

# CHAPTER 18: ENVIRONMENTAL QUALITY

Protecting and enhancing environmental quality is a critical livability issue. How the City chooses to grow could have significant impacts on the quality and sustainability of our environment.

This chapter is intended to consolidate the many environmental concerns facing the City, and to identify the management practices that will most effectively address these issues. The topics covered in this chapter include solid waste, air quality, energy conservation, water quality and supply and wastewater, storm water quality and quantity (drainage), endangered species, sustainable development, and natural habitats.

## EXISTING CONDITIONS AND TRENDS

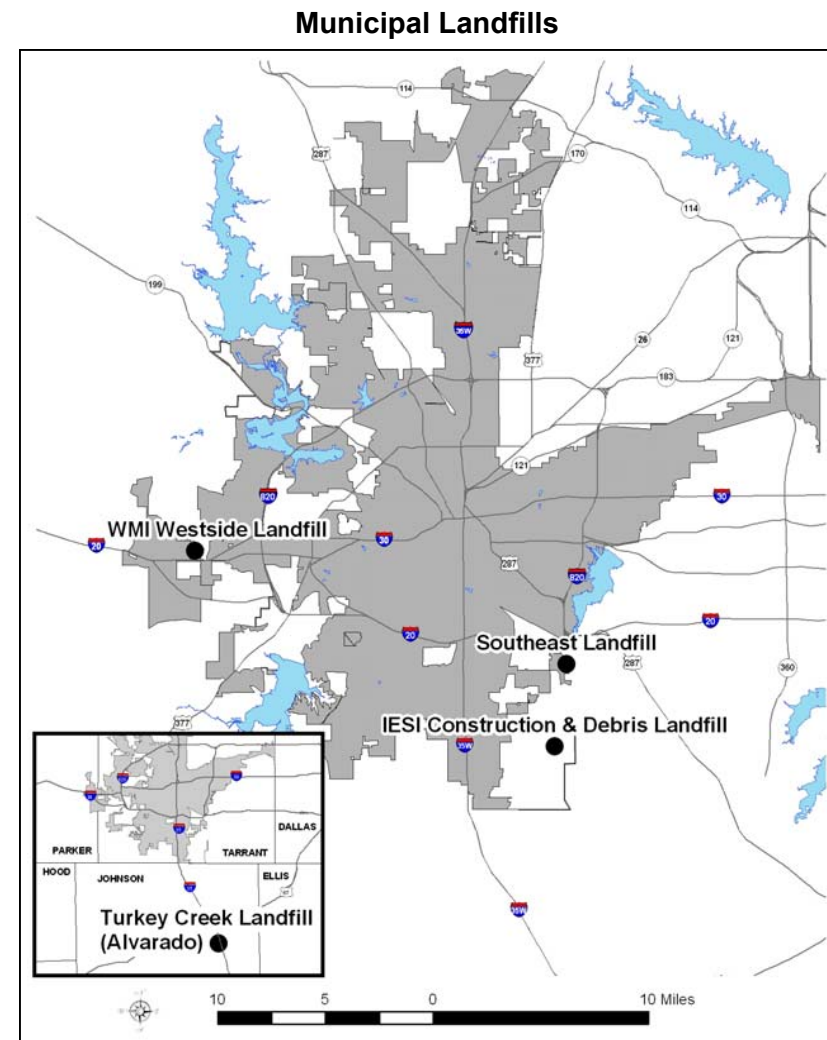
To effectively plan for the future, the City must know its current status. By assessing current environmental conditions, a baseline can be established against which the importance and impact of future decisions can be measured.

### Solid Waste

In fiscal year 2006, the City of Fort Worth collected 249,365 tons of residential garbage, recycling, brush and bulky waste from 175,000 households. The North Central Texas Council of Governments (NCTCOG) projects that the total municipal waste stream (which includes single family residential, multi-family residential and commercial waste projections) for Fort Worth will be 1.1 million tons by the year 2020.

NCTCOG also estimates that approximately 33 percent of the city's waste is generated by single family residences while the remaining 67 percent is produced by a combination of multifamily residential and commercial and industrial uses. A private collection company, under contract with the City, collects the residential waste from Fort Worth single family households. Several private firms collect waste produced by multi-family complexes and commercial and industrial uses. Once collected, the waste is transported to a landfill for disposal or to a material recovery facility to be processed for recycling. Prior to the start of a new solid waste collection program, the residential recycle diversion rate varied from 5 percent to 8 percent of the waste stream. Since the start of this new program in April 2003, approximately 21 percent of residential solid waste is diverted from landfill disposal by the Fort Worth program. This includes both material collected as single-stream recycling and yard waste.

Most of the waste produced in Fort Worth is delivered to landfills. Four landfills currently handle the bulk of the city's waste: the Southeast Landfill, which is owned by the City but operated by a private contractor, receives the residential waste; yard waste and non-putrescible bulk wastes collected through the residential program are either processed for mulch or disposed at the privately owned Fort Worth Construction and Demolition (C&D) Landfill; and, the privately-owned Westside and Turkey Creek Landfills receive the majority of wastes from multi-family complexes



The four main landfills used for the disposal of solid waste generated within Fort Worth during FY 2006 were the City's Southeast Landfill, the IESI Corporation Fort Worth C&D Landfill, the Waste Management Westside Landfill and the Allied Waste Services Turkey Creek Landfill in Johnson County. (Source: Environmental Management Department, 2007.)

and commercial and industrial sites.

Fort Worth operates two free Citizens Convenience Stations. Known as drop-off stations, these facilities offer a free alternative to residents of Fort Worth for the disposal of additional garbage, recycling, brush and yard trimmings, bulky items, and electronics. These two sites are located at 2400 Brennan Avenue and 5150 Martin Luther King Jr. Freeway. During fiscal year 2006, the Brennan and Southeast drop-off stations received over 15,400 tons of waste materials which was subsequently transported to a landfill for disposal or diverted to recycling facilities.

Since December 1997, the Environmental Management Department has operated a year-round regional household hazardous waste collection facility, the Environmental Collection Center, in support of its Municipal Separate Storm Sewer System permit. The facility provides service to 29 municipalities, as well as unincorporated areas of Tarrant County, the Tarrant Regional Water District, and the Upper Trinity Regional Water District. Mobile units travel to collect household hazardous waste at neighborhood locations, as well as in some surrounding cities. In fiscal year 2006, the Environmental Collection Center (ECC) collected and disposed of or recycled over 900 tons of household hazardous waste from 20,525 households. This is waste that otherwise might have ended up in the City's landfills or polluted its waterways.

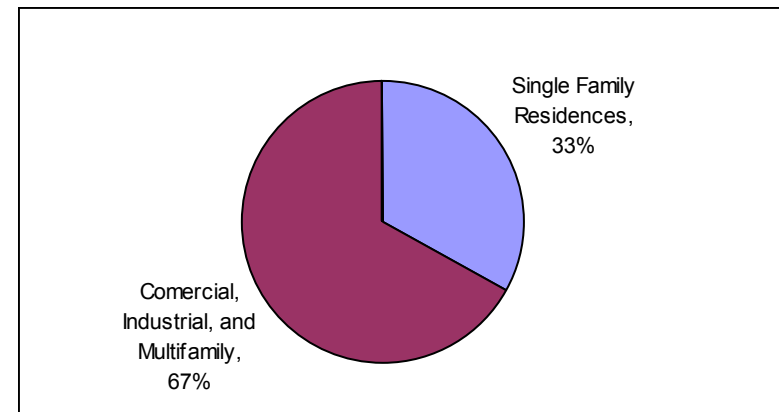
Significant changes to the City's solid waste program took effect in the spring and summer of 2003. The program provided to residential customers combines weekly variable-rate garbage collection in carts, weekly single stream recycling collection in carts, weekly yard waste collection in special bags and carts, and monthly bulky waste collection. The City's goals for the new solid waste contracts are to make the city cleaner and more attractive, provide residents with efficient, cost-effective service, and increase Fort Worth's recycling/diversion rate.

#### Air Quality

Air pollution is a problem facing most major urban areas. In the Metroplex, the primary form of air pollution is ground level ozone. In 2006, the American Lung Association (ALA) ranked Dallas/Fort Worth as the eighth most ozone-polluted metropolitan area in the country, and Tarrant County as the 11th most ozone-polluted county. It was the sixth consecutive year that the ALA gave the region a grade of "F" for air quality. Ozone is a colorless, odorless gas that is present both in the upper atmosphere and at ground level. The ozone that is present in the upper atmosphere protects the earth from harmful ultraviolet radiation. Ozone that is present at ground level is the chief component of smog. Ground level ozone is formed when pollutants react chemically in the presence of sunlight. Ground level ozone can affect health in a number of ways, including irritation of the respiratory system, reduction of lung function, aggravation of asthma, and inflammation or damage to the lining of the lungs. In addition to causing health problems by damaging lungs, ground-level ozone is responsible for one to two billion dollars in reduced crop production in the United States each year, and hastens the deterioration of electronic devices and materials such as rubber, plastics, outdoor paints, photographic papers, and fabrics.

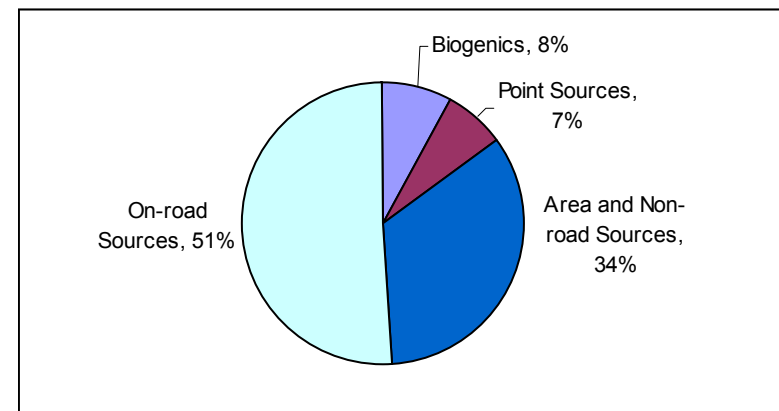
There are two major pollutants that cause the formation of ground level ozone:

### Sources of Solid Waste



Commercial and industrial uses create a higher percentage of waste than multifamily or single family uses. (Source: North Central Texas Council of Governments, 2006.)

### Estimated Sources of Major Air Pollutants (NOx) in North Central Texas — 2007



Ground level ozone is formed when pollutants react chemically with sunlight. In the Dallas-Fort Worth area, the largest contributors of the pollutants are cars and trucks. (Source: North Central Texas Council of Governments, 2007.)

volatile organic compounds (VOCs) and nitrogen oxides (NOx). Estimates projected from implementation of federal, state and local emission reduction initiatives show that in North Central Texas in 2007, seven percent of these pollutants will come from point sources (industrial and non-industrial stationary equipment or processes); eight percent from biogenics (trees and other plants); 34 percent from area sources (including landfills, wild fires, unpaved roads, solvent use, and product storage); and non-road sources (including aircraft, trains, lawn and garden equipment, and construction equipment); and 51 percent from on-road sources.

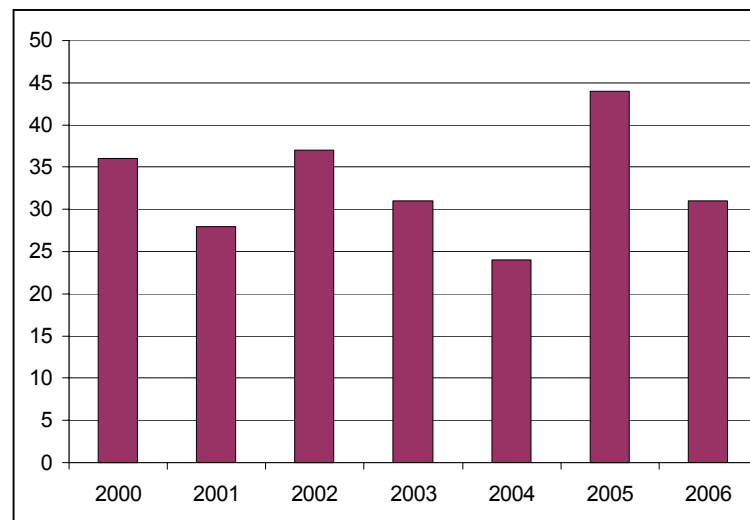
In 1998, the U.S. Environmental Protection Agency (EPA) classified the counties of Collin, Dallas, Denton and Tarrant as an area of serious non-attainment under the federal one-hour ozone standard. As part of that designation, pollution levels in the area were not to exceed the federal one-hour ozone standard more than three days during any three-year monitoring period. EPA also required the four-county area to prepare and implement a State Implementation Plan (SIP), which included initiatives to help reduce ozone-forming emissions in the future. In the monitoring period from 1997 to 1999, the region exceeded the federal one-hour standard 26 times, which could have caused the EPA to downgrade the region to severe non-attainment.

However, on April 15, 2004, EPA made its final designation for an eight-hour ozone non-attainment area comprising Collin, Dallas, Denton, Tarrant, Ellis, Johnson, Kaufman, Parker, and Rockwall counties. The nine-county designation became effective on June 15, 2004. EPA created the eight-hour ozone standard in July 1997, based on information demonstrating that the one-hour standard was inadequate for protecting public health. Ozone can affect human health at lower levels, and over longer exposure times than one hour. The eight-hour standard is much more difficult to attain. Under the one-hour standard, any hourly average of 125 ppb or higher of ozone at any regional air monitor is an exceedance. Under the eight-hour standard, any eight-hour average of 85 ppb or higher of ozone is an exceedance. In 2006, the nine-county region exceeded the eight-hour standard 31 times compared to 44 times in 2005.

With the eight-hour designation, the Dallas-Fort Worth (DFW) region's classification level changed from serious to moderate. The Clean Air Act specifies that the maximum period for attainment for a moderate area is six years from the effective date of designation, which gives the DFW region an attainment date of June 15, 2010. The region's classification had been high because of the failure to meet the one-hour standard in the past. The DFW region is now classified at a lower level based on the difference between the one-hour and eight-hour standard definitions and also on eight-hour ozone design values.

In 2007, the North Central Texas Council of Governments' (NCTCOG) Regional Transportation Council adopted *Mobility 2030*, the Metropolitan Transportation Plan. This plan focuses on improving transportation conditions through sustainable initiatives. Further, it is committed to ensuring that the region's transportation efforts are consistent with its air quality objectives by supporting local initiatives for town centers, mixed use growth centers, transit-oriented development, infill/brownfield development, and pedestrian-oriented projects. It has objectives to complement rail investments with investments in park and ride, bicycle, and pedestrian facilities, and

## DFW Region 8-Hour Ozone Exceedance History 2000-2006



Under the eight-hour standard, any eight-hour average of 85 ppb or higher of ozone is an exceedance. In 2006, the nine-county region exceeded the eight-hour standard 31 times compared to 44 times in 2005. (Source: Environmental Management Department, 2007.)

### Care for Cowtown Air



Care for Cowtown Air is a program administered by the City of Fort Worth Environmental Management Department. The program helps to improve air quality by offering incentives to City employees who participate in ozone reducing activities during the ozone season, May through October. Ozone reducing activities include bringing a lunch to work, walking to lunch, riding a bus, a bike, or carpooling to work, telecommuting, or using flex-time. (Source: Environmental Management Department, 2007.)

to reduce the growth in vehicle miles traveled per person. Implementation of *Mobility 2030* could significantly reduce VOC and NO<sub>x</sub> emissions in the region. More information on traffic congestion and transportation improvements can be found in Chapter 11: Transportation. The development of pedestrian and transit-oriented mixed-use growth centers described in Chapter 4: Land Use is consistent with *Mobility 2030*.

### **Resource Conservation**

Since 1970, Texas has nearly doubled both its population and its annual energy consumption. Texas ranks second in population, behind California, but according to the U.S. Department of Energy, Energy Information Administration, in 2001 Texas ranked first among states in energy consumption. Texans used 12.029 quadrillion Btu (Quads) or 12.5 percent of all U.S. energy consumption; more energy than number 2 consumer California and number 3 consumer Florida combined. Texas ranked first in consumption of electricity, petroleum, and natural gas, and second in consumption of coal.

Although Texas' total annual energy consumption per capita has dropped from its 1980 peak of 636.6 million British thermal units (M-Btu) to 579.01M-Btu in 2000, residential consumption has shown a steady rise. In 1960, each Texan was using 38.32M-Btu in their homes annually, but by 2000 that usage had nearly doubled to 74.59M-Btu annually. By contrast, California's per capita residential energy usage in 2000 was 43.02M-Btu.

Most electricity is still generated using fossil fuels (coal and natural gas), and the Texas Commission on Environmental Quality (TCEQ) has identified the electric industry as a major stationary source of air pollution in the state, particularly of nitrogen oxides (NO<sub>x</sub>). NO<sub>x</sub> contributes to the formation of ground-level ozone (smog). As described in the section above on Air Quality, the EPA classifies the Dallas-Fort Worth region as a moderate ozone non-attainment area. Ground-level ozone causes health problems by damaging lungs, is responsible for one- to two-billion dollars in reduced crop production in the United States each year, and hastens the deterioration of electronic devices and materials such as rubber, plastic, paints, paper, and fabrics.

A phenomenon called the "urban heat island effect" is another contributing factor to the formation of ground-level ozone and the high level of electricity consumption. In the summer, urbanized areas can be up to 10° F warmer than the surrounding countryside. The displacement of trees and shrubs by roadways, parking lots, and buildings eliminates the cooling effects of shade and evapotranspiration. Evapotranspiration occurs when plants secrete or transpire water through their leaves. The water draws heat as it evaporates, cooling the air in the process. According to the Lawrence Berkeley National Laboratory, a single, mature, and properly watered tree with a crown of 30 feet can evapotranspire up to 40 gallons of water in a day, removing a heat equivalent to that produced in four hours by a small electric space heater.

Although plants cool the air, buildings and roads often increase ambient air



An important component of the State Implementation Plan (SIP) is AirCheck Texas, the Motor Vehicle Emission Inspection and Maintenance Program that went into effect on May 1, 2002, in Collin, Dallas, Denton, and Tarrant counties. (Source: *Environmental Management Department, 2007.*)



An "Air Pollution Watch" will be issued for a day predicted to be a public health risk. TCEQ issues an "Air Pollution Warning" if air pollution levels actually reach unhealthy levels based on monitor readings. Ozone levels are represented by various colors in the warnings to easily convey the severity of air pollution. For example, purple indicates a very unhealthy level of ozone, while orange indicates that levels are unhealthy for sensitive groups. (Source: *Environmental Management Department, 2007.*)

temperature. Typical building and paving materials are quite efficient at absorbing solar radiation rather than reflecting it back into the atmosphere, causing both surface and ambient temperature to rise, leading to increased ozone formation. The darker the material is, the greater these increases in temperature. In the sun, black surfaces can become up to 70°F hotter than the most reflective white surfaces. If the surface is a roof, the absorbed heat also increases the structure's indoor temperature, increasing the demand for electricity to cool the structure to a comfortable level.

The resulting trend increases demand on power plants, increasing emissions of NO<sub>x</sub> and leading to increased ozone levels. Ultimately, heat islands reduce a city's livability by decreasing urban ventilation and increasing the risk of heat-related illness. Urban heat islands have some far-reaching effects as well. NASA scientists at the Goddard Space Flight Center have recently confirmed that urban heat islands cause destabilization of the atmosphere, leading to greatly increased rainfall in areas downwind of large cities. The City's conservation initiatives work to reduce these urban heat island effects and improve our overall environmental quality.

In 2001, the Texas Legislature adopted energy efficiency performance standards to encourage the construction of more energy efficient buildings. The Legislature stated that an effective building energy code is essential to "reducing the air pollutant emissions that are effecting the health of residents of this state: moderating future peak electric power demand; assuring the reliability of the electrical power grid; and controlling energy costs for residents and businesses in this state."

To achieve energy efficiency in residential, commercial and industrial construction sectors, the pertinent chapters of the International Residential Code and the International Energy Conservation Code, as they existed in May 2001, were adopted by the Legislature. Municipalities are mandated to administer and enforce these codes within their jurisdictions. The City adopted these codes, with amendments, on 11 December 2001, as the Fort Worth Energy Code, and charged the City's Building Official with their enforcement.

Another initiative adopted by the Legislature is known as Texas Senate Bill 5 (SB5), a.k.a. the *Texas Emission Reduction Plan (TERP)*. SB5 was enacted to assist the State in complying with the *Federal Clean Air Act*. The bill contains new energy efficiency measures that are designed to decrease energy consumption. These energy efficiency measures are intended to assist in reducing air emissions from electricity generation plants. SB5 adds Chapter 388 to the *Texas Health and Safety Code*. These provisions include, but are not limited to the following:

- Efficiency Measures—That political subdivisions in non-attainment areas implement energy efficiency measures that are deemed cost effective.
- Electricity Consumption Goal—That political subdivisions in non-attainment areas establish a goal to reduce their electricity consumption by five-percent each year for a five-year period beginning in January 2002, as measured against the baseline year of 2001.
- Annual Reporting—That political subdivisions in non-attainment areas annually report to the State their efforts and progress at meeting the requirements under Section 388.005.

## Urban Heat Island Strategies



Green roof on Atlanta City Hall



Green roof on Hamilton Apartments, Portland, Oregon, owned by the Housing Authority of Portland.

The City of Atlanta installed a green roof on its City Hall building in December 2003. The 3,000 square foot project has approximately 2,000 square feet of vegetated area and 1,000 square feet of pavers. From 1988 to 1998 the city lost 190,000 acres of tree cover due to development, and downtown Atlanta is now often 10 degrees warmer than outlying areas. The city is studying the use of green roofs as a way to counteract the urban heat island effect. The City of Portland, Oregon, officially recognizes the use of green roofs to reduce the effect of storm water runoff on local waterways. City grants have helped fund 14 green roofs in Portland, including office buildings and apartments. The City of Fort Worth will explore similar strategies to reduce energy consumption at municipal facilities.

The City currently implements cost-effective energy efficiency measures and annually reports its progress to the State Energy Conservation Office (SECO), as required, in support of the City's commitment to the stated electricity consumption goal. To that end, the City has made significant progress towards TERP goals. The City's Conservation Specialist works from within the Department of Transportation & Public Works' (TPW's) Facilities Management Group with all City Departments to develop, implement, track, and report on the effectiveness of resource conservation initiatives.

The City of Fort Worth's population grew by approximately four percent annually from 534,694 in 2000 to 686,850 in 2007. By 2025, the City's population is projected to increase to more than 784,000. If recent growth trends continue, however, Fort Worth's population could approach one million by 2025. Continuing population and economic growth in the Dallas-Fort Worth region will place increasing demands on environmental resources, in turn impacting City air quality. Strong economic growth typically acts to compromise environmental quality. To mitigate the effects of this trend, all sectors – residential, commercial, and industrial – need to find ways to reduce energy and water consumption.

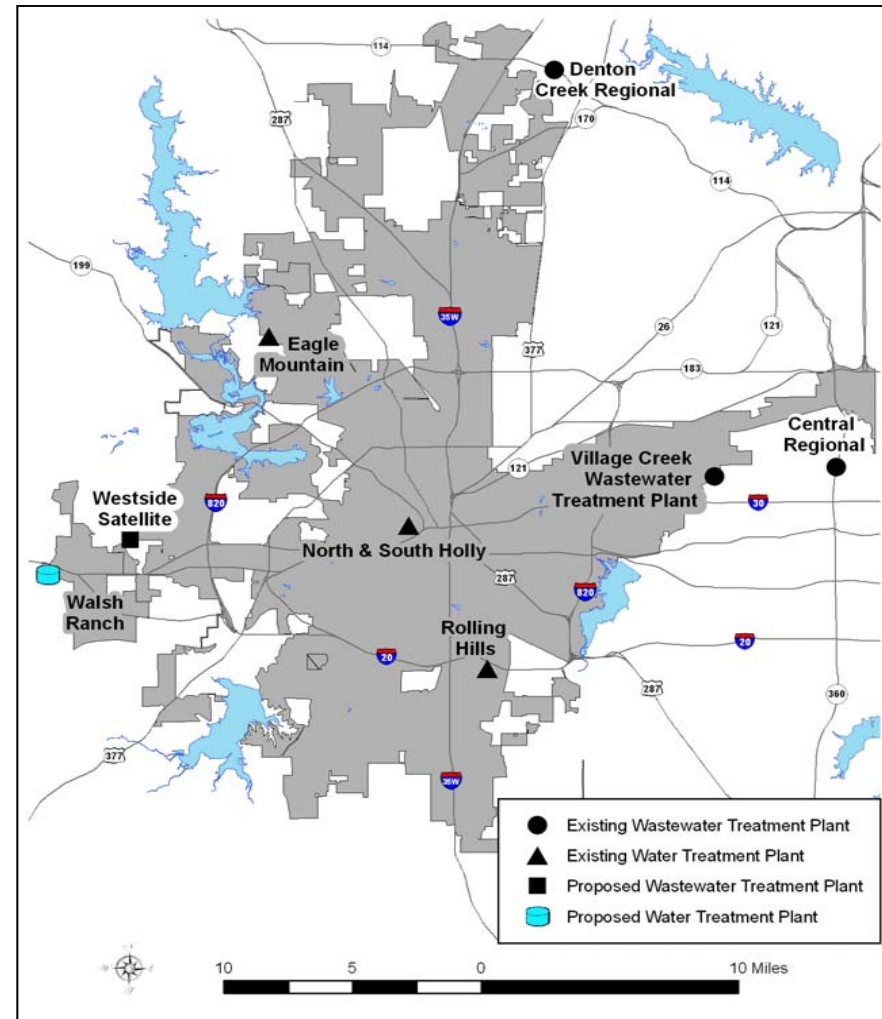
### **Water Quality and Supply**

The Water Department provides retail water service to the citizens and businesses of Fort Worth. The 2006 retail magnitude was approximately 206,178 water accounts. The City also provides wholesale water service to 29 customers, which are generally neighboring cities or water supply entities located adjacent to Fort Worth. In 2005, the City completed the Water Master Plan which developed a plan to meet supply and distribution needs through 2025.

Fort Worth's raw water supply is provided by the Tarrant Regional Water District (TRWD) under a long-term contract, and it is subject to availability and capacity of the TRWD system. Water sources include the West Fork of the Trinity River (Lake Worth, Eagle Mountain Lake and Lake Bridgeport), the Clear Fork of the Trinity River (released from Lake Benbrook), Richland Chambers Reservoir, and Cedar Creek Reservoir. Presently, TRWD has an adequate raw water supply for Fort Worth beyond the horizon of 2020. The current treatment capacity available to Fort Worth is approximately 450 million gallons per day (MGD). The 2006 average-day demand was 207 MGD, with a maximum-day demand of 344 MGD. The projected average-day demand for the year 2020 is 310 MGD, with the maximum-day demand for the year 2020 presently projected to be over 629 MGD.

There are four raw water treatment facilities that treat water to meet federal and state drinking water standards prior to delivery into the distribution system: North Holly, South Holly, Rolling Hills, and Eagle Mountain Water Treatment Plants. In 2003, the City completed upgrades to the North and South Holly and Rolling Hills water treatment plants that reduced existing levels of disinfection byproducts from 100 micrograms per liter to 80, and microbe levels from .5 turbidity units to .3 turbidity units. Also, the City is in the process of expanding the Eagle Mountain Water Treatment Plant. This expansion will bring the total treatment capacity to 485 MGD.

### **Water Treatment and Wastewater Treatment Facilities**



The City of Fort Worth uses four plants to treat raw water to meet federal and state drinking water standards before it is delivered into the distribution system. The majority of wastewater generated within Fort Worth is treated at the Village Creek wastewater treatment plant, with the remainder treated at Denton Creek and Central Regional Wastewater Treatment Plants. (Source: Environmental Management Department, 2007.)

The City has also taken steps to help ensure the security of Fort Worth's water supply by completing a security vulnerability assessment study in 2003.

The Water Department has invested significant capital to incorporate ozone at Eagle Mountain and Rolling Hills Water treatment Plants, with North and South Holly being the only plants not using ozone for primary disinfection and taste and odor control. To address taste and odor control at North and South Holly, it is anticipated that a project to install ozone at the Holy WTP's will be initiated.

In addition to providing potable water to citizens and businesses, the City provides a system for wastewater collection and treatment. In 1999, the City completed the Wastewater Master Plan Program to identify the needs of the city as it continues to grow.

Currently, the City provides service to 197,594 retail wastewater accounts generally within the city limits. The City also provides wholesale service to 22 wastewater customers outside city limits. Fort Worth uses three major wastewater treatment plants, which provide 98 percent of the wastewater service:

- Village Creek Wastewater Treatment Plant (owned by the City of Fort Worth).
- Denton Creek Regional Wastewater System (operated by the Trinity River Authority, TRA).
- Central Regional Wastewater System (operated by the TRA).

Wastewater is treated by these plants to meet stringent water quality standards contained in federal and state permits, and then discharged to the Trinity River and its tributaries. In 2003, the City completed rehabilitation and capacity improvement projects in the wastewater collection system to eliminate sanitary sewer overflows and backups.

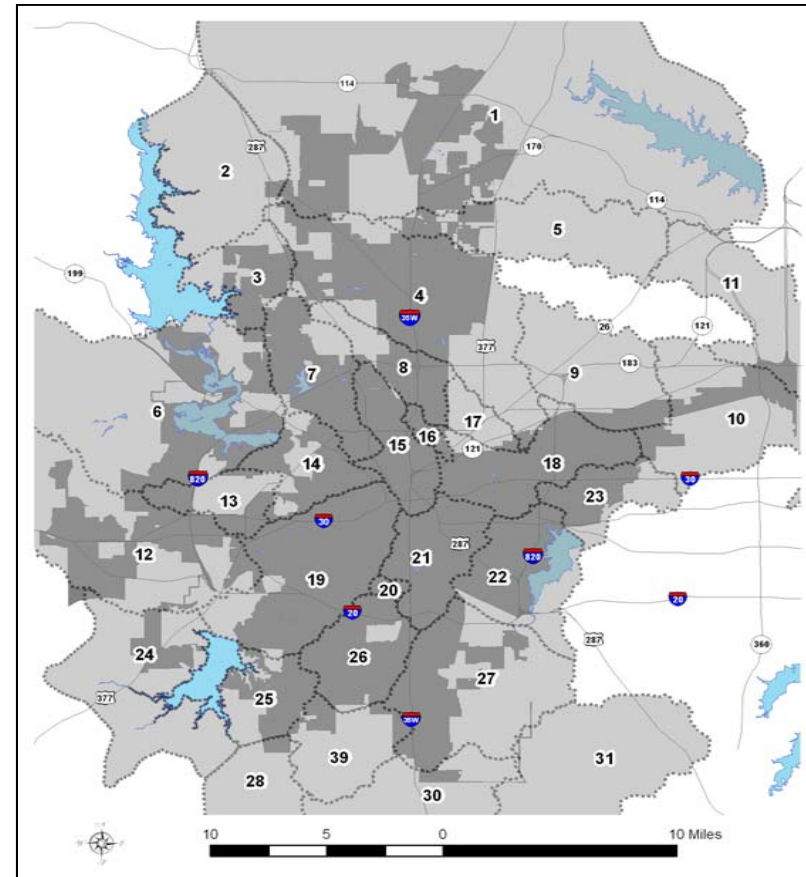
The Texas Commission on Environmental Quality has taken a stronger stance on sanitary sewer overflows and will be fining utilities that, in their determination, are not responding to the infrastructure needs of their collection system. The City has committed in excess of \$300 million over ten years to aggressively reduce existing sanitary sewer overflows.

Also, the Water Department has developed an \$85 million capital plan to be implemented over the next 15 years to develop a water reuse program for the area. Water reuse, developed in response to depleting water resources, makes beneficial use of wastewater that has been treated to an acceptable standard for non-domestic uses such as irrigation of golf courses, cemeteries, playing fields, parks and nonresidential landscaped areas.

### **Storm Water Management**

A problem facing many urbanized areas is the effect of storm water runoff in transporting non-point source pollution. Non-point source pollution is created when water runs over land and picks up sediment, debris, and other pollutants along the way, eventually depositing this material into lakes, rivers, and streams. Because urbanized areas have a high percentage of impervious surfaces, water has fewer

### **Watershed Boundaries**



- |                                    |                                      |                          |
|------------------------------------|--------------------------------------|--------------------------|
| 1. Grapevine Lake Dam              | 12. Mary's Creek                     | 23. Lower Village Creek  |
| 2. Unnamed                         | 13. King's Branch                    | 24. Unnamed              |
| 3. East of Eagle Mountain Lake     | 14. West Fork Above Clear Fork Creek | 25. Unnamed              |
| 4. Big Fossil Creek                | 15. West Fork Above Sycamore Creek   | 26. Upper Village Creek  |
| 5. Upper Big Bear                  | 16. Dry Branch                       | 27. Middle Village Creek |
| 6. Lake Worth Dam                  | 17. Lower Little Fossil Creek        | 28. Unnamed              |
| 7. Marine Creek                    | 18. West Fork Above Fossil Creek     | 30. Upper Village Creek  |
| 8. Upper Little Fossil Creek       | 19. Clear Fork Above Trinity River   | 31. Walnut Creek         |
| 9. Walker Branch                   | 20. Sycamore Tributary               | 39. Deer Creek           |
| 10. West Fork Above Mountain Creek | 21. Lower Sycamore Creek             |                          |
| 11. Lower Big Bear                 | 22. Lake Arlington Dam               |                          |

It is important to consider watershed boundaries when examining runoff patterns and issues because water does not flow according to political boundaries; what happens in one part of the region can affect other areas downstream. (Source: Planning and Development Department, 2007.)

places to infiltrate and it is quickly channeled into water bodies, along with the pollutants it picks up.

In December 1996, the City was issued a National Pollutant Discharge Elimination System (NPDES) permit by the U.S. Environmental Protection Agency (EPA) to discharge from the City's municipal separate storm water sewer system into waters of the United States. This permit was renewed in 2006 by the Texas Commission on Environmental Quality (TCEQ) as a Texas Pollution Discharge Elimination System (TPDES) permit. A major provision of this permit was the minimization of non-point source pollution in areas of new development and significant redevelopment, and the City developed planning procedures to address these issues.

In addition to preventing pollutants from entering storm water runoff, the City is concerned with improving existing drainage and preventing future flooding and erosion associated with development. Storm water runoff is not subject to man-made boundaries like neighborhoods, council districts, or sectors. What happens in one part of the city can affect other areas downstream. For this reason, issues pertaining to storm water and drainage should be investigated on a watershed basis. Because Fort Worth has grown substantially within the last 20 years, and has room for continued substantial growth over the next 20 years, drainage issues need to be addressed on a watershed basis when new developments or significant redevelopments are under consideration.

In November 2002, 55 local governments kicked off a regional effort to more effectively manage storm water impacts through the *integrated* Storm Water Management (iSWM) program. The iSWM initiative, coordinated by NCTCOG, will help the region achieve environmental goals, foster partnerships with state & federal agencies, and provide guidelines for comprehensive storm water management. The iSWM design manual was released by the NCTCOG in January 2006. In March 2006, the City of Fort Worth adopted the iSWM manual, together with a Local Criteria section, as the 2006 Fort Worth *Storm Water Management Design Manual*. This manual provides the most current storm water management techniques that are applicable to site planning and construction. Extensive future capital improvement projects, however, will be required to bring the numerous existing undersized storm drain systems and open channels up to current standards. To upgrade these deficient drainage systems, the Fort Worth City Council adopted a Storm Water Utility in 2006. This utility collects and manages funds to reconstruct and upgrade the City's drainage systems, and to provide operation and maintenance of the storm water system, including storm drains and drainage channels.

Major flooding in Tarrant County generally occurs as a result of heavy rainfall from frontal type storms, which are most frequent in the spring and summer months. Man-made reservoirs and levees have significantly altered flood flows. The City of Fort Worth has in place a Federal Flood Insurance Program, which regulates development in floodplain areas in the city and other areas under its jurisdiction and control. The City has amended this regulation to comply with the Federal Emergency Management Agency's (FEMA) new standards, procedures, policies, and guidelines. However, most structure flooding in Fort Worth occurs along storm drain lines and minor streams which are not regulated by the FEMA Flood Insurance Program.

## Storm Water Management



The iSWM (Integrated Storm Water Management) program is coordinated by the North Central Texas Council of Governments. The program is designed to help the region achieve environmental goals, foster partnerships with state and federal agencies, and provide guidelines for comprehensive storm water management. (Source: North Central Texas Council of Governments, 2007.)

### **Endangered Species and Natural Habitat**

In Tarrant County, there are three endangered or threatened species of animals: the Interior Least Tern, the Bald Eagle, and the Whooping Crane. The Least Tern can be found in habitats along the Trinity River, which has broad sandbars and barren shoreline. The Least Tern has declined in population due to the construction of reservoirs and channelization projects that exacerbate habitat flooding problems, water pollution, and increased vegetative growth in habitat areas.

The Bald Eagle has been documented in recent years at Lake Worth, and has reportedly been seen near Lake Benbrook. The eagles like areas near river systems or large water bodies. They use tall trees located close to marshes or lakes to nest. Due to an increase in population in 1995, their classification was reduced from endangered to threatened. They are currently considered neither endangered or threatened due to a further increase in population.

The Whooping Crane has historically used the Dallas-Fort Worth area as part of its regular migratory route. Recently, there has only been one sighting in Tarrant County. These large birds frequent marsh areas, river bottoms, and prairie and croplands—areas away from development that have plenty of vegetation and water. According to the U. S. Fish and Wildlife Service, they are currently threatened by the destruction of wintering and breeding habitats, entanglement in human structures like power lines and fences, and poaching.

In addition to the three birds, two plants warrant mentioning. These are the False Auriculate Foxglove and the Comanche Peak Prairie-Clover. The False Auriculate Foxglove is listed on the State historical list of plants for this area, but has not been seen since the turn of the last century in Tarrant County. It is listed because the proper habitat exists here and is found in some contiguous states. The Comanche Peak Prairie Clover is found in Parker and Wise counties. The proper habitat is found in Tarrant County, but only 6-20 populations are estimated statewide.

Within the greater Fort Worth area, there are four primary north central Texas ecosystems: the Grand Prairie, Western Crosstimbers, Eastern Crosstimbers, and the Trinity River Bottomland. The Grand Prairie typically consists of clay-based limestone soils. The soil cover can range from very thin, rocky, and dry on hilltops, to thicker covers on slope and bottom areas. The majority of the vegetation in this area is typically tall and mid grasses, with dispersed populations of wildflowers. Eastern and Western Crosstimbers are distinguished by their sandy or clay soil structures. The soil layer in these ecosystems is usually deeper and has more water-bearing potential than that of the Grand Prairie. Vegetation in these areas includes post oak, blackjack oak, tall and mid grasses, with small amounts of wildflowers. The Trinity River Bottomland is characterized by deep clay soils. Vegetation includes tall and mid grasses and a variety of flood plain trees, such as pecan, American elm, sugar hackberry, green ash, and cottonwood.

### **Sustainable Development**

In recent years, a new approach to environmental planning has emerged — sustainable development. Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs. This

### **Keep Fort Worth Beautiful Program**



The Keep Fort Worth Beautiful Program educates citizens on methods to reduce the amount of solid waste disposal. (Source: Environmental Management Department, 2007.)

approach promotes development with reduced environmental impacts. As population increases and land and resources become more scarce and expensive, it becomes ever more important to consider the long-term ramifications of growth. Cities like Chicago, Illinois, Austin, Texas, and Portland, Oregon, have programs in place to address these issues. Some include incentives to use natural vegetation to reduce water consumption, using more energy-efficient building materials to lower the demand on power sources, and using construction materials that are reusable or created from recycled material.

The Brownfields Economic Redevelopment Program is a component of the City's broader sustainable development initiatives. Brownfields are "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." Such contaminants typically are remnants of previous industrial uses of otherwise redevelopable land. The mission of the program is to encourage the redevelopment of economically distressed areas in Fort Worth through the integration of environmental assessment, remediation, and education. The program encompasses the entire city, but targets City Council Districts 2, 5, and 8. These districts have the highest minority populations in the city and are also the most economically disadvantaged. An inventory of Fort Worth's potential brownfield sites now tops 340 facilities. Approximately 72 percent of the identified sites are located in the targeted council districts. The vast majority of the sites in the inventory are a fraction of an acre in size, further complicating their redevelopment potential.

The objectives of brownfields redevelopment include reducing perceived and actual health problems associated with living and working in proximity to contaminated properties, reducing crime associated with abandoned buildings, increasing public awareness of issues associated with brownfields, and securing community involvement in remediation and redevelopment.

The Fort Worth Brownfields program began as a pilot in 1999 with a \$200,000 U.S. Environmental Protection Agency (EPA) assessment grant. A supplemental grant of \$200,000 was received two years later. In June 2004, the City of Fort Worth was selected by EPA to receive a new \$400,000 brownfields assessment grant. The 2004 grant will be used to perform Phase I and II site assessments, and prepare cleanup plans for hazardous substances and petroleum contamination. Fort Worth also has a \$1 million brownfields cleanup revolving loan fund from the EPA, to be used to provide low interest loans for brownfields cleanup.

In 2007 the Sustainability and Green Building Task Force was formed to create a program that promotes sustainable and green development practices to improve quality of life for future generations. The task force is preparing a final report with goals and objectives that will be included in the Comprehensive Plan when approved by the City Council. The final report is expected to be complete in the summer of 2008.

## Brownfields Assessment Demonstration Pilot



The Evans and Rosedale neighborhood is a brownfields success in the making. The intersection of Evans and Pulaski is now home to a beautiful public plaza celebrating African-American heritage in Fort Worth. Lead-contaminated soil was removed from the site, making it available for redevelopment. (Source: *Environmental Management Department, 2007.*)

## GOALS AND OBJECTIVES

The Mayor and City Council revised the following strategic goals related to environmental quality: 1) create and maintain a clean, attractive city, and 2) improve mobility and air quality. The following goals and objectives help achieve the City Council's broader strategic goals while addressing current and future needs.

### Solid Waste

Make Fort Worth cleaner and more attractive by enhancing solid waste services through a new collection program and provider contract implemented in spring 2003.

- Through curbside recycling, increase the amount of waste diverted from landfills from the current 22 percent to more than 25 percent in 2008.

### Air Quality

Improve Fort Worth's and the region's air quality through reduction of pollutants.

- Work in cooperation with TCEQ, NCTCOG, and other cities in the Dallas-Fort Worth Metroplex to bring the region into attainment for ozone by June 15, 2010.
- Comply with EPA mandates for the next monitoring period.
- Implement a Mobility and Air Quality Plan in 2008.

### Resource Conservation

Reduce electricity consumption.

- Reduce electricity consumption at City facilities by five percent per year through 2012.

### Municipal Water Quality, Supply, and Wastewater

Maintain a high level of water quality for current usage, and accommodate future development.

- Create new reservoirs along the Sulfur River to accommodate future growth.

### Storm Water Quality and Quantity (drainage)

Maintain or improve current water quality by reducing the non-point source pollutant load entering creeks, reservoirs, and rivers from new development and redevelopment.

- Regularly update policies and procedures to control water pollution caused by storm water runoff in order to comply with Fort Worth's Texas Pollutant Discharge Elimination System (TPDES) storm water permit.
- Reduce flooding through maintenance and improvements of drainage features.
- By 2009, complete an inventory of existing drainage structures in Fort Worth.

### Endangered Species and Natural Habitat

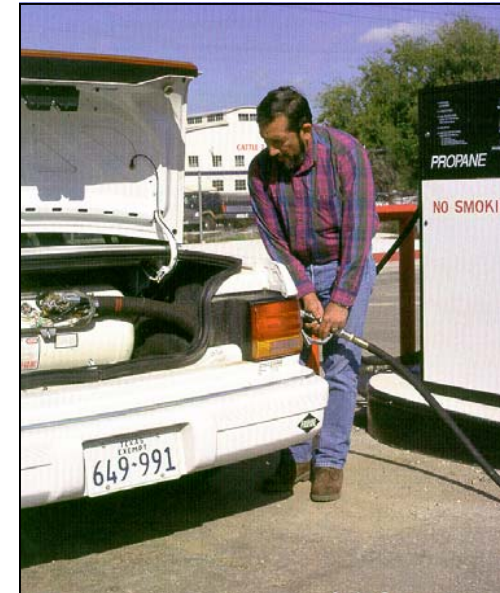
Preserve natural habitat and protect endangered or threatened species.

- Prepare Fort Worth area inventory of natural habitats and species in 2008.
- Begin to propagate and restore populations of native plant species in 2008.

### Sustainable Development

Redevelop abandoned industrial and commercial sites, or brownfields, to help reuse land in the central city.

## Use of Alternative Fuels



The use of alternative fuels, such as propane, is one way the City of Fort Worth is helping to reduce air pollution in the Dallas-Fort Worth Metroplex. (Source: City of Fort Worth, 2007.)

- Continue identification of potential brownfields redevelopment candidates, focusing on the central city.
- By the end of 2008, perform environmental site assessments of selected project sites, and facilitate the redevelopment of those sites.
- Continue developing Fort Worth's program—the demolition of regulated structures—to create a more economical way for local governments to demolish substandard nuisance structures containing asbestos, while protecting the environment and the public health. Maintain contact with the EPA and continue monitoring EPA's progress with testing their own alternative methods.
- Create a Brownfields Redevelopment Guidebook in 2008 to help educate potential developers on the City's brownfields program, the process needed to redevelop a site, and any funding or other incentives available.

## **POLICIES AND STRATEGIES**

The following policies and strategies will enable the City to achieve its environmental quality goals and objectives:

### **Solid Waste Policy**

- Pursue methods to minimize wastes, reduce recycling contaminants, re-use or recycle wastes, and assure long term disposal capacity.

### **Solid Waste Strategies**

- Allow a broad range of approved materials for recycling.
- Promote such programs as "Don't Bag It" and backyard composting.
- Provide effective educational opportunities to inform citizens on how to better manage waste.

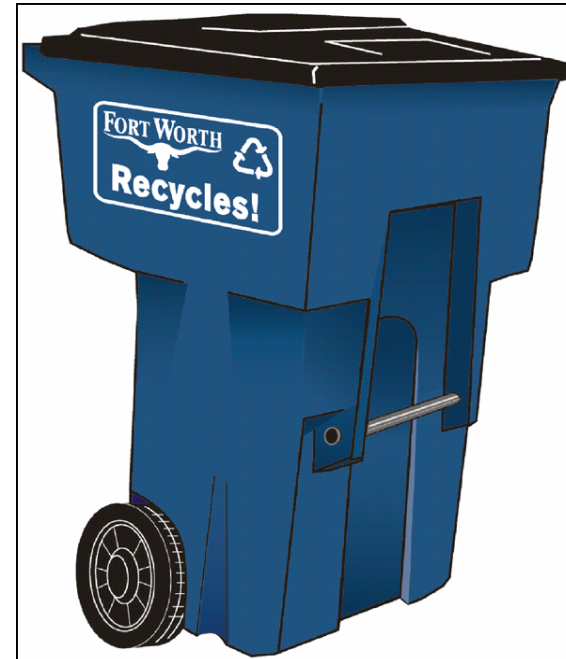
### **Air Quality Policies**

- Encourage regional public transportation by working with other cities in the Metroplex to create efficient commuter rail, light rail, bus service, and other types of mass transit.
- Encourage development that reduces daily vehicle miles traveled for commuters through the creation of mixed-use growth centers.
- Encourage the development of industries with minimal air emissions, which will allow continued economic growth while the Metroplex is under strict federal emissions standards.
- Encourage development that helps reduce higher temperatures in urban areas through the planting of shade trees and the use of appropriate highly reflective (high albedo) paving surfaces and roofing materials. Consider using City projects to demonstrate the effectiveness of these development practices.

### **Air Quality Strategies**

- Reduce automobile emissions by using alternative fueled and hybrid City vehicles, where appropriate.
- Encourage citizens, City employees, and contractors to follow ozone reduction steps throughout the year, and more so during the ozone season (May 1<sup>st</sup> through October 31<sup>st</sup>), particularly on Air Pollution Watch Days.

## **Curbside Recycling Program**



Fort Worth's curbside recycling program prevented 22 percent of waste from going to landfills during FY 2006. The City Council directed staff to pursue an aggressive goal of diverting 25 percent of the city's total annual waste stream as part of the solid waste collection program. (Source: *Environmental Management Department, 2007.*)

- Where appropriate, preserve mature trees, and plant additional trees to help the air filtering process and to reduce the ambient outdoor temperature.
- Determine the feasibility of an idling restriction ordinance for all vehicles.

### **Resource Conservation Policies**

- Pursue methods to reduce energy and water consumption at City facilities.
- Pursue methods to reduce the impact of the urban heat island effect on Fort Worth.
- Promote energy efficiency and use of renewable energy.
- Promote water efficiency and water re-use.

### **Resource Conservation Strategies**

- Reduce the amount of energy and water consumed throughout the City through administration, enforcement, and amendment of the Fort Worth Energy Code to require use of EnergyStar appliances at City facilities. EnergyStar appliances use less electricity and less water than conventional appliances.
- Reduce the reliance on electricity produced by fossil fuel by encouraging the use of renewable energy sources in new development and redevelopment.
- Reduce the reliance on potable water use by encouraging the appropriate re-use and reclamation of water in new development and redevelopment.
- Assess energy and water use in City facilities to identify opportunities for conservation and to implement appropriate measures.
- Educate employees on energy conservation in daily activities both at work and at home.
- Monitor energy and water consumption at City facilities to track conservation plan progress, and communicate results to City administrators, employees, and elected officials to maintain awareness.
- Research options to increase the reflectivity of City roofs and paved surfaces to reflect more solar radiation, thereby reducing air conditioning loads and urban heat island effects.
- Encourage planting and maintenance of native vegetation near buildings and along paved surfaces to directly shield them from the sun's rays, reducing urban heat island effects.

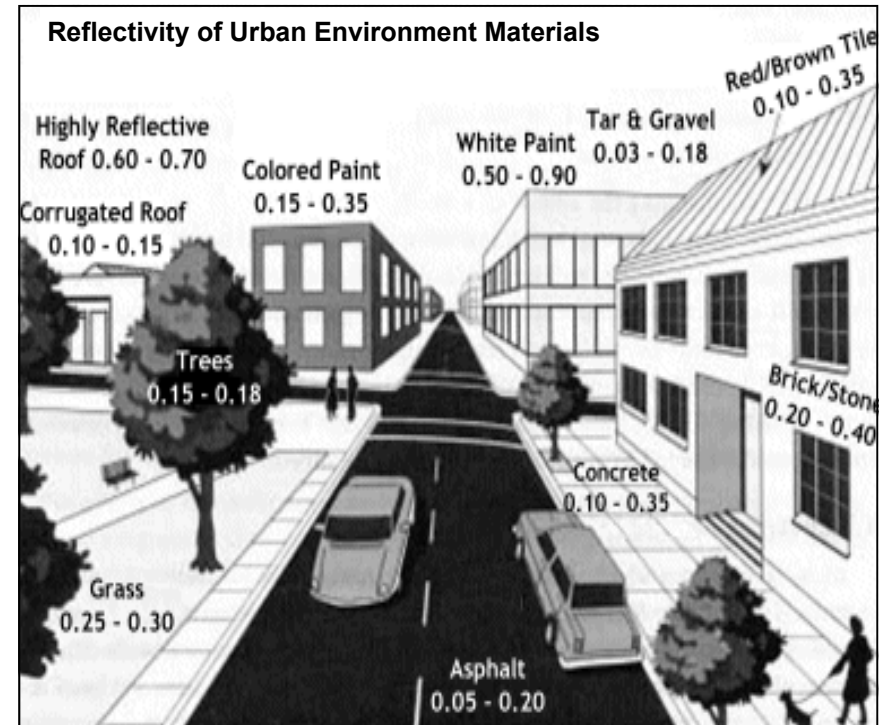
### **Municipal Water Quality and Supply and Wastewater Policies**

- Provide for handling wet weather flows in the sewer system in a cost-effective manner.
- Provide potable water in the service area as required by the projected growth.
- Assure adequate raw water resources to meet projected demand.
- Provide water service in an effective manner while meeting all federal and state water quality standards.

### **Storm Water Quality and Quantity (Drainage) Policies**

- Minimize impervious land cover in areas of new development and significant redevelopment.
- Encourage redevelopment and infill in order to reduce the amount of new

## **Energy Conservation Through Choice of Materials**



Reflective (or high albedo) and emissive roofs bounce incoming solar radiation back into the atmosphere, reducing heat transfer through the building envelope. This effectively cools building interiors, reducing electricity demand for air conditioning. Light colored paving materials also reflect solar radiation and reduce surface and ambient air temperatures. (Source: U.S. Environmental Protection Agency, 2007.)

- impervious surfaces.
- Utilize natural areas to retain and filter storm water runoff.

#### **Storm Water Quality and Quantity (Drainage) Strategies**

- When feasible, develop linear parks with walking and biking trails along drainage ways as an effective means of filtering out water pollutants and connecting neighborhoods.
- Reduce erosion and improve ground cover along drainage channels through effective design, construction, and maintenance.
- Support innovative efforts that are cost and environmentally effective in addressing water quality issues associated with new development and extensive redevelopment.
- Identify and address potential concerns regarding non-point source pollutant issues by providing information to parties involved in new and extensive redevelopment.
- Develop a detailed mitigation plan for increasing capacity and eliminating bottleneck conditions in areas presently subject to flooding.

#### **Endangered Species and Natural Habitat Policies**

- Protect riparian corridors as natural buffers to filter pollutants and conserve natural habitats.

#### **Endangered Species and Natural Habitat Strategies**

- Seek opportunities and encourage developers to use natural landscapes.
- Develop and implement a plan for the designation and protection of Wildwood Bottoms at Lake Worth as a nature sanctuary for American Bald Eagles and other species.
- Develop and implement an ecotourism plan that is focused on the natural attractions of Fort Worth.

#### **Sustainable Development Policies**

- Increase the efficiency and cost-effectiveness of providing City services by promoting development in mixed-use growth centers.
- Promote and facilitate the redevelopment of brownfields.
- Encourage building practices that reduce environmental impacts.
- Promote the use of natural vegetation on City property and in parks. (There are areas where this is not an appropriate or desirable goal, such as in historically significant parks like Capps, or in special venues such as the Water Gardens and the Zoo.)
- Where possible, the City should set an example by developing facilities that are environmentally responsible.
- Implement a sustainable development online forum—an educational and networking resource that will inform the public about local opportunities and the benefits of sustainable development, and while increasing builder participation.

### **Storm Water Management**



Due to undersized drainage systems built many years ago, a number of Fort Worth neighborhoods and roadways are subject to severe flooding in heavy rains. Over \$650 million in drainage needs have been identified. In response to this need, the City Council implemented a storm water utility in 2006. The storm water utility collects a monthly user fee that pays for maintenance, improvements to the storm water drainage system, and other storm water program activities. This fee is similar to other utility fees for water, sewer, and garbage. (Source: *Transportation and Public Works Department, 2007.*)



## PROGRAMS AND PROJECTS

### Solid Waste Programs

- Garbage collection—The City provides a variable-rate based system for weekly garbage collection in carts. Customer pays for service based on the size of cart selected among 96-gallon, 64-gallon and 32-gallon cart options.
- Curbside recycling—The City provides single stream recycling collection once per week in 64-gallon carts. Cost of recycling collection and processing is included in the cost of residential sanitation service.
- Yard waste pick-up—The City provides weekly yard waste (grass clippings and small brush) collection in paper yard bags, bundled limbs, up to 10 cubic yards of loose brush, and optional (for purchase) 96-gallon yard carts. Material is kept separate from other waste and is mulched for compost or other reuse.
- Bulky item waste pick-up—The City provides a monthly, scheduled bulky item waste collection of up to 10 cubic yards of collected material at no extra charge.
- Drop-off Stations—The City currently operates two permanent Drop-off Stations for resident use as an alternate means to dispose of bulky items and brush. The sites accept excess garbage and recycling as well. The City is also studying adding additional sites for drop-off stations in each of Fort Worth's quadrants.
- "Don't Bag It"—The Environmental Management Department provides information on how to take care of lawns and yards without disposing of yard waste in the municipal waste stream.
- Education—The Public Education Section of the Environmental Management Department provides many options for education opportunities, such as recycling, backyard composting, garbology for children, litter reduction, and "Don't Bag It."
- Dead animal pick-up—The City removes dead animals from public city-controlled rights-of-way and from residential units on a request basis.
- Illegal Dump Cleanup—The Solid Waste Division of the Environmental Management Department created an illegal dump clean-up program in 1993 to help mitigate the effects of illegal dumping in Fort Worth.
- Captain Crud School Assemblies.

### Air Quality Programs

- Air monitoring program—The Air Quality program of the Environmental Management Department assists the Environmental Protection Agency (EPA) and TCEQ with air monitoring. The program is also involved with creating an air quality plan for the Metroplex.
- Inspection program—The Environmental Management Department is responsible for enforcing the Clean Air Act within Fort Worth. Along with the EPA and TCEQ, this department helps with permitting, compliance inspections, complaint investigations, and enforcement.
- Public Education Program—The Environmental Management Department has several positions dedicated to providing outreach to schools, PTAs, faith-based groups, neighborhood associations, City staff, and other organizations.
- Care for Cowtown Air—During ozone season (May – October), the Environmental Management Department offers incentives, in the form of prizes, to City employees who participate in ozone reducing activities. Because of this effort, the City of Fort Worth was named by the U.S. EPA as one of the "Best Workplaces

### Resource Conservation with Green Building



Public buildings can also be green. Austin (2000), Dallas (2003) and Houston (2005) now require new and replacement facilities to follow Leadership in Energy and Environmental Design (LEED) standards. (Above) Austin City Hall is a LEED Gold Building. (Source: *City of Austin, Texas 2006.*) (Below) Homewood Middle School in Homewood, Alabama is the country's first LEED Silver middle school. (Source: *American Institute of Architects Alabama Chapter 2007.*)



for Commuters.”

- Clean Air Fair and Bike Rally—The Environmental Management Department holds an annual air fair downtown to coincide with the start of the ozone season, as a means to educate the public on air pollution issues. To conclude the region’s ozone season, the City hosts the Clean Air Bike Rally in October to promote alternative modes of transportation.
- Ozone-Forming Pollution Reduction programs—The City has committed to:
  1. Establish an Employee Transit Pass Program (E-Pass) and vehicle-miles traveled reduction study;
  2. Provide City employees with free parking at LaGrave Field; and
  3. Expand the Clean Vehicle Fleet Program, as the City Council deems appropriate.
- Conservation Specialist—This Transportation and Public Works Department staff member works as the Facilities Management Group Manager to develop, implement and track the effectiveness of energy- and water-efficiency programs and projects for the City of Fort Worth. As part of this work, the specialist provides reporting to the State Energy Conservation Office (SECO) in order to comply with Texas Senate Bill 5/*Texas Emission Reduction Plan* (SB5/TERP) amendments to the Texas Health and Safety Code. The TERP has been extended by SB 12, extending the City’s goal of a 5 percent per year reduction in electricity consumption through 2012, using 2006 as the baseline year.

#### **Resource Conservation Programs**

- Facility Condition Assessment Reports (CARs)—The City’s Facilities Maintenance Division performs annual assessments of City facilities to identify building envelope, lighting, HVAC and plumbing system improvements, implementing many that positively impact the conservation of energy and water resources.
- Design Guidelines for New & Existing Facilities—The City’s Architectural Services Division has recently published major guideline revisions to more accurately communicate City efficiency and sustainability concerns to City project architects, engineers and contractors. In addition, specific sustainability guidelines referencing the United States Green Building Council’s *Leadership in Energy & Environmental Design* (USGBC/LEED) program are being considered.
- Municipal Energy Management (MEM) Plan—The City’s draft plan uses a performance scorecard system to identify Energy Data Management, Energy Supply Management, Facility Energy Use, System & Equipment Efficiency, and Organizational Integrity Process. Plan adoption is anticipated in 2008.

#### **Resource Conservation Projects**

- Municipal Building Performance Benchmarking—The City participates in a pilot project using federal Energy Star® resources available through the U.S. Environmental Protection Agency and the U.S. Department of Energy.
- Traffic Signal Lamp Conversion—The proposed project involves conversion of the remaining incandescent lamp signals to light-emitting diode (LED) lamp inserts. Pending final approval, construction completion is estimated for early

### **United States Green Building Council’s Leadership in Energy & Environmental Design**



The U.S. Green Building Council (USGBC) is the nation’s foremost coalition of leaders from every sector of the building industry working to promote buildings that are environmentally responsible, profitable, and healthy places to live and work. The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. Texas has 145 total LEED-registered buildings (8 existing and 137 new construction). The Tarrant County College Downtown Campus (above right) is one of three LEED-registered projects in Fort Worth. (Source: USGBC, 2007.)

2008 with projected electricity usage savings of 5.8 M kWh/yr or 89 percent of their operating budget.

- Energy Savings Performance Contract (ESPC)–The multi-phase ESPC involves implementation of several projects including lighting, HVAC, control and water system improvements. For the first four ESPC phases projected electricity usage savings is 21 M kWh/yr. ESPC Phase V is under development for the City’s wastewater plant facilities. Potential conservation measures include both traditional building system improvements and improvements to wastewater processing systems. The Preliminary Report was completed in 2007. Energy and water savings have not yet been estimated. A detailed study will begin in 2008 and is slated for completion in 2009. After 5 years of projects resulting in savings upwards of 30 M kWh/yr, future projects may include street lighting, water metering, and/or water re-use system facilities and processes.
- Prototypical Fire Station–The City’s Architectural Services Division developed this project to include thorough assessments of energy impacts of various building envelope, lighting, HVAC, control, and water system options to ensure resource use efficiency. Similar conservation impact assessments are pursued in the development of all projects, including the Evans & Rosedale projects for the City’s Public Health and Public Library departments.
- Future Projects–After 5-years of projects resulting in City cost avoidance upwards of 30M-kWh/yr, City staff is drafting a Request for Qualifications (RFQ) to pursue other ESPC opportunities. In addition to the previous projects, future projects may include Street Lighting, Water Metering, and Water Re-use system facilities and processes.

#### **Municipal Water Quality and Supply and Wastewater Programs**

- Integrated Wet Weather Management Program–To assess the condition of the Fort Worth wastewater collection system and implement rehabilitation projects in order to eliminate sanitary sewer overflows and backups. Under this program, additional wet weather wastewater treatment capacity has been installed at the Village Creek Wastewater Treatment Plant.

#### **Endangered Species and Natural Habitat Programs**

- Outreach program–Coordinated by the Parks and Community Services Department, this program provides an opportunity for neighborhoods, schools, and businesses to act in an advisory capacity for natural landscape enhancements.

#### **Endangered Species and Natural Habitat Projects**

- Landscape restoration–The Parks and Community Services Department is coordinating landscape restorations of the Fort Worth Nature Center and Tandy Hills.

#### **Sustainable Development Programs**

- Brownfields Program–Funded through a grant from the U. S. Environmental Protection Agency, the Environmental Management Department is investigating potential brownfield sites and actively facilitating their redevelopment by providing environmental site assessments and cleanup loans. Examples include

### **Prototypical Fire Station**



The City’s Architectural Services Division developed this project to include thorough assessments of energy impacts of various building envelope, lighting, HVAC, control, and water system options to ensure resource use efficiency. Fire station 38, above, was built using the prototype. (Source: Fire Department, 2007.)

Evans and Rosedale, LaGrave field, Ellis Pecan, and 4th and Elm.

- Municipal Setting Designation—The State law establishing municipal setting designations (MSDs) creates a means by which the scope of investigations and response actions addressing groundwater contamination may be limited by the Texas Commission on Environmental Quality, if the groundwater is prohibited for use as a potable water source by municipal ordinance or restrictive covenant. An MSD for a given site must be approved by the municipality in which the property is located. MSDs facilitate the redevelopment of brownfields sites by reducing the remediation time and costs. The city's MSD program is administered by the Environment Management Department's Brownfields Program.

### **Water Quality, Water Supply and Drainage Projects**

The Tarrant Regional Water District supplies raw water for Fort Worth and is developing projects to divert water from the Trinity River to supplement the yield of Richland-Chambers Reservoir and Cedar Creek Lake in east Texas. Coupled with existing sources, the Trinity diversion projects will give the District adequate supplies to meet projected needs to the year 2020 and beyond. The City, in cooperation with the District, is studying other potential sources of water supply for the future, including Toledo Bend Lake, the proposed Marvin Nichols Reservoir, Brazos River Basin, and other possibilities.

- Watershed studies—The City, in cooperation with NCTCOG, has begun identifying developing areas and determining strategies to avoid downstream flooding in areas already developed. Strategies will be suggested on a watershed basis because drainage and water movement are based on these natural boundaries.
- The City has recently implemented modified design standards to reduce erosion and loss of vegetation along open channels.

### **Storm Water Quality and Quantity (Drainage) Programs**

- Education—The Water Department and the Environmental Management Department have a variety of programs to educate the public on water resources and pollution prevention.
- Bioassessment Program—Evaluates the diversity and sensitivity of aquatic life found in selected city streams.
- Construction Inspection Program—Obtains compliance from construction sites that are regulated by TCEQ.
- The City's program to develop an approved method for local governments to demolish substandard nuisance structures containing asbestos more economically, while at the same time protecting the environment and the public health, is on hold while the U.S. Environmental Protection Agency tests its own version of Fort Worth's method.
- Household Hazardous Waste Collection Program—Collects hazardous household wastes year-round and disposes of them properly for Fort Worth residents and many surrounding communities. Along with a fixed facility, a mobile collection unit is in operation.

**Captain Crud**



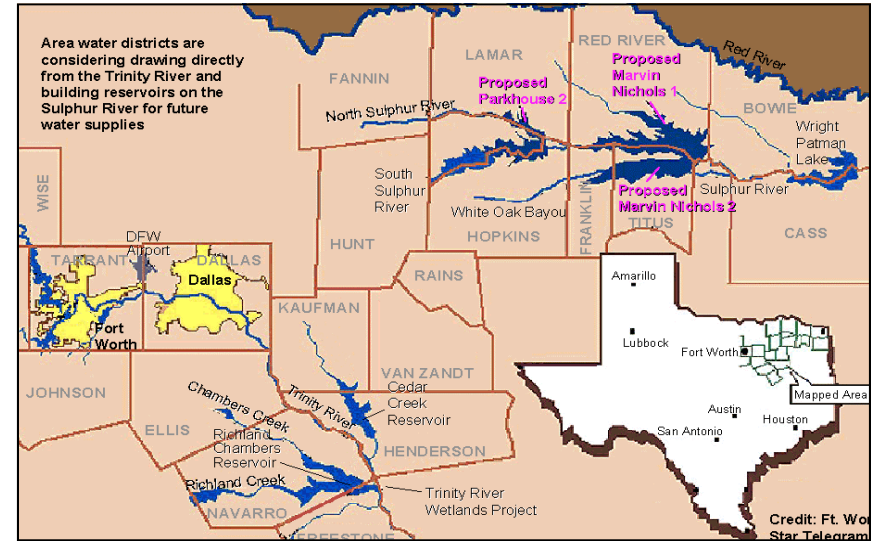
“Captain Crud” is a service mascot for the City of Fort Worth, created to help inform citizens about the household hazardous waste collection program and the benefits of recycling. (Source: Environmental Management Department, 2007.)

- Storm Sewer Outfall Screening—Conducts dry and wet weather field screening of water in storm sewer outfalls to monitor pollutants entering water bodies in the city.

**Capital Improvement Projects**

The capital improvement projects that have been identified for the next 20 years are listed in Appendix D and Appendix E with estimated costs, completion dates, and potential funding sources. Projects are divided into three categories including drainage, water, and wastewater. For the years 2008-2027, funded projects total \$1.2 billion and unfunded projects total over \$600 million.

**Proposed Marvin Nichols Reservoir**



The City is evaluating the feasibility of the Marvin Nichols Reservoir in northeast Texas and the Toledo Bend Reservoir in east Texas as future water sources for its citizens. (Sources: Fort Worth Star-Telegram, Water Department, 2004.)

**Proposed Toledo Bend Reservoir**

