshops, Presentations and Outreach Programs

Throughout the year, presentations on water conservation techniques and available City programs are given to a variety of interest groups. Approximately 30 to 50 presentations are made each year to area multi-family customers, hotels and motels, commercial customers, homeowners associations, garden clubs, professional organizations, and other community groups.

Professional Irrigator's WaterWise Training Course

The City offers WaterWise Training Courses to professional irrigators licensed in and around the Austin area. The training courses provide professional irrigators with information on water-efficient irrigation systems, City water conservation programs and regulations, and the recommended 5-day watering schedule and watering hours. Other topics include electrical troubleshooting, irrigation auditing, turfgrass water requirements, and ET. In addition, irrigators receive continuing education credits, required for certification by the TCEQ, for participating in the City's training course. Participating irrigators can agree to be WaterWise, which means that they will comply with the City's water conservation program by assisting customers with reducing their peak day water demand in the summer months. The City of Austin will provide water customers with a list of WaterWise Professionals to choose from for repairs or installations.

Xeriscape and Rainwater Harvesting Home Tour

The Water Conservation Program offers yearly Xeriscape and rainwater harvesting tours. These tours allow the public to see Xeriscapes and rainwater harvesting installations that have been installed under the City's rebate programs. The tour in October 2003 attracted approximately 300 people, and the April 2003 tour attracted over 1,000 people.

Videos & Other Publications

In 1994, the City of Austin produced a video, titled Xeriscape: Gardening for Austin, to educate residents about Xeriscape gardening techniques and effective outdoor water use. Two bonus features are also included on the

video, including Money Down the Drain and animated Water Follies. This video is available to the City water customers for \$2.25 each and to the general public (i.e., not a City water customer) for \$5. In addition, these videos are available at all branch libraries in Austin. Availability of the video is advertised regularly at public information fairs, presentations to the public, in bill stuffers, newspaper advertisements, and on the City's web page.

Other publications available to the public through the City's Water Conservation Program include the Texas Guide to Rainwater Harvesting, Xeriscape for Central Texas, Xeriscaping: Sowing the Seeds for Reducing Water Consumption, 1999 National Benchmarking Study for Water Conservation Programs and Water Price Elasticities for Single-Family Homes in Texas.

Web Page

The City of Austin provides a wide range of water conservation information on its website, www.cityofaustin.org/watercon. All water conservation programs offered by the City, including the various rebate and free water use audit programs, are described on the web page. For customer convenience, program applications are also available on-line. Tips on how to reduce indoor and outdoor water use are provided for businesses as well as the general public. In order to enhance the amount and quality of information provided to the public, the City's web page also provides links to other web sites providing water conservation information.

Peak Day Management Campaign

Continued growth throughout the mid and late 1990's, coupled with an unusually hot and dry summer in 2000 forced the city to institute mandatory outdoor water use restrictions for the first time since 1986. Stage 2 water use restrictions remained in place for a period of 69 days. In response to the 2000 summer restrictions, the City revised the Emergency Water Conservation Ordinance by expanding waste of water restrictions to be in force year-round.

Each summer the City initiates and facilitates a regional effort to conserve water during the hot summer months by promoting the Peak Day Management campaign. This campaign is a media effort designed to provide residents in the Austin region with information on how to reduce their outdoor water use. Messages urge citizens and businesses to comply with a 5-day watering schedule and to avoid watering between 10 a.m. and 7 p.m. when evaporation rates are at their highest during the summer months. The City produces magnets and stickers with the watering calendars to assist citizens in following the recommended schedule. Customers are asked to voluntarily comply with the watering schedule, unless Stage 2 of the Emergency and Peak Day Water Use Management Ordinance is declared, in which case the 5-day watering schedule becomes mandatory. Customers are also requested to follow ET watering recommendations. Other water conserving techniques are also encouraged during this extensive educational campaign.

The City of Austin has also implemented a Water Waste Awareness program to follow up on reports of water waste by customers. Customers are told about the reported problem and offered assistance in repairing or rescheduling their irrigation system.

A regional WaterWise partnership has been formed with Cedar Park, Round Rock, Georgetown, Barton Springs/Edwards Aquifer Water Conservation District, the Lower Colorado River Authority and other neighboring water utilities to promote a consistent message throughout the region about efficient watering techniques and irrigation scheduling.

6.10 Municipal Programs

Municipal Swimming Pool Retrofit Program

The Parks and Recreation department operates 33 municipal swimming pools and 12 wading pools. During water restrictions in the summer of 2000, pools that leaked or did not have operating recirculating and treatment systems were closed under the peak day demand management ordinance. In response, \$400,000 was budgeted from Water

Conservation in FY00-01 to retrofit the swimming pool at Ramsey Park and three wading pools at Metz, Shipe, and Little Stacey Parks. Ramsey, which was retrofitted with a recirculation system, was finished by July 4, 2001, and work was completed on the wading pools by the summer of 2002. Stacey Pool, which also lacked a recirculation system, was previously retrofitted in 1999 with funding from the Water Conservation Program and the Austin Water Utility. Funding for further wading pool retrofits was included in the FY02-03 budget, and the wading pool at Metz was converted to a water playscape and opened in the spring of 2002. Five other wading pools are currently being considered for replacement with water playscapes, and engineering and design work is continuing on those efforts.

Raw Water Pump Station

The City installed a pump station along the banks of Town Lake in Zilker Park with funding from the Water Conservation Program. This station is used to supply water for irrigating the soccer fields, and because it draws raw water, there is no increased demand on the water treatment plants.

Rainwater Harvesting Demonstration Projects

The Water Conservation Program is cooperating with several public entities in funding rainwater harvesting systems on new public facilities. The City and the Austin Independent School District built the J.J. Pickle Elementary School and St. John's Community Center, which incorporates a 100,000-gallon rainwater system. The collected rainwater will be used to supply the site's cooling tower, meeting half of its annual needs. Additional projects include systems on the City's North Service Center, the new homeless shelter in downtown Austin, and the new Wild Horse Ranch wastewater treatment plant.

A rainwater harvesting system demonstration site is currently being constructed at the Zilker Botanical Gardens to offset the amount of potable water used throughout the garden as well as serve as an educational tool to inform people of the benefits of rainwater collection. Four collection tanks are on display, which represent the main types of tanks currently available: one 3,100-gallon metal tank lined with PVC, two 2,500-gallon polypropylene tanks, and one 2,000-gallon fiberglass tank. Once completed, the site will have the potential to catch approximately 3,000 gallons of water during a 1-inch rain.

City-Wide Water Efficiency

Efficient use of Austin water should start the City of Austin's facilities. In 2004, the City implemented a comprehensive toilet retrofit program for City facilities. All fire stations and EMS stations that had old, large-capacity toilets were retrofitted with new efficient toilets. In addition, all City properties with irrigation systems except little league fields had irrigation audits. Efforts to bring the remaining City facilities up to their maximum water efficiency are ongoing.

7.0 Best Management Practices

Recognizing the need for conservation in the state, in 2003, the 78th Texas Legislature, under Senate Bill 1094 established a Water Conservation Implementation Task Force, a 32-member panel of experts appointed by the Texas Water Development Board. Over an 18-month period, the group's efforts resulted in two major documents: the ***Water Conservation Best Management Practices (BMP) Guide***, and a special report, ***Water Conservation Implementation Task Force Report to the 79th Legislature***, for consideration in the Legislature's 2005 session.

The BMP Guide was developed for the municipal, industrial and agricultural sectors. For each suggested measure, the BMP addresses implementation techniques and schedule, scope, water savings estimation procedures, and cost effectiveness. All BMPs are voluntary, intended as guidance for achieving water conservation. A total of 58 practices were addressed, including 22 for the municipal sector, 15 for the industrial sector and 21 for the agricultural sector.

The municipal sector's BMPs ranged from system water audits and toilet replacement to suggestions for specific

water customers such as commercial and industrial users, golf courses and athletic fields. Table 11 provides a summary of how the current City of Austin water conservation programs correspond to the 22 BMPs for the municipal sector. Table 12 outlines which of the 22 practices are not currently incorporated into the City's water conservation framework. As is evident from the two tables, the City of Austin has implemented the majority of the BMPs developed by the Water Conservation Task Force, with the exceptions being graywater reuse and a direct toilet flapper replacement program.

Table 11. Water Conservation Task Force Best Management Practices and Corresponding City of Austin Conservation Programs as of 2005

Best Management Practices		Corresponding City of Austin Conservation Program
Utility Practices	System Water Audit and Water Loss	Water loss is estimated annually, and a committee has been formed to enhance water accountability efforts.
	Water Conservation Pricing	The City implemented an increasing block rate structure for single-family residential water billing in 1994 (see Table 5).
	Cost-Effectiveness Analysis for Municipal Water Users	Considerations such as delaying the cost of additional purchase of LCRA water, are taken into account when deciding whether or not to implement various conservation programs.
	Prohibition on Wasting Water	Ordinance no. 010426-17 prohibits water waste anytime of the year for City of Austin water customers (Appendix A) lists the water waste prohibitions in detail).
Rebates & Incentive Programs	Residential Ultra Low Flow Toilet (ULFT) Replacement Program	The City offers two single-family toilet replacement programs for homes constructed prior to 1992 to replace up to three large capacity toilets with ULFT models: a free toilet program and a toilet rebate program.
	Residential Clothes Washer Incentive Program	The City offers rebates in conjunction with Austin Energy and Texas Gas Service towards the purchase of efficient clothes washers for single-family residences. The Water Conservation Program and Texas Gas Service fund the rebate for the multi-family replacement program for energy efficient front-loading coin-operated clothes washers.
	Conservation Programs for Industrial, Commercial, & Institutional Accounts	The City offers toilet replacement options for high water using toilets. The City offers rebates for the installation of new equipment that conserves water or the redesign of a manufacturing process that conserves water. The City offers free pre-rinse spray valve replacements and free restaurant water audits.
	Public Information	The City provides information on water conservation to the public through advertisements, bill stuffers, an electronic newsletter, workshops, presentations, tours, videos and other publications throughout the year.
Public Outreach	School Education	The City runs three education programs that target kindergarten to 4th graders, 5th graders, and 6th graders separately.
	Wholesale Agency Assistance Programs	Wholesale customers are eligible for most City of Austin water conservation programs (including toilet and washer rebates, rainbarrel sales, irrigation audits and rebates) and receive information about programs and activities throughout the year.
	Conservation Coordinator	The Water Conservation Program Manager acts as the conservation coordinator for the City of Austin.
	Water Use Surveys for Single-Family and Multi-Family Customers	The City offers free irrigation audits for residences using more than 25,000 gallons per month in the summer. The City also offers multi-family audits and commercial audits that provide free evaluations of all aspects of the customers' water consumption and make recommendations to lower their usage.
Outdoor Programs	Landscape Irrigation Conservation and Incentives	The City offers free irrigation audits to residential and commercial customers. Incentives for equipment upgrades provided by the City include rebates on new controllers, pressure-reducing valves, and rain shut-off devices.
	Water Wise Landscape Design and Conversion Programs	The City of Austin offers rebates for Water Wise trees, bushes, and shrubs for high water use customers using 20,000 gallons per month during the summer. The City also trains licensed irrigators on issues such as proper water use, ET, hydro-zone design, and landscape auditing.
	Athletic Field Conservation	Athletic fields must comply with the City's Summer Water Ordinance. The Water Conservation Program supplied funding to install a pump station along Town Lake in Zilker Park to supply raw water for irrigating the soccer fields.
	Park Conservation	All City parks are required to follow the 5-day watering schedule during summer months. Irrigation audits have been performed at all of the parks and those with automatic irrigation systems have been provided with rain shut-off devices.
	Golf Course Conservation	All but one City owned golf course use raw or reuse water to irrigate. Golf courses not using raw water are subject to watering restrictions during stages 2 and 3 of the Water Waste Ordinance.
	Water Reuse	Austin uses approximately 3 million gpd of reclaimed water and has plans for a reuse system expansion.
Alternative Water Use	Rainwater Harvesting and Condensate Reuse	The City rebates rainwater harvesting systems for commercial as well as residential properties. The City offers a rebate on newly purchased rainbarrels, in addition to selling them directly to City water customers at a discounted price.

Table 12. Water Conservation Task Force Best Management Practices and the Reasons for the Lack of City Programs

Best Management Practice	Task Force Description	Reasons for the Lack of City Program
Showerhead, Aerator, and Toilet Flapper Retrofit	<ul style="list-style-type: none"> • Target homes built prior to 1995 and • Target the early purchasers of 1.6 gpf toilets and directly install or distribute the flappers. • Develop and pass ordinance to retrofit homes, while offering rebates to offset the cost. The ordinance would require properties that changed ownership to install the fixtures. 	<p>The City does not subsidize the cost of flapper replacement.</p> <p>The Water Conservation Program and the free toilet vendor distribute water conserving showerheads and aerators at no cost to City water customers. Toilet program participants are required to install the low-flow showerheads.</p> <p>Newly constructed homes are required to <i>install water conserving aerators and showerheads, as well as ultra low flow toilets.</i></p>
Graywater Reuse	<ul style="list-style-type: none"> • A utility should implement an incentive plan to encourage builders/owners of homes to collect and use graywater. • Integrate graywater construction as part of a Green Builder type rating system. • Adopt regulations requiring new homes to install this type of plumbing. 	<p>No incentive plan is in place at this time to encourage the implementation of graywater systems. Rules concerning graywater have been under debate in recent years, with the new rules becoming effective on January 6, 2005. The City of Austin has not adopted the TCEQ rules at this time.</p>

8.0 Proposed Water Conservation Programs for the Next Five Years

In order to meet the City of Austin's water conservation goals, City staff members have proposed several new water conservation initiatives and expansions of current initiatives. These proposed future initiatives consist of ideas generated by the City of Austin Water Conservation Program staff as well as best practices of other water conservation districts throughout the country and suggestions from community groups, including wholesale and large industrial customers, neighborhood associations, garden clubs and others. Where possible, this plan also includes projections of the water savings achievable through these new and expanded water conservation measures.

8.1 Single-Family – Indoor Programs

New Toilet Initiatives

It is estimated that toilet use accounts for approximately 26 percent of per capita indoor water use.⁴ It is therefore understandable that water conservation districts throughout the country have devoted a great deal of effort to reduce the amount of water used for toilet flushing. In addition to the free toilet program and the toilet rebate programs, the City of Austin Water Conservation Program staff has proposed additional initiatives to reduce water use in this area. These initiatives fall into two categories: improved toilet maintenance and old toilet replacement.

Research studies have estimated that as much as 13 percent of per capita indoor water use is attributable to leaks.⁵ Leaking toilets, in particularly leaking toilet flappers, contribute substantially to this water loss. In an effort to curb this loss, the City of Austin Water Conservation Program staff has proposed that all customer classes be provided with toilet maintenance information and leak detection kits on a yearly basis. While total water savings achieved through such a program may be hard to quantify, distribution of this information would promote good toilet maintenance practices and raise the level of water awareness in the Austin community.

Several new toilet designs now exist which incorporate siphons or troughs that replace leak prone flapper systems. Dual mode designs are also available which offer the customer the option of two flushing amounts in order to clear the bowl: 1 gallon per flush or 1.6 gallons per flush. The City of Austin could increase water savings in the home through the promotion of both of these types of toilets. These toilet models already qualify for the City's toilet rebate.

Determining the achievable savings and the cost effectiveness of replacing standard water efficient toilets with leak-preventing or dual mode models would require further investigation into the market for these toilets as well as the amount of water savings they offer. In a recent multi-city research project, 8.5 percent of homes were found to have exclusively water efficient toilets and 26.2 percent of homes had a mixture of water efficient and inefficient toilets.⁶ The Metropolitan Water District recently completed a study of the durability of several of these models, but it did not include all of the models potentially available.

The City of Austin Water Conservation Program staff has also proposed an expansion of the services offered to multi-family and commercial customers participating in the free toilet and toilet rebate programs. Providing multi-family and ICI customers who retrofit their properties with "before and after" water consumption comparison charts periodically would raise public awareness of water use and potential savings among these customer classes. A previous study performed by the Water Conservation Program showed a 25 percent reduction in water consumption achieved through retrofitting with water efficient toilets.

⁴ Peter Mayer, et al. 1999. Residential End Uses of Water. AWWA Research Foundation and American Water Works Association. p. 87.

⁵ *Ibid.*

⁶ *Ibid.*, p.131.

Local or State Clothes Washer Standards

Since 1997, the City of Austin has offered rebates for residential, commercial and multi-family customers purchasing water efficient clothes washers. Potential water savings with these machines are estimated at up to 5,000 gallons annually for residential machines and between 13,500 and 36,000 gallons per machine per year for commercial and multi-family machines.⁷ Several other water districts throughout the country offer similar rebate programs, most notably San Diego, San Antonio and Seattle. In each case, a part of the rationale behind these rebates is that they strengthen the market for superior, though higher-priced machines. The Department of Energy (DoE) has adopted new energy efficiency standards for washing machines. There is a phase in of the new standards with the initial standard taking effect in 2004 and a more stringent standard becoming effective in 2007. These standards do not address water consumption, but it is likely that there will be substantial water efficiency benefits.

In 2001, the Texas legislature passed HB 2403, which requires clothes washer manufacturers to report every year the numbers of washers they import into Texas in three groups: water factor (WF) of 9.5 or less; WF of 9.5 to 11; and WF greater than 11. They must also report the average water efficiency of all of the machines they import. This reporting is intended to monitor the manufacturer's claims that the new DOE standards will act as a de facto water efficiency standard. If progress towards more water efficient washers is not observed, the Legislature will then be in position to enact legislation setting water efficiency standards.

Water savings are not the only potential benefit associated with efficient clothes washers however. Efficient clothes washers also represent substantial energy savings as well. Efficient residential clothes washers are estimated to save up to 580 kWh per year when used with electric resistance water heating and an electric dryer and up to 24 therms when used with gas water heating and a gas dryer. In the multi-family and commercial settings, efficient clothes washers are estimate to save up between 1,500 – 4,000 kWh for electric resistance water heating and drying per machine per year and 63 to 168 therms when used with gas water heating and drying.⁸

Winter Leak Detection

In a 1999 study of residential end uses of water, the American Water Works Association Research Foundation (AWWARF) found a 76 percent probability that a single family home occupied by four persons or less having winter water use (essentially indoor use) exceeding 12,000 gallons per month (400 gallons per day) had a major leak problem exceeding 4,000 gallons per month (130 gallons per day). In order to make efficient use of available resources, AWWARF researchers recommended that water utilities target single family accounts with water use exceeding 12,000 gallons per month to receive a high consumption notice accompanied by suggestions for searching for and repairing leaks. Austin customers in this category would save on their monthly water bills upon completing repairs.

The water savings achievable through this program depend upon how many Austin-area customers fall in this category and how many of them respond to the suggestions and actually repair their leaks. The costs of the program would be limited to the printing of high consumption notices and repair materials, postage for mailing those materials and of cost associated with identifying the customers to be targeted through the CIS billing system.

8.2 Single-Family – Outdoor Programs

⁷ The Consortium for Energy Efficiency. Available: <http://www.ceeformt.org>. (Amount of water saved by commercial and multi-family machines depends on the number of machine turns each day.)

⁸ *Ibid.*

Irrigation Permitting

Title 30 of the Texas Administrative Code (TAC) section 344.70, as written by the Texas Natural Resource Conservation Commission (TNRCC), has left the regulation of landscape irrigation systems largely to local authorities. The TNRCC has established a set of statewide minimum specifications for all in-ground irrigation systems under section 344.77 of the TAC; however, these specifications serve as a foundation, which local authorities can expand upon. Currently, the only piece of landscape irrigation equipment required by law is a backflow prevention device, required by 30 TAC §344.75(a). Backflow prevention devices are designed to keep contaminated runoff from siphoning back into potable water supplies. Water utilities are charged with the responsibility of insuring that these devices are installed. In Austin, a third-party currently inspects backflow prevention devices on new irrigation systems connected to the City's Water and Wastewater utility.

According to a 1999 AWWA study, homes with in-ground irrigation systems use 35 percent more water outdoors than those who do not have an in-ground system.⁹ A City of Austin study showed that homes with irrigation systems use 132 gallons per day on average than those that do not.¹⁰ Water utilities throughout the country are therefore justifiably concerned that these in-ground systems operate as efficiently as possible. The City could pass an ordinance expanding the requirements for new irrigation systems. Rain shutoff sensors, 5-day programmable controllers, pressure regulators (where needed), and head-to-head sprinkler spacing in their design could be required for all new systems. These requirements would ensure that new systems are designed efficiently and with proper coverage.

Residential customers who irrigate frequently typically see between 2,000 and 3,000 gallons per month in water savings by following a 5-day watering schedule during peak usage times of year. Requiring new irrigation systems to employ 5-day programmable controllers both saves customers money on their water bill and enables them to comply with the City's recommended watering schedule throughout the summer months. Water conservation staff-members have observed that 20 to 50 percent of the water emitted by over-pressurized irrigation systems is lost due to misting. An ordinance mandating proper pressurization of irrigation systems would therefore represent substantial water savings to the City and its water customers. The incorporation of rain shutoff sensors into new irrigation systems would help to limit landscape irrigation that frequently occurs when pre-programmed systems run immediately after or even during rain showers. Many current irrigation systems do not deliver uniform coverage to all parts of the irrigated landscape. In order to adequately water the area of the landscape that has the least coverage, homeowners often end up over-watering other areas of their landscape. A City requirement of head-to-head sprinkler spacing would cut down this type of over-watering considerably.

Permitting and inspection of irrigation systems could be combined with backflow prevention inspections. Due to the high failure rate of many backflow prevention devices, the city staff has also recommended that follow-up inspections be conducted approximately every three years. These backflow prevention inspections could also serve as opportunities to offer homeowners irrigation system audits and educate them about the efficient use of their irrigation system. Enforcing new irrigation system regulations would require the employment of additional inspectors to insure compliance; however, the cost of these inspectors would be born by an increase in the cost of irrigation system permits. These regulations would represent substantial peak-day water savings for the City, further offsetting the need for increased water system capacity. The Water Conservation staff met with area irrigators regarding this issue and received their initial support, as long as sufficient enforcement is available.

Remote Control of Automatic Irrigation Controllers

In 1998, the Irvine Ranch Water District (IRWD) and the Metropolitan Water District of Southern California (MWD) began a study of Remotely Controlled Automatic Irrigation Controllers. IRWD and MWD tested the WeatherTRAK-ET controller. The WeatherTRAK-ET controller downloads evapo-transpiration data from local weather stations 1-2 times per week via pager signal. The controller then combines user-entered information about plant types, soil

⁹ Peter Mayer, et al. 1999. *Residential End Uses of Water*. AWWA Research Foundation and American Water Works Association. p. 154.

¹⁰ Dan Strub, et al, 1999. *Xeriscaping: Sowing the Seeds for Reducing Water Consumption*, City of Austin, pp. 2-6.

types, irrigation equipment, precipitation rates and site exposure with the ET data, and adjusts run times and cycling of the irrigation system accordingly. The WeatherTRAK-ET controller thereby delivers the optimal amount of water required by the landscape and virtually eliminates over-watering by customers. In their study, IRWD and MWD found a 16 percent savings in water used for irrigation, or an overall 7 percent decrease in total water use for homes equipped with the WeatherTRAK-ET controller. These savings were observed in homes which, due to existing water budgets and other conservation measures, were already considered efficient.

WeatherTRAK-ET controllers are not in mass production and therefore have not been consistently available to interested water utilities. Once these controllers are available, the Water Conservation Program could initiate a rebate program to help homeowners purchase WeatherTRAK-ET controllers or similar ET-based irrigation controllers. Programming WeatherTRAK units is often beyond the capability of most residential customers and will initially need to be performed by an experienced installer. However, as long as customers do not alter their landscape, WeatherTRAK units will only need to be programmed once. It is quite likely that as the market for these controllers expand, the programming will be simplified in order to make the controllers attractive to a wider market.

Assuming that Austin residential customers can achieve savings equal to those observed in Irvine Ranch Water District, an Austin customer who uses 25,000 gallons per month could save 1,750 gallons of water per month, or approximately \$8.50 in water charges per billing cycle. At \$100 per WeatherTRAK controller, the payback period for the full cost of the controller is 12 months for a home that uses 25,000 gallons per month for irrigation, which is typical for in-ground irrigation systems. If the City of Austin offered rebates of \$50 toward the purchase of these controllers, most city customers would save the remaining \$50 of the retail price over the course of two summers using the WeatherTRAK controller. Such a program could be offered through an irrigation or landscape contractor, who would offer the programming as a service to its customers.

The City of Austin or a contractor would also have to outfit a local weather station with a transmitter capable of paging WeatherTRAK-ET controllers throughout the city via satellite with updated ET data. This would represent a one-time expense and would be passed through to customers in the form of a monthly subscriber fee on their water bill.

Rainwater Harvesting Incentives for New Construction

In 2001, the Texas Legislature passed Senate Bill 2, which exempts rainwater harvesting materials from Texas state sales tax. This tax abatement represents the growing awareness among Texans of the potential water savings achievable through the collection of rainwater. Like most water utilities, Austin Water and Wastewater could benefit from increased use of rainwater by its customers. Collected rainwater typically replaces potable water for use in landscape irrigation, and as such it would not count against the city's overall contractual rights with the LCRA. Depending upon summer precipitation, increased use of harvested rainwater could also help the city reduce peak season demand.

Though the City of Austin offers rainwater harvesting rebates to encourage homeowners to add rainwater harvesting systems to existing homes, no program currently exists to encourage the incorporation of rainwater harvesting systems into the construction of new homes. The City could offer rebates to area homebuilders toward the installation of rainwater harvesting systems for their customers. Rebate amounts would likely be set similarly to existing rebate programs, according to the storage capacity of rainwater cisterns up to a maximum rebate amount.

Graywater Recycling

Wastewater from a household is divided into two components, graywater and blackwater. In general, graywater is wastewater drained from showers, bathtubs, clothes washers, and sinks not used for the disposal of hazardous or toxic ingredients or waste from food preparation. Blackwater is usually wastewater from the kitchen sink, dishwasher and toilet. The higher levels of nutrients, solids and pathogens in blackwater demand more complex treatment than graywater. Graywater recycling involves filtering, treating, storing, and reusing graywater on site for non-potable uses such as landscape irrigation. It has been estimated that residential customers generate between

40 and 60 gallons of graywater per capita per day.¹¹ If properly reused, graywater can replace up to 40 percent of the potable water used by residential customers for landscape irrigation.¹² Unlike irrigating with harvested rainwater, graywater irrigation does not depend upon the weather, as residential customers produce consistent amounts of graywater. Each gallon of potable water replaced by graywater for irrigation contributes to a decrease in average daily demand and peak-day demand for potable water. Recycling graywater instead of discharging it into the sanitary sewer would also reduce the load on the wastewater treatment system.

Because of the substantial savings achievable through the reuse of graywater, government agencies and water utilities nationwide have begun investigating the possibility of encouraging their customers to make use of this resource. In 1999, the San Diego County Water Authority proposed a graywater incentive pilot program that would provide up to a \$260 rebate for the installation of graywater systems in single-family homes.¹³ In January of 2001, the General Assembly of the state of Connecticut passed Committee Bill No. 6414, which charged the Connecticut Department of Environmental Protection Agency with the establishment of a pilot program to recycle graywater in public schools and municipal facilities.¹⁴ In 2003, the Texas Legislature passed House Bill 2661 directing the Texas Commission on Environmental Quality (TCEQ) to promulgate rules on graywater reuse.

In 2004, the Texas Commission on Environmental Quality (TCEQ) promulgated new graywater reuse rules for Texas. The City of Austin will allow the installation of graywater systems following Appendix G of the Uniform Plumbing Code. This new activity in this area has promoted a re-examination of the subject and a rebate program of some sort may be possible in the future.

Often the greatest impediment to the efficient recycling of graywater is the expense of modifying the plumbing in existing homes to capture the graywater. The City of Austin could amend local plumbing code to require that new homes built in the Austin area to be plumbed with dual blackwater and graywater exit lines. City customers wishing to make use of graywater in their homes would then face only minimal expense in establishing a graywater recycling system. Dual piping would raise the cost of new homes slightly. If homeowners make effective use of their graywater however, they will enjoy lower water bills throughout the lifetime of the home, offsetting the initial cost of the dual plumbing.

The City of Austin could also institute a rebate program to help homeowners offset the cost of installing a graywater capture, treatment and distribution system on existing homes. Such a program could resemble the incentive program proposed by the San Diego County Water Authority. Graywater incentives could be set as a percentage of the cost of retrofits necessary to complete a functional graywater recycling system. Eligibility criteria could specify a pre-set minimum rebate amount to insure that the achievable savings justify the expense of providing a city rebate. In addition, the City could establish a program to provide rebates for plumbing new homes for graywater. Rebates of \$100 would offset most or all of the cost incurred to plumb showers, bathtubs and washing machines for graywater collection.

Additional costs associated with either plumbing code changes or the initiation of a rebate program include the publication of graywater promotion materials and the training and education of city staff members to administer the program and inspect completed graywater systems. These costs would be offset by the water conservation benefits.

Soil Depth Ordinance

The Soil Depth Rebate has been in place for nearly 1½ years, but participation has been very low. Most builders

¹¹ *Texas Water Savers: News of Water Conservation and Reuse in Texas*. "Graywater reuse future depends upon definition and agencies' rulings." Vol. 5, No. 1, Winter 1998. p. 1.

¹² *Ibid.*

¹³ San Diego Regional Chamber of Commerce. *Greywater Pilot Project*.
<http://www.sdchamber.org/public/infrastr/reclam.html>

¹⁴ Committee Bill No. 6414. *An Act Concerning a Municipal Pilot Program for Gray Water*.
<http://www.cga.state.ct.us/2001/tob/h/2001HB-06414-R02-HB.htm>

so far have refused to participate. As an alternative to offering builders rebates to improve the depth and composition of soil on their lots, the City could pass an ordinance setting minimum depth and composition standards for any area where turf grass is to be planted. Such a residential soil depth ordinance would be similar to Chapter 13-7 §13-7-61 of the Austin Land Development Code, which prescribes plant cover and soil conditions for new commercial properties. A residential soil depth ordinance would not require any proportion of the landscape to be devoted to certain plants or plant types. Properties meeting the depth and composition standards of the ordinance would require less water to maintain and would reduce runoff from over-watering.

Parkway Strips

Parkway strips are the landscaped areas between streets and sidewalks in residential neighborhoods. City of Austin's Transportation Criteria Manual currently requires that all residential development include a parkway strip at least two feet wide. Traditionally, these parkway strips have been landscaped with turf grass. Irrigating this turf grass by in-ground or hose-end sprinkler frequently results in water waste as single family customers end up watering the street or sidewalk in addition to their grass. The City could amend the Land Development Code to remove landscaped parkway strips in new developments, thereby placing the sidewalk adjacent to the curb. This would make it easier for homeowners to irrigate their landscapes by in-ground or hose-end sprinkler while losing only minimal amounts of water to over-spray onto paved surfaces. Such an amendment would help to reduce a form a water waste which, because of the seasonal nature of landscape irrigation, typically occurs during peak demand times of year. An amendment removing parkway strips between streets and sidewalks would also help customers to abide by the provisions of City's year round water waste ordinance.

Moving sidewalks out to the curb would require an alternate placement of city water meters in some cases and would leave an area of the city's right of way between the sidewalk and the homeowner's property line which could be altered by homeowners. This sidewalk placement might have some conflict with the alternate city goal of providing the safest possible passage for pedestrians.

As an alternative to a City ordinance mandating removal of parkway strips, the City of Austin could also issue a new ordinance forbidding the installation of any form of irrigation system in parkway strips other than drip irrigation systems. The City of Corpus Christi passed an ordinance to this effect in 1997.

Swimming Pool Filter Rebate

Most pools remove suspended particles from water by re-circulating the water through a filter. The three types of filters used in pools are sand, cartridge and DE (diatomaceous earth). All swimming pool filters require some degree of routine maintenance to remove deposits and reduce pressure on the water circulation system. For sand and DE filters, this maintenance is usually done through backwashing, in which the water circulation is temporarily reversed in order to remove buildup from the filter element. Most pools use between 400 and 1000 gallons of water every time the filter is backwashed. Unlike sand and DE filters, cartridge filters do not require backwashing to clean. Cartridge filters can either be periodically replaced, or disassembled and cleaned by hand with very little water. Though this process is slightly more labor intensive for the pool operator, it saves large quantities of water over backwashing. High capacity commercial or multi-family pools often require sand or DE filters to adequately filter the pool water; however, cartridge filters are sufficient for most residential pools. The City could develop an incentive program to encourage pool operators to install cartridge filters on smaller new pools instead of sand or DE filters. For large pools that require sand or DE filters, the City could offer rebates to help pay for plumbing to allow the backwash water to be reused.

Rebate amounts would be set on a case-by-case basis, depending upon the size of the pool and the amount of water that would otherwise be lost as backwash. A minimum rebate amount would be set in order to ensure that the water savings achieved are sufficient to justify the use of city funds. A maximum rebate amount would also be set to control the costs of the rebate program.

8.3 Multi-family and ICI– Indoor Programs

Apartment Submetering

Submetering is used in units such as apartments, condominiums, and trailer homes to indicate water use by individual units instead of simply metering the main supplier. Submetering makes it possible to bill tenants for the water that they actually use rather than for a percentage of the total water use for the complex. Studies have shown that when tenants are responsible for paying for their own water use, they reduce consumption between 10 and 30 percent. HB 2404, passed by the Texas Legislature in 2001, requires multi-family properties constructed after January 1, 2003 to include individual meters owned by the retail public utility. If the utility deems that installing meters is not feasible, the property must be plumbed so that submeters may be installed. Multi-family properties which provide government assisted or subsidized rental housing to low, or very low income residents are not required to include submeters or individual utility meters by the bill, however they are still required to include a plumbing system that would allow for the subsequent addition of sub-meters. The Water and Wastewater Utility is working on the criteria that would need to be followed if the Utility is requested to provide metering for apartment units.

Restaurant and Food Service Initiative

A joint effort between Water Conservation, Austin Energy, Solid Waste, and Industrial Pre Treatment is under way to jointly promote the Earth Smart Restaurant concept. This will involve joint marketing efforts. Water Conservation will use the opportunity to market the toilet replacement programs along with a new pre-rinse spray valve that significantly reduces water and energy used for this operation and for the replacement of garbage grinders with scrapper basket systems that also significantly reduce water and energy use and to audit irrigation systems to ensure they are being operated efficiently. As part of the program, restaurants that meet the water conservation criteria are designated as "Water Wise" restaurants and are advertised as such. Similar services are offered to all food service operations, including schools, hospitals, nursing homes, grocery stores, and any others who prepare food commercially.

Car Wash Ordinance & Rebate

The City of Austin encourages all new car washes to recycle water and be able to meet the standards set in Stage 2 of the Ordinance. The City of Austin also offers rebates for installation of water recycle or reuse equipment at car washes.

Prohibition of Once-through Cooling Equipment

Water is often used in industrial processes to cool heat-generating equipment or to condense gases in a thermodynamic cycle. The most water-intensive cooling method used in industrial applications is once-through cooling, in which water contacts and lowers the temperature of a heat source and is then discharged, typically into the sanitary sewer system.¹⁵ Once through cooling is employed in ice machines, ice cream machines, refrigerators, coolers and freezers, refrigerated air conditioning equipment, condensers for dry cleaning equipment and laboratory and medical equipment.

Several cities, including Phoenix and Seattle, have banned the use of certain once-through cooling systems because of the water they waste in the cooling process and the excess hydraulic load they place on the wastewater system. The City is in the process in revising its plumbing code, and one revision that is being proposed is to require that new cooling equipment be air-cooled or use re-circulating cooling. Re-circulating cooling systems can greatly reduce water use by using the same water to perform several cooling operations or cycles.

Air-cooled equipment also offers significant water savings over once-through water-cooled equipment. An 800 pound per day ice machine (typical for a busy convenience store or a medium sized restaurant) can use over 1,000 gallons of water per day for once-through cooling as opposed to 100 to 200 gallons per day for an air

¹⁵ U.S. Environmental Protection Agency. *How to Conserve Water and Use It Effectively*.
<http://www.epa.gov/OWW/you/chap3.html>. Accessed Jan. 22, 1999.

cooled system. In addition to water savings, re-circulating and air-cooled equipment also saves ICI customers money on their water and wastewater bills.

Under the amended plumbing code, the use of potable water for once through cooling of commercial equipment including but not limited to ice machines, ice cream machines, refrigerators, coolers, freezers, air conditioning equipment and condensers for dry cleaning equipment shall be prohibited unless 100 percent of potable water is returned for non-potable uses such as cooling tower make up, or other approved uses for any new installation.

Central Cooling Plants

Central Cooling Plants use water remove waste heat from refrigerant in HVAC air conditioning systems. Central cooling plants offer economies of scale not available to smaller cooling plants, and can also use raw or reuse water instead of potable water for the cooling process. Raw water could be pumped out of Town Lake and passed through central cooling plants in the downtown area before being discharged into the sanitary sewer system. Reclaimed or reuse water is treated wastewater provided by city utilities for non-potable purposes such as irrigation and central cooling. The City of Austin is currently developing a reuse water delivery system, which will begin in East Austin at the Walnut Creek Wastewater Treatment Plant and will pass through the Robert Mueller Municipal Airport area and then South through the downtown area.

The Austin Energy is constructing central cooling plants in new commercial developments. The City could provide special rates on raw water or reuse water to encourage their use in central cooling plants. Either raw or reuse water would save potable water and reduce both water and energy costs. Raw water could be counted against the City's underused industrial water rights. When raw water is used for once-through cooling, only the amount of water not returned to the river is counted against the City's water rights.

Commercial Clothes Washer Standards

Coin operated clothes washers will be exempt from the new efficiency standards for clothes washers being implemented by the DOE. Thus, laundromats and apartment laundry rooms could provide on ongoing market for inefficient machines. The State or the City could establish standards for single load, coin-operated clothes washers that are comparable to the standard for residential machines. California is currently developing such a standard, which would be phased in by 2007 to mirror the DOE standard's implementation. Ideally, the legislature would set a statewide standard to simplify enforcement issues, but failing that, the City could impose such standards within its jurisdiction.

8.4 Multi-family and ICI – Outdoor Programs

Rainwater and Stormwater Harvesting Incentives for New Construction

New commercial and multi-family properties offer tremendous potential for water savings through the incorporation of rainwater and stormwater collection systems. Unfortunately, commercial customers often do not utilize stormwater or rainwater because the marginal cost of storing this water makes it more expensive per gallon than potable water. Where potable water typically costs ICI customers ¼ cent per gallon, stored rainwater and stormwater average 5 cents per gallon. For water quality and flood control reasons, many multi-family and commercial properties are required to collect and retain stormwater. Though retention ponds are typically constructed to slow the runoff of stormwater into creeks and filter out pollutants picked up along the way, they potentially could be used as a water source for irrigation and other non-potable uses. Current regulations require that the stormwater retention ponds be emptied within 72 hours of a rainfall event to free up storage capacity for the next rainfall. The City could either relax this 72-hour requirement or encourage construction of excess capacity to allow the stormwater to be used for irrigation. While Senate Bill 2 already provides for tax exemptions for rainwater harvesting equipment, additional rebates might help make rainwater and stormwater collection more cost-effective. Rebate amounts for rainwater harvesting systems would likely be set according to the storage capacity and estimated water savings through reuse of retained stormwater. Sophisticated computer models

currently exist which can estimate the long-term rainwater and stormwater collection rates reliably. Rebates for stormwater collection projects could be set according to water savings estimated through simulation and would likely be capped at a maximum amount. New developments can also participate in the City of Austin's Green Building Program. If rainwater and stormwater collection can be incorporated under the City's Green Building criteria, developers will have additional social and monetary incentives to collect rainwater or stormwater.

Graywater Recycling – Multi-Family Properties

The City of Austin could amend local plumbing code to require that new multi-family properties built in the Austin area to be plumbed with dual blackwater and graywater exit lines. Multi-family customers wishing to make use of graywater on their properties would then face only minimal expense in establishing a graywater recycling system. Dual piping would raise the cost of new multi-family properties slightly; however if owners of multi-family properties make effective use of their graywater, they will enjoy lower water bills throughout the lifetime of the property.

The City could also institute a rebate program to help multi-family customers offset the cost of installing graywater capture, treatment and distribution systems on existing multi-family properties. In many cases, graywater recycling systems could be integrated with rainwater and stormwater harvesting systems to further increase the amount of non-potable water available for irrigation. A multi-family graywater incentive program offers the same potential savings and associated costs as a single-family graywater incentive program. Graywater incentives for multi-family customers could also be set as a percentage of the cost of retrofits necessary to complete a functional graywater recycling system. Eligibility criteria could specify a higher pre-set minimum rebate and pre-set maximum rebate amount for multi-family customers due to the increased scale of the graywater systems to be installed.

Graywater Recycling – Commercial Properties

As most commercial customers do not have laundry or shower facilities on site, commercial customers produce less graywater per person than do single-family or multi-family customers. In most cases, a commercial graywater incentive program therefore will not offer potential savings quite as high as those of single family or multi-family customers. There are some commercial customers who do maintain shower and laundry facilities and could enjoy substantial water savings from recycling graywater. The City of Austin could also institute a rebate program to help these commercial customers offset the cost of installing graywater capture, treatment and distribution systems. These incentives for commercial customers could also be set as a percentage of the cost of retrofits necessary to complete a functional graywater recycling system. Eligibility criteria for commercial graywater rebates would likely be similar to those for multi-family customers. In many cases, graywater recycling systems could be integrated with rainwater and stormwater harvesting systems to further increase the amount of non-potable water available for irrigation.

Parkway Strips

Amending to the City's Land and Development Code to prohibit irrigation of parkway strips in new developments, or issuing a new city ordinance requiring that they be irrigated by drip irrigation would affect commercial and multi-family customers as well as single-family customers. See Section 8.2: Single Family – Outdoor Programs above. Developers of new properties would have to comply with either the parkway strip watering prohibition, or establish a drip irrigation system according to a city irrigation ordinance. Median strips should be prohibited from having any landscaping unless they are at least eight feet wide.

Alternative Water Sources

There are several untapped alternative sources for water – groundwater, air conditioning condensate, reused process water. This water could be used to supplant potable water used for irrigation. The City offers rebates towards the equipment required to recover this water.

8.5 City Water Use Programs

Setting Water Restriction Triggers

Activation of water restrictions under the City's Emergency and Peak Day Water Use Ordinance is triggered by water usage reaching a certain level. During the summer of 2004, the triggers for imposing Stage II were either 247 MGD for three consecutive days or 251 MGD for one day. These triggers, as those in the past, were set based on the overall capacity of the system. When system capacity increased dramatically, triggers likewise increased, setting up a pattern of crisis years where the need for conservation was pronounced followed by years of inactivity. An alternate approach to setting those triggers would be to allow them to increase based on the increase in population, up to the constraint imposed by system capacity. Thus, when there is a large increase in system capacity, the trigger would not jump up but would instead increase the same amount that the population increases, discouraging the formation of wasteful water use habits in a time of artificial plenty. For example, if the system were to increase its capacity by 27 MGD by the summer of 2006, but population only increased by 2 percent, the triggers would increase not to 274 and 282 MGD, but to 252 and 260 MGD. This policy would help teach customers that water conservation is something that must be practiced every year, not just in those years when the system capacity is stressed.

8.6 Other Public Education Programs

Block Leader Program

Solid Waste Services already uses a block leader program to assist its customer with information on proper recycling and other solid waste issues. Using that program as a starting point, Water Conservation plans to recruit block leaders to help disseminate information focusing on the landscape rebate program, the irrigation audit program, on proper watering methods, and on the principles of Xeriscaping in an effort to further reduce outdoor water use. This community – based effort will create more local buy-in of programs and help influence community expectations of what a healthy and appropriate landscape looks like in Austin's climate.

Swimming Pool Maintenance

According to a 1999 study of the residential end uses of water, households with swimming pools have a 55 percent greater amount of leakage on average than do other households.¹⁶ A program could be instituted with the aim of reducing water use and leakage in swimming pools. Such a program would be applicable to residential, multi-family, commercial and municipal customers. One element of the program would be the organization of workshops to teach pool operators water conserving maintenance techniques. These techniques include covering pools when not in use to reduce evaporation, backwashing pools only when necessary, using no more water than is necessary for backwashing, recovering and reusing backwash water for irrigation and turning off circulating pumps at night to reduce overflow. The water savings achievable through such an education program would be very difficult to quantify, however such a program would likely be received enthusiastically, would raise the level of water awareness in the community and would promote water conserving pool maintenance practices throughout the city. The costs associated with such a program would be minimal. Some City staff have already attended training on swimming pool maintenance. The program would require the publication of educational materials and the time and expense of conducting educational workshops.

The other possible element of a swimming pool maintenance program could involve providing information on leak detection and incentives to fix leaks. Pool leak detection materials could be easily be created and distributed to pool operators with only the cost of publication and postage. Pool operators have a natural incentive to find and repair leaks in order to save water and reduce their monthly water bills, however these repairs can sometimes

¹⁶ Peter Mayer, et al. 1999. Residential End Uses of Water. AWWA Research Foundation and American Water Works Association. p. 153.

be prohibitively expensive. In order to encourage pool operators to fix leaks once detected, the City of Austin could also offer pool operators additional financial incentives. Bill credits or repair rebates would be scaled according to the estimated water savings achievable by the repair. Eligibility criteria can specify a pre-set minimum rebate amount to insure that the achievable savings justify the expense of providing a city rebate. A pre-set maximum rebate amount can also be set to ensure that program costs do not get out of hand.

9.0 Strategies Under Evaluation

There are several strategies under evaluation for which the Water Conservation Program lacks sufficient data to propose their implementation at this time.

Water Budgeting / Conservation Rate Structures

Individual water budgets and conservation promoting rate structures are among the most effective tools available to water conservation districts for the management of customer demand. Several water districts in California have already instituted water budgets based on the water needs of individual properties. A property's water needs are computed using GIS information on lot size and potential landscape coverage. A water budget is then calculated for the property using Evapo-Transpiration (ET) measurements taken at a network of weather stations. Customers' water rates are then based upon the percentage of their budget they actually use. The Irvine Ranch Water District, which provides domestic water service to over 260,000 people in and around the city of Irvine, California, is a prominent example of the effective use of water budgets and conservation rate structures to lower water demand. Irvine Ranch assesses water rates according to the schedule shown in Table 13.

Table 13. Conservation Rate Structures for the Irvine Ranch Water District

Tier	Rate (per ccf*)	Use (percent of allocation)
Low Volume Discount	\$0.48	0-40%
Conservation Base Rate	\$0.64	41-100%
Inefficient	\$1.28	101-150%
Excessive	\$2.56	151-200%
Wasteful	\$5.12	210%+

*One ccf = 100 cubic feet = 748 gallons

Many of Austin's water customers are becoming familiar with the concept of Evapo-Transpiration through the city's Watering with Evapo-Transpiration (WET) program. Enforcement of the mandatory five-day watering schedule during stage two water rationing in the summer of 2000 has also made city water customers more cognizant of the amount of water their landscape requires. Recent stakeholder meetings held in connection with the Green Gardening for Water Quality Protection Initiative made clear that there is support among city residents for the use of a steeper increasing rate structure which assigns financial penalties for "excessive" or "wasteful" water use.

The water savings achievable and costs associated with a water-budget based rate system would be fairly easy to estimate. Assuming water budgets would be universally applied to all single-family residential customers, the number of customers exceeding their budgets could be estimated with a reasonable degree of certainty. The primary costs associated with transitioning to this system would be the labor needed to compile GIS data on lot size and potential landscape coverage for all lots in Austin. Use of water budgets combined with a conservation rate structure would reduce both average daily water demand and peak daily water use for the summer when customers are currently prone to over-watering. Lower demand would mean less water drawn each year against the city's LCRA water rights contract.

Collection of Air Conditioner Condensate

In some situations it is feasible and economical to collect the condensate water from air conditioning units for reuse either as feed water for manufacturing processes or for irrigation. Several businesses and institutions in Austin already collect their condensate water, most notably the University of Texas. A program could be implemented to promote harvesting and reuse of this water source.

Collecting Fuel Cell Water Vapor

When fuel cells discharge their energy, they produce water as a byproduct. Austin Energy is already installing a commercial fuel cell. As this technology matures and becomes more widespread, it may become feasible to harvest this water for irrigation and other non-potable uses.

Energy and Water Conservation

There may be opportunities to link energy and water conservation so that both may benefit. First, many types of water conserving equipment also reduce energy use. As a result, the City of Austin has established several joint energy-water rebate programs including efficient clothes washers, medical vacuum pumps, and for the removal of garbage disposals in restaurants. In addition, large amounts of electricity are needed to pump and treat water and wastewater. In Austin, 3.9 kWh of electricity are used for every 1,000 gallons of water and wastewater. Pumping energy needs alone average 2.3 kWh per 1,000 gallons. Thus saving water also reduced energy use and the resulting air pollution associated with power generation. These savings are being captured and reported as part of the City's overall energy conservation efforts. In a reverse manner, wind and solar power generation do not require water for cooling and thus save water that would be used for that purpose. Current wind power generation alone saves the evaporation of just over half a million gallons of water a day for cooling.

10.0 Public Involvement in Planning Process

The Water and Wastewater Commission and Resource Management Commission reviewed the draft plan and passed resolutions in support of Council adoption of the 2005 Water Conservation Plan. The resolutions are included in Appendix D.

11.0 Implementation and Enforcement

This Plan will be presented to Austin's City Council after it is completed. All new wholesale supply contracts entered into or renewed after official adoption of this plan will require wholesale customers to develop and implement a water conservation plan or water conservation measures consistent with the TCEQ water conservation planning regulations and guidelines. Currently, the City works closely with wholesale customers in providing technical assistance on water conservation education and programs. Monthly meetings are conducted with the City's wholesale and large industrial retail customers. The retail customers of the City's wholesale water customers are eligible to participate in most of the City's water conservation programs.

APPENDIX A: Emergency and Peak Day Water Use Management Codes

AUSTIN CITY CODE CHAPTER 6-4

ARTICLE 2. WATER USE MANAGEMENT.

Division 1. General Provisions.

§ 6-4-51 DEFINITIONS.

In this article:

- (1) DIRECTOR means the director of the Austin Water Utility.
- (2) NEW LANDSCAPE means vegetation:
 - (a) installed at the time of the construction of a new house, multi-family building, or commercial building;
 - (b) installed as part of a governmental entity's capital improvement project; or
 - (c) that alters more than one-half of the area of an existing landscape.
- (3) OUTDOOR WATER USE DAY means the day an owner is permitted to water under the city manager's water conservation guidelines.

Source: 1992 Code Section 4-2-54; Ord. 031023-10; Ord. 031211-11.

§ 6-4-52 WATER USE MANAGEMENT PLAN ESTABLISHED.

This article establishes a water use management plan.

Source: 1992 Code Section 4-2-50; Ord. 031023-10; Ord. 031211-11.

§ 6-4-53 APPLICABILITY.

This article applies to a person who uses or allows the use of water supplied by Austin Water Utility.

Source: 1992 Code Section 4-2-53; Ord. 031023-10; Ord. 031211-11.

§ 6-4-54 COMPLIANCE REQUIRED.

A person may not knowingly use or permit the use of the water in a manner that conflicts with the requirements of this article or in an amount greater than permitted by this article.

Source: 1992 Code Section 4-2-60(A); Ord. 031023-10; Ord. 031211-11.

Division 2. Water Use Guidelines and Restrictions.

§ 6-4-61 WATER CONSERVATION GUIDELINES.

- (A) The city manager shall adopt water conservation guidelines.
- (B) The guidelines shall include:
 - (1) policies for compliance by city departments;
 - (2) the criteria for determining when a conservation stage takes effect or terminates; and
 - (3) a system designating allowed days for outdoor water use by customers.
- (C) The city manager shall update the guidelines if the city manager determines that changed conditions of the city's water supply system require the update.
- (D) The guidelines shall be available for inspection at the Austin Water Utility administrative offices during normal business hours.

Source: 1992 Code Section 4-2-60(B); Ord. 031023-10; Ord. 031211-11.

§ 6-4-62 EFFECTIVE DATES OF CONSERVATION STAGES.

- (A) Except as provided in Subsection (B), Section 6-4-64 (*Water Conservation Stage One Regulations*) is effective:
 - (1) May 1 through September 30; and
 - (2) during other time periods as determined by the director.
- (B) The city manager may order that the water use restrictions of Section 6-4-65 (*Water Conservation Stage Two Regulations*), Section 6-4-66 (*Water Conservation Stage Three Regulations*), or Section 6-4-72 (*Additional Restrictions During Long-Term Water Supply Shortages*) take effect or terminate after determining that the order is necessary to protect the public health, safety, or welfare. The order is effective when announced publicly.
- (C) The director shall monitor the daily supply and demand for water and recommend to the city manager whether to implement or terminate water use restrictions.

Source: 1992 Code Sections 4-2-52, 4-2-60(B), and 4-2-76; Ord. 031023-10; Ord. 031211-11.

§ 6-4-63 PERMANENT WATER USE RESTRICTIONS.

A person may not:

- (1) fail to repair a controllable leak, including a broken sprinkler head, a leaking valve, leaking or broken

pipes, or a leaking faucet;

(2) operate a permanently installed irrigation system with:

- (a) a broken head;
- (b) a head that is out of adjustment and the arc of the spray head is over a street or parking lot; or
- (c) a head that is misting because of high water pressure; or

(3) during irrigation, allow water:

- (a) to run off a property and form a stream of water in a street for a distance of 50 feet or greater; or
- (b) to pond in a street or parking lot to a depth greater than one-quarter of an inch.

Source: 1992 Code Section 4-2-61; Ord. 031023-10; Ord. 031211-11.

§ 6-4-64 WATER CONSERVATION STAGE ONE REGULATIONS.

(A) This section prescribes water conservation stage one regulations.

(B) This section applies during the time periods prescribed by Section 6-4-62 (*Effective Dates Of Conservation Stages*).

(C) Except as provided in Subsection (D), a person may not irrigate outdoors using a permanently installed automatic irrigation system between the hours of 10:00 a.m. and 7:00 p.m.

(D) Subsection (C) does not apply to irrigation:

- (1) at a single family, duplex, triplex, or fourplex residence;
- (2) of a new landscape, if the owner provides complete notice in the form established in the water conservation guidelines to the director at least one day before installation:
 - (a) during landscape installation; and
 - (b) during the first seven days after installation is complete;
- (3) during repair or testing of a new or existing irrigation system if the person performing the testing is present; or
- (4) to water nursery stock at a commercial plant nursery.

Source: 1992 Code Section 4-2-62; Ord. 031023-10; Ord. 031211-11.

§ 6-4-65 WATER CONSERVATION STAGE TWO REGULATIONS.

(A) This section prescribes stage two water use management regulations.

(B) This section applies during a time period ordered by the city manager in accordance with Section 6-4-62 (*Effective Dates of Conservation Stages*).

(C) This section does not apply to:

- (1) necessary use of water, other than for landscape irrigation, by a governmental entity performing a governmental function, including for a capital improvement construction project;
- (2) necessary use of water, other than for landscape irrigation, for land development including roadway base preparation, flushing a utility line, dust control, concrete or asphalt work, and building construction, provided that if reclaimed water is available within one mile of the construction site, reclaimed water must be used for roadway base preparation and dust control;
- (3) necessary use of water for repair of a water distribution facility, residential and commercial plumbing, or a permanently installed landscape irrigation system; or
- (4) use of water in accordance with a variance approved by the director.

(D) The allowed days for outdoor water use in the water conservation guidelines do not apply to a customer who uses treated wastewater effluent or raw water.

(E) This subsection prescribes requirements for outdoor irrigation, excluding watering nursery stock at a commercial plant nursery.

(1) A person may not irrigate outdoors, except:

- (a) with a hand-held hose or a hand-held bucket at any time;
- (b) with a hose-end sprinkler, a soaker hose, or drip irrigation, from 12:00 a.m. to 10:00 a.m. and from 7:00 p.m. to 12:00 a.m. on a designated outdoor water use day;
- (c) with a permanently installed automatic irrigation system from 12:00 a.m. to 10:00 a.m. on a designated outdoor water use day; or
- (d) in accordance with a variance granted by the director, if the director determines that a property cannot be completely watered with an average of three-quarters of an inch of water in a single day and that the property should be divided into sections to be watered on different days.

(2) This paragraph prescribes requirements for irrigating new landscape.

(a) A person may not irrigate new landscape, unless:

- (i) the person provides a completed notice in the form established in the water conservation guidelines to the director at least one day before the landscape is installed; and
- (ii) the person irrigates with a hose-end sprinkler, a soaker hose, or drip irrigation only from 12:00 a.m. to 10:00 a.m. and from 7:00 p.m. to 12:00 a.m. on a designated outdoor water use day, or with an automatic irrigation system from 12:00 a.m. to 10:00 a.m. on a designated outdoor water use day.

(b) The director may grant a variance from Subparagraph (a) if the director determines that a new landscape does not have an underground irrigation system and cannot feasibly be watered before 10:00

a.m. or after 7:00 p.m. If the director grants a variance, a person may water not more than three-quarters inch between 10:00 a.m. and 7:00 p.m. if the person:

- (i) uses a hose timer or is on-site during the irrigation; and
- (ii) complies with the following schedule:
 - 1. for the first 10 days after installation, watering is permitted every day;
 - 2. for day 11 through day 20 after installation, watering is permitted every other day; and
 - 3. for day 21 through day 30 after installation, watering is permitted every third day.

(F) This subsection prescribes requirements for washing an automobile, truck, trailer, boat, airplane, or other mobile equipment.

- (1) A person may not wash a vehicle or mobile equipment, except on a designated outdoor water use day from 12:00 a.m. to 10:00 a.m. and from 7:00 p.m. to 12:00 a.m.
- (2) A person who washes a vehicle or mobile equipment must use a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle.
- (3) A person may not conduct or participate in a charity car wash.
- (4) A person commits a separate offense for each vehicle or piece of equipment washed in violation of the terms and conditions of this restriction.
- (5) This subsection does not apply to a commercial carwash if:
 - (a) in-bay, hand-held spray wash equipment, including a spray wand or foaming brush, does not use more than 3.0 gallons of water a minute and has a trigger shutoff;
 - (b) portable pressure wash equipment with a spray nozzle does not use more than 3.5 gallons of water a minute and has a trigger shutoff;
 - (c) a conveyor friction system does not use more than 20 gallons for each vehicle;
 - (d) a conveyor touchless system does not use more than 40 gallons for each vehicle;
 - (e) a rollover automatic system does not use more than 45 gallons for each vehicle;
 - (f) each chamois wringer has a positive shutoff valve; and
 - (g) a system using reverse osmosis rinse water reclaims and reuses reject water, and the reject water is not discharged into a sanitary sewer.
- (6) This subsection does not apply if washing the vehicle is necessary to protect the health, safety, or welfare of the public.

(G) This subsection prescribes requirements for foundation watering.

- (1) A person may not water the ground around a foundation to prevent foundation cracking except on a designated outdoor water use day from 12:00 a.m. to 10:00 a.m.

- (2) The director may grant a variance to Paragraph (1) if the director determines that additional watering is necessary to prevent foundation cracking. If the director grants a variance, a person may water a foundation:
 - (a) during the time period prescribed by Paragraph (1); and
 - (b) on the second day after time period prescribed by Paragraph (1) from 12:00 a.m. to 10:00 a.m. using a soaker hose or drip system placed within 24 inches of the foundation that does not produce a spray of water above the ground.
- (II) A person may not use an automatic fill valve to add water to an outdoor swimming, wading pool, or pond.
- (I) A person may not operate an outdoor ornamental fountain or structure making similar use of water, other than the aeration necessary to preserve habitat for aquatic species. A person may not fill, refill, or add water to an indoor fountain.
- (J) A person may not irrigate a golf fairway, except on a designated outdoor water use day from 12:00 a.m. to 10:00 a.m. and from 7:00 p.m. to 12:00 a.m. A person may irrigate a golf course green or tee every other day if the person files a plan with the director establishing the irrigation schedule.
- (K) A person may not wash a sidewalk, driveway, parking area, street, tennis court, patio, or other paved area, except to alleviate an immediate health or safety hazard.
- (L) A restaurant may not serve water to a customer except when requested by the customer.
- (M) The owner of an athletic field used for an organized sport shall:
 - (1) comply with the outdoor irrigation requirements of Subsection (E); or
 - (2) if applicable, notify the director that the athletic field is in use or is to be used within 60 days of the institution of stage two regulations; and
 - (a) water the athletic field during the hours designated in Subsection (E) either each Monday and Thursday or each Tuesday and Friday; or
 - (b) if the irrigation system cannot provide three-fourths inch of water to the entire athletic field in one day during the designated hours, divide the athletic field into portions with separate addresses, and water each portion based on the assigned address on the appropriate outdoor water use day during the hours designated in Subsection (E).

Source: 1992 Code Section 4-2-63; Ord. 031023-10; Ord. 031211-11.

§ 6-4-66 WATER CONSERVATION STAGE THREE REGULATIONS.

- (A) This section prescribes stage three water use management regulations.
- (B) This section applies during a time period ordered by the city manager in accordance with Section 6-4-62

(Effective Dates of Conservation Stages).

- (C) This section does not apply to a person who uses treated wastewater effluent or raw water.
- (D) A person may not irrigate vegetation outdoors, except:
 - (1) with a hand-held hose or hand-held watering can from 6:00 a.m. to 10:00 a.m. and 7:00 p.m. to 10:00 p.m. on a designated outdoor water use day; or
 - (2) at a commercial plant nursery with a hand-held hose, hand-held watering can, or drip irrigation system.
- (E) A person may not wash an automobile, truck, trailer, boat, airplane, or other mobile equipment. This prohibition does not apply if the washing is necessary to alleviate an immediate threat to public health, safety, or welfare, but a person may use a commercial car wash or commercial service station for this purpose only between 12:00 p.m. and 5:00 p.m.
- (F) This subsection prescribes requirements for foundation watering.
 - (1) A person may not water the ground around a foundation to prevent foundation cracking except on a designated outdoor water use day from 12:00 a.m. to 10:00 a.m.
 - (2) The director may grant a variance to Paragraph (1) if the director determines that additional watering is necessary to prevent foundation cracking. If the director grants a variance, a person may water a foundation:
 - (a) during the time period prescribed by Paragraph (1); and
 - (b) on the second day after time period prescribed by Paragraph (1) from 12:00 a.m. to 10:00 a.m. using a soaker hose or drip system placed within 24 inches of the foundation that does not produce a spray of water above the ground.
- (G) A person may not operate an outdoor ornamental fountain or structure making similar use of water, other than the aeration necessary to preserve habitat for aquatic species.
- (H) A person may not add potable water to a swimming pool, wading pool, fountain, or pond.
- (I) A person may not begin the installation of new landscape.
- (J) A person may not wash a sidewalk, driveway, parking area, street, tennis court, patio, or other paved area, except to alleviate an immediate health or safety hazard.
- (K) A restaurant may not serve water to a customer except when requested by the customer.

Source: 1992 Code Section 4-2-64; Ord. 031023-10; Ord. 031211-11.

Division 3. Additional Restrictions.

§ 6-4-71 DIRECTOR'S AUTHORITY TO IMPOSE ADDITIONAL RESTRICTIONS.

- (A) The director may implement mandatory water restrictions in addition to those prescribed by Division 2 (*Water Use Guidelines And Restrictions*) to protect the public health and safety in the event of an unusual water system operational event, catastrophic occurrence, or severe weather event.
- (B) The director may implement mandatory restrictions, immediately effective, by public announcement.

Source: 1992 Code Section 4-2-70; Ord. 031023-10; Ord. 031211-11.

§ 6-4-72 ADDITIONAL RESTRICTIONS DURING LONG-TERM WATER SUPPLY SHORTAGES.

- (A) This section applies if the city manager determines that:
 - (1) the available capacity of the Highland Lakes Reservoir is less than the anticipated demand; or
 - (2) the combined water storage levels of Lakes Travis and Buchanan are less than 681,000 acre-feet.
- (B) The city manager may:
 - (1) prohibit outdoor watering, except with treated wastewater effluent, raw water, well water, storm water, or stored rainwater; or
 - (2) require municipal wholesale customers to curtail water use on a pro rata basis, in accordance with Section 11.039 (*Distribution of Water During Shortage*) of the Texas Water Code.

Source: 1992 Code Section 4-2-71; Ord. 031023-10; Ord. 031211-11.

Division 4. Variances; Alternative Compliance.

§ 6-4-81 VARIANCE.

- (A) Except as provided in Subsection (B), the director may grant a variance from a requirement of this article if the director determines that special circumstances exist and that compliance with this article:
 - (1) adversely affects the health, sanitation, or fire protection of the public or the applicant; or
 - (2) substantially threatens the applicant's primary source of income.
- (B) The director may grant a variance from a requirement of Subsections 6-4-65(E) or 6-4-65(G) (*Water Conservation Stage Two Regulations*) in accordance with the applicable subsection.

- (C) A person may seek a variance by filing an application with the director. The director may require the applicant to provide information the director determines is necessary to evaluate the variance request.
- (D) If the director approves a variance, the applicant shall keep a copy of the approval in a location on the affected property that is accessible and visible to the public.

Source: 1992 Code Section 4-2-77; Ord. 031023-10; Ord. 031211-11.

§ 6-4-82 EXPIRATION OF VARIANCE.

- (A) A variance from a stage one requirement expires when stage two regulations take effect.
- (B) A variance from a stage two requirement expires when stage three regulations take effect.
- (C) A variance from a requirement of this article expires when additional restrictions during long-term water supply shortage are adopted under Section 6-4-72 (*Additional Restrictions During Long-Term Water Supply Shortages*).
- (D) A variance from a requirement of this article expires if the applicant is convicted of violating this article.

Source: 1992 Code Section 4-2-79; Ord. 031023-10; Ord. 031211-11.

§ 6-4-83 ALTERNATIVE COMPLIANCE.

- (A) The director may permit a person to comply with alternative water use restrictions after determining that the alternative restrictions meet or exceed the intent of this article.
- (B) If the director approves alternate water use restrictions, the applicant shall keep a copy of the approved restrictions in a location on the affected property that is accessible and visible to the public.

Source: 1992 Code Section 4-2-78; Ord. 031023-10; Ord. 031211-11.

ARTICLE 3. ENFORCEMENT.

§ 6-4-91 PRESUMPTION OF VIOLATION.

A person in whose name a water service account is held is presumed to be responsible for a violation of this article that occurs at the water service account location.

Source: 1992 Code Section 4-2-75; Ord. 031023-10; Ord. 031211-11.

§ 6-4-92 PENALTY.

- (A) A person commits an offense if the person performs an act prohibited by this chapter or fails to perform an act required by this chapter. Each instance of a violation of this chapter is a separate offense.

- (B) Proof of a culpable mental state is not required for a conviction of an offense under this chapter.
- (C) An offense under this chapter is a Class C misdemeanor, punishable by a fine not to exceed \$2,000.00.
Prosecution of an offense and enforcement of other remedies under this chapter are cumulative.
- (D) For repeat violations of this chapter, the director may disconnect or restrict water service.
- (E) If a person is irrigating during a time period or on a day when irrigation is not permitted for the person's street address, and a City employee cannot find a person at that address to turn off the irrigation system, the City employee may turn off an accessible irrigation system.

Source: 1992 Code Section 4-2-99; Ord. 031023-10; Ord. 031211-11.

APPENDIX B: City of Austin Council Resolution Establishing Water Conservation Goals, 1990

901206-91

RESOLUTION

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF AUSTIN:

WHEREAS, Austin is the trustee and protector of the City's natural environment, including the water quality of the creeks, lakes and river within its jurisdiction; and

WHEREAS, it is critical to the economic vitality of Austin and central Texas to maintain and enhance the water quality of the Colorado River; and

WHEREAS, these water resources serve as a drinking water supply, and as an economic and recreational base for central Texas; and

WHEREAS, the City of Austin wastewater treatment plants discharge over sixty million gallons per day of treated wastewater effluent into the Colorado River; and

WHEREAS, the City has been consistently meeting a higher level of wastewater treatment at its wastewater plants than is required by its Texas Water Commission permits; and

WHEREAS, Austin is committed to operating its wastewater plants at least at the same level in the future;

NOW, THEREFORE in recognition of these considerations the City Council of Austin, Texas resolves to develop and implement a long range water quality protection plan aimed at maintaining the high quality of effluent currently entering

the river from its wastewater treatment plants. In order to achieve the water quality benefits of this plan, the City Council resolves to:

1. amend its permits with the Texas Water Commission for its Walnut Creek and South Austin Regional wastewater treatment facilities during the 1991 permit renewal process to provide a minimum treatment level of 5 milligrams per liter (mg/l) CBOD₅ (5-day Carbonaceous Biochemical Oxygen Demand), 5 mg/l Total Suspended Solids (TSS), and 2 mg/l NH₃-N (Ammonia Nitrogen) based on actual flows averaged on an annual basis. The 5-5-2 permit shall reflect final effluent limitations and monitoring requirements for the outfalls from the Walnut Creek and South Austin Regional wastewater treatment facilities as shown on the attachment included in this resolution;
2. by the year 2000, either: 1) retire the Govalle wastewater treatment plant; 2) amend the Govalle wastewater discharge permit to 5 mg/l CBOD₅, 5 mg/l TSS; and 2 mg/l NH₃-N based on an annual average; or 3) operate the plant as a no discharge facility;
3. develop for City Council consideration an ordinance for those watersheds currently defined as "urban" in its Comprehensive Watersheds Ordinance (Ord. No. 860508-V) by March 1, 1991. The ordinance will provide for the reduction of nonpoint source runoff from new development and redeveloped construction in the urban watersheds including the installation of pollution control devices for all capital improvement projects in these watersheds;
4. work with the Texas Water Commission, the Lower Colorado River Authority (LCRA) and other governmental agencies to protect the water quality of the Edwards Aquifer and the Highland Lakes by supporting the establishment of nonpoint source pollution controls for the Highland Lakes and those portions of the Edwards Aquifer currently unprotected by nonpoint source regulations;
5. establish and operate a permanent household hazardous waste collection site, and will seek a contribution of \$125,000 from LCRA for its creation prior to construction, to be in place by October 1, 1991;

6. establish a joint water quality monitoring program with the United States Geological Survey, Texas Water Commission (TWC), LCRA, Texas Department of Health and Barton Springs-Edwards Underground Conservation District by April 1, 1991, to avoid overlap and duplication of water pollution data collection and analysis. The goal will be to utilize existing resources to identify water pollution problems and develop protection and remediation strategies to prevent further degradation of water quality and impairment of desired uses;
7. develop and implement a public education program that specifically addresses the impacts of point source pollution, the benefits of phosphate free detergents, and the impacts and sources of nonpoint source pollution. The program will target action plans to reduce sources of nonpoint source pollution that can be utilized by individual citizens. This program will be developed by June 1, 1991;
8. pursue an urban water quality retrofit project by July 1, 1991 in coordination with LCRA, the TWC and the U.S. Environmental Protection Agency; and
9. continue implementing water conservation and water reuse programs with the objectives of reducing, by the year 2000, projected maximum-day water demand by 10 percent and projected average per capita daily consumption by 5 percent. To achieve these objectives, Austin shall evaluate and modify current water conservation programs, develop and implement new programs, and seek LCRA's cooperation in these endeavors. These programs will include:
 - a. coordination by May 1, 1991, of the City's public education/awareness campaign on water conservation with other governmental entities to maximize the effectiveness of the available resources;
 - b. active promotion and enforcement of recently amended plumbing code standards for water conservation, which become effective January 1, 1991;
 - c. development and implementation of a long-range master plan for beneficial reuse of "reclaimed" water (e.g., treated wastewater effluent and greywater) for non-potable purposes (e.g., irrigation of public and private greenspace);

- d. active participation in the development and implementation of a landscape water management program for large irrigated turf-areas; and
- e. consider revision of the Austin landscape ordinance to provide greater emphasis on landscape and irrigation design principles that promote water conservation.

City of Austin staff shall monitor the progress made under this resolution and shall make an annual report to the Austin City Council on such progress.

ADOPTED: December 6, 1990.

ATTEST:

James E. Aldridge
James E. Aldridge
City Clerk

NKM:sla
8368

#91

Walnut Creek and South Austin Regional WWTP

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Outfall Number _____

1. During the period beginning up on the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge subject to the following effluent limitations:

The daily average flow of effluent shall not exceed _____ gallons per day (MGD); nor shall the average discharge during any two-hour period (2-hour peak) exceed _____ gallons per minute (gpm).

Effluent Characteristic	Discharge Limitations			Min. Self-Monitoring Requirements	
	Annual Avg mg/l	Daily Avg mg/l	7-day Avg mg/l	Single Grab mg/l	Measurement Frequency Sample Type
Flow	N/A	N/A	N/A	N/A	Continuous Totalizing meter
Biochemical Oxygen Demand (5-day)	5	10	15	35	Two/week Composite
Total Suspended Solids	5	15	25	60	Two/week Composite
Ammonia Nitrogen	2	2	5	15	Two/week Composite

APPENDIX C: Water Conservation Performance Measures and Estimated Water Savings

Water Conservation Performance Measures

Programs

Residential Programs	98-99	99-00	200-01	2001-02	2002-03	2003-04	Totals
Free Toilets	2,893	1,540	1,187	3,358	2,528	2,715	14,221
Toilet Rebates	1,345	1,579	1,282	1,526	402	1,047	7,181
Clotheswasher Rebates	1,480	1,745	1,769	1,897	2,248	2,220	11,359
Irrigation Rebates	20	34	21	18	321	211	625
WaterWise Rebates	32	27	46	45	26	7	183
Aerators		4,555	1,797	670	71	11	7,104
Showerheads	328	8,101	9,867	6,346	595	721	25,958
Irrigation Audits	379	268	345	447	711	1,572	3,722
Rainwater Rebates	9	7	9	9	2	10	46
Rain barrel Rebates		50	1,118	1,749	2,603	1,673	7,193
Indoor Audits	18	15	0	0	0	5	38
Hose Timers		2,344	1,435	365	170	298	4,612
Rain Shutoffs					59	74	133

Multi-Family Programs

Free Toilets	4,766	5,173	3,096	1,295	1,488	2,506	18,324
Toilet Rebates	607	1,834	679	1,463	187	1,713	6,483
Clotheswasher Rebates	6	314	12	80	23	39	474

Commercial Programs

Toilet Rebates	352	20	614	420	669	429	2,504
Free Toilets	185	122	114	202	80	116	819
Irrigation Audits	88	98	76	71	77	106	516
ICI Audits	7	0	17	20	4	126	174
Commercial Rebates	1	1	6	1	30	8	47
Grinder Rebates						2	2
Spray Valves						263	263
Dental Vacuum Pumps				10	2	10	22
Aerators						624	624

Education Programs

Dowser Dan Shows	214	191	251	231	221	200	1,308
Dowser Dan Attendance		28,449	30,869	29,473	30,183	32,291	151,265
Water in Our World		1,482	1,453	2,653	4,482	3,727	13,797
Xerisape and Rainwater Events				926	0	1,000	1,926

Savings from Water Conservation and Reuse

In millions of gallons per day

Year	Peak Day Savings			Year	Average Day Savings		
	Water Conservation	Reuse	Total Savings		Water Conservation	Reuse	Total Savings
92-93	168,032	750,000	918,032	92-93	144,000	375,000	519,000
93-94	335,000	750,000	1,085,000	93-94	274,000	375,000	649,000
94-95	604,000		604,000	94-95	562,000		562,000
95-96	863,000		863,000	95-96	733,000		733,000
96-97	621,000		621,000	96-97	472,000		472,000
97-98	1,140,000		1,140,000	97-98	884,000		884,000
98-99	1,258,195		1,258,195	98-99	1,056,692		1,056,692
99-00	892,976		892,976	99-00	767,658		767,658
00-01	827,910	1,150,000	1,977,910	00-01	731,246	205,000	936,246
2001-02	871,471	1,638,000	2,509,471	2001-02	783,381	819,000	1,602,381
2002-03	1,129,025	560,000	1,689,025	2002-03	963,609	560,000	1,523,609
2003-04	820,977	1,000,000	1,820,977	2003-04	761,509	500,000	1,261,509
Totals	9,531,586	5,848,000	15,379,586	Totals	8,133,095	2,834,000	10,967,095

Year	Cumulative Peak Day Savings		
	Water Conservation	Reuse	Total Savings
92-93	168,032	750,000	918,032
93-94	503,032	1,500,000	2,003,032
94-95	1,107,032	1,500,000	2,607,032
95-96	1,970,032	1,500,000	3,470,032
96-97	2,591,032	1,500,000	4,091,032
97-98	3,731,032	1,500,000	5,231,032
98-99	4,989,227	1,500,000	6,489,227
99-00	5,882,203	1,500,000	7,382,203
00-01	6,710,113	2,650,000	9,360,113
2001-02	7,581,584	4,288,000	11,869,584
2002-03	8,710,609	4,848,000	13,558,609
2003-04	9,531,586	5,848,000	15,379,586

APPENDIX D: Public Outreach Component of Water Conservation Planning Process

1. Water and Wastewater Commission Resolution
2. Resource Management Commission Resolution



Water and Wastewater Commission

Resolution

Austin Water Utility – Water Conservation Program

April 6, 2005

Vote: 0-0-0-0-0

Motion by:

Second by:

For:

Against:

Abstain:

Absent:

Vacant:

Motion:

The Water and Wastewater Commission supports the City of Austin's Water Conservation Programs, and recommends that the City Council adopt the 2005 Water Conservation Plan. This plan is provided to meet the requirements of the Texas Administrative Code, Title 30: Environmental Quality, Chapter 288, Subchapter A, Rule §288.2: Water Conservation Plans for Municipal Uses by Public Water Suppliers. The City of Austin has water rights that exceed 1,000 acre-feet and is therefore required to comply with the provisions of the Texas Administrative Code. The plan is required to be officially adopted through resolution or ordinance before being submitted to the TCEQ for final approval on May 1, 2005.

The 2005 Water Conservation Plan adheres to the requirements of the Texas Administrative Code by including a utility system profile that describes the City of Austin's water supply, water and wastewater treatment capacity, and water demand projections. In response to House Bill 2660 enacted during the 78th Legislature, the 2005 Water Conservation Plan also includes specific, quantified 5-year and 10-year targets for water savings, and describes current and future programs designed to meet those conservation goals. In addition to the Administrative Code requirements, the Conservation Plan also provides a description of how the City of Austin's policies and programs correspond to the Texas Water Development Board's Water Conservation Best Management Practices Guide, as set forth by the Water Conservation Implementation Task Force.

Approved, Michael Warner, Chair

April 6, 2005



Resource Management Commission

Resolution

Austin Water Utility – Water Conservation Program

April 19, 2005

Vote: 0-0-0-0-0

Motion by:

Second by:

For:

Against:

Abstain:

Absent:

Vacant:

Motion:

The Resource Management Commission supports the City of Austin's Water Conservation Programs, and recommends that the City Council adopt the 2005 Water Conservation Plan. This plan is provided to meet the requirements of the Texas Administrative Code, Title 30: Environmental Quality, Chapter 288, Subchapter A, Rule §288.2: Water Conservation Plans for Municipal Uses by Public Water Suppliers. The City of Austin has water rights that exceed 1,000 acre-feet and is therefore required to comply with the provisions of the Texas Administrative Code. The plan is required to be officially adopted through resolution or ordinance before being submitted to the TCEQ for final approval on May 1, 2005.

The 2005 Water Conservation Plan adheres to the requirements of the Texas Administrative Code by including a utility system profile that describes the City of Austin's water supply, water and wastewater treatment capacity, and water demand projections. In response to House Bill 2660 enacted during the 78th Legislature, the 2005 Water Conservation Plan also includes specific, quantified 5-year and 10-year targets for water savings, and describes current and future programs designed to meet those conservation goals. In addition to the Administrative Code requirements, the Conservation Plan also provides a description of how the City of Austin's policies and programs correspond to the Texas Water Development Board's Water Conservation Best Management Practices Guide, as set forth by the Water Conservation Implementation Task Force.

Approved, Adán Martínez, Chair

April 19, 2005

APPENDIX E: City of Austin Council Resolution Adopting the
Water Conservation Plan

APPENDIX F: Transmittal Letter to the SB 1 Region K Planning Group