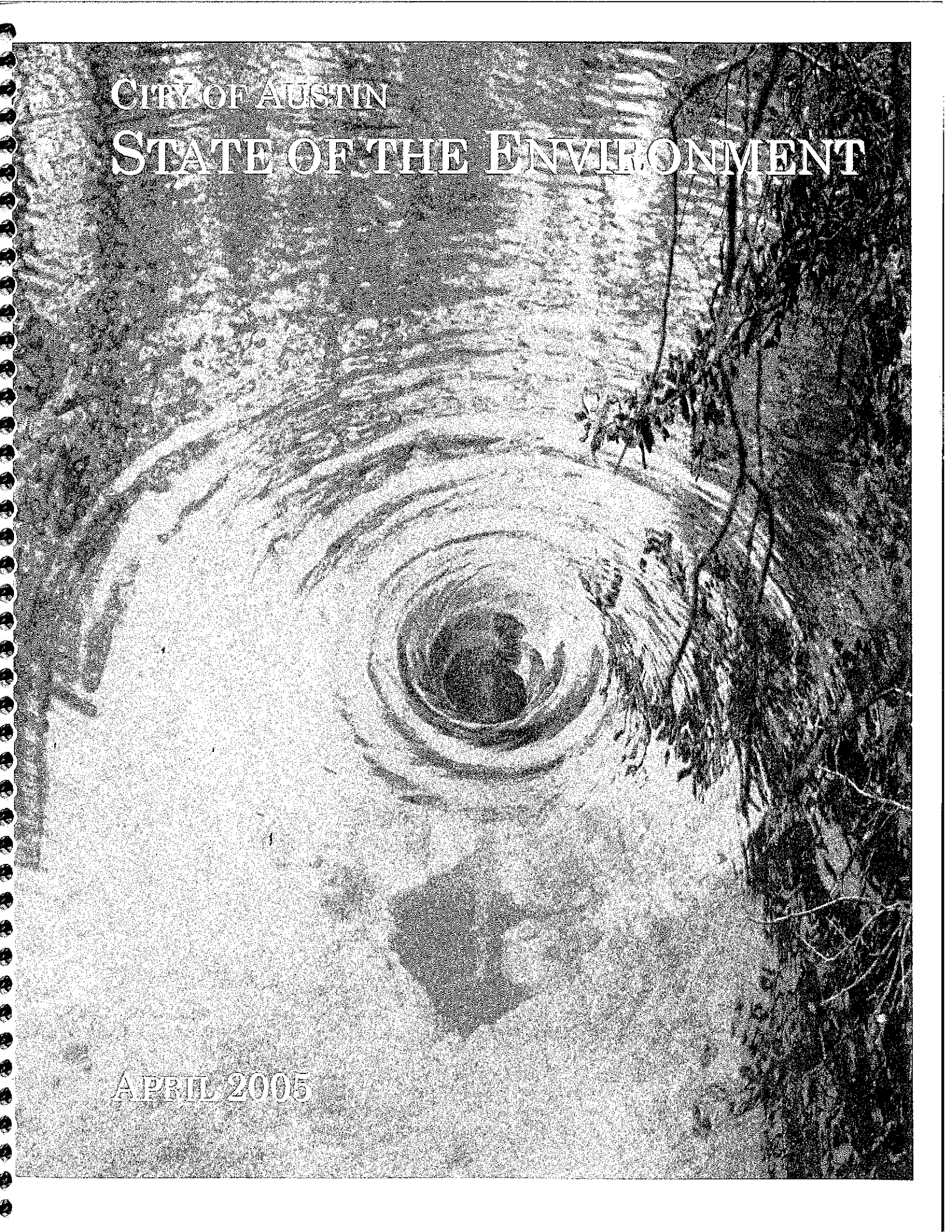


CITY OF AUSTIN

STATE OF THE ENVIRONMENT

APRIL 2005





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With special thanks to staff members of the following
City Departments for their help:

Austin Energy

Austin Water Utility

Parks and Recreation

Solid Waste Services

Watershed Protection and Development Review

Table of Contents

Executive Summary.....	i
Section 1 Watershed Protection Issues.....	1-1
Section 2 Air Quality.....	2-1
Section 3 Solid Waste Services	3-1
Section 4 Water Supply and Conservation, and Wastewater Service.....	4-1
Section 5 Wildlands and Parkland.....	5-1
Section 6 Austin Energy Distributed Energy Services.....	6-1

Executive Summary

On June 16, 1996, the City Council approved an ordinance directing the City Manager to appoint an Environmental Officer to ensure that environmental protection is given the highest priority, and to produce an annual report regarding the state of Austin's environment. This ninth annual report addresses the state of our environment using the following environmental indicators: watershed protection, air quality, solid waste and hazardous waste disposal, water supply and conservation and wastewater service, open spaces and parkland, and energy consumption and conservation.

Watershed Protection

In the spring of 2003, local media coverage focused on high sediment concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) in the area upstream of and in Barton Springs pool. From ongoing WPDRD monitoring and investigations, City staff concluded that parking lot pavement sealants are the primary source of PAHs in these sediments. Sealants used in the Austin area are either asphalt-based or coal tar-based. Coal tar is a known source of PAHs and coal tar-based sealants contain higher concentrations of these constituents.

Since the last update on the sediment contamination issue, progress has been made in several areas toward management of this problem. Public education and access to data has been expanded to make sure that the widest possible dissemination of information about the issue and local water quality conditions in general is made. Research into the pavement sealer transport and environmental impact has begun and preliminary results have guided concrete plans for getting the data that will help determine appropriate regulatory action by the City of Austin regarding pavement sealants. Coordination with sealant manufacturers, applicators, and industry consultants has begun and results of research activities will continue to be provided to these groups. Finally, the capital improvement projects to remediate the priority sediment contamination sites identified in

the lower Barton Creek watershed and provide ongoing stormwater treatment have been pursued and are scheduled for completion by the end of the next fiscal year. Although Barton Springs Pool continues to be shown safe from a human health standpoint for public recreation, follow-up on the pavement sealer contamination continues to be a priority for protection of aquatic life.

Air Quality

The Texas Commission on Environmental Quality (TCEQ) collects and analyzes statewide air quality data. Central Texas monitors show exceedances of EPA's health-based 8-hour standard for ground-level ozone. Based on that data, the Austin/Round Rock Metropolitan Statistical Area (MSA) are acting to assure attainment and maintenance of the federal 8-hour standard. Using the Early Action Compact (EAC) Protocol, the MSA has prepared a Clean Air Action Plan (CAAP) that provides clean air sooner, maintains local flexibility and can defer the effective date of nonattainment designation.

While some cities can attribute the majority of their air pollution to old manufacturing plants or refineries, Austin cannot. Most area NOx emissions come from on-road sources - cars and trucks. Additional sources include non-road (e.g., construction and landscaping equipment, trains, boats), point (e.g., large factories, power plants) and area (e.g., small facilities, households).

Clean air is a vital aspect of the quality of life in the Austin region, and air quality statistics impact Austin's reputation for "livability". Poor air quality creates aesthetic concerns such as reduced visibility and an unsightly green or brown haze. It damages property including buildings, vehicles, and flora. Most importantly, air pollution is a health hazard, especially for the very young, athletes who exercise outdoors, and the elderly.

Recognizing the regional nature of air quality, the City of Austin takes an active role in area initiatives. Section Two of this report provides information on initiatives taken by the City to comply the federal standard for average ground-level ozone concentration.

Solid Waste/Hazardous Waste Disposal

The official diversion rate for FY02/03 rose to 29.11%, up from 28.78% the previous year. As the number of households served and the tonnage of garbage collected have increased steadily over the past several years, the tonnage of material recycled by residents has also risen to hold the diversion rate between 28-29%.

Through curbside collection of recyclables and yard trimmings, Solid Waste Services diverts a significant portion of the residential waste stream from the landfill. Recyclable materials are processed and sold through the City's Material Recovery Facility, while yard trimmings are delivered to the Hornsby Bend facility and composted into Dillo Dirt.

Water Supply and Conservation, and Wastewater Service

Water consumption in the Austin area has steadily increased over the years due to consistent growth in the entire Central Texas region. The Austin Water Utility supplies water within its boundaries and in a number of surrounding areas. The size of Austin's water service area continues to grow, but the city has taken measures to ensure that it can accommodate substantial population growth for decades in the future.

In October 1999, the City of Austin supplemented its state-adjudicated water rights with additional water purchased from the Lower Colorado River Authority (LCRA) through a new water supply agreement. These combined supplies, backed by firm storage in the Highland Lakes, in conjunction with water reclamation and conservation are expected to meet demands for raw water within Austin's service area through the next 50 years.

Open Space and Parkland

With 16,800 acres of parks and greenbelts, Austin ranks as a leading city in parkland acres both in the state and nationally. Although Austin's population has continued to grow rapidly over the past two decades, parkland acquisition programs approved by the voters have enabled the parkland to population ratio to remain relatively constant. The ratio in 1985 was 26 acres per 1000 people and in 2004 is the same. Parkland acquisition through Capital Improvement Programs and the Parkland Dedication Ordinance insures that this growing population will continue to have an abundance of parkland to enjoy.

Energy Consumption/Conservation

The Austin Energy's Conservation and Renewable Energy Division, provides residential energy efficiency and commercial energy management services to all types of residential and commercial customers of Austin Energy. These services include, providing technical assistance through energy audits to identify energy efficiency opportunities, making recommendations on the most cost effective measures, and offering financial incentives for the installation of energy efficient measures.

The purpose of these programs is maximizing efficiency in the use of Austin's energy resources while increasing customer comfort and satisfaction and lowering customer electric bills. Maximizing efficiency lowers costs to Austin Energy and its customers, while also reducing power plant emissions and promoting economic development in the Austin area. These services also provide economic benefits through increased employment in the local energy efficiency industry and greater spending in the local economy due to thousands of Austinites having increased disposable income as a result of lower energy bills.

Section 1

Significant Year 2004 Watershed Protection Issues

PAHS AND COAL TAR PAVEMENT SEALANT UPATE

In the spring of 2003, local media coverage focused on high sediment concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) in the area upstream of and in Barton Springs pool. After alleviating concerns associated with the pool, City staff focused on the source of the PAH contamination in the immediate area – coal tar-based pavement sealants.

The first phase of experimental work on pavement sealers with the United States Geological Survey (USGS) in cooperation with Watershed Protection and Development Review Department (WPDRD) staff was completed and a report published showing that total PAHs in runoff from parking lots with coal-tar based sealants was significantly higher than other types of parking lots.

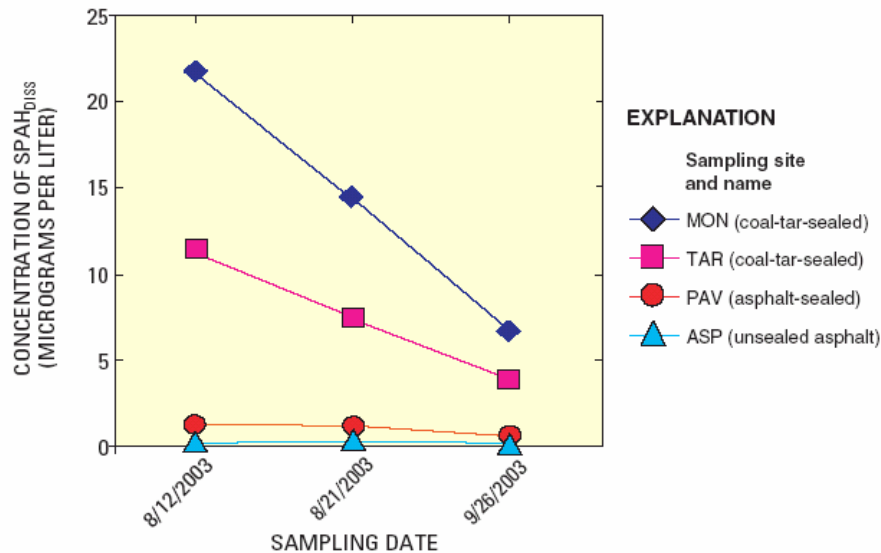


Figure 3. Concentrations of total dissolved polycyclic aromatic hydrocarbons ($\Sigma\text{PAH}_{\text{diss}}$) in runoff samples from four test plots in Austin, Texas, 2003.

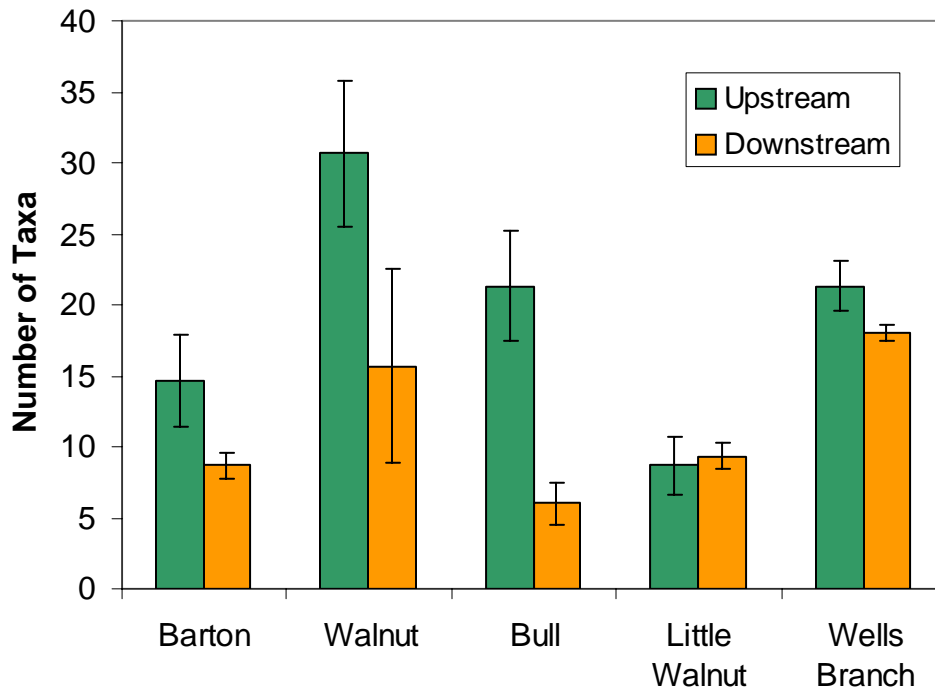
The Texas Water Quality Inventory is a biennial report generated by the Texas Commission on Environmental Quality (TCEQ) that summarizes the status of the State's waters and lists water quality problems and concerns. The draft 2004 report lists sediment contaminants concerns in Barton Creek above the pool and in Barton Springs Pool based on City of Austin data on PAHs in sediment. The listing has prompted TCEQ to conduct additional sediment and biological assessments in Barton Creek for at least a two year period. Results are updated regularly at their website: http://www.tceq.state.tx.us/comm_exec/tox/bsp/BartonMain.html.

- **Biological studies of pavement sealer impacts** have been conducted by Texas State University (TSU) TCEQ, USGS, and by a contract laboratory for toxicity in cooperation with WPDR staff biologists. The studies were designed to determine whether PAHs in the form of pavement sealers have negative impact to aquatic life and to compare impacts of coal tar-based sealants with those of asphalt-based sealants. The following research was completed. Final reports and results will be provided via the City internet and will also be published or presented in upcoming technical symposia.
1. **Toxicity studies conducted with the Great Lakes Environmental Research Center** – The City contracted with this laboratory to run separate controlled experiments with sediments spiked with dried pavement sealants (both coal-tar and asphalt based products). Toxicity to the test organism, *Hyallela*, a bottom dwelling aquatic invertebrate, was demonstrated both with and without UV-exposure for the coal-tar based sealants. Toxicity in the asphalt-based sealants experiments was greatly reduced (see data below). Note that PAH concentrations in the asphalt based product experiments are significantly lower than those in the coal tar-based experiment.

<i>Initial Total PAH Concentration, mg/kg</i>	<i>Hyallela Survival after 28 days (%)</i>	<i>:Hyallela Survival After UV Exposure (72 hours intermittent)</i>
<i>Control (0 mg/kg)</i>	<i>100%</i>	<i>100%</i>
<i>Coal-tar based Sealant</i>		
<i>597.9</i>	<i>13%</i>	<i>could not test*</i>
<i>72.4</i>	<i>29%</i>	<i>could not test*</i>
<i>33.2</i>	<i>81%</i>	<i>10%</i>
<i>Asphalt-based Sealant</i>		
<i>2.9</i>	<i>94%</i>	<i>16%</i>
<i>0.3</i>	<i>95%</i>	<i>70%</i>
<i>0.1</i>	<i>98%</i>	<i>84%</i>

**too much mortality in first 28 days to conduct further valid toxicity testing*

2. **Biological Field Studies conducted with Texas State University** -Standard biological assessment techniques were used to examine the effect of PAH-contaminated sediments on bottom-dwelling invertebrate communities in Austin streams. Assessments were made upstream and downstream of parking lots sealed with coal tar sealants. Even in large urban streams, sediment chemistry differences between upstream and downstream were apparent. Furthermore, degradation of biological communities was seen downstream of sealed parking lot areas. The graph below shows the diversity of aquatic life upstream and downstream of the parking lots.



3. **Field Sediment Mesocosm Studies (small scale manipulated experiments - see below) - Conducted at Texas State University** – Clean sediments in a field mesocosm experiment (with UV exposure) were spiked with three levels of coal tar sealant and inoculated with local organisms. After 24 days, the resulting community structure was examined. The results were that at high PAH levels, both abundance and diversity of aquatic life were severely impacted; the severity of the biological response to the three levels was proportional to the concentration.



4. **TCEQ Standard Ambient Toxicity of Barton Creek Sediments** – Toxicity testing to date on sediments collected in Barton Springs Pool and in Barton Creek, has only shown some growth effects in test organisms. However, the sediment chemistry indicates low levels of PAHs at the times and sites of collections; most importantly, the testing has not included

UV exposure. The lack of UV exposure excludes effect of photo-induced toxicity of PAHs to benthic organisms.

5. **USGS Standard Ambient Toxicity of Parking Lot Particulates** – To address the question of relative toxicity of different parking lot sources on the macroinvertebrate community, the USGS has collected particulates from parking lots by filtering runoff in order to conduct standard ambient toxicity tests with the particulates. Two benthic species will be studied at levels of PAH seen in Austin creek sediments.

6. **Laboratory Amphibian Toxicity to Coal-tar Based Sealants** – A University laboratory has applied for funding for the study of toxicity of the sealants to salamanders. These standard tests will examine mortality, growth and reproduction of a salamander to sediments spiked with the sealant. Calibration to a salamander species similar to the Barton Springs salamander is planned.

Community Outreach

Based on chemical evidence of high PAH contaminant levels in coal-tar based pavement sealants and their wash-off, the City issued a press release in June 2004 requesting a voluntary ban on the use of the coal-tar based sealants. Paired with the press release, the City disseminated information to reach multiple sources:

- ◆ Information was published on the City website including a fact sheet and list of preferred alternative products.

(www.ci.austin.tx.us/watershed/downloads/coaltarfacts.pdf)

- ◆ Distributors and retailers were contacted and provided with information on the requested ban. Response has been varied, however;

- o Some local retailers no longer carry coal-tar based products on their shelves
- o One distributor provides the fact sheets and ban request to customers. He applies only asphalt-based sealants in the Barton Creek area.

Recommendations regarding a possible City-wide ban on coal-tar based pavement sealants will be developed as a result of the studies and the City's long term monitoring efforts.

ON-GOING PROGRAMS

STORMWATER MONITORING: GOLF COURSE RUNOFF STUDIES

Watershed Protection staff has established four stormwater monitoring site to measure and evaluate runoff from effluent irrigated golf courses in the Austin area. One of the golf courses was older and had recently implemented some design retro-fits to help reduce direct runoff. The other course was new and had implemented some BMPs to mitigate the impacts associated with the golf course. The drainage areas for the monitoring sites on both courses were predominantly fairways although some portions were made up of tees and greens.

Water quality concentrations are normally related to impervious cover; as impervious cover increases, pollutant concentrations increase. Runoff concentrations from effluent irrigated golf courses do not follow this trend. Golf courses have very low impervious cover but also have higher levels of nutrient inputs associated with managed turf. The runoff quality from the effluent irrigated golf courses was compared to other land uses

(single family, commercial, undeveloped, etc.) to determine if there was a significant difference in quality. For most water quality parameters the concentration in the runoff from golf courses was similar to runoff from undeveloped land. However, the runoff concentrations of nutrients (nitrogen and phosphorus) from the golf course site were significantly higher than most other land uses. Dissolved and total phosphorus concentrations were three and five times higher than the next highest land use and up to twenty times higher than undeveloped land.

At this time it is not possible to determine if the increase in nutrient concentrations, especially phosphorus, can be attributed to golf courses/managed turf in general or effluent irrigation or some combination of the two. Water quality monitoring is in the process of establishing monitoring stations on non-effluent irrigated golf course and on effluent irrigation areas to try to further resolve this issue.

The total load of nutrients from golf courses may not exceed other undeveloped land uses even though the concentrations of nutrients in the runoff from a golf course may be higher. This is due to golf courses having low impervious cover and producing a lower volume of runoff. Comparing an estimate of the loads from a golf course with single-family residential (SFR) show that a golf course will generate approximately the same load of total phosphorus but twice the load of dissolved phosphorus as SFR and 50-75% as much nitrogen. Comparing to the loads to undeveloped land indicate a golf course will generate 10-20 times the load phosphorus and 5-8 times the load of nitrogen.

The complete report on effluent irrigated golf course monitoring may be found at:

<http://www.ci.austin.tx.us/watershed/publications.htm>

WATER QUALITY EDUCATION

WATERSHED WATCH

The Watershed Protection and Development Review Department launched a new program with StormCenter Communications and KVUE TV (Channel 3, 24) to merge technology and watershed education. StormCenter created a website that includes

satellite images, real-time data and the City of Austin's GIS mapping tools (<http://kvue.iewaterheds.com>). KVUE has run companion stories on the air featuring in-depth watershed information. To date, they have done an overview of the Colorado River watershed, its smaller Austin watersheds, the basics of hydrology, and the impacts of water pollution.



GREEN GARDEN INITIATIVE

The Green Garden Initiative, a program that includes staff from five City departments that promote earth-wise gardening messages, offered the first annual Green Garden Festival. Nearly 1000 people attended the event which featured speakers and hands-on demonstrations on topics such as organic gardening, earthwise plant choices, rainwater harvesting, and composting.



GROW GREEN

Grow Green, a Water Quality Protection landscaping program that offers homeowners 20 Fact Sheets and an extensive Native and Adaptec Plant Guide at 45 nurseries and home

improvement centers throughout the city, won the Texas Environmental Excellence award for education. The Texas Commission on Environmental Quality also applied for, and won, an EPA grant that will take some of the program components to five major markets throughout the state. Through a separate grant, TCEQ will offer several of the fact sheets to some of the smaller markets in the state. In return for use of the Grow Green materials, Austin will receive television advertising promoting the program and the benefits of earthwise landscaping. It is also hoped that the expansion of the program to other major cities will increase the demand for environmentally-sound products around the state and improve the chances of manufacturers developing additional low-toxic alternatives.



POLLUTION PREVENTION AND REDUCTION

STORMWATER DISCHARGE PERMIT PROGRAM

Inspections are conducted and permits issued to specific commercial and industrial operations to prevent/minimize polluting discharges to the storm sewer system and receiving waterways. Waste storage, handling, disposal practices and premise maintenance activities are assessed as well as the operational condition of water quality controls (i.e. stormwater ponds, oil/grit separators, hazardous material interceptors, storm drains). Illegal plumbing connections causing polluting discharges are identified and corrected. Inspectors identify contamination and ensure responsible party cleanup. Inspectors advise on applicable regulations, pollutant testing, remediation technology, cleanup and prevention strategies. Educational materials and training are provided. Enforcement action is taken when necessary.

In 2004, 1153 permits were issued and 688 inspections were conducted for compliance. As a result of the inspections, 43 cubic yards of contaminated solids (oil contaminated soil, used sorbent, etc.) and 186 gallons of contaminated liquids (used motor oil, solvent, antifreeze, gasoline, diesel, etc.) were removed from the environment. Program staff routinely conducts follow-up inspections to achieve 100% compliance. However, the program has seen a steady decrease in the number of facilities requiring a follow-up. In 2004, approximately 61% of previously inspected operations demonstrated 100% compliance without a follow-up visit, showing the success of the program's educational efforts for business operators.

SPILLS AND COMPLAINTS RESPONSE PROGRAM

Program investigators respond to hazardous and non-hazardous material spills and citizen pollution complaints 24 hours a day, 7 days a week through the City's Pollution Hotline 974-2550. Investigations are conducted to prevent/minimize polluting discharges to the storm sewer system and receiving waterways, often reducing/eliminating threats to life and property at the same time. Investigators assess the environmental impact, identify the responsible party and pollutants, and ensure proper cleanup and implementation of preventative measures by the responsible party. Investigators advise on applicable regulations, pollutant testing, remediation technology, cleanup and prevention strategies. Educational materials and training are provided. Enforcement action is taken when necessary.

In 2004, 1,497 investigations were conducted. Investigators ensured removal of 5,815,865 gallons and 277 cubic yards of pollutants from the environment. The top five pollutants were: sewage (e.g. public and private system overflows) which represented 53% of the incidents where a pollutant was found; petroleum (e.g. messy vehicle repair practices, vehicle and equipment leaks, improper disposal, etc.) 24%; wastewater discharges, other than sewage, 6%; sediment (e.g. construction activities lacking proper controls) 5%; food grease (spills from leaking and overfilled containers) 4%; and paint (e.g. improper disposal, equipment washing, etc.) 4%. The remaining 4% of the incidents

where a pollutant was found were divided between yard wastes (e.g. dumping leaves, grass clippings, and brush into creeks), chemicals (e.g. antifreeze, abandoned drums, etc.), soap (e.g. washing vehicles, pavement and equipment outside without proper facilities) and trash.

FOOD SERVICE ENVIRONMENTAL OUTREACH INITIATIVE

In April/May of 2004, a new education and outreach initiative began in order to address pollution concerns associated with the downtown food service industry. The focus area is the 6th Street corridor between South Congress Avenue and Interstate Highway 35. Staff visited the food service establishments to identify pollutant sources and ensure implementation of best management practices and preventative measures to protect nearby waterways. Information was gathered regarding daily business practices such as exterior lot cleaning; solid waste handling, storage and disposal; kitchen equipment cleaning; and, food grease handling, storage, disposal/recycling. Corrective actions were required for any violations found during site inspections. Staff are currently working with the City's Solid Waste Services Department and the Austin Health and Human Services Department to organize/evaluate the information and develop action plans. The findings will be provided to the Austin Downtown Alliance as well as City officials. The desired outcome will be to implement measures to maintain clean alleyways and the 6th Street corridor.

SHADE TREE MECHANIC PROGRAM

In response to an increasing number of spills related to "Do it yourself auto repair", a new program is being developed to address proper disposal of pollutants associated with home auto repair and similar "Shade Tree Mechanic" operations. Analysis of complaints to the program's 24-hour Environmental Hotline indicated that nearly 20% of all spills

were vehicle related and a substantial number of those involved “do it yourself” auto repair. The program will provide special containers for collecting used oil and other auto fluids at residential sites where a spill has occurred. The containers will be given out for free along with instructions on proper disposal. Each bucket will advertise the Environmental Hotline phone number and will also advertise a new website dedicated to educating the public in the proper disposal of a wide variety of automotive related wastes including tires, batteries, used oil, antifreeze, etc.



Oil and Oil Filter Recycling Container



For drop off and recycling locations,
call 512.974.2550 or visit
www.cityofaustin.org/watershed/shadetree.htm



Watershed Protection
Development Review

For information on protecting our local creeks call 512.974.2550 or visit www.cityofaustin.org/watershed

MABEL DAVIS PARK

The project to remediate pesticide and lead contamination from old landfill activities in Mabel Davis Park in south Austin continues to move forward. The Texas Commission on Environmental Quality approved the City’s site assessment and remediation plan in August 2004. A contract was awarded in October. Construction on the remediation began

in November 2004 and is expected to be completed in September 2005. The cost is expected to be approximately \$8 million.

KINDER MORGAN PIPELINE CONVERSION SAFETY REVIEW

The Watershed Protection and Development Review Department (WPDRD) led an inter-departmental and independent consultant review of the proposed conversion of a pipeline that crosses south Austin. Kinder Morgan purchased the former crude oil pipeline with the intent to convert it to natural gas service. The line would supply natural gas to Austin Energy's new Sand Hill power plant. City staff from WPDRD, Austin Fire Department, and Public Works worked with independent pipeline safety experts to evaluate the history and construction of the pipeline, Kinder Morgan's operational procedures, and the structural integrity of the pipeline. As a result of this evaluation, Kinder Morgan implemented a number of safety upgrades, including state of the art pressure testing of the line that went far beyond the minimum regulatory requirements. The City's consultants concluded that the pipeline should provide many years of safe operation. The results of the evaluation were included in a report and presented to the Environmental Board, Council and the public.

FLOOD HAZARD MITIGATION

No Adverse Impact (NAI) Floodplain Management Case Study Community

The City of Austin was selected as a case study community through the Association of State Flood Plain Managers (ASFPM) nationwide municipal case study assessment on No Adverse Impact (NAI) floodplain management approaches. Austin is one of eleven cities to be so honored. This award
April 2005



underscores the value of the City's floodplain management code and technical criteria manual. The City's water quality protection programs and integrated master planning activities were also acknowledged in the ASFMP's evaluation of the City's watershed management programs.

The City of Austin, along with ten other cities, was selected in the Spring of 2004 out of scores of applicants as a case study community. These communities are being showcased throughout the Country by ASFPM in order to promote the NAI initiative, and provide examples to other communities of how NAI may be implemented.

City staff submitted documentation of the City's drainage policies and criteria in order to be selected. The information will be included in a publication distributed by ASFPM. The hope is also to spin off additional products from this publication to facilitate ways communities can be successful in helping themselves. The primary target audience includes local government officials, elected representatives and citizens in communities of all sizes, especially those that are flood-prone.

Additional information about NAI and ASFPM is available at www.floods.org.

Travis County Floodplain Study and Mapping Project.

In June 2003, FEMA Region 6 selected Travis County as its first trial for FEMA Map Modernization initiatives. FEMA granted \$2.4 Million for the Travis County Floodplain study and mapping project. The project is comprised of three phases, project scoping (June 03--Aug. 03), Phase I (Sep. 03--Sep. 04), and Phase II (Oct. 04--Oct. 05). The project scope includes 15 watersheds for detailed hydrologic and hydraulic studies and digital mapping, 34 watersheds for digital redelineation of effective flood insurance rate maps (FIRMs) using the City of Austin's 2003 new topographic data and color aerial photos, and five watersheds studied by City of Austin in the past five years for inclusion in the Travis County-wide digital FIRMs. All of the 54 watersheds in Travis County will be digitally mapped by October 2005, followed by a period of public review, appeal, and revision process before they are officially published.

The City of Austin has also contributed funds to the study to ensure all of the City's 19 prioritized watersheds are studied and mapped, and include 25-year and 100-year future-condition floodplains.

For more information on this project, please visit <http://www.halff-femastudy.com/>.

FLOOD HAZARD MITIGATION PROGRAM

A cost effective method of reducing the impacts of flooding on structures in the community is through the process of voluntary home buyouts. Homes or structures that are currently in the flood hazard areas, or have had repeated losses from floods in the past are targeted in this activity. As of the end of September 2004, eighty-four (84) structures have been removed from flood hazard areas and 25.53 acres of land have been converted to green space along the creeks. The majority of these structures have been in the Onion and Williamson Creek watersheds.

Walnut Creek

The Crystalbrook area was one of the City's most serious residential flooding conditions. There were over 175 single family homes that were subject to direct flooding from Walnut Creek, immediately north of Loyola Lane. Much of the area was within the 5-year floodplain and water depths from a 100-year storm could reach 7 feet in some of the homes. Additionally, the storm drain system in the neighborhood was inadequate; resulting in serious localized flooding during smaller storm events occurring on an annual or more frequent basis.

Two feasible solutions were identified during the preliminary engineering: 1) a levee/floodwall barrier around the neighborhood to prevent flood waters from entering the neighborhood, and 2) major modifications to the existing natural channel system and construction of a bypass channel below Loyola Lane to reduce water surface elevations. Both feasible options included major capacity upgrades to the neighborhood storm drain system.

The levee/floodwall option was selected for design and construction based on: 1) higher flood protection level, 2) less environmental and park impacts, 3) lower construction cost, and 4) shorter completion schedule.

The project was constructed in two phases; Phase I is the improvements to the storm drain system, and Phase II is the levee/floodwall system which will protect the neighborhood from creek overflows. The levee/floodwall system was incorporated into the Loyola Lane improvements which integrated a portion of the floodwall system parallel to the roadway to form the flood barrier on the southern boundary of the neighborhood.

Country Club Creek

The culvert was enlarged at Crossing Place Road at Tributary 2 of Country Club Creek and a pilot channel was added to increase channel slope to reduce sediment deposition. Benefits of the project included reducing the risk of flooding to three apartment buildings and eliminating floodwater overtopping the roadway, improving channel aesthetics and hydrologic integrity. Construction was completed in February 2004 with a three year maintenance period to establish native vegetation, including grasses and oak trees, in the channel.

Onion Creek and Williamson Creek Study

The US Army Corps of Engineers Flood Hazard mitigation and environmental restoration study is approximately 75-percent complete with Phase IIA. During Phase IIA, the City of Austin and the Corps have spent considerable staff time looking for environmental restoration opportunities in both the Onion and Williamson Creek watersheds both within and outside the flood damage mitigation areas. The results of their findings will be presented at the conclusion of Phase IIA.

The Williamson Creek flood damage mitigation options include both a structural and non-structural approach. The structural approach proposes to create a “bench” along the natural channel to increase stormwater conveyance capacity. The structural option will

attempt to balance the need for additional stormwater conveyance capacity with the desire to remain environmentally and aesthetically pleasing. The non-structural approach involves purchasing the houses at risk of flooding and restoring the land to be similar to the natural surroundings.

The Onion Creek flood damage mitigation options include both a structural and non-structural approach. The structural approach proposes to create a levee along the natural channel to protect houses from flooding. The structural option may become environmentally unfeasible due to the large number of trees along Onion Creek. The non-structural approach involves purchasing the houses at risk of flooding and restoring the land to be similar to the natural surroundings.

At the conclusion of Phase IIA, a preferred flood damage mitigation plan will be recommended by the Corps. The recommended plan will be carried into Phase IIB to complete the study. The projected completion for Phase IIB is December 2006.

Williamson Creek

The Creek Bend Flood Control project consists of construction of floodwall, by-pass channel, extension of South Pleasant Valley Road bridge, box culvert/storm drain improvements and internal detention pond. 185 houses will be protected from the flood hazard up to the 100-year storm event. In addition, more than 20 houses that encroached into the floodway were bought out and demolished. Demolished home sites will be dedicated as greenbelt to bring back the natural characteristics of this area. Construction of the flood plain bench was carefully designed to not disturb the environmentally sensitive low flow channel. Trees along the low flow channel and other feasible areas were protected in order to preserve their valuable environmental functions. South Pleasant Valley Road bridge was extended in order to remove the embankment encroachment into the creek and restore the flood water conveyance capacity. Concrete flood wall was constructed in order to minimize channel work and provide flood protection to the neighborhood. Final completion is anticipated in Summer 2005.

Creek Erosion Hazard Mitigation Program

The purpose of the Watershed Protection, Creek Erosion Hazard Mitigation Program is to protect properties and public infrastructure by stabilizing our stream systems.

Urbanization impacts our creeks by adding impervious cover, which increases the volume and frequency of storm runoff, which increases stream channel erosion. Our creeks react by getting deeper and wider. Stream channel erosion impacts hundreds of public and private amenities city-wide. When the floodwaters subside, the creek erosion persists and grows worse with every rain.

The Creek Erosion Hazard Mitigation staff identify erosion threats and stream channel instability, develop solutions and implement stream stabilization and streambank reconstruction projects that protect properties while enhancing the natural stream setting. The Creek Erosion Hazard Mitigation staff also manages capital projects and produce in-house erosion repair designs for capital projects and the Field Operation's Erosion Repair Crew.

Shoal Creek: Northwest Park to Foster Lane Stream Stabilization



BEFORE



AFTER

The October 1998 flood scoured away the streamside embankment of the Northwest Park storm detention pond levee. This capital project reconstructed the earthen levee embankment that insured flood reduction benefits to approximately 300 area homes. In addition, this project reconstructed streambanks and stabilized 4,500 feet of stream channel that provides erosion protection for homes, an apartment complex and wastewater infrastructure from Northwest Park to Foster Lane. The stabilization techniques included rock grade controls, rock rip-rap armor, reinforced earth bank reconstruction and native grasses, plants and trees.

Bear Creek: Barrel Bend Channel Stabilization



BEFORE



AFTER

This residential drainage channel was experiencing severe headcutting and lateral instability. The channel movement had undermined a citizen's fence and was causing property loss outside the drainage easement. The stabilization project included development of an active channel with a grade control section. A constructed riffle was used for grade control and native vegetation improved habitat conditions while ultimately providing channel stability. The project was designed by the Creek Erosion Hazard Mitigation staff and constructed by the Field Operation's Erosion Repair Crew.

Barton Springs: Sunken Gardens Channel Stabilization



BEFORE



AFTER

The old Sunken Gardens pool is home to endangered Barton Springs salamanders. Spring flows had flanked a wooden post structure and scoured away a section of the channel bank. This project removed the treated wooden post structure and reconstructed the channel. A rock boulder drop section was designed by the Creek Erosion Hazard staff and constructed by the Field Operation's Erosion Repair Crew.

Tannehill Branch: Lovell Drive Channel Stabilization



BEFORE



IN PROGRESS

Stream incision or down cutting lowered the stream channel approximately 6-feet (see before photo). A tremendous amount of sediment had been transported downstream as a result of the down cutting. Storm flows had exposed and threatened a large sanitary line and scoured away a significant portion of adjoining City property. This project stabilized 250-feet of stream channel, protected the sanitary line, installed grade controls to prevent

further down cutting and armored the outside the creek bend to protect City property. Native materials and plants were used to enhance the natural stream setting. This project was designed by the Creek Erosion Hazard Mitigation staff and constructed by the Field Operation's Erosion Repair Crew.

Nonattainment designation triggers mandatory state and federal pollution reduction requirements. They are typically prescriptive; noncompliance can lead to a loss of federal highway funding.

Regional Initiatives

Recognizing the regional nature of air quality, the COA takes an active role in area initiatives. In conjunction with the CLEAN AIR Force of Central Texas, the COA participates in ongoing public outreach campaigns. As a member of the Commute Solutions Coalition, it assists area employers in promoting trip reduction measures, which reduce traffic congestion and associated emissions.

The COA hosts Clean Cities of Central Texas, a voluntary program of the U.S. Department of Energy. Its mission is to promote the use of alternative fuel vehicles and to encourage development of alternative fueling infrastructures to reduce consumption of foreign oil and to lower emissions.

In March 2002, the COA joined elected officials from the five-county Austin/Round Rock MSA (i.e., Bastrop, Caldwell, Hays, Travis, and Williamson) in signing the O₃ Flex Agreement. O₃ Flex commits signatories to measurable and quantifiable emission reductions through voluntary actions. The agreement with TCEQ and EPA is designed to help areas remain in compliance with the 1-hour federal ozone standard. Central Texas was first in the nation to make this voluntary commitment.

The O₃ Flex Agreement addresses only the 1-hour standard. Central Texas currently monitors attainment of this standard. To address the 8-hour standard, TCEQ and EPA developed the Early Action Compact (EAC) Protocol. Regions that choose the EAC must follow strict timelines for developing an emission reduction plan. The plan is adopted into the State Implementation Plan (SIP) and becomes law. In return for choosing legally enforceable early action, the region is given flexibility in crafting the plan and will reach attainment two years earlier. Failure to complete any portion of the EAC means the area reverts to the traditional nonattainment process, although without penalty, and with credit given for emission reductions already accomplished.

Austin's Mayor Garcia, along with other Central Texas leaders, signed the EAC in December 2002. The Clean Air Action Plan's ozone pollution reduction strategies for the region were decided upon and submitted to TCEQ and EPA by March 31, 2004. The CAAP was incorporated into the SIP, and the SIP was adopted by TCEQ by December 31, 2004 and must be implemented by December 31, 2005. The goal is to get Central Texas air quality to healthy levels no later than December 31, 2007.

COA Initiatives

OZONE REDUCTION STRATEGIES

Staff developed strategies to minimize NO_x and VOC emissions from daily COA operations. These strategies comprise the core emission reduction measures of the COA's O₃ Flex commitment and serve as a template for other municipalities and government agencies. Because cars and trucks are responsible for about 60% of smog-producing emissions in the Austin/Round Rock region, a number of the emissions reduction strategies are aimed at vehicles. The strategies include:

- Voluntary transportation control measures for employees;

- Reductions in emissions from fleet vehicles;
- Reductions in emissions related to traffic congestion;
- Reductions in emissions through contractual agreements;
- Programs to encourage Smart Growth initiatives;
- Enhanced public education programs;
- Development of regional partnerships;
- Reductions in emissions from mobile sources; and
- Reductions in emissions from area and point sources.

Within the CAAP, the strategies are reflected by specific emissions reduction proposals, of which, two of the more substantial are:

1. Vehicle Emissions Testing – Inspection and Maintenance (I/M) Program
 - Would be required annually for all vehicles 2-24 years old.
 - Must pass before new vehicle registration or safety inspection can be issued.
 - Fee expected to be no more than \$20 in Travis, Hays, and Williamson counties.
 - Safety inspection fee would remain at \$12.50.
 - If emissions test failed, must get repairs within 15 days to get free re-test.
 - Repair financial assistance for low-income drivers.
 - Infrared mobile testing equipment will measure vehicle tailpipe emissions at selected traffic points. High-emitting vehicles have 30 days to get repairs.
2. Commute Emissions Reduction Program
 - Required for locations where a business has 100 employees or more.
 - Must reduce NOx and VOC commute emissions by 3% a year until 10% in reductions are achieved.

The Austin/Round Rock MSA Clean Air Action Plan also includes a commitment from Austin Energy to reduce total annual NOx emissions from Holly and Decker combined to 1,500 tons or less – from the 1,750 tons that would have been allowed under SB 7. In addition, Austin Energy has committed to cap the total NOx emissions from all AE power plants located in Austin at 1,500 tons per year, even with the addition of the City's newest generating plant, the natural gas-fueled Sand Hill Energy Center.

DEPARTMENTAL OZONE ACTION DAY (OZAD) PLANS

Every department has an OZAD plan. It guides air-friendly operational changes made on OZADs or for the entire ozone season. Plans are department-specific, but all include employee notification and trip reduction measures.

TELEWORK PROGRAM

With assistance from a State Energy Conservation Office grant, the COA has expanded its telework program. Teleworkers, some 600 to date, receive formal training. The COA includes telework as one of its O₃ Flex commitments.

CITY EMPLOYEES RIDE CAPITAL METRO FREE PROGRAM

Effective October 1, 2004, the City of Austin entered into an interlocal agreement with Capital Metro to enable all City employees to use approved Capital Metro transportation services free anytime, simply by presenting a valid City employee identification card. The program's easy-to-use approach is intended to encourage Metro ridership, and further supports the City's goal of voluntary automobile trip reductions.

Section 2

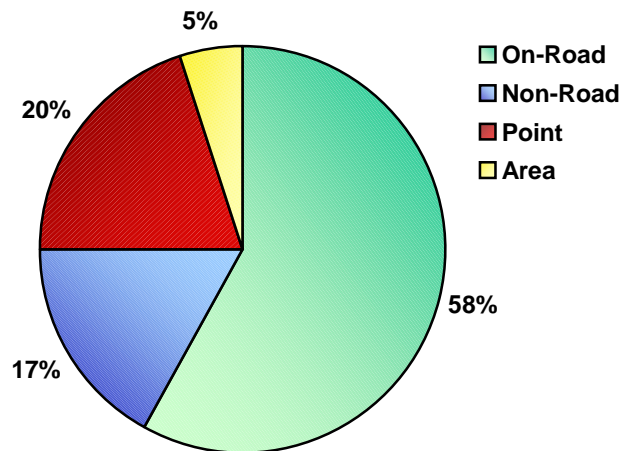
Air Quality

Assessment

The Texas Commission on Environmental Quality (TCEQ) collects and analyzes statewide air quality data. Central Texas monitors show exceedances of EPA’s health-based 8-hour standard for ground-level ozone. Based on that data, the Austin/Round Rock Metropolitan Statistical Area (MSA) are acting to assure attainment and maintenance of the federal 8-hour standard. Using the Early Action Compact (EAC) Protocol, the MSA has prepared a Clean Air Action Plan (CAAP) that provides clean air sooner, maintains local flexibility and can defer the effective date of nonattainment designation. The complete CAAP can be found at www.cleanairforce.org.

Background

Ground-level ozone (O₃) forms when nitrogen oxides (NO_x) and volatile organic compounds (VOCs) combine and “bake” in the sun. While ozone is beneficial in the stratosphere, protecting earth from ultra-violet radiation, in the lower atmosphere it threatens human health and the environment.



Ground-level ozone is a lung irritant. It can make breathing difficult and aggravate respiratory conditions. Children, seniors, people with compromised respiratory systems, and those who exercise or work outdoors are most susceptible. High ozone concentrations may affect even healthy adults. Ground-level ozone also damages buildings, vehicles, and vegetation.

While some cities can attribute the majority of their air pollution to old manufacturing plants or refineries, Austin cannot. Most area NO_x emissions come from on-road sources - cars and trucks. Additional sources include non-road (e.g., construction and landscaping equipment, trains, boats), point (e.g., large factories, power plants) and area (e.g., small facilities, households).

Federal Requirements

An average ground-level ozone concentration ≥ 85 parts per billion (ppb) within an eight-hour period constitutes an exceedance of the federal standard. EPA bases an area's attainment status on data from the previous three years. The average of the fourth highest reading from each of the past three years is called the design value. If it is ≥ 85 ppb, the area is in violation. The current Austin/San Marcos MSA design value is 85.

Nonattainment designation triggers mandatory state and federal pollution reduction requirements. They are typically prescriptive; noncompliance can lead to a loss of federal highway funding.

Regional Initiatives

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Section 3

Solid Waste Services

Solid Waste Management

DIVERSION

The Pay-As-You-Throw program offers customers once per week collection of garbage, recycling, and yard trimmings all in effort to keep materials out of area landfills. Solid Waste Services crews collect curbside set-outs of glass bottles and jars, steel/tin cans, and #1 and #2 plastic bottles commingled in blue recycling bins. Customers may also recycle bundled corrugated cardboard and paper grocery bags of newspapers, junk mail, magazines, and mixed paper at the curb. Grass clippings and leaves placed in brown Kraft paper yard bags, Christmas trees, and small branches are also collected curbside and sent to the Hornsby Bend facility to be composted into Dillo Dirt.

Solid Waste Services tracks the diversion accomplished through these curbside collections. The diversion rate reflects the percentage of the total residential waste stream that is recycled or composted from the weekly household pickups. The diversion rate for FY03/04 was 28.49%, down slightly from 29.11% the previous year. Over the past five years, the annual diversion rate has remained high, fluctuating only slightly between 28-29%.

Austin residents also receive curbside collection of large brush and bulky items twice a year. During FY03/04, Solid Waste Services recycled 389 tons of the bulky items collected and 5,050 tons of large brush.

PILOT PROGRAMS

Solid Waste Services launched two major pilot programs in FY03/04.

The **On Call Brush Pilot**, which was designed to test the feasibility of collecting large brush in a more efficient manner, started in June. Currently, residents are notified by mail in advance of two collection dates per year. Customers in either of the two pilot areas may schedule brush collection appointments for any Monday, with a limit of two collections during the 12-month pilot. Additional requests will be treated as out-of-cycle collections subject to the usual fees and guidelines. Approximately 30,000 Pay-As-You-Throw customers are testing the On Call Brush collection method.

The **All-In-One Recycling Pilot**, a six-month trial of collecting all recyclables in 60-gallon carts, began in July. The objective of this pilot is to study the feasibility of utilizing fewer resources by collecting curbside recyclables more efficiently without compromising customer service or diminishing the effectiveness of the recycling program. The All-In-One Recycling Pilot includes 5,000 Pay-As-You-Throw customers in five areas of the city, one from each collection day. The areas were selected to represent a demographic cross section of Austin.

The current recycling program requires customers to sort their recyclables into two “streams” consisting of paper and containers. Crews must manually lift and empty recycling bins into the trucks. With All-In-One Recycling, customers set out all

recyclables commingled in recycling carts, which are lifted and emptied automatically by collection vehicles. During the pilot, customers may also add boxboard items to their carts. The collection schedule will change from weekly to every other week.

RECYCLING PARTICIPATION SURVEY

This year's drive-by surveys focused on the five All-in-One Recycling Pilot areas. Recycling participation with the blue bin system prior to the pilot program averaged 68.3% in these areas. (Recycling participation is the percentage of customers setting out at least once during the observation period.) Surveys will be repeated toward the end of the pilot to determine the participation rate with the cart system in place.

COMMERCIAL RECYCLING

Solid Waste Services administers the Commercial/Multi-family Recycling Ordinance, which requires businesses with at least 100 employees on site and apartment complexes with 100 units or more to set up recycling programs. Since FY00/01, affected properties have collectively recycled over 50,000 tons of material each year.

The Congress Avenue paper recycling implementation project was completed in 2004. Businesses along Congress Avenue and those on East Sixth Street jointly recycled 139 tons of cardboard and paper throughout the year.

RIGHT SIZE YOUR CART CAMPAIGN

The aim of the Right Size Your Cart campaign was to reduce the number of extra garbage bags placed outside carts. Unlike trash set out in carts, bagged garbage requires special manual collection by crews. Customers who regularly have extra garbage were encouraged to step up to larger carts and enjoy the resulting cost savings. During the

promotion, customers were allowed to upgrade with the usual \$15 administrative fee waived. Approximately 1,963 customers “right sized” their carts during the campaign.

YOUTH EDUCATION

Solid Waste Services’ award winning Youth Education Program introduces Austin’s young citizens to the concepts of recycling and waste reduction. This year, 15,587 students in kindergarten through second grade were treated to “Sergeant Bin Goes Camping,” another fun-filled adventure in the popular musical series featuring recycling hero Captain Can. The department also offers recycling presentations to groups and hosts tours of the landfill, the Household Hazardous Waste drop-off facility, and the Material Recovery Facility, where recyclables are processed and sold. Presentations and facility tours reached an additional 1,329 children in FY03/04.

RESIDENTIAL CURBSIDE COLLECTION

FISCAL YEAR	RESIDENTIAL HOUSEHOLDS	Garbage (TONS)	Recycling (TONS)	Yard Trimmings (TONS)	TOTAL TONS	DIVERSION RATE
FY 91-92 %	112,400	128,333 90.23%	13,899 9.77%	0 0.00%	142,232 100.00%	9.77%
FY 92-93 %	121,100	125,881 88.07%	16,535 11.57%	510 0.36%	142,926 100.00%	11.93%
FY 93-94 %	123,300	122,000 81.72%	22,428 15.02%	4,858 3.25%	149,286 100.00%	18.28%
FY 94-95 %	125,300	114,067 77.02%	22,732 15.35%	11,307 7.63%	148,106 100.00%	22.98%
FY 95-96 %	127,200	118,298 79.20%	21,340 14.29%	9,735 6.52%	149,372 100.00%	20.80%
FY 96-97 %	131,200	113,059 74.40%	24,776 16.30%	14,133 9.30%	151,969 100.00%	25.60%
FY 97-98 %	132,000	107,272 70.75%	26,107 17.22%	18,242 12.03%	151,621 100.00%	29.25%
FY 98-99 %	134,643	108,228 72.19%	26,104 17.41%	15,593 10.40%	149,925 100.00%	27.81%
FY 99-00 %	136,200	109,242 71.53%	26,797 17.55%	16,686 10.93%	152,725 100.00%	28.47%
FY 00-01 %	141,015	115,268 71.77%	28,594 17.80%	16,747 10.43%	160,609 100.00%	28.23%
FY 01-02 %	142,651	116,492 71.22%	28,446 17.39%	18,636 11.39%	163,574 100.00%	28.78%
FY 02-03 %	144,414	118,580 70.89%	30,348 18.14%	18,356 10.97%	167,284 100.00%	29.11%

FY 03-04*	152,869	122,469	30,553	18,232	171,254	28.49%
%		71.51%	17.84%	10.65%	100.00%	

* Through September 2004

RESIDENTIAL BRUSH / BULKY COLLECTION

FISCAL YEAR	RESIDENTIAL HOUSEHOLDS	Disposed Bulky (TONS)	Recycled Bulky (TONS)	Brush (TONS)	TOTAL TONS	DIVERSION RATE
FY 93-94 %	123,300	4,125 78.56%	607 11.56%	519 9.88%	5,251 100.00%	21.44%
FY 94-95 %	125,300	4,605 71.94%	660 10.31%	1,136 17.75%	6,401 100.00%	28.06%
FY 95-96 %	127,200	3,937 64.65%	463 7.60%	1,690 27.75%	6,090 100.00%	35.35%
FY 96-97 %	131,200	6,062 69.77%	649 7.47%	1,977 22.76%	8,688 100.00%	30.23%
FY 97-98 %	132,000	3,814 68.02%	485 8.64%	1,309 23.34%	5,607 100.00%	31.98%
FY 98-99 %	134,643	4,638 58.63%	1,450 18.32%	1,823 23.05%	7,911 100.00%	41.37%
FY 99-00 %	138,700	4,472 59.72%	935 12.48%	2,081 27.79%	7,488 100.00%	40.28%
FY 00-01 %	143,803	6,564 59.30%	1,330 12.01%	3,175 28.68%	11,069 100.00%	40.70%
FY 01-02 %	144,806	7,404 61.45%	1,149 9.54%	3,495 29.01%	12,048 100.00%	38.55%
FY 02-03 %	146,569	7,334 62.96%	754 6.47%	3,560 30.56%	11,648 100.00%	37.04%
FY 03-04* %	152,869	7,112 56.66%	389 3.10%	5,050 40.24%	12,551 100.00%	43.34%

* Through September 2004

Code Compliance

Solid Waste Services Code Compliance includes Property Abatement, Zoning Code Compliance and Dangerous Buildings and Housing.

Property Abatement responds to complaints about weeds or grass taller than 12 inches, accumulations of junk and debris and standing water on public or private vacant or occupied properties in the City of Austin and/or Limited Purpose Annexations. Also addressed are complaints of tree limbs overhanging the public right of way that are lower than 14 feet above the roadway or sidewalk area. This group also investigates and prosecutes cases of illegal dumping.

In FY03/04, Property Abatement investigated 8,042 complaints/requests. A private contractor was used to abate 513 properties and the number of days needed to process a vacant property complaint improved to 25.87 days.

Zoning Code Compliance investigates complaints about issues related to zoning and land use violations. The types of complaints vary in complexity from easier cases such as recreational vehicle screening requirements to home occupations, adult oriented business regulations, and complex site plan violations. Zoning regulations establish 4 districts and over 130 uses based on those districts and may involve approved neighborhood plans, conditional overlays, non-conforming uses, and other conditions that may affect the determination of whether violations exist.

In FY 03-04 Zoning Code Enforcement responded to 2208 complaints with a 66 day average to attain voluntary compliance. It took an average number of 247 days to achieve compliance when escalating a case to judicial action.

Dangerous Buildings and Housing Code Compliance responds to complaints from tenants or citizens relating to the safety and condition of structures in the City of Austin and/or Limited Purpose Annexations. The structures investigated include all categories of residential structures from single-family through apartment uses as well as dangerous commercial structures. The group also conducts proactive inspections of hotel, motel, rooming houses and boarding houses.

In FY03/04, Dangerous Buildings and Housing investigated 1092 complaints/requests and achieved voluntary compliance within an average of 147 days. 86 structures were demolished after Dangerous Buildings and Housing Code Compliance action.

Hazardous Waste Management

HOUSEHOLD HAZARDOUS WASTE

The City of Austin started collecting household hazardous waste (HHW) at annual collection events in 1986. Participation grew from 450 households generating 37,000 lbs. of hazardous waste in 1986 to 1,750 households generating 150,000 lbs. of hazardous waste in 1990. This material was diverted from solid waste or sanitary and storm sewer streams to recycling or proper treatment and disposal at EPA-permitted hazardous waste treatment facilities. In 1991, the City completed construction of a permanent HHW Collection Facility. For two years, the HHW Facility was open on one Saturday every

other month for home chemical collection. Participation again increased to 3,300 homes generating over 200,000 lbs. of hazardous waste in 1992.

In 1993-1994, the Solid Waste Services Department began weekly (Wednesday, 12:00 pm to 7:00 p.m.) collections. The City of Austin HHW Program completed its sixth year of weekly collections in September, 1999. Nearly 43,000 households were serviced in those six years, diverting over 3.1 million pounds of hazardous waste (Tables 3-1 and 3-2). On January 4, 2000, this program opened at its new larger facility at 2514 Business Center Drive and implemented a twice-weekly collection schedule (Tuesdays and Wednesday, 12:00 pm to 7:00 pm). During Fiscal Year 2003-2004, this program serviced 7,955 households and diverted approximately 860,000 pounds of household hazardous waste. Figures 3-1 and #2 and Table 3-3 provide an overview of historical annual waste volumes collected, participation levels, and historical results as the Household Hazardous Waste Program progressed from its inception as an annual program to its current bi-weekly program.

If this waste were not collected, it would remain in people's homes or be discarded with the risk of injury to Solid Waste Services workers and/or pollution through the solid waste stream, wastewater, or even storm sewer. The City's HHW has serviced nearly 90,000 households and collected nearly eight (8) million pounds of household hazardous waste for recycling or proper disposal, since the program's inception in 1986. Not only has this program safely diverted hazardous waste from improper dumping, the landfill, and wastewater systems, but it substantially increases the safety of solid waste workers who may be exposed to such chemicals during garbage collection or at the landfill. The overall purpose of the program is also to increase the public's awareness of the hazards of these materials at home and in the waste stream, and to encourage alternative behaviors that will lead to wiser use of such materials and reduction in the generation of these wastes.

Although overall HHW budgetary costs have increased significantly since 1986, the overall program cost per participating household is less than \$81. (Chart 6). Disposal costs per household have been reduced from \$132.00 to approximately \$36.00 largely through hands-on management (bulking compatible materials, decanting aerosols, crushing paint cans, etc.) and enhanced recycling (various batteries, antifreeze, paint, etc.). In addition, the HHW Program coordinates a household battery-recycling program with collection at a number of retail outlets throughout the City, so customers can deposit old batteries when they buy new ones. Although it is not practical to keep count of households recycling batteries at retail and school outlets, the number exceeds several thousand annually.

Table 3-3

City of Austin

Household Hazardous Waste Collection Program

	ANNUAL EVENTS 1986- 1990	QUARTERLY EVENTS 1991-1993	WEEKLY SCHEDULE 1994-1999	TWICE WEEKLY SCHEDULE 2000-2004	TOTAL
Households	5,185	11,375	42,872	30,339	89,771
Volume HHW (pounds)	425,203	731,052	3,125,250	3,366,027	7,647,532
Waste Oil Recycled (gallons)	11,750	12,885	51,019	38,752	114,406
Lead Acid Batteries	1,957	1,350	4,798	7,276	15,381
Recycled Latex Paint (gallons)	N/A	3,169	26,925	38,761	68,855
Disposal Cost	\$429,079	\$913,248	\$1,531,172	\$1,079,145	\$3,952,644
Disposal Cost/Household	\$83	\$80	\$36	\$36	\$42 (average)
Total Cost/Household	\$127	\$114	\$68	\$80	\$81 (average)

One of the most successful recycling ventures is the recycled latex “Old Paint.” Good quality latex paint is segregated, bulked, and shipped to a paint plant in the Austin area. The paint is rebled to a good quality specification, containerized, and picked up by the HHW Program for distribution to community improvement projects and low-income housing building or refurbishing. Since 1991/1992, over 65,000 gallons of paint have successfully been rebled and distributed to worthwhile projects, including those completed by Habitat for Humanity, Casa Verde Builders, and Urban Youth Corps. Recycling paint has saved the HHW Program over \$309,000 in disposal costs and has conservatively contributed over \$500,000 in material costs. The Capital Area Corporate Recycling Council awarded the “Old Paint” Recycling Program a first place “Closing The Loop” award in 1996.

Relocating to the new facility has allowed for the opening of a Product Reuse Center where citizens can obtain new or unused material. This material includes paint and paint products, automotive products, cleansers, and garden products (excluding restricted or prohibited pesticides). During Fiscal Year 2003-2004, the product reuse efforts diverted over 104,000 pounds of new or unused products, saving over \$25,000 in disposal costs.

Since its inception in 2000, the Product Reuse Center has diverted over 250,000 pounds and saved nearly \$60,000 in disposal costs.

The HHW Program is open to City of Austin and Travis County residents outside the City Limits. Participation and hazardous waste volumes collected in the HHW Program continue to increase and probably will for some time. The City of Austin’s HHW Program is the first of its kind in the State of Texas. It has received regional and national recognition, including the EPA Regional Administrator’s Award for Environmental Excellence for Outstanding Non-point Source Pollution Prevention in 1992, and Keep America Beautiful, Inc. National Recycling Award in 1995. In 1994, the National HHW Conference selected Austin as its host City, and over 400 HHW managers/staff from around the nation have visited the City’s Facility and observed its operation.

SMALL BUSINESS HAZARDOUS WASTE DISPOSAL PROGRAM

The Solid Waste Services Department offers hazardous waste disposal services to small business. Developed in mid-1996, this program provides an environmentally safe and convenient option for businesses to dispose of unwanted hazardous waste streams. The program is limited to those businesses generating less than 220 pounds of hazardous waste in a month (classified as Conditionally-Exempt Small Quantity Generator), and disposal costs are borne by the business utilizing the service.

A major problem that small businesses encounter when having to dispose of hazardous waste is that the volume generated is not sufficient to obtain service from a licensed hazardous waste disposal company. In some instances, the licensed companies have provided the service, but at a cost that is prohibitively expensive. When these instances arise, business options are limited and usually involve improper or illegal storage or disposal. During 2003-2004, this program serviced 326 businesses, and collected approximately 170,000 pounds of hazardous waste. Since the program's inception in 1996, over 1,750 businesses have utilized this service and disposed of over 940,000 pounds of hazardous wastes. Figures 3-4 and 3-5 detail the annual growth in both pounds of hazardous waste disposed and businesses serviced since this program inception in 1996. This program serves as a model for other municipalities wanting to provide similar services to their small business community.

Section 4

Water Supply, and Wastewater Service

Water Supply / Conservation

Water consumption in the Austin area has steadily increased over the years due to consistent growth in the entire Central Texas region. The Austin Water Utility supplies water within its boundaries and in a number of surrounding areas. The size of Austin's water service area continues to grow, but the city has taken measures to ensure that it can accommodate substantial population growth for decades in the future.

In October 1999, the City of Austin supplemented its state-adjudicated water rights with additional water purchased from the Lower Colorado River Authority (LCRA) through a new water supply agreement. These combined supplies, backed by firm storage in the Highland Lakes, in conjunction with water reclamation and conservation are expected to meet demands for raw water within Austin's service area through the next 50 years.

However, capacity in Austin's water treatment and distribution facilities has been strained in recent years. Water use increased to its highest maximum usage ever with 244 million gallons per day (MGD) in 2001. The summer of 2003 was both hotter and slightly wetter than average. The peak usage in 2003 was 225 MGD, the second highest yearly peak ever, but was held down by the spacing of the rainfall events that did not result in prolonged dry spells.

Two key system improvement projects, the Ullrich Medium Service 72-inch Transmission Main and the Ullrich Water Treatment Plant Capacity Upgrade to 100 MGD, were completed in the fall of 2000. However, necessary pipe joint repairs in the 72-inch transmission main caused a delay in placing the water main fully in service until

just prior to the summer of 2002. After these repairs were completed in May 2002, the water system had a peak day capacity of 260 MGD. No additional capacity will be added

until 2005 when the next expansion to the Ullrich Water Treatment Plant is scheduled to be completed.

The following chart shows the history of peak day water usage in Austin.

Fiscal Year	Peak Usage (MGD)
94 – 95	191.3
95 – 96	195.7
96 – 97	191
97 – 98	206.4
98 – 99	211.2
99 – 00	220.3
00 – 01	244
01 – 02	213
02 – 03	225
03 – 04	191

In addition to planned capacity and distribution improvements, the City has implemented comprehensive conservation and reclaimed water programs with the following goals.

1. Reduce peak day use by 20 million gallons per day through a combination of demand reduction and reclaimed water substitution:

Benefit: This will supplement the Utility's plans to meet future water supply demands.

2. Reduce customer demand by a total of 50,000-acre feet (AF) by 2050 through a combination of demand reduction and reclaimed water substitution.

Benefit: The City will not have to purchase additional water supplies, which would be extremely costly.

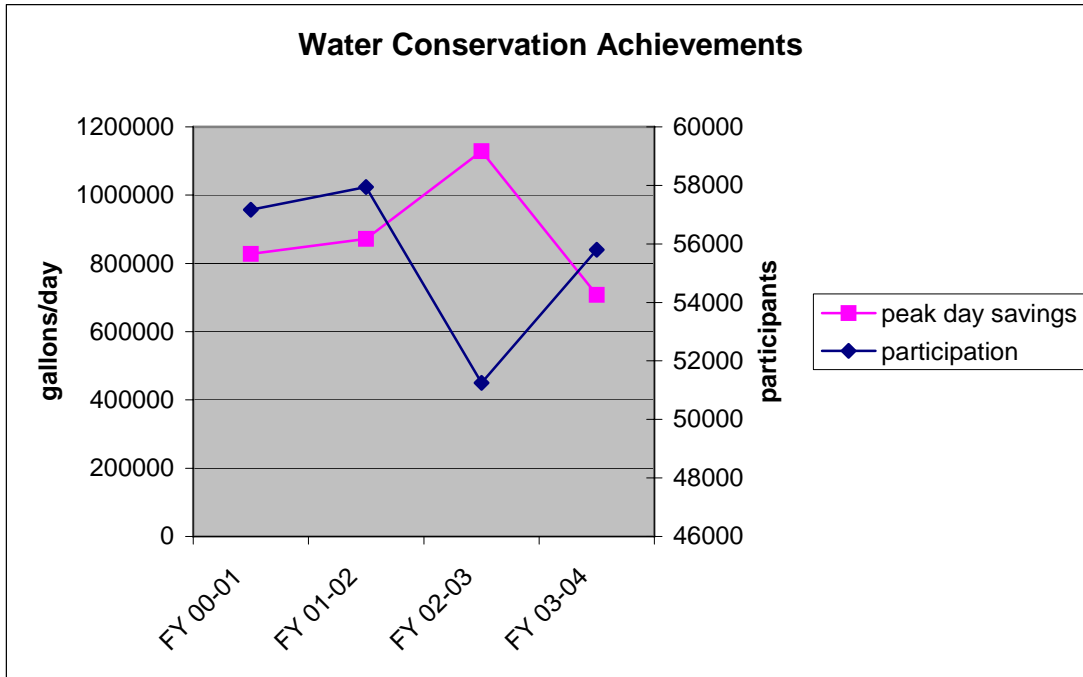
3. Delay reaching a total water demand of 201,000 AF as long as possible.

Benefit: Since the City prepaid the LCRA for water up to 201,000 AF, the City will not incur additional costs for water used between 150,000 and 201,000 AF until we exceed 201,000 AF, which will be an annual saving of approximately \$11.7 million.

4. Provide customers with water conservation programs to reduce their monthly consumption of water and wastewater.

Benefit: Many customers need and welcome an opportunity to reduce their water and wastewater costs.

The Water Conservation Program has been able to save 963,000 gallons per day through its program due to its efforts in FY02-03, with 51,255 customers participating in the programs offered, or 29.2% of all customers who receive water from Austin Water.



The Water Conservation Program has developed a wide variety of water conservation programs that target all customer classes, including single-family, multi-family, industrial, commercial, and institutional. The following are some of the largest programs.

TOILET REPLACEMENT PROGRAMS

The City offers two toilet replacement programs for properties 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. To date, over 60,000 toilets have been replaced through these programs.

Single-Family customers can participate in the replacement programs for up to three water efficient toilets per household through the City’s water conservation program to replace old, large capacity toilets. Multi-family customers are not limited to the number

of toilets they may replace, but they must replace all toilets in a building at the same time. To receive free toilets, customers must first submit an application. In return, they receive a voucher for redemption at a local plumbing supply company contracted by the City. In addition, there is a \$30 per toilet installation rebate if a licensed plumber installs the toilet.

Under the rebate program, customers first purchase toilets off a list of eligible models. 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 the toilet and installation by a licensed plumber.

WASHWISE PROGRAM

The WashWise Rebate Program is a partnership of Austin Water Conservation, Austin Energy, and Texas Gas Service. Under this program, residential customers can receive a rebate towards the purchase of a high-efficiency clothes washer. To qualify for a rebate, the washer 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 standard rebate for these machines is \$50 for water and \$50 for energy saved by either gas or electric water heating. Rebate amounts have varied over time, totaling as much as \$200 from the City, with occasional additional manufacturer rebates of \$50. In the seven years of this program, over 12,000 machines have been rebated.

FREE IRRIGATION SYSTEM AUDITS

The City offers free irrigation audits to owners of commercial in-ground sprinkler systems and residential systems that 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 controller schedule for their system so that they can follow the evapotranspiration recommendations.

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 500 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 recirculating 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.

'WATER IN OUR WORLD' FIFTH GRADE EDUCATION PROGRAM

“Water in Our World” is a program developed for 5th grade students that continues to expand. The objective of the program is to provide valuable information to the students on water sources, treatment, conservation and protection. What makes this material unique is its focus on Austin. It includes lessons designed to make students aware of local water issues in the hope that they will become informed citizens who will make water-wise choices now and in the future. Since the pilot in 1999, over 10,000 students and teachers have participated and the numbers continue to grow. The curriculum consists of lessons that can be taught in a three-week period, or as stand-alone lessons, allowing plenty of hands-on experience. Each student receives a water conservation kit that includes water conserving showerheads and faucet aerators. The program is the result of a collaborative effort between the City of Austin and the Austin Independent School District. Three area school districts and the Community Outreach and Education Program (Environmental Health Science Institute) at the University of Texas MD Anderson Cancer Center for 5th grade students in the Bastrop-Smithville school districts are currently implementing the program.

'DOWN THE DRAIN' SIXTH GRADE EDUCATION PROGRAM

“Down The Drain” is a sixth grade program developed as a collaborative effort between the City of Austin and the Austin Independent School District. The objective of the program is to provide valuable information on wastewater treatment, biosolids reuse, reclamation, and alternative waste systems. The partners want the students to come full circle in understanding the City’s water and wastewater infrastructure and related issues. Like the 5th grade program, “Down The Drain” is Austin specific and can be taught as a unit or as stand-alone lessons. Since the pilot in 2003, over 3,400 students and teachers have participated and the numbers continue to grow. Three area school districts and the Community Outreach and Education Program (Environmental Health Science Institute) at the University of Texas MD Anderson Cancer Center for 5th grade students in the Bastrop-Smithville school districts are currently implementing the program.

Drinking Water Distribution System

The Austin Water and Utility serves a population of approximately 786,000 through roughly 188,000 service connections. The Utility delivers highly purified drinking water from three treatment plants to its customers through a distribution system containing more than 2,780 miles of water main, 22,160 fire hydrants, 21 pump stations, and 32 water storage reservoirs. The distribution system is further divided into eight major pressure zones because of the varied topography within the City of Austin.

Leaders in the field of drinking water supply acknowledge that water quality can degrade between the time it is treated at the plants and when it is delivered to the customers. Realizing this, the Utility is implementing a program with the goal of assuring that the high quality drinking water produced at the plant maintains its quality while it is distributed to the customers. Activities to date include developing a comprehensive monitoring plan, updating the standards for the disinfection of new pipelines being accepted into the distribution system, analyzing the suitability of sampling sites, regularly measuring water quality in storage tanks, and routinely flushing mains when disinfection residuals are low. Water quality, as measured by the standards in the Total Coliform Rule, has improved. Several hazardous situations in the distribution system have been identified and corrected.

Wastewater Treatment

The Austin Water and Utility owns and operates three major wastewater treatment plants (WWTP): Govalle, Walnut Creek and South Austin Regional (SAR), which have a total treatment capacity of 135 million gallons per day (MGD). These three plants discharge their highly treated effluent to the Colorado River. The effluent quality from these plants surpasses the State and Federal permit requirements. As a result the water quality in the segment of the Colorado River to which these plants discharge is exceptionally good and

the segment has been classified by the Texas Commission on Environmental Quality (TCEQ) as “exceptional.” The City also owns and operates four water reclamation plants -- Davenport Water Reclamation Plant (WRP), Pickfair WRP, Balcones, WRP, and Onion Creek WRP -- and an interim treatment plant at Harris Branch. The water reclamation plants dispose of their effluent by irrigating golf courses. The Harris Branch Treatment Plant discharges into Harris Branch. An expansion and upgrade of the Harris Branch Treatment Plant was completed in late 2002 enabling it to handle increased flows from its service area.

In December 2003, at the request of TCEQ and the Office of the Attorney General, the Austin Water Utility accepted a small and dilapidated Thoroughbred Farms Wastewater Treatment Plant that was dysfunctional and was discharging raw wastewater without any treatment into Dry Creek creating an environmental and public health hazard. The Austin Water Utility has already made major improvements to the plant and vastly improved its performance. The Utility continues to make improvements to the plant’s operation and maintenance to achieve long-term compliance with the plant’s permit.

Biosolids (sewage sludge) from all of the City’s wastewater treatment plants are pumped to the Hornsby Bend Biosolids Management Plant for treatment and disposal. All biosolids were beneficially reused either as Class A biosolids produced and sold as Dillo Dirt compost or Class B biosolids that were land applied at Hornsby Bend and an off-site location near Webberville. See section on Hornsby Bend below.

During 2003-2004, the Utility treated and discharged approximately 81.6 million gallons per day of highly treated effluent from Govalle, Walnut Creek and SAR WWTPs. The Association of Metropolitan Sewerage Agencies recognizes outstanding Wastewater Treatment facilities with annual Peak Performance awards. For calendar year 2003, all three plants received Gold awards, reflecting no permit violations during the year.

Part of the treated effluent from SAR is currently used to irrigate three City-owned golf courses. Construction of an ambitious Water Reclamation Initiative Plan to provide

treated effluent (reclaimed water) to the central and northeast service areas was completed in 2002 at the Walnut Creek Wastewater Treatment Plant and vicinity. The South System Master Plan currently underway will expand the reclaimed water system currently served by SAR. For more details, see the *Water Reclamation Initiative* section below.

Construction for the expansion of Walnut Creek WWTP from 60 to 75 MGD was completed in July 2004. With the expansion of the Walnut Creek WWTP to 75 MGD, the capacity of the Govalle WWTP was reduced from 20 to 10 MGD. Construction for the expansion of SAR WWTP from 50 to 75 MGD is scheduled to be completed in 2006. After the expansion of SAR, the 10 MGD Govalle WWTP, which has been operating since 1937, will be decommissioned and all of its flows diverted to SAR for treatment.

THE HORNSBY BEND BIOSOLIDS MANAGEMENT PLANT AND THE CENTER FOR ENVIRONMENTAL RESEARCH

The City of Austin Hornsby Bend Biosolids Management Plant is an award winning biosolids reuse and recycling facility that has won numerous local, regional, state and national awards, including two EPA National First Place awards. Hornsby Bend is responsible for treating and reusing all of the City's biosolids (sewage sludge) and all of Austin's yard trimmings and brush collected curbside. All water generated in processing the biosolids is treated through a 185-acre pond system and is recycled on-site for crop irrigation.

All biosolids are anaerobically digested to reduce pathogens and odors. A by-product of anaerobic digestion is methane, which is used to produce up to 800 kilowatts of electricity from on-site cogenerators. Waste heat from cogeneration is utilized to help heat the digesters. Following anaerobic digestion, biosolids are either land applied to on-site and off-site farmland or composted with yard trimmings and brush picked up curbside around the city by Solid Waste Services. When land applied, the biosolids provide all the necessary nutrients for the crops grown and harvested by local farmers.

Dillo Dirt Compost

Approximately one third of the biosolids produced at Hornsby Bend are used in Dillo Dirt. Yard trimmings and brush delivered by the Solid Waste Department are ground and mixed with digested biosolids to form windrow piles. The heating, turning, and subsequent curing produces a finished compost product called “Dillo Dirt”, a trademarked name and logo. Dillo Dirt meets the highest treatment and safety standards for pathogen reduction and metals content set by EPA and the Texas Commission for Environmental Quality, even considered safe enough for vegetable gardens. This composting program utilizes the City’s yard trimmings and brush streams, approximately 13% of the total municipal solid waste produced by the City, and accounts for approximately 43% of the solid waste recycling done by the City. Dillo Dirt is sold wholesale to garden centers, nurseries, and landscapers around the city. Dillo Dirt is also donated to City projects, public schools and nonprofits.

Environmental Impact

The biosolids and yard trimmings recycling program saves valuable landfill space, recycles nutrients back into the soil, helps protect water quality, and generates revenue. Approximately 100,000 cubic yards of yard trimmings and brush are utilized each year which generates revenue and avoids the cost of landfilling. When utilized in the landscape, Dillo Dirt increases nutrient and moisture holding capacity in the soil, resulting in a healthier ecosystem.

Increased organic matter in the soil from products like Dillo Dirt increases water infiltration rates and holding capacities, helping to reduce runoff and watering requirements. Reduced landfill tipping fees and revenue generated by Dillo Dirt sales make this program very cost effective.

Ecological Significance

What is waste for us is the beginnings of a high nutrient food chain that provides nourishment to wildlife while recycling these “wastes” in an ecologically sound and sustainable manner. Hornsby Bend is nationally known as one of the best birdwatching sites in Texas – harboring over 370 species of birds and an abundance of other wildlife. This diversity is present both because of the bio-treatment processes used by the facility and because of the diversity of habitats found at the site. The multifaceted character of the site presents a unique opportunity for environmental research and education about Austin’s environment.

Research and Education – The Center for Environmental Research

The Austin Water Utility Center for Environmental Research (CER) is located at the Hornsby Bend Biosolids Management Facility and was built in 1988. It is a partnership between the University of Texas at Austin, Texas A&M University, and the City of Austin Water Utility. The purpose of this center is to support research and education about urban ecology and sustainability. As a community service, the CER auditorium and classrooms are used by a wide range of organizations for environmental workshops, training, and classes throughout the year.

Most directly, the CER works closely to support the recycling of biosolids at the Hornsby Bend facility through its research projects and to manage the land at the 1200-acre site along 3.5 miles of the Colorado River. In 2001, the Hornsby Bend facility was given by the TCEQ one of only two “experimental exemptions” in Texas for biosolids research, and this research is managed by Kevin Anderson, the CER coordinator, working with Dr. Patricia Richardson and Dr. Dick Richardson at the University of Texas in cooperation with Jody Slagle, the environmental engineer for the Hornsby Bend facility. Additionally, the CER has developed programs and projects managed by the CER coordinator, and these are described below.

CER Highlights of 2004

- Began a multi-year study with Travis Cooperative Extension of the effects of Dillo Dirt compost on fire ants at Hornsby Bend.
- Nominee for the Excellent Partnership award by the Del Valle Independent School District Adopt-a-School Program for the fourth year in a row for the Living Lab Program [the CER won this award in 2003].
- Hosted the first fieldtrips of 4th graders from Bastrop ISD as part of a 5 year NIH grant funded environmental health education program in partnership the University of Texas Center for Research on Environmental Disease at the M. D. Anderson Cancer Center.
- In 2004 the CER's Austin-Bastrop River Corridor Partnership held two public workshops with support from the National Park Service and the LCRA on issues and opportunities for the river corridor with over 130 participants representing agencies, organizations, schools, businesses, and landowners. The National Park Service Rivers, Trails and Conservation Assistance Program, through a competitive application process, selected the Austin-Bastrop River Corridor Partnership for technical assistance in 2004 and 2005.
- Launched a Riparian Restoration project in partnership with the Water Quality Protection Lands, Treefolks, and the National Park Service to restore riparian trees on Slaughter and Onion Creeks. Seeds from trees are collected on WQPL properties and grown at a tree nursery located Hornsby Bend at the Treefolks office. Initial phase of this project will last 3-4 years.

- The Austin Youth River Watch Program established its office in a house at Hornsby Bend as part of the CER's EcoHouses Project. It joined Treefolks which moved its office to a house at Hornsby Bend in 2003.
- In 2004 completed first year of monthly CER Urban Ecology Lunchtime Lectures at Waller Center. Topics covered included soil, agriculture, river corridor, wetlands, water monitoring, and biodiversity.

Below is a list of the main programs and projects of the CER:

- **Biosolids and Soil Research** – supported by a TCEQ Experimental Exemption and in partnership with University of Texas Integrative Biology Professors Dick and Patricia Richardson, the CER is conducting long-term research at the Hornsby Bend site and City of Austin property near Webberville.
- **The Hornsby Bend Community Environmental Partnership** – a stakeholder group of governmental and non-governmental organizations involved in research and education at Hornsby Bend. Website – <http://www.sbs.utexas.edu/hornsby>
- **The Hornsby Bend Bird Observatory [HBBO]** – The HBBO is an effort to promote the study and conservation of birds in Central Texas. Hornsby Bend is the most popular birdwatching site in the Austin area, and the HBBO supports a range of bird monitoring programs, classes, and training at Hornsby Bend. Website – <http://www.hornsbybend.org>.
- **The Ecological Mentorship Program** – an academic internship program for University of Texas undergraduates interested in natural resource management. The interns work on research projects under the supervision of UT professors and environmental professionals at the CER. During 2004, 6 undergraduates completed academic internships through the CER.

- **The Living Lab Program** – a science education program in partnership with Hornsby-Dunlap Elementary School 4th and 5th grades (over 200 students) that brings these students to the Hornsby Bend site three times during the year for ecological field studies. Volunteers from Hornsby Bend Partnership organizations lead these field trips.
- **The Texas Riparian Association** – this statewide organization is hosted by the CER. Founded in 2002, the TRA promotes riparian (waterside habitat) ecosystem protection and restoration across Texas. Website – <http://www.texasriparian.org>
- **Austin Biodiversity Project** – a project to inventory local flora and fauna and to maximize sustainable populations of all native species in the Austin area. Jointly managed by the CER and the University of Texas – Texas Memorial Museum.
- **EcoHouses Project** – a program to demonstrate green building techniques and water conservation landscaping by remodeling houses on the Hornsby Bend site in partnership with the Austin Energy Green Building Program. These houses are becoming offices for some of the Hornsby Bend Partnership organizations.

Austin to Bastrop River Corridor Partnership – a public-private partnership created in 2003 to study the rapid development along the river corridor from Austin to Bastrop and to promote land use planning to protect the river ecosystem.

THE AUSTIN YOUTH RIVER WATCH PROGRAM

The Austin Water Utility and the Watershed Protection Department jointly fund the Austin Youth River Watch Program (AYRWP) managed by the Colorado River Watch Foundation (CRWF). This program provides an after-school outreach activity for middle

and high school students in Austin who are considered at risk of leaving school prior to graduation, while at the same time providing the City of Austin with valuable water quality monitoring services. The River Watch students are required to conduct weekly chemical and biological monitoring with at 17 designated monitoring sites located on Austin's waterways. The students' data are used by both the City of Austin and the LCRA. After completion of their water quality monitoring duties, time is provided for students to study or to work on their school assignments.

During 2004, 50 high school and middle school students were involved in the Austin Youth River Watch program representing 6 different AISD high schools. These students presented 8 reports at the CRWF Student Symposium and other events. Twenty-five students went on to participate in River Watch summer leadership program during June and July. On average, AYRWP high school students attended school more regularly and had grade point averages comparable to or higher than the comparison group of AISD high school students. Most importantly, 15 River Watch students graduated from high school during 2004.

Additional support for the Austin Youth River Watch Program is given through the Austin Water Utility Center for Environmental Research UT undergraduate interns. During 2004, 6 interns mentored the River Watch students by volunteering once a week with the program and attending campouts and fieldtrips with the students. This partnership with the Austin Water Utility grew further in spring of 2004 with the Austin Youth River Watch Program moving its office into a house at the Hornsby Bend Biosolids Management Plant as a part of the Center for Environmental Research EcoHouses Project.

Energy Conservation Program in Austin Water Utility

The Austin Water Utility has initiated a program to implement electric energy conservation and load reduction/management. Under this program, the Utility will implement measures to improve energy efficiency, energy conservation and electric load reduction/management through process, operational and equipment modifications.

The Utility has entered into an interdepartmental agreement with Austin Energy to reduce energy demand at various Water and Wastewater facilities and provide assistance for demand side management. The Utility has entered into "Load Co-op Program" agreements with Austin Energy for all of its Wastewater Treatment Facilities. Under these agreements, the facilities will curtail a portion of their energy loads during peak demand periods after a request from Austin Energy. The facilities will be compensated for their participation in the program based on their estimated load reduction. Facilities will also receive additional compensation depending on the actual amount of energy demand that has been reduced at the facility.

Currently, a project is being planned to reduce air requirements in the treatment process at the Walnut Creek WWTP. Air requirements at wastewater treatment plants account for almost 70% of the plants' power demand. Reduction in air requirements is expected to reduce power demand at the treatment facilities.

Austin Clean Water Program

The Austin Clean Water Program was created in November 2001 to comply with the U.S. Environmental Protection Agency (EPA) issued Administrative Order (AO) to eliminate Sanitary Sewer Overflows (SSOs) from the wastewater collection system. SSOs are unplanned discharges of wastewater from the collection system, usually caused by sewer blockage due to the presence of roots, grease or high water flows during wet weather in the pipelines.

The City of Austin received an AO from the U.S. EPA on April 29, 1999. The Administrative Order requires that the City of Austin perform a series of activities designed to result in an improved wastewater collection system free from SSOs. These activities include Infiltration/Inflow Studies, Sanitary Sewer Evaluation Surveys, as well as subsequent design and construction of necessary improvements to the wastewater collection system. Austin Clean Water Program Team provides management support and coordination for the planning, design and construction of sustainable wastewater collection facilities necessary to meet the AO requirements.

To date, the Utility has completed 9 out of 14 AO items on schedule. The remaining five items are ongoing and on schedule. Already, more than 775,000 feet of sewer have been rehabilitated. Enhanced maintenance, developed as part of ACWP, will include extensive cleaning and inspection of the sanitary sewer system.

In addition to pursuing the activities required by the AO, the utility has completed the following extra work to help eliminate overflows:

Wastewater Lines Televised:	5,341,280 ft
Wastewater Lines Cleaned:	3,753,667 ft
Wastewater Lines Smoke Tested:	1,323,094 ft
Manholes Located and Raised:	8,952

Structural improvements to the collection system will consist largely of repairs to the sanitary sewer system, or in some cases, complete replacement of specific segments, depending on their age and condition.

When sanitary sewage leaves the collection system in an uncontrolled manner, there is a potential that the sewage will enter a drainage system, creek or lake. The Utility staff makes every effort to collect and pump the material back in to the system while simultaneously trying to stop the overflow. As the ACWP corrects sources of SSOs, their frequency and volume will decrease and the amount of raw sewage that leaves the collection system and contributes to non-point source pollution will also decrease. This should result in streams that are cleaner and safer.

As part of the ACWP, the Austin Water Utility and the Watershed Protection and Development Review Department presented and received approval from the City Council for the ACWP ordinance, establishing an integrated design and permitting process. The ordinance would also establish an administrative process for approval of variances from specific sections of the City of Austin Land Development code, if they are needed. The ACWP ordinance was necessary to alleviate schedule constraints imposed by the current City permitting process for critical projects within the ACWP in order to meet the EPA mandated construction schedules. The ordinance will expire when the AO is satisfied in 2007.

The ACWP has organized a team of specialists to visit each project site involving wastewater lines in creeks, as part of the integrated design and permitting process. This “Stream Team” visits each project site. During these field visits, team members make recommendations for placement of wastewater lines, alternate routes, environmental protection, construction and permanent access, constructability, stream stability and restoration. The Stream Team has compiled a menu of standard streambank restabilization techniques, as well as special revegetation methodology, for stream and

wetland areas. Members of the team include biologists, wetlands specialists, hydrogeologists, civil and environmental engineers, stream stability and watershed specialists, permitting specialists, regulators, field maintenance personnel, and project managers. The Austin Water Utility has made a serious commitment to relocating sewer lines outside of creek areas where possible to improve maintenance and minimize environmental impacts.

In addition to accelerating the design and permitting process, the benefits of this integrated team approach include:

Environmental Protection – Early identification of critical environmental features such as springs, seeps or rimrock that merit special consideration in the design process.

Route Alternatives – Identification of alternate routes that provide for potential cost savings, increased environmental protection and/or reduced construction schedules.

Stream Stabilization – Evaluation of alternative channel stabilization and restoration techniques that provide protection of new wastewater infrastructure while minimizing the impact to the natural character of the creek.

Currently there are over twenty-five project under construction with nearly forty more scheduled to start over the next twelve months. Peak construction activity will occur in the late Spring of Calendar Year 2006. Given the volume of construction projects the Austin Water Utility has created a Construction Awareness Website that allows the public to quickly obtain street closure and detour information via the internet at: <http://www.ci.austin.tx.us/ca/default.cfm>

The Austin Water Utility has established a genuine partnership with the United States Environmental Protection Agency as a result of the project. Utility senior management personally brief EPA Region 6 staff on a biannual basis and have received a positive reception for this effort.

Section 5

Wildlands and Parkland

Wildlands

The Austin Water Utility's Wildland Conservation Division (WCD) manages more than 30,000 acres that enhance water quality and quantity through its two programs—the Water Quality Protection Lands (WQPL) and the Balcones Canyonlands Preserve (BCP). The latter program has the additional and primary goal of conserving endangered species and their habitat. Since its creation in 2002, the Division continues to successfully share resources between the two programs to efficiently fulfill each program's mandate. Figure 5-1 shows the location of properties attributed to each program.

Water Quality Protection Lands

Bonds passed in 1998 enabled the purchase of land to protect water quality and enhance runoff and recharge in watersheds serving the city's water supply. Since then, the City has acquired 17,727 acres of land. This includes 7,538 acres in full fee title and 10,189 acres in conservation easements. Over 1,600 acres in conservation easement were acquired recently with grants from the USDA's Farm and Ranchland Protection Program. These lands border the WQPL's Onion Creek Management Unit



Karst feature on WQPL's Onion Creek Management Unit.

In the 2003 - 2004 fiscal year over 2,500 acres of WQPL fee simple land received land treatment for ecological restoration. Conservation practices implemented by staff and contractors included mechanical management of woody species, re-seeding native grasses, control of exotic species and wildlife management. These practices were intended to enhance ecological function in order to benefit hydrological processes.

All conservation easements are visited annually to ensure compliance by landowners. The WQPL program annually monitors 10 conservation easements to document compliance with the terms and conditions of the Conservation Easement Agreements. Established photo-points are re-taken every other year on these properties.

Several research projects are ongoing at WQPL properties as part of the program's goal to benefit the Barton Springs watershed by better documenting the relationship between the land and hydrologic processes. The Texas Cave Management Association is monitoring water quality and quantity of water seeping into a cave under the proposed State Highway 45 Right of Way at a depth of 140 ft. The Bureau of Economic Geology is studying the infiltration rates of small sinkholes in upland settings. The United States Geologic Survey has established two well sites to study water quality on the WQPL as part of the National Water Quality Assessment program. A student from the University

of Texas School of Geosciences is studying fracture orientation, fracture density, depth to water table and the effective porosity of the aquifer at a quarry site on the WQPL. The Barton Springs Edwards Aquifer Conservation District has established a research well on the WQPL to study the vertical flow gradient between the Trinity and Edwards aquifer. A multi-partner cooperative research effort continues to develop a detailed water balance equation for a Water Quality Protection Lands site in the Slaughter Creek and Bear Creek Watersheds. Development of this model will allow the WQPL program to better predict hydrologic responses to land treatment and management. This project is being implemented in cooperation with University of Texas, Barton Springs Edwards Aquifer Conservation District, U. S. Geological Survey, Texas A&M University, and COA Watershed Protection and Development Review Department. Finally, a study is being conducted in cooperation with Texas A&M University through the Water for Texas Program looking at runoff and sediment responses from different Best Management Practices used for land management.

The WQPL program continues to receive support from more than 25 organizations, and local, state, and federal agencies that make up the Stakeholder Steering Committee. These include environmental organizations, activity interest groups, neighborhood groups, ethnic and cultural organizations, and federal, state and county governments who assembled to assist with planning and implementing public access recommendations and public education actions



Volunteers planting trees along Slaughter Creek.

From the Stakeholder Steering Committee, two coalitions of stakeholders have signed Memorandums Of Agreements with the City of Austin to develop multi-use trails on two WQPL properties—the Bull Creek Management Unit and the Slaughter Creek Management Unit. These groups received grant funding to design and install a trail, as well as conduct volunteer stewardship training and install riparian plantings. Efforts between WCD staff and stakeholders has resulted in the collection and growing of native riparian seed stock for future restoration plantings. The initial volunteer training will also result in a cadre of volunteers capable of leading interpretive hikes on the Slaughter Creek unit for community groups.

The WQPL program has greatly benefited from the addition of a WCD staff member to coordinate education and volunteer activities. At Austin Water Utility's Water Education Festival WCD staff led an interactive activity using the Slaughter Creek watershed model for almost 400 5th grade students. The activity incorporates information about non-point source pollution, aquifer hydrologic zones, and role of the wildlands in water quality and quantity enhancement. Other educational outreach activities included presentations to and correspondence with neighborhood associations about the lands and trespassing issues and use of the watershed model at an annual Cave Festival in southwest Austin. Seven volunteer activities, ranging from wetland restoration to wildlife management, involved 55 individuals who invested 707 hours.

Balcones Canyonlands Preserves

In 1993 City Council authorized the Balcones Canyonlands Preserves. The City, Travis County, and other partners manage this program in order to protect habitat for eight species of animals listed as threatened or endangered under the Endangered Species Act while allowing development to occur in western Austin and western Travis County. The Preserve operates under the terms of the Balcones Canyonlands Conservation Plan (BCCP), which is a regional, multi-species habitat conservation plan that approaches conservation and management from a whole ecosystem perspective.

The City's portion of the Balcones Canyonlands Preserves currently includes 13,035 acres in six macro-sites. These preserves are situated in watersheds serving Lake Austin and Lake Travis. While the primary focus of management of these preserves is to protect habitat for endangered species, it also serves to lessen threats to water quality, enhance air quality, provide a unique aesthetic quality to the City, and preserve the natural heritage of Austin's rapidly changing landscape.

In fiscal year 2003 - 2004 staff actions focused on measures to further the program's mandate, including habitat restoration projects, erosion control, preserves infrastructure and security enhancement, monitoring of protected species, management of other wildlife species, management of non-native and feral species, public education and outreach, management of the BCCP Infrastructure Process, and planning development of Urban/Wildland human health and safety issues. Staff also began a collaborative process with other BCCP partners in a U. S. Fish and Wildlife Service required five-year revision of the BCP Land Management Plans.



The endangered golden-cheeked warbler.

2004 marked the seventh year of ongoing monitoring of golden-cheeked warblers on Balcones Canyonlands Preserves. Evaluation of data indicates populations of this species on our preserves appear to be stable but species productivity is lower when compared to other golden-cheeked warbler conservation management areas. Additionally, last year's

survey data indicates that territory establishment in areas of heavy public use is declining. However, golden-cheeked warblers are being observed on the preserve in transitional habitat, sites that were not expected to provide adequate habitat until several years in the future. This indicated that while golden-cheeked warblers may be struggling to find local habitat outside the preserves, they could rely on our preserves to meet their habitat needs.



Spring run on BCP property in which Jollyville salamanders are routinely surveyed.

Monitoring for the presence of the aquatic Jollyville Plateau salamander on the City's BCP land is performed quarterly. Although this salamander is not listed on the City's section 10(a) permit and is not a federally listed species, the Jollyville Plateau salamander is monitored as an indicator of stream health and water quality. Conserving and protecting this salamander on BCP land may negate the need for future federal listing, which could lead to local or regional economic constraints. City staff conducts surveys following protocol established in the City of Austin's Watershed Protection and Development Review Department report "Jollyville Plateau Water Quality and Salamander Assessment."

There are six species of endangered karst invertebrates and 25 karst species of concern covered by the City's permit. Twenty-three caves are protected as part of the BCP on

City owned or managed land and they are managed by the Austin Water Utility Department – BCP Program. This past year the City’s BCP staff performed species surveys for Airman’s, Broken Arrow, Cotterell, District Park, Flintridge, Goat, Maple Run and Midnight Caves.

Major threats to the black-capped vireo survival include habitat loss, habitat fragmentation, and parasitism by brown-headed cowbirds. To offset one of these threats, habitat loss, on the City’s preserve land, BCP staff has mechanically created two new 30-acre black-capped vireo habitat restoration areas. These two new sites are in addition to the 76-acre site that was mechanically manipulated in 1995. The new habitat areas were manipulated by a combination of contractor juniper tree shearing and mulching and volunteer and American YouthWorks crews hand labor. Additional acreage adjacent to the new areas will be added in a similar fashion in FY05 and FY06.

The City of Austin has completed its land acquisition commitments for BCCP. We continue to support Travis County and our other partners as they strive to complete their acquisitions.

The Balcones Canyonlands Preserves program has developed collaboration with Texas State University at San Marcos (TSUSM) to further the goals of the program and the educational goals of the University. TSUSM has supplied undergraduate and graduate students, through their Internship Course Program, to assist the BCP program with numerous studies and projects. Additionally, TSUSM, Oklahoma State University, and the University of Missouri at Columbus are conducting research projects that will aid the City’s BCP Program and other partners in the BCCP in developing management strategies and guidelines for the future. These studies included black-capped vireo foraging analysis, nest predation and productivity in an urban/wildland interface, abiotic and biotic factors associated with preserve edges, biking effects on golden-cheeked

warbler behavior and productivity, and effects of non-native trees in an oak-juniper woodland on neo-tropical bird migrants.

The BCP program has also benefited from the addition of a WCD staff member to coordinate education and volunteer activities. In addition to demonstration of a watershed model at Austin Water Utility's Water Education Festival, WCD staff set up a display with information about the endangered species protected under the BCCP. In January and February of 2004, 72 individuals were educated in classes and earned a Bull Creek Entry Permit to enter the preserve during the golden-cheeked warbler breeding season. During the summer of 2004, the lecture portion of the class was converted to an online website. WCD staff participated in training for Capital Area Master Naturalists by presenting information on urban endangered species conservation issues. New signs were also designed and installed to better communicate rules and restrictions to the public. Twelve volunteer activities, ranging from litter cleanups to wildlife management, involved 60 individuals who invested 457 hours.

Open Space and Parkland

On April 1, 2002, the Austin City Council transferred the Balcones Canyonlands Preserves program to the Water and Wastewater Utility. In response to this action the director created the Wildland Conservation Division. This division manages both the Water Quality Protection Lands program and The Balcones Canyonlands Preserve program. Through management of these two programs the Utility protects significant portions of the watersheds that provide drinking water for the City of Austin.

Water Quality Protection Lands

In May 1998 and November 1998, voters in Austin passed water and wastewater utility revenue bond initiatives for the purchase of land to protect water quality and enhance runoff and recharge in watersheds which serve the city's water supply. Since then, the City has purchased 16,687 acres of land. This includes 7,294 acres in full fee title and 9393 acres in conservation easements. These figures include 688 acres as conservation easements that were formerly held in full fee title by the Water and Wastewater Utility. Figure 5-1 depicts the areas within the Water Quality Protection Lands, as well as the Balcones Canyonlands Preserve.

On December 13, 2001, City Council approved management plans for Water Quality Protection Lands. Management plans include actions to be taken to manage this land for protection or enhancement of water quality and quantity, management of public access, and public education. Staff immediately began implementation of these plans.

In the 2002 - 2003 fiscal year over 2258 acres of WQPL received land treatment for ecological restoration. Conservation practices implemented by staff include prescribed burning, mechanical management of woody species, erosion control, and wildlife management. These practices were intended to enhance ecological function in order to benefit hydrological processes. All conservation easements were monitored and easement compliance by land owners was documented.

As part of the program's goal to benefit the Barton Springs watershed, Wildland Conservation Division staff has begun implementing a three-pronged monitoring program to document the effects of land treatment on hydrological processes. First, permanent vegetative monitoring sites have been established on uplands and riparian areas to gauge trends in plant communities against ecological site descriptions which depict desired conditions for best hydrologic responses. Next, two sets of paired plots have been established which will allow staff to compare runoff and sediment responses

from sites receiving land treatment against untreated sites. This study is being conducted in cooperation with Texas A&M University through the Water for Texas Program.

Finally, a multi-partner cooperative research effort has begun to develop a detailed water balance equation for a Water Quality Protection Lands site in the Slaughter Creek and Bear Creek Watersheds. Development of this model will allow the land manager to better predict hydrologic responses to land treatment and management. This project is being implemented in cooperation with University of Texas, Barton Springs Edwards Aquifer Conservation District, U. S. Geological Survey, Texas A&M University, and COA Watershed Protection and Development Review Department.

The Water Quality Protection Land program continues to support its partnerships with more than 25 organizations, and local, state, and federal agencies through their Stakeholder Steering Committee. These include environmental organizations, activity interest groups, neighborhood groups, ethnic and cultural organizations, and federal, state and county governments who assembled to assist with planning and implementing public access recommendations and public education actions

From the Stakeholder Steering Committee, two coalitions of stakeholders have formed to develop site-specific plans for trails on the Bull Creek Management Unit and the Slaughter Creek Management Unit. In 2003 these volunteer groups, with support from the National Parks Service Rivers and Trails Conservation Assistance Program began trail design and layout. They have also initiated environmental evaluations required as part of the grants they have received. They expect to have both trails open by the fall of 2003. Additionally, another stakeholder, Hill Country Foundation, has developed curriculum for a Stewardship Training Course. This course is intended to train citizen volunteers to serve as volunteer land stewards for Water Quality Protection Lands. They will perform trail operation and maintenance functions, lead volunteer workdays established to implement land management tasks, and serve as educational docents. The Stewardship Training has been funded by grants from the Shield Ranch Foundation, Selah Ranch Foundation, and National Park Service. This training will begin in 2004.

Balcones Canyonlands Preserves

In 1993 City Council authorized the Balcones Canyonlands Preserves. The City, Travis County, and other partners manage this program in order to protect habitat for eight species of animals listed as threatened or endangered under the Endangered Species Act while allowing some development to occur in western Austin and western Travis County. The Preserve operates under the terms of the Balcones Canyonlands Conservation Plan (BCCP), which is a regional, multi-species habitat conservation plan that approaches conservation and management from a whole ecosystem perspective.

The City's portion of the Balcones Canyonlands Preserves currently includes 13,035 acres in six macro-sites. These preserves are situated in watersheds serving Lake Austin and Lake Travis. While the primary focus of management of these preserves is to protect habitat for endangered species, it also serves to lessen threats to water quality and preserve the natural heritage of Austin's rapidly changing landscape.

In fiscal year 2002 - 2003 staff actions focused on implementing activities defined in the regional Habitat Conservation Plan approved in 1995 and management plans approved in 2000. These actions include habitat restoration projects, erosion control, preserves infrastructure and security enhancement, monitoring of protected species responses, management of other wildlife species, and public education and outreach.

2003 marked the fifth year of ongoing monitoring of Golden Cheeked Warblers on Balcones Canyonlands Preserves. Evaluation of data indicates populations of these species on our preserves are stable or growing. Furthermore, these birds are being observed on sites that were not expected to provide adequate habitat until several years in the future. This indicated that while individual Golden Cheeked Warblers may be struggling to find local habitat outside the preserves, they could rely on our preserves to meet their habitat needs.

The City of Austin has completed its land acquisition commitments for BCCP. We continue to support Travis County and our other partners as they strive to complete their acquisitions.

The Balcones Canyonlands Preserves program has also developed collaboration with Southwest Texas State University to further the goals of the program and the educational goals of the University. The University supplied undergraduate and graduate students, through their Internship Course Program, to assist the BCP program with numerous studies and projects. These projects and studies include GPS mapping of trails within the Preserve, vegetation surveys and mapping, compilation of existing data and development of databases, analysis of the education and outreach efforts of the BCP Program, and native plant rescue from a future construction site within the preserve. Furthermore, the Senior Biologist with the BCP Program co-teaches a Conservation Biology class for the Department of Biology at SWTSU and through this association has recruited graduate students for independent research efforts within the Preserve.

Parkland

Austin ranks as a leading city in parkland acres both in the state and nationally. Austin has been able to steadily maintain and/or exceed 24 acres per resident. Currently, the Parks and Recreation Department oversees 16,543 acres of parks and special preserve lands.

In 1998, Austin voters approved \$40.2 million for Destination Parks and Greenways which was for the purchase of parkland all along the east of I.H. 35 and for the purchase of greenway corridors throughout the city. This initiative was created in order for the city to keep pace with a rapidly growing community and to plan for future generations. The initiative is winding down with most of the land purchases being completed. The task was not easily achieved, though, with developers vying for the same properties as the city sought.

In addition, the City continues to receive land or money to purchase additional land through its Parkland Dedication Ordinance. As of 2003, the ratio is 25 acres of parkland per 1,000 residents.

Section 6

Austin Energy

Distributed Energy Services

Austin Energy's Distributed Energy Services Division provides residential energy efficiency, commercial energy management and green building services to residential and commercial customers of Austin Energy. These services include, providing technical assistance through energy audits to identify energy efficiency opportunities, making recommendations on the most cost effective measures, and offering financial incentives for the installation of energy efficient measures.

These programs are intended to maximize efficiency in the use of Austin's energy resources while increasing customer comfort and satisfaction and lowering customer electric bills. Maximizing efficiency lowers costs to Austin Energy and its customers, while also reducing power plant emissions and promoting economic development in the Austin area. These services also provide economic benefits through increased employment in the local energy efficiency industry and greater spending in the local economy due to thousands of Austinites having increased disposable income as a result of lower energy bills.

Austin Energy's Green Building Program continues to be a national leader in the area of sustainable commercial and residential building. The program was the first program in the country to offer a sustainability rating. The rating provides a measure of a building's environmental impact in terms of energy, water, resource efficiency, indoor environmental quality and community impact. In 2004 the program was involved in several noteworthy projects. The new Austin City Hall was completed and is on track to receive a LEED (Leadership in Energy and Environmental Design) Silver rating from the

U.S. Green Building Council. The LEED rating system evaluates the sustainability of buildings in the areas of Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials Resources, Indoor Environmental Quality and Innovation. 2004 also saw the completion of other LEED rated projects in Austin including the Austin Resource Center of the Homeless, the Carver Library and Museum and the Combined Transportation and Emergency Communications Center. Green Building Program staff provided input and design assistance to all of these projects.

In the past, homes and other buildings have been built without considering how they affect the global, local and indoor environments. In addition, how specific systems related to each other, such as how heating and cooling needs relate to window size, were rarely considered. The Green Building Program bases its rating system on the premise that a building is a single system and considers these major components in the rating: energy, water, materials, health and safety and community.

In addition to its work providing the construction industry with technical advice, research, an evaluation of projects to promote the construction of more sustainable homes and buildings, the program also works to educate the public about the benefits of green building to create market demand for green homes and buildings. The Green by Design public workshops are perhaps the most valuable tool the program uses to educate the public. These workshops take place 4 times a year and attract between 80 and 120 attendees. For their \$30 registration fee the attendees receive the award winning Green by Design CD, a workbook and seven hours of instruction on the basics of green design and construction from program staff.

Only a few years ago Green Building was considered a fringe movement by many in the construction industry. In Austin the Green Building Program now has architects, engineers, custom and production builders and product and service providers as members. These members voluntarily rated 22% of the single-family new construction and several thousand units of multi-family construction in the Austin Energy service area

with the program. The commercial construction component of the program works with projects ranging in size from 5000 sq. ft. to over 400,000 sq. ft.

The diverse mixture of Austin Energy's Residential Efficiency, Commercial Energy Management, and Green Building Programs achieved substantial reductions in peak electric demand, energy usage, and power plant emissions. In FY 2003 - 2004, Austin Energy achieved the following impacts:

Estimated Reduction in Energy Usage:

- 41.18 Peak Demand Megawatts Reduction in Required Power-Plant Capacity
- 68,026 Megawatt-Hours Energy Savings
- 17,564 MCF of Natural Gas Savings

Estimated Annual Power-Plant Emissions' reductions:

- Sulfur Dioxide: 7.52 Metric Tons
- Nitrogen Oxides: 37.95 Metric Tons
- Carbon monoxide: 49.46 Metric Tons
- Total Suspended Particulate: 9.84 Metric Tons
- Carbon Dioxide: 39,355 Metric Tons
- NMOC (VOC) 3.82 Metric Tons