Public Systems: Infrastructure, Facilities and Services

personal vision statements:

"A greener, safer city made a reality by great leaders and involved citizens. Improvement and maintenance of infrastructure to enhance, attract and support economic development…"

Chapter Summary

This chapter focuses on the public systems and facilities that support Shreveport-Caddo residents in their neighborhoods and their workplaces. Underinvestment in public infrastructure, in particular, and in some public facilities has been routine for many years. Sprawling growth has stretched budgets beyond their limits as public investment has been made to accommodate this growth while older areas lack maintenance. The chapter discusses the infrastructure and public facility needs in the context of contemporary approaches that can provide resource-efficient, cost-effective and environmentally-friendly solutions.

Strategies and actions include:

- Fund and implement comprehensive master plans for sewer, water supply and stormwater management.
- Set long-term priorities for infrastructure and facilities by funding and implementing a municipal asset-management system linked to an up-to-date GIS (geographic information systems) database.
- Work with other jurisdictions to create a multiparish water-supply utility district.
- Establish and structure development impact fees to make sure that new development pays its way and to incentivize infill development inside the loop.
- Develop policies to make Parish and City facilities, buildings and operations models of resource efficiency and sustainable practices.
- Implement a solid-waste fee, encourage recycling and composting, and reduce the solid waste stream by at least 20% from 2010 levels in order to extend the life of the landfill and save resources.

GOALS	POLICIES FOR DECISION MAKERS
Infrastructure investment and management that supports quality of life, economic development and redevelopment in the city's inner core.	• Integrate land use and infrastructure investment policies to avoid expanding new infrastructure.
	• Support full implementation of a GIS-based municipal asset management system over time to end the need to respond to repeated emergency conditions.
Excellent quality and adequate quantity of drinking water to meet all current and future needs of the Shreveport-Caddo Master Plan Area.	• Protect and enhance water quality in Cross Lake reservoir.
	• Enhance the water quality in Twelve Mile Bayou.
	• Support development of new water-treatment facilities and supply sources.
	• Monitor water use by gas companies in connection with drilling activities.
Reliable and efficient wastewater system and sewer service.	• Support wastewater system improvements to meet EPA standards.
Reliable stormwater-management and drainage systems that incorporate best practices.	• Evaluate options as they emerge for best practices and alternative, non-structural solutions for managing and treating urban runoff.
	• Continue to evaluate options for alternative, nonstructural solutions for stormwater management and drainage practices for large developments and for citywide applications.
	• Promote initiatives that aim to make drainage infrastructure a public amenity.
Maintain City/Parish buildings and facilities for long-term use.	• Support investment in an asset-management system.
Public safety facilities (police, fire, EMS) that meet best practices performance standards in all areas of Shreveport/ Caddo.	• Fund all public safety departments so they are able to meet best-practice standards through five-year plan cycles in coordination with the capital improvement program.
	• Support community-based public safety programs.
	• Support interagency incident management teams and training first responders.
All City and Parish facilities and operations to become models of energy and resource efficiency.	• Where possible, meet new needs and demands by enhancement/expansion of existing facilities, rather than building new.
	• Use best practices for long-term, life-cycle energy and resource efficiency in improvements, renovations, or new facilities.
Solid waste reduction of 20 percent from 2010 levels	• Extend life of the landfill to 2030.
	• Support phased expansion of the landfill if feasible.
	• Support measures to reduce the amount of solid waste.
	• Explore viable options, including best practices, for solid waste disposal.
	• Explore regional solid waste disposal solutions.
Compliance with accessibility standards under ADA in both public and private facilities.	• Support funding to meet all outstanding ADA deficiencies in public facilities.
	• Continue to make ADA accessibility information available to the public.

Findings

- Lack of redundant systems for peak water usage periods creates possible risks for Shreveport's drinking water supply and treatment facilities.
- Sprawling growth patterns have added many miles of water, sewer, and roadway infrastructure, resulting in high per capita maintenance/repair costs because the population has not been growing.
- Insufficient funding, particularly in older parts of the city. Repeated sanitary sewer overflows (SSOs) in both wet and dry periods have an impact on water quality in neighborhood bayous, with potential impacts on the Red River and Cross Lake.
- A consent agreement between the City and the EPA on removing SSOs is expected to require substantial expenditures.
- The City lacks an asset management system to better plan for repair and pre-emptive maintenance of existing infrastructure and facilities.
- Public safety departments need improved facilities.
- Shreveport does not charge residents or businesses for trash pickup.
- Caddo Parish has a high-quality, modern library system.

Challenges

- Creating a multiparish water utility to provide a long-term, cost-effective water supply source.
- Maintaining water, sewer and drainage infrastructure systems given current funding.
- Establishing new funding sources and rate schedules to maintain and repair existing and newly added infrastructure.
- Implementing impact fees on new development to offset City costs to maintain new infrastructure or provide additional capacity to serve new development.
- Establishing incentives and programs to reduce solid waste, including solid waste pickup fees, to extend the life of the Woolworth Road Regional Solid Waste Facility.
- Upgrading infrastructure standards for developers to meet modern best practices.

A. Current Conditions

INFRASTRUCTURE, LIVABILITY AND COMPETITIVENESS

Underlying the Shreveport-Caddo Vision for this master plan is the vision of a community that works. To most people, much of the public infrastructure that makes modern communities function is invisible—the underground pipes and the treatment plants—until it breaks down. We take for granted the public buildings and facilities that keep our systems and services going. But when infrastructure stops working, when buildings and facilities are not well-maintained and start to deteriorate, and when services don't meet our expectations, communities are no longer as livable or economically competitive as they should be.

A community's infrastructure and facilities constitute a huge investment made by previous generations. Many older cities across America are wrestling with the consequences of inadequate public investment over the course of the last generation, but Shreveport's situation is especially severe. The combined impacts of population stagnation, leapfrog development patterns, disinvestment in the core, and inadequate resources have produced an infrastructure crisis. While services have extended to more areas and more miles of pipes have been laid, population has stagnated, leading to unsustainable per-capita costs. Systemwide planning and maintenance has taken a back seat to reactive response to emergencies and to the expanding service area.

Shreveport cannot achieve the master plan Vision without starting to solve its infrastructure crisis. Cities where residents, property owners, and businesses have to contend with repeated water main breaks, sewer backups, and flooding cannot provide the quality of life and conditions that will attract new growth. Similarly, good public facilities and services of all types are the foundation for successful communities. Moreover, traditional ways of doing things cannot hope to meet high public expectations for innovative methods and solutions that are environmentally friendly, resource-efficient, and cost-effective.

DRINKING WATER SUPPLY

Cross Lake provides drinking water for the City of Shreveport, Barksdale Air Force Base, and for industrial areas outside the city limits, such as the port. The 13.4-square-mile lake dates from the 1920s when a dam and spillway were constructed to impound Cross Bayou. In addition to the water supply for Shreveport, Cross Lake serves a variety of recreational purposes, including boating (power and sail), fishing, water skiing, and swimming, despite a resident population of alligators. More than two thirds of the lake's shoreline has been developed for residential use, mostly along the north, south and eastern edges of the lake. The lake's western edge, however, includes forest and wetlands. If necessary, Shreveport can also draw raw water from Twelve Mile Bayou.

The depth of Cross Lake has decreased over the years by nearly 42 percent, dropping from 12 feet to 7 feet, with a corresponding decrease in water volume. This is due to:

- siltation from feeder creeks and streams
- nonpoint source pollution from surface-water runoff containing fertilizer, oil and gasoline, and other chemicals
- invasive, non-native vegetation that, in addition to exacerbating siltation and degrading recreational use of the lake, introduces taste and odor challenges into the water treatment process.

Since 1996 the Louisiana Department of Environmental Quality (LDEQ) and the City of Shreveport have sponsored a Cross Lake Watershed Protection Program to provide education, training, and assistance to property owners on best management practices to avoid nonpoint source pollution and other activities in the watershed that have deleterious impacts on the water. Because of these problems and water supply issues elsewhere in the region, discussions are underway for a multiparish water supply utility that would draw water from the Red River.

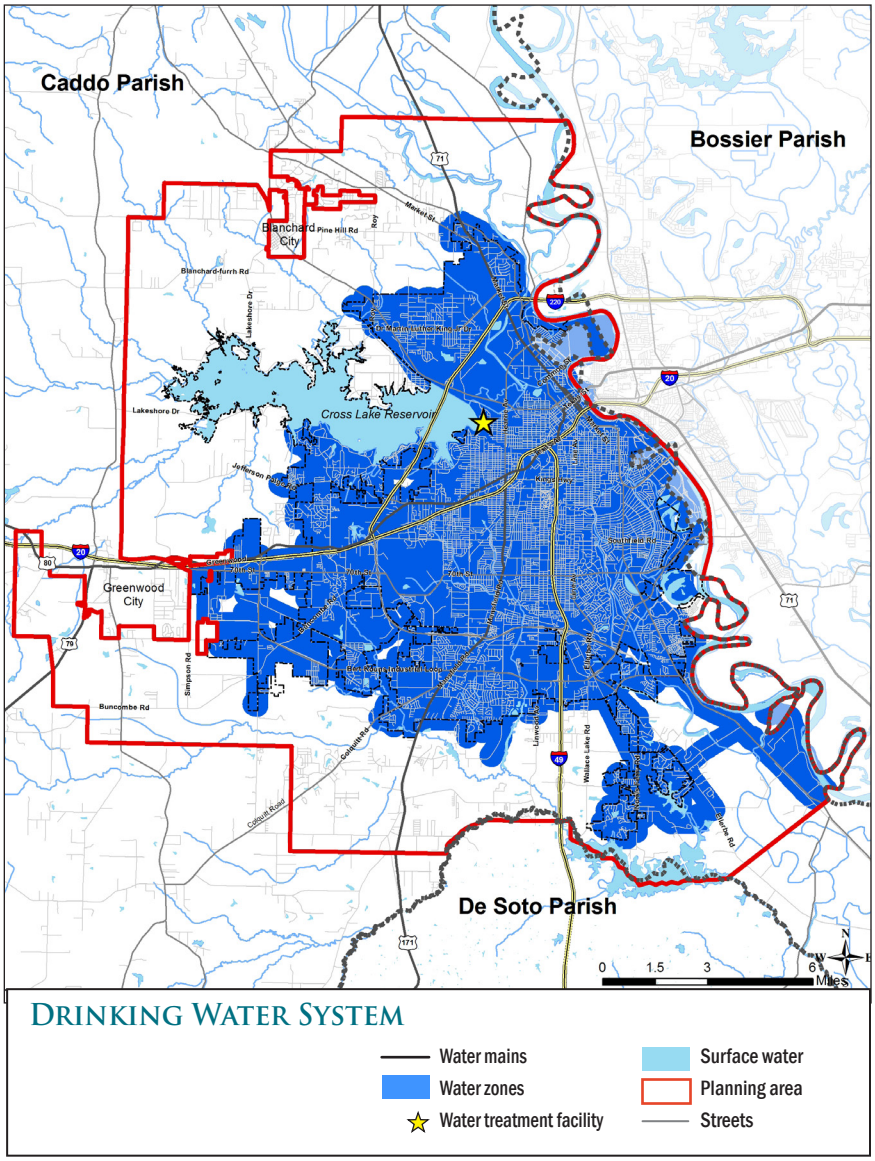
Water treatment facilities

The T.L. Amiss Water Treatment Plant (WTP), on the eastern shore of Cross Lake, was built in the 1920s with an initial capacity of 8 MGD (million gallons per day). The facility has been enlarged or updated several times since to achieve

its current capacity of 90 MGD. However, the WTP can treat only 78 MGD due to stringent regulations, shrinking its total daily capacity by more than 13 percent. On an annual basis, usage demand averages 38 MGD, but summer demand can be twice the winter levels of 32-35 MGD. The Shreveport water plant also supplies Barksdale AFB across the river in Bossier City via a single water line.

While this aging facility can handle normal demand, it has no redundant treatment capabilities—that is, capacity problems can arise if a unit is taken off line for cleaning or repair. Should a situation requiring repairs arise during the summer, when demand can rise (and has risen) to the plant's total capacity, the WTP would be hard-pressed to meet the city's demand for water. For example, during one seven-day period in summer 2009, the WTP operated at 60-65 MGD with hourly peaks between 75 and 85 MGD. In July 2009, the WTP produced an average of 63 MGD or approximately 81 percent of total capacity on a daily basis. A failure requiring a unit to go off line during this time would have spelled serious consequences for the city.

MAP 9.1 **DRINKING WATER**



Source: NLCOG, 2009

Although structural failure is not imminent, the Cross Lake Dam and Spillway is 80 years old and in need of additional support. The dam complex carries railroad tracks used by trains crossing the eastern end of the lake. It also serves as a flood-control mechanism, helping control rises in the lake level caused by heavy rains. Since this facility is well beyond its design life, replacement parts are no longer available and repairs would be very expensive. The spillway will need replacement, which appears to be the most cost-effective alternative.

Water service and maintenance

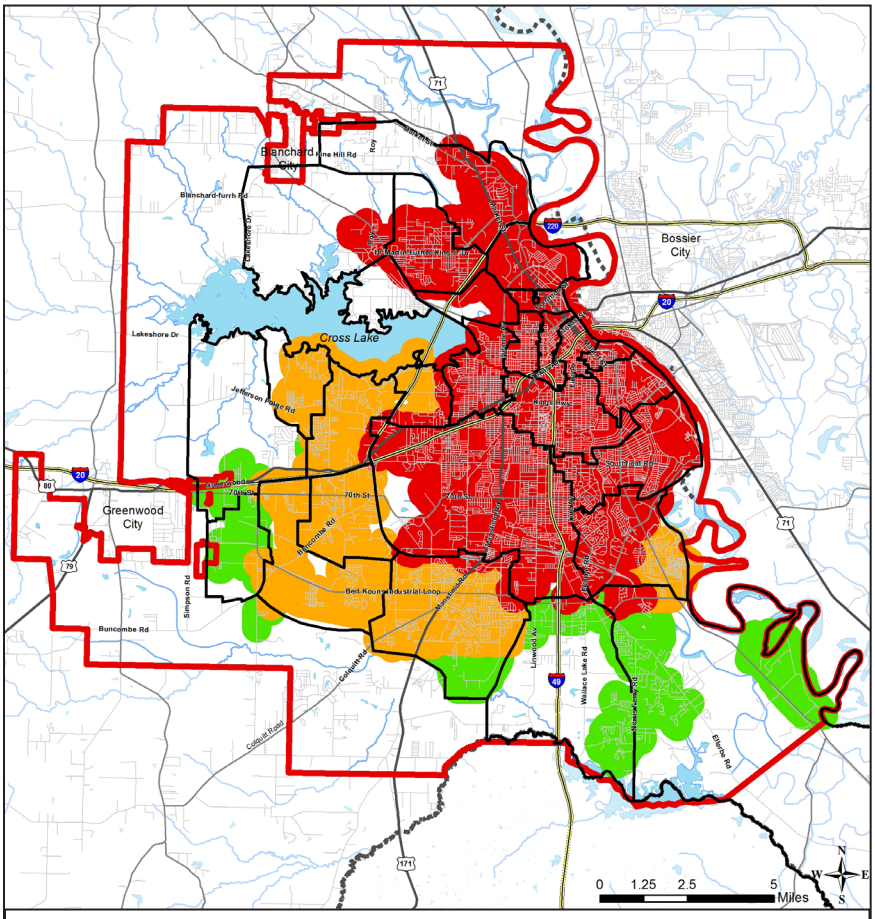
The remaining water-system infrastructure consists primarily of water mains—some 1,100 pipe miles. The leapfrog development pattern, in which the city expands its boundaries by annexing new developments, means that water service is being provided farther from the treatment facility, an arrangement requiring more and more infrastructure. For the City to accept it, developers must build infrastructure to City specifications from their property to City water mains. Once accepted, this

infrastructure becomes a permanent maintenance expense for Shreveport ratepayers.

The costs of expanding the water system have come largely at the expense of system maintenance, particularly (but not exclusively) in the older areas of the city and in downtown. In these areas, where the infrastructure is old, obsolete (well beyond useful life), and/or undersized, the City has been able to respond only to emergency situations, such as water main blow-outs and failures, which can be frequent. In winter 2009-10, over 150 water main emergencies occurred within a seven-day period, leaving parts of the city temporarily without water as crews worked non-stop to repair the problems. The emergency repairs cost the City millions of dollars.

Insufficient funds are typically budgeted for systemwide maintenance. This situation is exacerbated by the way the system has expanded over the years in response to development, the sheer extent of the infrastructure, and the lack of an adequate GIS-based asset management system. All these factors together, coupled with years of neglect in older areas, present difficult choices as the City prepares to pursue a policy designed to promote infill development along smart growth principles in these areas. Because land use and infrastructure policies and standards have not been integrated, there are uncertainties for developers and, more than likely, pricing inequities for residents of the older areas of the city.

MAP 9.2 **AGE OF SEWER SERVICE AREA**



AGE OF SEWER SERVICE AREA

- Sewer age: 1–20 years
- Sewer age: 20–40 years
- Sewer age: 40 years or more
- Surface water
- Planning area
- Streets

Source: NLCOG, 2009

An example of the City's reactive approach to water infrastructure is the improvement program under way for the southeastern part of the city. Recent development in this area encountered low water pressure, caused primarily by inadequate transmission capacity to specific areas of the distribution system and by inadequate pumping/pressure capacity for elevation differentials in some areas. Four projects at a cost of $32 million are expected to be completed by summer 2010 to resolve these problems.

The recommendations of the City's 1999 water master plan are still being implemented and are adequate for the area within the present city limits.

However, the City needs a plan that comprehensively addresses future needs in the context of an integrated land use and infrastructure investment policy, whether or not Cross Lake is ultimately phased out as the city's water supply in favor of a regional water utility. The next water master plan will be more regional in scope.

Proposed multiparish water supply utility

Working agreements are in place among Caddo Parish, the City of Shreveport and Bossier Parish to create a multiparish system, but no board has been appointed and a water district has not been formalized. However, all parties are moving forward with the project, discussing financing needs and related issues. The initiative will be costly and will likely require federal funds to make it work. Infrastructure costs alone are estimated to be at least $360 million, which would include two water treatment plants and additional transmission lines. A regional water district makes sense, but it is important to align planning for the utility with the land use goals of the master plan. Without careful coordination, incentives for smarter-growth investments within the loop rather than in the exurban periphery could easily be undermined by expansion of infrastructure where it is not needed or where its full cost is not covered by new development.

SEWER SERVICE AND FACILITIES

The City of Shreveport is served by two wastewater treatment plants, the North Regional Wastewater Treatment Plant in the older area of the city northwest of downtown, and the Lucas Wastewater Treatment Plant, a larger facility in southeast Shreveport. Outfalls for both facilities are located on the Red River. Both plants received significant upgrades within the last ten years.

As in the case of the water-supply network, Shreveport has a huge sanitary sewer network relative to its population—1,100 miles with 115 lift stations. This means that per capita costs associated with construction, maintenance, and repair of Shreveport's system are very high. The extensive sewer system infrastructure that the City must maintain is, again, the result of the area's leapfrog development pattern. As infrastructure is extended greater distances from the city center to serve new developments, which are then annexed, the infrastructure becomes the City's maintenance responsibility. To delay maintenance costs for as long as possible in these areas, the City will not accept through annexation any new infrastructure that does not meet its construction standards and specifications.

Shreveport's sewer infrastructure, like most of the nation's, is between 30 and 100 years old, placing it at increased risk for failure due to deterioration (leaks, blockages, malfunctions, and so on). It is a fact that the longer a sewer collection system's problems go unresolved, the more serious they become, placing vital public assets at risk of further degradation, posing unacceptable risks to human health and the environment, damaging public and private property, and adversely impacting the local economy and economic development efforts. Sewer infrastructure in Shreveport continues to be a chronic problem, particularly in older areas of the city. As older sections of piping break, repairs are made on an emergency basis, but, overall, maintenance funds are inadequate to meet the need.

Sanitary sewer overflows (SSO)

As happens with sanitary sewer systems in many older cities, Shreveport's system becomes overburdened at times, causing sanitary sewer overflows, or SSOs. An SSO is defined as an unintentional release of sewage from a collection system before it reaches the wastewater treatment plant. Sewage released in this manner can contaminate groundwater or surface water, causing serious water-quality problems and threatening drinking water supplies. It can also back up into basements. Such overflows are unhealthy, destructive to public and private property, bad for recreation, tourism, and economic development, and hard on sanitary sewer system equipment.

SSOs occur both in wet and dry conditions. In general, the causes of SSOs can be attributed to many factors, including:

- stormwater or groundwater infiltration
- broken pipes or equipment (pump) failures
- age-related deterioration exacerbated by soil-related factors in conjunction with weather-related temperature extremes

- tree roots growing into sewer pipes
- inadequate flow capacity due to undersized pipes or obstructions
- rapid development (causing sewage flows to exceed system capacity)
- lack of funds for scheduled or preventive maintenance.

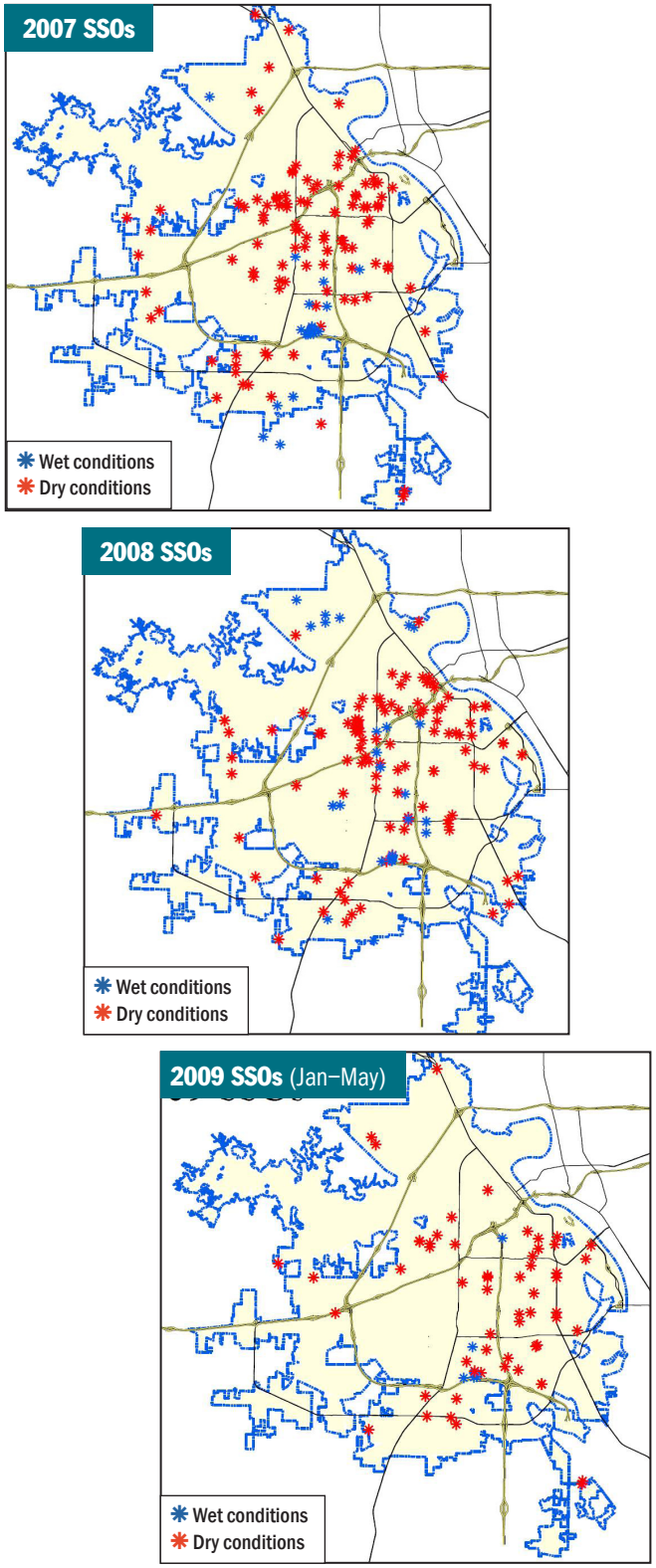
Wet-condition SSOs occur when excessive stormwater runoff infiltrates the system and results in overflows. Dry condition SSOs are more likely to be caused by clogged and/or collapsed sewer lines, a condition brought about by a lack of systematic maintenance, although groundwater seepage can be a contributing factor in some areas. Undersized sewer lines can contribute to the problem in both types of overflow.

Lack of funding for adequate scheduled or preventive maintenance, in particular, greatly exacerbates age-related deterioration, symptoms of which include frequent clogs and collapsed lines brought on by root growth and the accumulation of debris, sediment, oil and grease. Lack of maintenance also affects mechanical equipment, eventually leading to failure, which often results in overflows.

SSOs have caused and continue to cause problems for homes and businesses in many areas of Shreveport, seriously straining capacity and Clean Water Act permit limits at the treatment plants. For example, the Lucas Treatment Plan can experience flow demand of twice its 30 MGD capacity, but upgrades have kept it well below its permit limits.

The map and history of SSOs in Shreveport (Map 9.3) shows that this problem is present in most of the city, not just within the loop, although a comparison of historic SSO data suggests that progress in alleviating the problem has been made, particularly since 2004. Wet-condition SSOs are concentrated in the Cedar Grove sewer basin, and dry-condition SSOs, which are more prevalent in Shreveport, tend to be concentrated in the Queensborough, Westside, and Cedar Grove sewer basins, and where the Princess Park, Stoner, and Southside sewer basins intersect, including the downtown area.

MAP 9.3 **SANITARY SEWER OVERFLOWS**



More SSOs occur during dry conditions than during wet, rain events.
Source: City of Shreveport

The SSO problem is monitored and reported regularly to both the US Environmental Protection Agency (EPA) and the Louisiana Department of Environmental Quality (LDEQ). The City is currently in negotiations with EPA and the US Department of Justice to alleviate the SSO problem in Shreveport under the Clean Water Act. The result is expected to be a consent decree with a specific time limit for milestone achievements toward correcting the problem. Failing this, the city will have to litigate the issue. The estimated cost to fix the SSO problem is between $180 million and $200 million.

Currently, the City of Shreveport, given all of its funding demands, cannot allocate sufficient funds to maintain its existing sewer infrastructure adequately. This poses a serious problem, because a good sewer system is a foundation of local and regional growth. Without a well-maintained sewer system, the city cannot gurantee new or expanding businesses access to the level of service they require, it cannot keep its core area strong, and it cannot control sprawl. Shreveport must be able to offer high-quality sewer service (as well as water and other utilities) in its urban core if it expects to encourage businesses and residents to stay, return, or locate there.

Because a sewer system is a collection system—as opposed to a water system that distributes water from one or more sources—its problems are much more difficult to fix. For example, repair of, or addition to, the system in one area may overwhelm downstream capacity if the changes are not properly accounted for across the entire system. Properly addressing Shreveport's sewage treatment capacity and collection system will require a sewer master plan. The last such plan was completed in 1984 and is entirely outdated. Without a master plan there is no way to be certain that money spent on the sewage collection system is being spent effectively. As of fall 2010, the City is negotiating with an engineering consultant to prepare a new sewer master plan.

STORMWATER MANAGEMENT AND DRAINAGE FACILITIES

The purpose of a drainage system is to manage the quantity and quality of stormwater in areas that have been modified by development and construction. Where land is undeveloped, all or most precipitation is absorbed into the ground or is returned to the atmosphere through evapotranspiration by trees and other plants. Urban development disrupts natural water systems through clearing of vegetation; grading; soil compaction; the addition of impervious surfaces in the form of buildings, roads, and parking lots; and the use of drainage infrastructure such as gutters, storm sewers and hard-lined water channels. Water flows away from these surfaces, either directly, to natural waterways, or into engineered storm sewers or drainage ways that eventually convey the water to natural streams or lakes. These alterations of the land elevate the volume and speed of stormwater runoff and increase erosion, flooding and pollution in downstream bodies of water that receive the runoff, unless they are properly regulated.

Stormwater management is designed to reduce both the velocity and pollution impacts of stormwater. Increased impervious surfaces produce more stormwater that moves faster—heightening the potential for flooding—and that carries contaminants into natural waterways. Pollution from stormwater is called "nonpoint source pollution" because it does not come from a specific source, like a factory, but from stormwater flows that, for example, pick up oil, gasoline and other pollutants on roadways as they move toward water bodies. Best practices increasingly focus on re-introducing natural drainage systems and low-impact development into urban conditions when possible. The EPA establishes minimum standards for stormwater management under the Clean Water Act.

The City of Shreveport operates an extensive drainage system that includes underground storm-sewer lines, above-ground drainage canals, and one pumping station used only in specific circumstances. Shreveport's stormwater runoff finds its way to several receiving streams or bodies of water, including Wallace Lake, Cross Lake, and Bayou Pierre, with the Red River as final destination for much of the city. In general, the entire drainage system depends on gravity flow. Forced drainage is used in a single, relatively isolated area of the city, Southern Oaks, and only when it becomes necessary to close flood gates to prevent backwater flooding as water rises in Gilmer Bayou. When this occurs, the pumping station on Dean Road is used to remove accumulating runoff as needed.

The City regulates stormwater quantity and quality through codes and policies that encourage implementation of best management practices in accordance with EPA and LDEQ permitting guidelines. New development and redevelopment throughout the city is required to provide detention methods to meet stormwater runoff targets. During the development review process, the City encourages developers to propose innovative methods to handle stormwater management requirements contained in various City codes and policies. This flexibility allows developers to consider the aesthetic and economic benefits that innovative stormwater management solutions can provide.

Sections 34-95 of the city ordinances regulate the volume of stormwater that must be detained on site and the allowable velocity of the release of that stormwater into the off-site drainage system. Except for the Ockley Ditch drainage basin, the minimum requirements are:

- **Single-family building sites and sites of less than one-half acre:** detention of water generated by a ten-year-design storm with gradual release at the rate of a ten-year storm.
- **Other building sites:** detention of water generated by a 25-year-design storm (a larger volume of water) with a gradual release rate at a ten-year-storm level.
- **Ockley Ditch drainage basin:** the detention volume is based on a 100-year storm, and the release rate is based on a ten-year storm.

The City's *Stormwater Management Handbook* refers project engineers to criteria "for urban stormwater quality best management practices such as dry detention ponds, wet detention ponds, oil skimmers, sediment forebays, floatables controls, buffer strips, vegetative filter strips and other techniques designed to improve stormwater quality." The City encourages the application of new and innovative best management practices to meet the requirements of its stormwater codes and policies.

Over the years, some properties in the city have experienced flooding. The publication of FIRM maps (flood insurance rate maps) showed which properties located in flood-prone areas, many of which had been

Drainage infrastructure takes many shapes in Shreveport.

flooded repetitively. In 1989, Shreveport began a program of purchasing repeatedly-flooded properties with local funds. Of the 139 properties acquired through 2009, approximately 62 percent were purchased in the period 1994-1996. Only one repetitive-loss property was acquired in 2009. Officials estimate that 50 to 60 properties in flood-prone areas of the city remain as buy-out candidates, although such properties must meet stringent buy-out criteria established by the City. No funds are currently budgeted for acquisition of flood-prone repetitive-loss properties, but DOS is requesting $3 million in bond money to purchase about 30 such properties. While FEMA provides funding for the acquisition of repetitively flooded properties under certain circumstances, the City has chosen to rely on local funds for the sake of expediency. To counter this type of flooding and repetitive property losses, the City requires the slabs or first-floor elevations of new construction to be at least one foot above the Base Flood Elevation (BFE) requirement.

Much of Shreveport drains into Wallace Lake and Cross Lake. Other sections of the city rely on the Red River and Bayou Pierre as receiving streams for stormwater runoff. A variety of pollutants—oil and other petroleum-based substances, pesticides and fertilizers—is typically found in at least the first flush of stormwater runoff. To counter this water-quality problem, the City requires the concrete drainage channels used in the city's older, more densely developed areas to employ some form of water-treatment to capture pollutants and floatables, either by natural means or a structural facility, before stormwater is discharged into the receiving water body. In newer areas of the City, stormwater tends to be handled by natural systems by design. Such systems are very effective at cleansing stormwater before it reaches a receiving stream.

Overall, drainage improvement efforts in the city are challenged by insufficient funding for system maintenance and improvements, particularly in some of the older areas, where drainage facility rights-of-way have been squeezed by building patterns. In these areas, needed drainage improvements, such as channel widening, for example, cannot be carried out without additional (and costly) right-of-way and structure acquisition. Exacerbating the situation in these older neighborhoods is the fact that most structures, both residential and commercial, were built before FEMA established Base Flood Elevations (BFEs) for flood insurance purposes. As a consequence, all of these structures sit below the BFE. Another challenge is finding methods (and funds) for mitigating a few street flooding problems that are attributable both to older design standards and the relative elevation of the street. In these areas, intense rains can produce flash-flooding on some streets. Although the duration of the flooding is relatively short, motorists caught in the wrong locations at the wrong times can be flooded out.

Stormwater management public education

In 2010 a team of local agencies launched a Web-based public education and information initiative. The Caddo Parish Stormwater Partnership—a collaboration among Caddo Parish, the City of Shreveport, the LSUS Red River Watershed Management Institute, and the Caddo Parish Levee Board—aims to create a central clearinghouse and forum for regional stormwater data, stormwater education materials, and sustainable stormwater management. The partnership has set up a Facebook page as a forum where residents and property owners experiencing flooding can report on conditions and discuss stormwater issues. The data can then be analyzed by the Red River Watershed Management Institute, compared to historic flooding data, and contribute to development of stormwater-management plans.

Natural drainage facilities

Cities across the nation have been searching for alternatives to traditional "hardscape" solutions to storm drainage problems. Some have turned to methods that incorporate water-quality enhancement and public amenity with drainage improvements. Common approaches applied on a smaller scale include vegetated swales and the protection and enhancement of stream buffers. Others include floodplain enhancement on a larger scale. Such approaches gain greater effectiveness when implemented alongside strategies that keep stormwater runoff out of storm sewers altogether. Requiring use of pervious pavement and redirection of rooftop runoff to vegetated areas helps to reduce the amount of stormwater runoff entering the system. Additionally, they offer a host of other benefits: recharge of groundwater

levels, reduction of urban temperatures, improvement of urban aesthetics and livability, and reduced capital costs for engineered systems. Many of these techniques have application, or have found application in Shreveport, with the notable exception of pervious pavement. Given the high clay content in local soils, water does not efficiently percolate through pervious paving.

Over time, as Shreveport grew outward from its downtown core, development occurred in nearby floodplains. This development took place before regulation of floodplain development and the establishment of minimum Base Flood Elevation (BFE) requirements. This development in Shreveport brought about many consequences:

- reduced capacity of streams to convey stormwater runoff
- increased stormwater flow velocities within main channels and increased erosion potential
- loss of water quality benefits provided by natural buffers between developed areas and streams
- loss of recreational and/or urban amenity opportunities within the floodplain
- loss of aesthetic quality and potential property value within the corridor.

It should be noted, however, that most of the pollution found in urban stormwater runoff comes in the first flush. This water is carried by the drainage channel itself, not by the floodplain. In addition, floodplain areas in Shreveport are held in private, not public ownership, although, as noted, the City has purchased property located in floodplains to alleviate repeated flooding problems.

Effective natural drainage facilities, which can serve as an urban amenity and even provide passive recreational opportunities, generally require sufficient rights-of-way to ensure their capacity to handle design flow and characteristics. In one or two instances, the City has attempted to provide landscaping within drainage canal rights-of-way and along the edges of floodway rights-of-way to make them more attractive to the surrounding neighborhoods and more effective in treating runoff. Most of these attempts, however, lacked sufficient rights-of-way, resulting in added maintenance costs for the City (for control of grass and other vegetation, replacement of washed-away plantings and mulch, and similar work). In addition, accumulated debris needed to be removed from drainage streams to prevent degradation of the ability to handle and drain water.

The lesson of this experience is that effective use of floodplain areas as urban amenities requires sufficient right-of-way or horizontal space. Some drainage channel bottoms in Shreveport could be paved to reduce erosion (as is currently done), or can be deepened (thereby lowering the BFE) and channel slopes flattened to reduce flow velocity to an acceptable rate. But if the floodplain is to be used to provide a variety of urban amenities and recreational opportunities, the City should look for ways to acquire those floodplains that have enough width to allow a variety of uses without degradation of their drainage ability. A well-designed urban amenity floodplain offers multiple benefits:

- improvement of the drainage way's ability to treat and polish stormwater runoff in addition to maintaining its capacity to hold and discharge water according to its design parameters
- reduction of channel erosion
- lower maintenance costs through good professional design and proper application of landscaping, trees, and plants throughout the floodplain
- development of linkages to other areas of the city along the floodplain with walking and/or bike paths
- development of conveniently situated passive recreational areas
- increase in natural habitat areas for birds and other wildlife.

A good example in Shreveport of a public amenity that has important drainage functions is the "Duck Pond" in East Kings Highway Park.

PUBLIC SAFETY DEPARTMENTS

Police department

The Shreveport Police Department (SPD) has an authorized strength of 578 sworn positions, but currently operates with 550 officers. Police headquarters is located at 1234 Texas Avenue, and there are no district or precinct

stations. Officers utilize public parks around the city as locations for preparing reports and responding to calls in their general location—although these locations do not necessarily enjoy an around-the-clock police presence.

At present the SPD operates with no strategic plan. Several have been started over the years by incoming chiefs, but due to turnover in this position, none has been completed. The department has, however, commissioned manpower-allocation studies over the years in order to ensure that manpower levels match those of departments in cities of similar size.

The Shreveport Police Department's main mission is to reduce and eliminate criminal behavior. To that end, the department maintains contact with other departments in cities of similar size to learn current and best practices. Successful practices are adapted to local needs. The SPD has been successful with this strategy—reported crimes, particularly those in major categories, have decreased four years in a row. According to statistics provided by the department, in 2007 the Violent Crime Index (homicide, rape, robbery, and aggravated assault/battery) was down 2 percent and the Property Crime Index (burglary, theft, and auto theft) was down 4 percent from 2006. For the period 2007–2008, the indices showed declines of 14 percent and 12 percent, respectively. For the period 2008–2009, the Violent Crime Index dropped a further 5 percent, and the Property Crime Index another 2 percent.

FIGURE 9.1 **POLICE DEPARTMENT CAPITAL PROJECTS**

PROJECT	ESTIMATED COST
PROPERTY/EVIDENCE FACILITY	$6,800,000
Construct a new multistory property/evidence facility on City-owned property adjacent to the new jail. This facility will address security, fire safety, employee needs, and OSHA regulations.	
CRIME SCENE INVESTIGATIONS FACILITY	$1,200,000
Construct a state-of-the-art evidence-processing facility attached to the property/evidence facility. This facility will also address security, fire safety, and OSHA regulations.	
DOWNTOWN UNIT HEADQUARTERS	$1,500,000
Construct a new facility downtown to house administrative offices for the units patrolling the downtown district and to board police horses.	
RENOVATION OF OLD CITY JAIL TO INVESTIGATIONS OFFICES	$1,500,000
Renovate both floors of the old jail from jail space to office space, providing the department the opportunity to relocate the Caddo-Shreveport Financial Crimes Unit to the SPD building, eliminating rental expense and providing easier access for the citizens to investigators.	
REPLACE CROSS LAKE PATROL BUILDING, BOATHOUSE AND BREAKWATER	$400,000
Construct a new Cross Lake Patrol office and make repairs to the current boathouse and breakwater.	
BACKUP POWER GENERATOR	$1,000,000
Contract an engineering study of the electrical needs of the entire police complex and provide backup power to maintain normal services during all severe weather.	
TOTAL PROJECTS	**$12,400,000**

The department has a level of service (LOS) standard of responding to a call (officer on scene) in seven minutes or less. On average, the department reports that it meets this goal. The expanding periphery of the city, however, is presenting challenges to the department in maintaining its seven-minute response standard.

The department also employs a number of community policing techniques and programs that have improved communication and trust between the department and citizenry, contributing to the reported reduction in crime. Community policing techniques include Neighborhood Watch programs and designation of a Community Liaison Officer assigned to assist and work with neighborhood residents. Some of these programs have been initiated and staffed with grants from the federal government, but the department is expected to continue funding these positions when grant funds are depleted after three years.

Funding for the SPD comes from a dedicated millage and a quarter-cent sales tax that was approved by voters in 2004 to pay for police pay increases. Nevertheless, the department has insufficient funding to accomplish all of its projects and initiatives. Needs identified by the department with estimated costs are listed in Table 9.1. Information on how the cost estimates were determined was not available.

Expanding city boundaries create additional costs for the SPD. The department maintains more than 300 patrol cars and expects to replace several of the 1999 models in 2009-10. Nor-

mally, the department does not keep patrol cars this long, but funding for new vehicles has been constrained. The expansion of the city adds mileage, increases the need for more frequent routine maintenance, and shortens the service life of patrol vehicles as they respond to calls at the edges of the city. As the service life of patrol vehicles decreases, replacement vehicles are needed on an accelerated schedule. According to a police department spokesman, if the city continues to grow toward the southeast, it would be desirable to open a substation in southeast Shreveport, but there are no plans to do so currently.

An increasing number of calls to the police department may erode service if more personnel and/or phone lines are not made available to prevent dropped calls and busy signals. Currently, when a call comes into the 911 center (owned by the Parish Communication District) and after the nature of the emergency has been determined, the call is handed off to the appropriate department (fire, EMS, or police). During the last 15 years, neither the number of police personnel assigned to handle police calls in this center, nor the equipment used, has been increased or upgraded.

Although the population of the city has remained steady for at least a decade, the number of calls received for police service has increased 5-8 percent annually. The department suggests several reasons for this seemingly contradictory phenomenon.

- **Increased trust in SPD.** Trust fostered through various community relations and policing programs has not only helped bring about a reduction in crime, but spurred citizens to call 911 to report suspicious persons or situations that would have gone unreported in the past. This trust has actually increased the "eyes and ears" of the police in the community.
- **Dropped calls.** Calls that come into the 911 Communications Center are logged by the dispatcher and then handed off to the police, fire, or EMS services. Callers sent to the police dispatcher may stay on hold for an extended period if personnel are involved with other calls, causing the caller to hang up (dropped call) and call 911 again. This second attempt is logged as a different call. Delays in responding to the caller are caused by a shortage of police personnel in the 911 center, according to the SPD.
- **Widespread use of cell phones.** Many motorists who witness the same traffic accident use their cell phones to call 911 and report the same accident. Each call is logged; the 911 dispatcher has no way of knowing that someone has already reported the accident to police.
- **Police-generated calls.** Police personnel on patrol report suspicious activity they are about to investigate. Since the vast majority of police cars on patrol in the city are manned by one officer, the call initiated by the investigating officer gives the dispatcher information on the officer's location should assistance or back-up become necessary.

Fire department

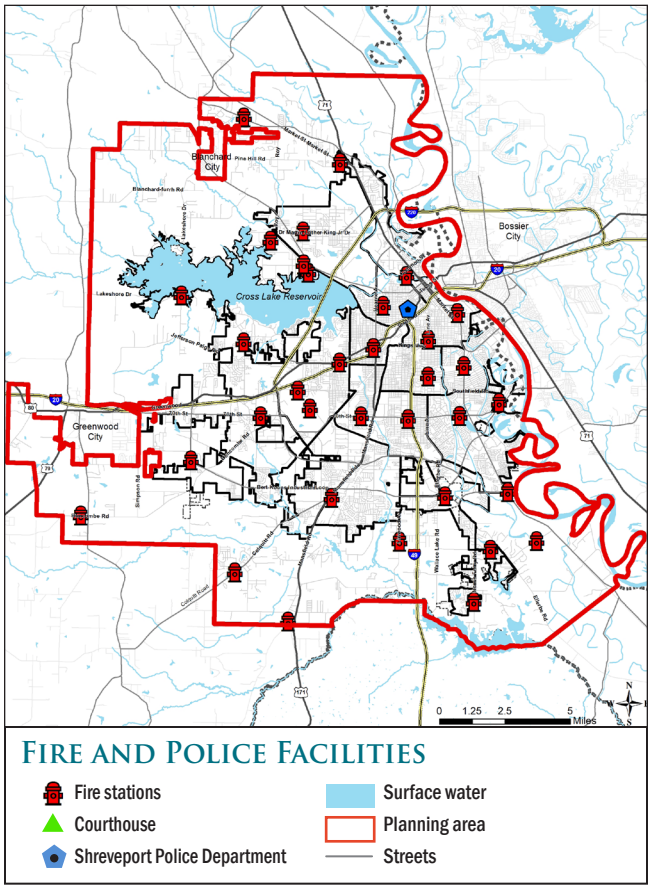
The Shreveport Fire Department (SFD) operates 21 stations covering the city's approximately 121 square miles. The Fire Department currently enjoys a Class 1 rating under the NFPA 1710 standard and uses overtime to meet the minimum staffing requirement for its size of 127 personnel per shift. The department regularly prepares a five-year plan. It is working to meet the challenge of maintaining service levels in the face of increasing demand over a larger area. Some stations have been rendered ineffective due to population shifts, changes in land use, and longer travel times. Although the service rendered by the fire department is adequate throughout most of the city, problems have emerged at the periphery, and service levels may begin to deteriorate if current development patterns continue.

One of the SFD's priority projects, to move the North Shreveport fire station south to the intersection of North Market Street and MLK, carries a lesson about building facilities in anticipation of growth that may not come. From the Fire Department's bond request documents:

> *Fire Station #2 was built in 1981…. This station was initially designed for its current location because it was felt at the time the population trend was moving northward. This turned out not to be the case as it is currently located in a less than maximum effective response area to provide the greatest level of service to the citizens of north Shreveport and should be moved further south for greater efficiency.*

Source: NLC/CC 2008

MAP 9.4 **FIRE AND POLICE FACILITIES**



Source: NLCOG 2009

Response times for the majority of the 35,000+ calls received annually is less than six minutes, although at the periphery of the city, response times can be as high at 12 minutes. Response times will likely degrade if the city continues to annex new areas and shift population to locations outside the loop, as fewer units will be available to respond to calls due to increased travel times. The fire department's strategic plan for 2010-2014 assumes that annexations and population shifts will continue; it identifies funding sources necessary to maintain current service levels, as well as new resources that would be required. The plan proposes relocation of existing stations to more efficient locations (Station #15 to 7300 Mansfield Road; Station #14 to Greenwood and Broadway; Station #17 to Bert Kouns and Kingston Road; and Station #2 to MLK and North Market), and the construction of a new station (Station #23 at Dean Road and Bert Kouns Industrial Loop). Although the relocation of existing stations will not result in a need for additional personnel, the two new fire stations would require more firefighters.

Station relocation is driven by the age of a facility and its area of overlapping service. Relocation can allow more effective overlapping service and the provision of a facility better able to accommodate new fire equipment, which tends to be larger and more difficult to house adequately at smaller, older stations. Although it is possible to relocate personnel from one station to another, construction of a new fire station requires funding for additional personnel.

Other challenges facing the Shreveport Fire Department include:

- retrofitting of the older stations to accommodate female personnel
- upgrading electrical systems at older stations (50 or more years old) to accommodate modern fire-fighting needs and new technology
- continued maintenance of stations and associated department facilities
- identifying and programming sufficient funds to replace aging equipment and rolling stock.

The department has identified $22 million in capital needs:

- Fire engine replacement (11 fire engines and 2 ladder engines): $7,500,000
- Fire station construction (relocation and building of four stations): $11,000,000
- Fire station renovation: $3,500,000

In addition, both the fire and police departments need a training academy to increase classroom and office space, provide better indoor and outdoor physical training space, and make improvements in the library, women's facilities, and firing range and add tactical houses. The estimated cost is $4.2 million.

Emergency Medical Service

Shreveport's Emergency Medical Service is housed in its fire stations and staffed by fire department personnel who are either trained emergency medical technicians (EMTs)

or paramedics. Currently, EMS accounts for more than 77 percent of calls annually to the fire department, and EMS personnel are well trained to treat people on site or stabilize them sufficiently before they are transported to the hospital. Calls received are expected to increase annually due to an aging population with more medical needs, and increasing demand for health care services.

At three fire stations, the Single Paramedic Intervention (SPRINT) program has been implemented to enhance EMS service and save money. The SPRINT program uses an SUV that is more agile in traffic, faster, and much more fuel-efficient than a ladder truck, on which the service has typically relied. In addition, routine maintenance and repairs to the SUV are generally less expensive. With the SPRINT vehicles, EMS personnel can respond to medical emergencies quickly, rendering life-saving treatment before an ambulance arrives on scene.

National standards for EMS service call for response of less than or equal to 8 minutes 90 percent of the time. Due to the number of medical units and their distribution, EMS fails to meet this standard in some areas of the city, notably some areas at the periphery. In response to this challenge, an EMS Enhancement Plan was included in the fire department's strategic plan. In order to improve overall response times throughout the city and provide a more efficient service, the plan calls for increasing the number of medical units and adding SPRINT units, as well as increasing personnel assigned to these units. In addition, plans also call for positioning special medical equipment such as defibrillators in public buildings, which will allow others to administer life-saving actions before EMS personnel arrive on the scene.

SOLID WASTE COLLECTION AND DISPOSAL

Waste collection and charges

Both Caddo Parish and the City of Shreveport operate solid waste collection services. Within the city, solid waste pick-up and recycling is offered at curbside and in some instances from the back doors of residences.[1] In the unincorporated parish within the Master Plan Area, residents are required to transport their solid waste to one of nineteen compactors in various locations. Additionally, Shreveport's solid waste collection operation has a contract to pick up domestically generated trash and garbage in Bossier City.

The City offers curbside collection once per week at each residence in the city. Although the solid waste collection operation is not required to pick up commercially generated solid waste, it typically makes an exception for small, "mom and pop" commercial establishments as long as the waste can be contained in no more than two standard garbage receptacles. Larger commercial establishments in Shreveport have a choice of more than 20 companies that offer garbage and trash pickup in the region.

Until late 2010, the City did not directly charge residents for waste removal, opting instead to cover the cost of this service through the General Fund. A fee of $2.50 per month was approved in November, 2010, but will not cover the entire cost of the service. Having the Solid Waste division compete with other city departments for its annual operating and capital budgets represents a distinct disadvantage for Solid Waste. Moreover, if it were to generate its own operating revenue, there would be more in the General Fund to support city departments that have no funding option other than the General Fund. Many communities in Louisiana and across the country charge di-

[1] 1,200 to 1,500 residents have signed up for the city's "back door" garbage pick-up for an extremely low fee of $15 per quarter. In certain circumstances, this service can also be obtained free of direct charges. For example, handicapped residents who cannot take their trash cans to the street can opt for the back door service.

rectly for solid waste pick-up and disposal. In fact, Bossier City charges its residents for garbage pickup at a rate per customer that is higher than the City of Shreveport charges Bossier City for this service. Although the new fee will generate some revenue for garbage operations, it will not fully cover their cost.

Recycling

The City of Shreveport provides pick-up service for recyclables. Residents who participate in this program must pay $2.50 per month, as of 2010, for the service and are required to use a special 64-gallon container provided by the city. Materials to be recycled are transported by a private contractor, Pratt Industries, to a materials recovery company in the Port of Shreveport. On a weekly basis, approximately 750 tons of recyclables are collected with the city. Materials to be recycled include paper, plastics and glass. The City expects to take over collection from Pratt Industries in the near future. Caddo Parish collects recyclables at each of its 19 transfer stations, and then sells the recycled aluminum and steel it collects and transports newsprint and cardboard to the same recycler at the port.

The environmental organization Shreveport Green, with assistance from the City, runs a series of household hazardous-materials collection events throughout the year. Initially an annual event, the collection became so popular that it is now held six to eight times each year. Caddo Parish does not collect used oil or sponsor similar household hazardous collection events.

Waste disposal vehicles

Until late 2010, the most pressing challenge facing Shreveport's Solid Waste Division was funding to replace its aging fleet of approximately fifty 25-yd garbage trucks, most of which were at or near the end of their 5- to 6-year service lives. As the fleet ages, maintenance costs soar for such heavily-used vehicles, which need to be safe if they are to operate on public streets (otherwise the City would face unacceptable liabilities). To avoid maintenance costs—which mount dramatically as vehicles reach the end of normal service life—the department normally purchases several new vehicles through the city's annual capital budgeting process. These replacement purchases, however, have greatly slowed in recent years. The City approved the purchase of new trucks in summer 2010.

Woolworth Road Regional Solid Waste Facility

All solid waste that is not recycled is transported to the City of Shreveport-owned Woolworth Road Regional Solid Waste Facility in south Caddo Parish which was opened in 1988. The facility contains approximately 435 acres. In 2009 the landfill took in nearly 374,000 tons of solid waste, of which approximately 7,000 tons (slightly less than two percent of the total) was received from East Texas. According to its permit, it has a 300-mile service area.

Tipping fees at the landfill facility vary according to contract. Trucks from both Caddo Parish and Bossier City, for example, pay $29.40 per ton, whereas those from Texas pay $36.50 per ton. These tipping fees appear to be in line with other regional landfill operations. For example, Terrebonne Parish—which has no active landfill for municipal solid waste—pays tipping fees of $26.50 per ton at the River Birch landfill site near the west bank boundary of St. Charles and Jefferson parishes. (The total fee per ton paid by Terrebonne Parish is higher when transportation costs from the parish's transfer facility to River Birch are factored in.)

In 2008, the Intergovernmental Solid Waste Agreement between Shreveport and Bossier City was extended for five years through November 2013, as per an agreement signed in 2003. Under this agreement, Bossier City pays for an 11-person crew responsible for the curbside solid waste pick-up operation there. This is in addition to the tipping fees it pays to Shreveport at the landfill.

The Solid Waste Division superintendent reports that the landfill takes in from 1,200 to 1,500 tons a day. At current rates, the landfill is expected to be viable until 2025, although the City may be able to extend its life a few years by filling higher, since it has obtained a revised height permit. Additionally, the City has right of first refusal on approximately 230 acres of land immediately south of the landfill. The height-expansion permit gives the City a way to continue to utilize this facility should it face a decision about purchasing the adjacent land at an unfavorable price.

The landfill's situation presents a challenge, but not an immediate one. The city has time to plan for the end of this facility's useful life. If sufficient collection fees were to be implemented, the City could begin to set aside funds annually in anticipation of the day when it will be required to expand the facility. Additionally, increasing the recycling program would extend the site's life. At some point, however, the landfill will have to close permanently, a process that involves costly and on-going monitoring under the permit. Monitoring efforts are necessary because of the types of materials that end up in landfills. Regulatory agencies such as the EPA and LDEQ work to prevent liquids leaching from the site that could reach and contaminate groundwater. Monitoring provides advance notice of such problems, allowing time for remedial plans to be developed and executed. The City will need to budget significant amounts of funding over multiple years to support site monitoring and to complete the reports and other measures that closure will require.

Caddo Parish libraries serve as focal points of the community, providing traditional library amenities as well as public Internet access and community meeting rooms, which were used for numerous master plan meetings.

PUBLIC LIBRARY SYSTEM

The Caddo Parish public library system maintains the central library, Shreve Memorial Library at 424 Texas Street, and ten branch library facilities within the Master Plan Area:

- North Shreveport Branch, 4844 North Market Street
- David Raines Branch, 1625 David Raines Road
- Wallette Lakeside Branch, 363 Hearne Avenue
- Atkins Branch, 2709 Hassett Avenue
- West Shreveport Branch, 6723 Pines Road
- Mooretown Branch, 4260 Hollywood Avenue
- Extension Center Branch, 5802 Union Street
- Broadmoor Branch, 1212 Captain Shreve Drive
- Cedar Grove/Line Ave. Branch, 8303 Line Avenue
- J.C. Hamilton-South Caddo Branch, 2111 Bert Kouns South Industrial Loop

In addition to providing books, periodicals and research materials, the system offers public Internet access and meeting spaces for community use. These public libraries serve approximately 220,000 people in the Master Plan Area. The entire Caddo Parish system also includes one bookmobile and ten additional branches, most of which are located in the northern part of the parish between Shreveport and the Arkansas line.

In addition, five academic and medical libraries are located in Shreveport:

- John F. Magale Memorial Library, Centenary College of Louisiana
- Noel Memorial Library, Louisiana State University-Shreveport
- LSUHSC-Shreveport Library, LSU Medical Center
- OBVAMC Library, Overton Brooks VA Medical Center
- Southern University at Shreveport Library, Southern University-Shreveport

Overall, the library services available to the people of Shreveport and Caddo Parish appear capable of handling additional growth both in population and outward expansion, with no need for the construction of additional branch facilities. Moreover, a growth policy concentrating on the core area should not require additional library facilities for the next 15 to 20 years.

PUBLIC BUILDINGS AND PUBLIC SPACES

Shreveport Public Assembly and Recreation (SPAR)

In addition to its role as manager of the public park, open space and recreation system (discussed in Chapter 4), Shreveport Public Assembly and Recreation (SPAR) is responsible for maintaining 132 buildings and Clyde Fant Parkway. Some of these facilities collect user fees, but most do not. Although user fees help to offset budgetary needs, ongoing maintenance continues to be a challenge for SPAR, which emerged from the merger of two city departments, Recreation and Public Buildings. This arrangement appears to work well and saves money in that some functions of the former departments (such as payroll and maintenance) were combined to eliminate duplication of services

About 40 percent of SPAR's annual budget is dedicated to the maintenance of the buildings, grounds, and parks under its responsibility. Nevertheless, maintenance money is always in short supply, and finding sufficient funds for this task is perhaps SPAR's most significant challenge annually. Most of SPAR's annual funding comes from the General Fund, although there is also a very small dedicated millage. All services and programs at all SPAR recreation centers are free to participants, which is unusual compared to many other cities that have found that a judicious use of fees can both ensure that services are available to those who are unable to pay and broaden the number and kind of services that are available.

Although maintenance is a significant issue, SPAR sets park and recreation priorities based on a master plan which was completed in 2006. Through community meetings, Internet surveys, and other means, SPAR learned that the community is interested in three main issues: greenways and trails to enhance connectivity; activities along the Red River, or ways that the community can better utilize the areas along the river for recreational purposes; and more public information about SPAR activities.

SPAR has already provided 15 recreational facilities in the areas of greatest growth in the city. SPAR anticipates that with existing facilities it could handle population growth from a revitalization strategy that concentrates on Shreveport's inner core, although some facilities might eventually need to expand. Nevertheless, it will still face a need to improve, upgrade or renovate a portion of its facilities annually, regardless of their location. The department's current highest-priority initiative reflects this challenge: ADA compliance improvements at Municipal Auditorium, R.S Barnwell Memorial Garden and Arts Center, and RiverView Theatre/Hall, which are all the subject of a consent decree. Even the relatively new Sci-Port building needs refurbishment and equipment replacement due to the amount of usage it enjoys. The total estimated cost for all these building improvements is about $11 million, about one-third of the department's total capital improvement needs. However, SPAR's "wish list" also includes projects mentioned as needs by other city departments, such as the police department Crime

CHART 9.2 **PUBLIC ASSEMBLY FACILITIES RENOVATIONS AND IMPROVEMENTS**

PROJECT	ESTIMATED COST
MUNICIPAL AUDITORIUM IMPROVEMENTS / ADA COMPLIANCE	$5,300,000
Construct accessible dressing rooms, provide wheelchair seating and upgrade elevator to comply with ADA. Provide concert production system (sound and lighting) and stage access elevator. Expand HVAC system to foyer andl obbies and upgrade electrical service. Resurface wood floors, replace seating, and renovate basement to provide usable space for event operations.	
R.S. BARNWELL MEMORIAL GARDEN AND ARTS CENTER IMPROVEMENTS / ADA COMPLIANCE	$1,500,000
Replace conservatory dome structure, reconstruct conservatory floor to comply with ADA and remodel to address minor cosmetic and operational deficiencies.	
RIVERVIEW THEATER/HALL ADA COMPLIANCE	$3,200,000
Reconstruct theater floor/seating; renovate restrooms, ticket counters, concession/coat check counter, and dressing rooms to comply with ADA.	
RIVERFRONT BUILDING IMPROVEMENTS	$1,000,000
• RiverView Hall: Electrical upgrades, cosmetic face-lift in exhibit hall, replace deteriorated equipment such as staging, skirts/drapes, banquet tables and chairs. • RiverView Theater: Replace rigging and upgrade stage theatrical components. • Sci-Port: Refurbishment and equipment replacement.	
BUILDINGS SUBTOTAL	**$11,000,000**

In addition to parks and recreational facilities, SPAR is responsible for maintaining City-owned facilities such as the Municipal Auditorium and the T.S. Barnwell Center.

Scene Evidence Storage Facility, described earlier, and construction of two CNG fueling facilities—one a fast-fill station to service public and city vehicles, and a slow-fill station for city solid waste vehicles—at $1.5 million each.

Caddo Parish buildings

Caddo Parish owns and maintains 1.3 million square feet of space in 28 public buildings. The most important of these buildings are the historic Caddo Parish Courthouse, Caddo Correctional Center, the Coroner's Building, LSU Extension Building, David Raines Community Center, Francis Bickham Building, Government Plaza, Juvenile Justice Building, Shreveport Regional Lab, and the Highland Health Unit Complex.

B. Community Issues and Concerns

In a series of public meetings and a public opinion survey, residents, employees and business owners within the Shreveport-Caddo study area agreed on the critical importance of infrastructure, community facilities and services to the future prosperity and livability of the city, parish and region.

Public opinion survey

Key findings of the survey included:

- 94 percent of respondents say "reducing crime" is important to the future of the Shreveport area, and it is seen as the most important issue overall.
- 90 percent of respondents said "adequate water supply and good water quality" is important to the future of the Shreveport area. A quarter of all respondents ranked this among the four highest priorities.
- Over 40 percent of survey respondents agreed that "less sprawling growth" should occur in the future.
- 79 percent of respondents felt the study area needed more/better community services.
- 75 percent said "the government should promote development with incentives and public investments, where needed" and 79 percent felt development should be "promoted in downtown and central areas that have vacant housing or land."

Visioning forum for the 2030 master plan

During small group discussions, the major challenges and opportunities that emerged related to public facilities, services and infrastructure included:

- Basic infrastructure—water, sewer, electric—needs improvement
- Residents have negative perception of safety and community—crime and police protection
- Utilities should be put underground.

"Speak Out!" neighborhood vision meetings

Nearly a quarter of all participants in these sessions identified "Infrastructure" as being one of the top two challenges the city and parish face. Safety and crime, and associated services, were also a major concern of residents at these meetings.

District and neighborhood meetings

Two series of neighborhood-level meetings were held in the fall of 2009 to identify key issues, concerns and opportunities within the city's numerous neighborhoods and geographical areas. Major findings at these meetings included:

- Some areas have drainage and sewer problems.
- Water system needs improvements, as demonstrated by

low water pressure in southeast Shreveport.
- "Fix what we have first"—water /drainage/sewer service have been neglected in older areas in favor of new developments.
- Code enforcement often requires repeat notification—if we don't address this, all else fails.
- Lack of trust between police and citizens.
- Good garbage-pickup service, but backward incentives (fees for recycling, but not garbage pickup).
- More police presence/patrols.
- Community centers are not used to full potential—have low attendance.

Community infrastructure, facilities, and services in the vision and principles

Infrastructure, public facilities and services are not generally an explicit part of a vision statement because the vision describes the kind of community that assumes good infrastructure:
- "Our neighborhoods—safe, clean and welcoming—are connected by shared civic spirit and by a network of inviting public spaces and transportation choices."
- "Shreveport is the "greenest" and healthiest city in the South, committed to resource and energy sustainability and enhancing access to healthy lifestyles."

Similarly, the principles assume a well-functioning and sustainable system of infrastructure, services and facilities:
- **Fairness and opportunity for everyone.** Make every neighborhood a "neighborhood of choice" with excellent infrastructure, services and amenities.
- **Good stewardship of our natural and cultural heritage.** Protect the quality of the water, air, and landscape.
- **A green and healthy community.** Maintain and improve existing infrastructure before expansion to new areas.
- **High standards of quality in development and design.** Make public investments a model of quality, excellent design, and long-term vision.
- **Strong local and regional partnerships.** Foster collaboration among governmental entities as well as communities across the entire metropolitan region to work toward a shared vision.

C. Strategies and Actions to Achieve the Goals

The Vision and Principles of this master plan call for focusing development and reinvestment within the core of the city—inside the loop—and in existing communities inside the loop, whether in the form of neighborhood-serving business or revitalized neighborhoods. The other chapters of the master plan discuss the strategies and actions to achieve this goal. Therefore, the assumption that the needs of public safety departments or other services and infrastructure must be driven by continued outward expansion and annexation should be re-examined.

In general, in providing for renovation of existing facilities and construction of new ones, Shreveport needs to establish a capital planning process that provides sufficient information and a set of fact-based criteria for a transparent process of setting priorities on a citywide basis. This also means taking into account the land use goals for smarter growth and less sprawl that are a cornerstone of this plan. Best practices in capital improvement planning are discussed in Chapter 13.

WATER, SEWER, AND DRAINAGE INFRASTRUCTURE PLANNING

The master plan process included a fiscal impact exercise to model the likely fiscal impacts of the three approaches to growth developed as alternative levels of effort (see Chapter 2, Chapter 12, and the Appendix). Typically a fiscal impact analysis does not include water/sewer infrastructure and operations due to their nature as an enterprise fund. That is, analyses typically assume that rates and fees pay for water and sewer expenditures, including infrastructure improvements. The fact that the City has turned to general bond funding to pay for water and sewer infrastructure indicates that rates and fees are not sufficient to pay for improvements.
Although Shreveport has raised rates nominally in recent

years to cover operations and basic maintenance, it has not conducted a formal rate study since 1999. Rates appear to be low relative to other comparable systems. A wastewater surcharge is imposed on commercial and industrial users requiring higher-strength treatment. However, water rates can be calculated to encourage conservation, something the current rate structure does not do.

Additionally, a portion of capacity costs could be recouped through capacity or impact fees, allowing growth to pay for its capacity needs and freeing up rate revenue to serve existing development and address backlog needs. For example, recent improvements of $32 million have been made to improve water pressure and supply problems in areas of the city with new growth and development. These costs are being funded through overall rates and fees as opposed to fees applied specifically to recoup these costs.

Because of the overwhelming nature of infrastructure needs and costs facing the City, it is crucial to develop a priority list. New master plans for both sewer and water systems are essential, with detailed description of the need for projects—including an indication of whether improvements represent a response to new demand from growth or address existing issues—costs, and potential sources of funding. In many cases, however, it is difficult to sort out priorities because the condition of the infrastructure is unknown. A "condition assessment system" would play a key role in a utility master planning process. Like an asset management system, this tool helps set priorities for necessary improvements. However, the condition assessment system allows viewing from inside sewer and water pipes to better determine if replacement/rehabilitation is needed as opposed to setting priorities on the basis of infrastructure age alone.

In the case of drainage infrastructure, new development is typically required to mitigate storm-drainage impacts. Significant costs exist, however, due to existing development and aging infrastructure. Annual maintenance and infrastructure replacement costs are estimated at approximately $7 million. The backlog of infrastructure capital improvements is estimated at $110 million. Development of a stormwater utility, with financial incentives to encourage property owners to reduce impervious surfaces and retain as much stormwater on site as possible, could provide a solution.

Finally, all of the above should be folded into a long-term financial plan for the utility system that considers operating and maintenance costs; capital costs for replacement/renewal and new capacity; reserves for operating, capital fund, rate stabilization and debt coverage; as well as potential sources of revenues from rates, grants, loans, and other sources.

GOVERNMENT PRACTICES AS MODELS OF SUSTAINABILITY

Because they own long-term assets, governments are well-positioned to put sustainability into practice. They can take life-cycle costs into account and demonstrate the long-term savings that come with more resource-efficient and healthy practices. By establishing policies and practices that model sustainability, both the City and the Parish will provide examples for the private sector and save money for taxpayers.

Even though funding for water and sewer infrastructure projects has not been plentiful in recent years, the City has incorporated sustainable elements into the work that has been funded. These elements range from premium efficiency motors on pumping equipment for reduced energy usage to the installation of new radio-read industrial/commercial water meters that not only provide more accurate readings, but allow for leak detection and alarms so that customers can be notified quickly of problems with their water service.

Goal 1

Infrastructure investment and management that supports quality of life, economic development and redevelopment in the city's inner core.

Policies

- *Integrate land use and infrastructure investment policies to avoid expanding new infrastructure.*
- *Support full implementation of a GIS-based municipal asset management system over time to end the need to respond to repeated emergency conditions.*

STRATEGIES

A. Set priorities for infrastructure funding and combine federal, state, local bond and other funding to achieve infrastructure goals.

Actions

1. **Acquire and implement a municipal asset management system to complement the development of infrastructure master plans.**
   The physical systems and structures owned by the City, the Parish and their agencies represent a huge community investment. Asset management involves taking care of these physical systems and structures owned so that they deliver the desired level of service at the most reasonable cost. A number of software systems are available to help governments keep track of the condition of their assets and support decision making about maintenance and replacement. These systems are connected to GIS (geographic information systems), so assets are mapped and their locations connected to a database containing information on when they were put in service, expected service life, condition, and how much annual maintenance is needed. Managers need this information in order to make the most cost-effective decisions while maximizing service and to drive decisions on whether and when to maintain, repair, or replace assets. While it requires an initial investment, training, and improved data systems, asset management ultimately saves money. As noted earlier in this chapter, an asset-management system can be built up incrementally, as assets are improved, built or acquired and put into the system. The City and Parish governments could benefit from sharing the costs of acquiring and implementing an asset management system.

2. **Consider setting up a Neighborhood Infrastructure Fund to assist inner core redevelopment.**
   The City can set aside a portion of infrastructure-bond financing for infrastructure costs associated with neighborhood revitalization projects that implement master plan policies to promote development within the loop. Unfortunately, redevelopment of older neighborhoods does not always means that the existing infrastructure is in good condition. Infill projects often have to repair existing or install new infrastructure.

3. **Prepare educational materials/presentations/brochures to highlight the need for infrastructure investment at the time of bond elections.**
   Voters need to understand the critical need for infrastructure improvements in multiple contexts, including public health, economic development, and future growth. They also need information on criteria used for setting priorities and the rationale for cost estimates.

B. Evaluate the potential benefits and costs of establishing infrastructure impact fees.

Impact fees are regulatory measures to ensure orderly growth with one-time fees assessed on new development to reflect new growth's fair share of the cost to provide necessary capital facilities. They can be structured to incentivize development and redevelopment in the city core. Potential fee categories include water; sewer;

roads; parks and recreation; public safety; and solid waste. Establishing infrastructure impact fees for new development would remove some of the burden of capital expenses (but not day-to-day operation) for infrastructure from the City's General Fund and allow more current funds to be used for maintenance and rehabilitation of existing infrastructure. In Louisiana, East Baton Rouge Parish and St. Tammany Parish in 2009 levied impact fees averaging $2,900 total on an average single family house, as well as similar fees on multifamily units and commercial development. The fees were tied to roads, water and sewer impacts.

Actions

1. **Commission a study to determine how to structure impact fees to meet legal requirements and to promote policy goals to reduce sprawl development.**
   In order to implement impact fees, a study would be required to develop a fair system of evaluating fees and ensuring that their administration meets the legal test of proportionality and a "nexus" between the impacts on city services caused by new development and the fee imposed. The policy goal of promoting redevelopment could be achieved either through fee differentials—higher where infrastructure needs to be expanded or to reflect different land use characteristics—or through waivers or reduced fees where development is to be encouraged. In areas where waivers or reduced amounts are desired, but additional capacity is still needed, standard impact-fee systems require that the program would need to be fully funded. That is, the City would be required to fund those "waived fees" from other revenue sources. (For more information, see Chapter 13 and the Revenue Strategies Report in the Appendix.)

2. **Implement pricing differentials to "capture" increased costs of service provision and maintenance at the periphery of the city.**
   DOS should identify concentric zones indicating baseline annual maintenance costs per unit for infrastructure. Fees could then be structured per unit based on distance. An asset management system would greatly assist DOS in developing the per-unit cost for maintenance.

C. Maintain memberships and participation in partnerships and other entities such as Caddo Parish Stormwater Partnership and Water Resources Committee of Northwest Louisiana.

Action

1. **Invite these groups to make bi-annual or quarterly reports and presentations to the MPC, City Council, and Parish Commission to keep the public apprised of developments in these areas.**

Goal 2

Excellent quality and adequate quantity of drinking water to meet all current and future needs of the Shreveport-Caddo Master Plan Area.

Policies:

- *Protect and enhance water quality in Cross Lake reservoir.*
- *Enhance the water quality in Twelve Mile Bayou.*
- *Support development of new water-treatment facilities and supply sources.*
- *Monitor water use by gas companies in connection with drilling activities.*

STRATEGIES

A. Update the water-supply master plan in the context of the regional water utility district planning process.

A new water-supply master plan is needed to address realistic future needs for distribution system growth, additional water-treatment plants, and new water source(s); system redundancy in case one treatment

Control of pollutants and invasive vegetation in Cross Lake continues to be critical to meeting needs for drinking-water supply, recreation, and beauty.

facility fails; and standard distribution line sizes for each particular application, including fire hydrant service. A new plan, which is included in a proposed bond issue as of fall 2010, should begin to formalize some type of agreement for a regional water utility system, allowing Shreveport's water-treatment facilities to meet the city's needs more efficiently, as well as those of the region.

Action

1. **Prepare a comprehensive water-supply master plan.**
   Like the sewer master plan, the water-supply plan will need to include investigation of the subsurface water distribution system.

B. Continue to enhance programs to protect Cross Lake from point and nonpoint source pollution.

Actions

1. **Continue the Cross Lake Watershed Protection Program (nonpoint source pollution management program, including bayous flowing into the lake).**
   Activities should include periodic workshops focusing on home sewage systems, forestry management, and stormwater runoff as well as making information readily available to landowners, loggers, and foresters in the Red River Basin on erosion control, forestry best management practices, and their importance in protecting water quality and fish habitat. The Caddo Parish Stormwater Partnership clearinghouse should include information on protection of the Cross Lake watershed with collaboration from the City and LDEQ.

2. **Limit the amount of petroleum pollutants introduced into Cross Lake.**
   Develop initiatives and public education efforts to make boaters less likely to pollute the lake. Explore opportunities for non-motorized boating by establishing or increasing fees/licenses for motorized boating on the lake.

3. **Work with LDEQ to identify specific sources of nonpoint-source pollution in Twelve Mile Bayou and Cross Lake.**
   Continue work with other agencies in providing information to agricultural interests and others to reduce the concentration of sediment, nutrients, and pesticides leaving their fields and entering Twelve Mile Bayou.

C. With neighboring parishes, continue to pursue a regional water utility system consisting of two major treatment plants drawing water supply from Red River.

Actions

1. **Establish a regional committee to create an action plan leading to formal establishment of a regional water utility district.**
   The committee should include representatives from Shreveport, Bossier City, Caddo Parish and Bossier Parish. In addition, representatives of regional agencies, such as the metropolitan planning commissions, the Northwest Louisiana Council of Governments, the Red River Waterway Commission, and the Port of Shreveport, as well as the Water Resources Committee of Northwest Louisiana should be included.

2. **Integrate water-supply planning with land use planning in development of the regional water utility.**
   Land use plans, such as this Shreveport-Caddo master plan, should be consulted in conjunction with planning for the regional water supply district. Land use objectives, such as the smart growth emphasis on promoting compact growth inside the loop that is central to this master plan, rather than promoting more exurban, leapfrog growth, can be undermined if infrastructure constraints or monetary incentives are eliminated.

D. Establish water-conservation programs.

Action

1. **Identify potential water-conservation programs in the new water-supply master plan for implementation in the long term.**
   While northwest Louisiana today appears to be water-rich, many observers expect that droughts and water shortages will become increasingly serious over the course of the 21st century.

A regional water utility using the Red River can provide plentiful drinking water to the city, parish, and region.

Establishing a culture of resource conservation and resource efficiency will be beneficial to the Shreveport-Caddo area. According to the 1999 water master plan, common water-conservation measures include plumbing retrofit programs, water use audits, and public information and education programs.

Shreveport has established a program to provide treated wastewater effluent (re-use water) to industry as a way of reducing the consumption of potable drinking water by processes that do not require a high level of treatment. This water will be provided to industries at the Port of Shreveport-Bossier and can be used for hydraulic fractural drilling for natural gas ("fracking"). Future plans call for the program to provide up to 10 million gallons per day. This represents the first phase of a re-use plan developed under the 1999 water master plan.

Another possible use of treated effluent is to irrigate golf courses. This can save more than 2,000 gallons of water per golfer per round of golf, based on a study of water reuse in the San Antonio, Texas, translating into an annual savings of more than 53,000 gallons of water per golfer, assuming each golfer averages 25 rounds a year. The water saved at a single golf course, averaging approximately 312,000 gallons per day, could potentially reduce water demand by nearly 114 million gallons annually for each golf course in the Shreveport planning area. If all golf courses were to utilize treated effluent for irrigation, the annual water saving would be substantial, even if Shreveport's golf courses consume water at a lower rate than San Antonio's.

E. Continue to work with energy companies and regional water-management groups to ensure safe and prudent water use for Haynesville Shale activities.

Action

1. **Participate in regional water-management groups and work with energy companies to monitor impacts on water resources.**
   As discussed in Chapter 4, regional initiatives have been put in place to encourage prudent use of water resources in natural gas fracking.

Goal 3

Reliable and efficient wastewater system and sewer service.

Policy:

- *Support wastewater system improvements to meet EPA standards*

STRATEGIES

A. Upgrade the sewer system to a high standard.

Deferred maintenance and capacity problems plague the Shreveport sewer system. In order to achieve the master plan vision for 2030 and attract new growth, as well as retaining households and businesses here now, it is imperative that the sewer system be brought up to standard.

A sewer master plan is critical for maintaining and upgrading the sewer system to serve residents and meet EPA standards.

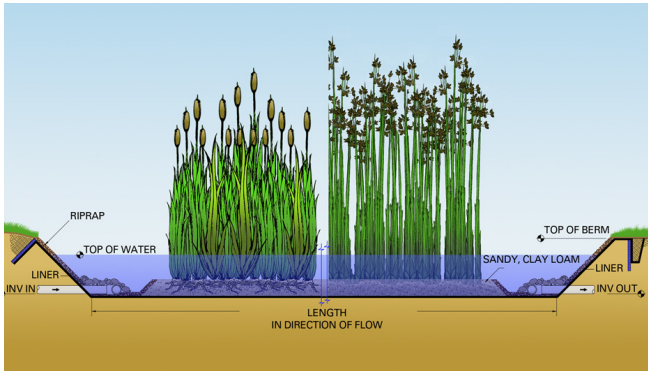
Action

1. **Fund and carry out a sewer master plan.**
   Because of the age of the sewer system, the City does not have complete information on the existing conditions underground, making it difficult to make recommendations about partial improvements to serve development because the capacity and condition of the entire system is unclear. A sewer master plan is a critical first step in making sure that this basic infrastructure system can continue to serve the City. The sewer master plan should be prepared to be consistent with the policy framework of the Shreveport-Caddo master plan. Implementation of the plan will require long-term incremental investment. Correction of SSOs to meet EPA requirements will be the first priority.

   During preparation of the Shreveport-Caddo master plan, steps were taken to initiate a new sewer master plan. As of fall 2010, negotiations are underway for preparation of that plan. Among other things, it will include a plan for providing infrastructure where it does not currently exist, such as in certain locations near the river.

B. Over the long term, explore alternative methods for urban wastewater treatment and management.

Constructed wetlands are manmade ponds that contain aquatic plants that provide treatment of wastewater and can be designed to emulate the bio-filtration actions of natural wetlands. In doing so, constructed wetlands can accept discharge such as wastewater, stormwater runoff, or even sewage (if properly sized and constructed for the particular application). Constructed wetlands are even capable of removing sediments and pollutants such as heavy metals from the water. Because they can provide aesthetic benefits and potentially obviate the need for more extensive infrastructure investments, they can be an appealing option in the



Constructed wetlands can provide alternative wastewater treatment and decrease the need for extensive new infrastructure investment. *Source: Natural Systems International, www.natsys-inc.com*

right circumstances and if correctly designed. According to a manual published by the Environmental Protection Agency, "For some applications, they are an excellent option because they are low in cost and in maintenance requirements, offer good performance, and provide a natural appearance, if not more beneficial ecological benefits. In other applications, such as large urban areas with large wastewater flows, they may not be at all appropriate owing to their land requirements. Constructed wetlands are especially well suited for wastewater treatment in small communities where inexpensive land is available and skilled operators hard to find and keep."[2]

While the master plan area as a whole contains large areas of inexpensive land and there are large areas of unused land within the city, the city may not be a suitable location to use wetlands for full treatment of wastewater. However, wetlands can be used for tertiary treatment of wastewater that has already been through primary and secondary treatment at wastewater treatment plants. For example, the New Orleans Sewerage and Water Board is among a number of agencies pursuing projects to use wetlands for tertiary treatment of wastewater. Federal funds for innovative projects of this type can be available. Water eventually discharged from such facilities can be used for irrigation. Over the long term, as technologies evolve to effectively mimic natural processes to fully or partially treat wastewater, they should be evaluated for potential use in Shreveport.

Actions

1. **Evaluate the potential and economic feasibility of using tertiary treatment of treated wastewater with a constructed wetlands system at both Shreveport wastewater treatment facilities, should new EPA regulations require much cleaner discharge in the future.**
   As part of the sewer and wastewater master plan, constructed wetlands options should be given an initial evaluation, with a general discussion of potential long-term costs and benefits of this approach.

2. **Collaborate with SPAR and others as the City develops a greenway system to explore the potential to incorporate a constructed wetlands tertiary treatment system for wastewater as part of a natural urban park system and make educational materials available to the public.**

Goal 4

Reliable stormwater-management and drainage systems that incorporate best practices.

Policies:

- ***Evaluate options as they emerge for best practices and alternative, non-structural solutions for managing and treating urban runoff.***
- ***Continue to evaluate options for alternative, nonstructural solutions for stormwater management and drainage practices for large developments and for citywide applications.***
- ***Promote initiatives that aim to make drainage infrastructure a public amenity.***

[2] *Manual: Constructed Wetlands Treatment of Municipal Wastewaters*l, Cincinnati, OH: Environmental Protection Agency, Office of Research and Development, EPA/625/R-99/010, September 2000), Abstract, *http://www.epa.gov/ORD/NRMRL*

STRATEGIES

A. Promote preservation of natural drainage and use of natural channel design in drainage plans and regulations.

Communities are increasingly implementing best practices for stormwater management that encourage preservation of natural drainage systems and, where preservation is not feasible, encourage use of natural drainage and channel design to the extent possible. Current best practices emphasize the many benefits of preserving natural drainage:

- Floodplains store water during big storms, reducing the velocity of the water and reducing downstream flooding.
- The natural floodplain buffer between developed areas and the stream mitigates nonpoint source pollution from the developed areas.
- Tree conservation, parks, greenways and recreational areas in the floodplain enhance the community.

If preservation of natural drainage is not possible, bioengineered solutions for natural channel design are preferable. Bioengineering solutions use soil engineering and plantings to increase drainage capacity, reduce stormwater velocity, and reduce erosion. In some areas of Shreveport where drainage channels are severely constricted due to urban encroachment, lining the bottom of the channel with concrete may be necessary to stop erosion. However, under the Clean Water Act, the U.S. Army Corps of Engineers (USACE) will generally not allow concrete lining of natural channel areas (including slopes) unless it can be demonstrated that there is absolutely no other option, and the permitting process for concrete lining can be time-consuming. Although initial construction costs for a concrete-lined channel and slopes may be less than that of a bioengineered approach, the costs of mitigation requirements for a concrete-lined drainage facility greatly exceed the costs of options that allow for some self-mitigation within the channel that employ appropriately bioengineered solutions. Preserving the natural drainage corridor in order to provide stream buffers as well as erosion-hazard setback zones in areas of future development is a prudent step toward meeting the water-quality goals dictated by EPA Phase II stormwater regulations.

Some floodplain areas within Shreveport have sufficient right-of-way to allow construction of a natural drainage amenity (employing, for example, a constructed wetland), and sufficient right-of-way is a key element to consider. A well-designed and functioning natural drainage corridor affords the adjacent community some recreational benefits, and also serves as a method for treating and clarifying runoff, removing contaminants before they reach the receiving water body or stream. Over the long term, a correctly designed natural drainage facility is more cost-effective than paved drainage courses. For drainage infrastructure in new development, the City currently employs the "10 percent rule" to identify potential downstream impacts. This rule requires that calculations of peak flows, velocities and hydraulic effects should proceed downstream to the point where the site drainage area represents 10 percent of the total drainage area. This best management practice allows the City to identify potential impacts from the development and discover existing deficiencies early in the development process.

Actions

1. **Identify specific drainage courses and floodplains throughout the city with sufficient right-of-way (ROW) to allow development and implementation of natural drainage systems.** These amenities would adequately serve the runoff needs of the area, offering primary treatment to improve water quality in the receiving stream or water body, and serve as a recreational and aesthetic amenity designed to improve quality of life in the surrounding community.

2. **Revise regulations to promote best management practices and default language that reflects a preference for natural drainage and natural channel design.**

   Regulations should promote natural drainage and natural channel design where feasible. Stormwater management best management practices should be incorporated into development regulations with applications in all general land use classification types. Ideally, stormwater management regulations will ultimately become part of a Unified Development Code that would ensure that zoning, subdivision and environmental regulations are consistent and easily accessible in one place.

3. **Target the medical district and the lower Stoner Hill area for pilot projects to resolve drainage problems while creating public amenities.**
   For details, see the box entitled "Shreveport at the Sustainable Cities Design Academy" at the end this chapter.

4. **Develop a working scale model of an existing opportunity to use a natural drainage course within the city.**
   With input and advice from SPAR, this could be an excellent project for design and engineering students in the region's colleges and universities. A working scale model can demonstrate the recreational, connectivity, drainage, and water-treatment benefits natural drainage provides the community. This model can then be exhibited in the Red River section at Sci-Port and at schools and other locations around the city.

5. **Encourage protection and integration of natural drainage features into the community through park systems and planned land use.**
   Coordinate park and land use planning with planning for drainage and stormwater management to create neighborhood amenities, when possible.

B. Explore strategies to reduce the amount of stormwater runoff entering the citywide drainage system.

Impervious surfaces on developed land—mainly rooftops and paving—shed stormwater at high velocities, sending it into the stormwater system and, eventually, streams and rivers, where it increases pollution, erosion and turbidity if not managed properly. A quarter-inch of rain on the typical roof produces 55 gallons of runoff. A number of cities have adopted regulations and programs that keep significant volumes of stormwater out of the stormwater system, thus reducing the public cost of maintaining and expanding the system. These cities put a price on stormwater management—because the construction and operation of the system is costly—but they also allow and encourage best management practices that retain water on site so that it either evaporates into the air (because it is taken up by trees and plants), slowly infiltrates back into the ground, or is used to irrigate ornamental landscapes. On-site management of stormwater by private property owners then results in a discount or elimination of a stormwater fee.

Actions

1. **Explore establishment of a stormwater utility, with discounts for on-site reduction of stormwater flow to public streets and infrastructure.**
   Shreveport could become the first city in Louisiana to establish a stormwater utility. The purpose of a stormwater utility is to create a dedicated source of funding for maintenance and improvement of stormwater management. The fee for stormwater impact is based on the amount of runoff that enters the public stormwater-management system—the use of the system by the property owner. This idea reflects the principle used for water and sewer service, that customers should pay for service based on usage measured by their water meters. Stormwater utility fees are typically calculated based on the amount of impervious surface on a site,

though some communities use gross parcel size for residential properties. Stormwater utilities provide an incentive for best management practices by offering credits against the stormwater fee to private property owners who reduce or eliminate runoff or improve the water quality of runoff.

In addition, stormwater utilities often offer exemptions for certain kinds of properties based on level of development, ownership, community use, and similar considerations. In the case of Shreveport, where some residential areas have very little public drainage infrastructure—typically lower-income neighborhoods—property owners should not be subject to a full fee if little service is available. By establishing a stormwater utility, a community is creating a type of enterprise fund similar to the water and sewer funds, where the cost of maintenance and capital expenditures should be paid by the utility's revenues. This then frees up General Fund resources for government services and facilities that do not have the potential to generate revenue. Stormwater-utility revenues are used for a variety of purposes, including flood control, maintenance, water-quality treatment and management improvements, system planning, open space preservation, and regulation and enforcement. Most communities with stormwater utilities bill the fee with other utility bills or on the property tax bill. Stormwater utilities have been established in cities and counties all over the country, including in Georgia, Florida, Oklahoma, Michigan, Kentucky, Ohio, Minnesota, Washington, Oregon, Colorado and Utah. State courts have found that stormwater utility charges are true user fees for services and not taxes.

Establishment of a stormwater utility generally requires some years of planning, preparation and public education. Many manuals are now available to assist communities in crafting a utility appropriate to their conditions. Low initial rates can help property owners get used to the idea of paying a stormwater charge. A stormwater management master plan is essential because it will put forward the program of specific programs and projects that need to be funded and then the rate structure will have to be adjusted so that, over time, these programs and projects are put into effect and supported by sufficient funding.

2. Prepare a stormwater management master plan for the entire master plan area.
As noted above, a stormwater management master plan will provide the detailed assessment of needs and a maintenance and operations program, including public education and dissemination of best practices at all levels, to lift the stormwater-management system incrementally to a higher standard.

Establishment of a funding source, such as a stormwater utility, is an important precondition for success. In order to look at the entire system and integrate it with land use conditions and planning, the stormwater-management plan should, at a minimum, cover the entire Master Plan Area, not just the city of Shreveport.

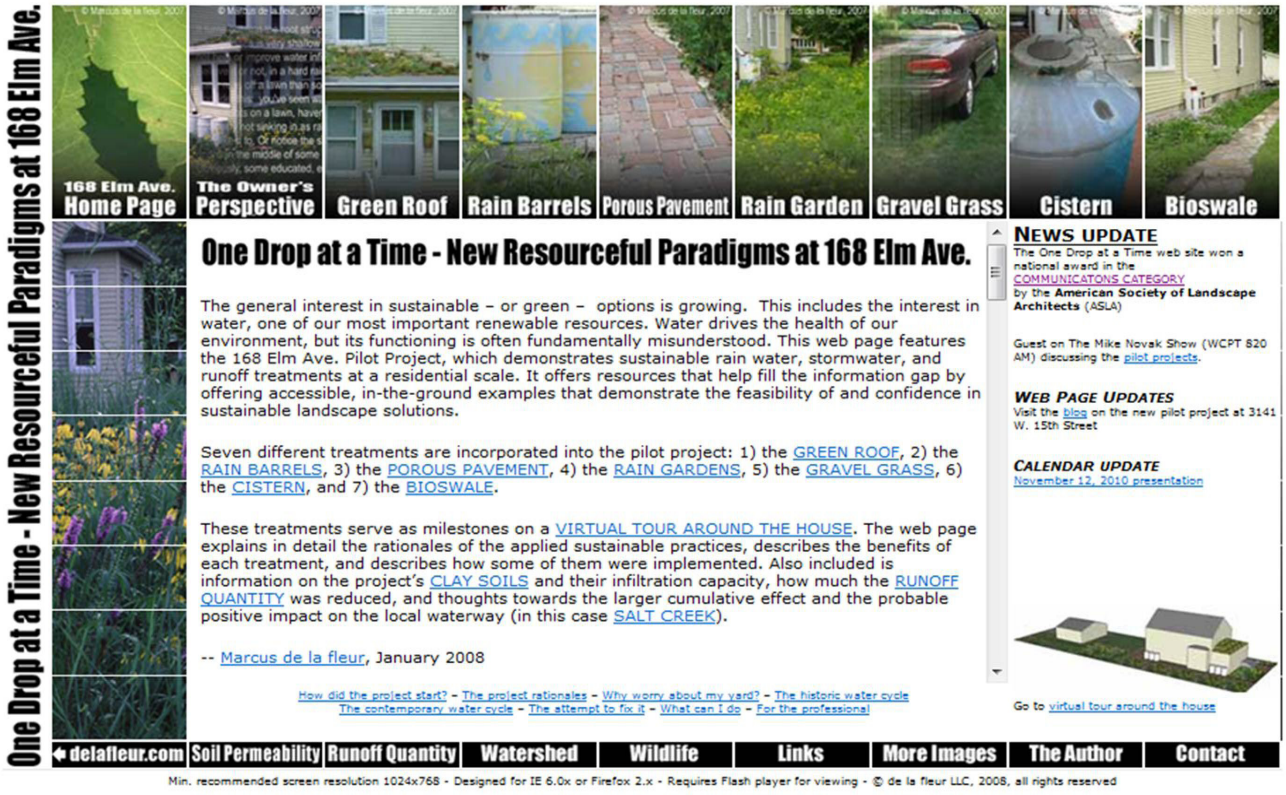
A stormwater master plan should focus on these goals:[3]

- Reduce flood damage.
- Minimize increase in stormwater runoff from any new development.
- Reduce soil erosion from development and construction projects.
- Assure adequacy of existing and proposed bridges and culverts.
- Maintain groundwater recharge.
- Prevent nonpoint-source pollution to the extent possible.
- Maintain the integrity of stream channels for biological function and drainage.
- Minimize pollutants in stormwater runoff from new and existing development.
- Protect public safety.

[3] Adapted from "Municipal Stormwater Management Planning" fact sheet (FS557), Rutgers Cooperative Research & Extension, NJ Agricultural Experiment Station, *www.water.rutgers.edu/Fact_Sheets/fs557.pdf*

The plan should demonstrate how it would promote those goals, comply with state and federal regulations, and be integrated with other plans and documents, including the Shreveport-Caddo master plan, and provide for mitigation in the case of variances or exemptions from local stormwater regulations that are designed to promote the goals.

3. **Supplement existing stormwater-management regulations with incentives and public education that promote the best practices of on-site management and infiltration of stormwater.** Zoning, stormwater-management ordinances and manuals should provide criteria, regulations and incentives for use of bio-retention areas (rain gardens, bio-swales, filtration strips, etc.) and similar practices in all types of development. All of these strategies call for creation of slightly sunken areas planted with native vegetation that allow for the collection and infiltration of stormwater, especially from rooftops and parking areas. Care must be taken to account for the high clay content of Shreveport-area soil, because clay soil has limited permeability. Disconnecting rooftop downspouts and sump pump discharges so that their output flows into bio-retention areas or rain barrels can be a simple way to reduce stormwater runoff. An example of how simple landscape and rainwater-management practices were put into effect on a small urban property in Ohio can be found at the "One Drop at a Time" website (*www.delafleur. com/168_Elm/*). Through a combination of fees, tax credits, and zoning incentives, the city of Portland, Oregon, manages stormwater runoff by encouraging owners to create rooftop gardens (which capture nearly 80 percent of rainfall); connect gutters to rain barrels that collect water for later use; and other strategies to reduce stormwater runoff, thereby reducing the need for expensive additions to stormwater-infrastructure capacity.



Simple stormwater practices can make a difference in a small urban property like the one in this website.

Bioswales planted with native species provide an effective alternative to more expensive concrete drainage infrastructure.

4. **Explore "Green Streets" approaches to stormwater management and replace some stormwater drains with natural areas and native plant species that absorb the majority of stormwater.**
   "Green Streets" include vegetated elements that intercept stormwater contaminated with gasoline and other chemicals for infiltration and mitigation. Such early interception of runoff reduces demands on stormwater sewers and helps the system return relatively clean water to the receiving streams. In Shreveport, such practices may have the added benefit of helping to reduce wet weather SSOs. Green Streets can include planted bio-retention "bump outs" at corners and mid-block or wide vegetated areas between sidewalks and streets. Depending on the context, Green Street designs can be formal in business or commercial districts, and more informal in neighborhood settings.

5. **Support and enhance the Caddo Parish Stormwater Partnership as a regional resource for stormwater-management education and collaboration and a source of educational materials for the public on best practices and residential stormwater management.**
   Launched in 2010, the Caddo Parish Stormwater Partnership has the potential to become an important public resource for watershed and stormwater education. A wealth of public information materials is already available from nonprofit groups and from other municipalities, states, and the EPA on watershed and stormwater planning, best practices, and simple changes—such as using rain barrels—that are easy for individual households to implement. Links from the partnership's Facebook and Web pages to the Center for Watershed Protection (*www.cwp.org*) can provide an extensive library of state-of-the-art materials both for ordinary citizens and for professionals.

6. **Where sufficient right-of-way width exists in drainage corridors or other infrastructure easements, build several greenways on a pilot basis, employing constructed wetlands techniques and other best practices.**
   By using drainage corridors, and employing constructed wetland techniques, the City and its residents can receive improved drainage that is sustainable while benefitting from additional recreational amenities. (See Chapter 4 for more discussion of a park and open space network that uses natural and constructed drainage ways.)

Goal 5

Maintain City/Parish buildings and facilities for long-term use.

Policies:

- ***Support investment in an asset-management system.***

STRATEGIES

A. Seek out best-practice examples of municipal and county asset management and implement a system in Shreveport and Caddo Parish.

As noted earlier, an asset-management system, tied to GIS software, documents a municipality's or parish's true needs by tracking assets such as roads, water and sewer mains, and buildings (what they are, their location, current condition), and it promotes

the preservation of each asset by extending its life through timely programmed maintenance. In the long run this saves the agency money, since maintaining infrastructure is less costly than replacing it. A joint system for the City of Shreveport and Caddo Parish could be a cost-effective option.

Shreveport and Caddo Parish would benefit from such a system, particularly in light of the City's need to address systematically its unusually large backlog of infrastructure maintenance, repair and replacement needs. Additionally, by documenting new infrastructure additions now so that design life can be extended in the future through programmed maintenance, the City will save additional money that can then be used to address problem areas.

Actions

1. **Determine specific and detailed asset management needs of each municipal department.**
   A complete asset-management system would address the needs of all municipal departments including documented roadway, utility, vehicle, building and other conditions. Should funding be limited, however, most asset-management software allows municipalities put a system in place incrementally. For example, Pinellas County, Florida, started with a basic system that included a maintenance-management system and asset tracking to generate city work orders. Later it added pavement and is now looking to add bridges and utility tracking to its system. The initial cost, which included training for staff, was $700,000. After one year, the county recorded $6 million in documented/audited savings—nearly 10 times what it paid for the system.

2. **Develop a plan for establishing and implementing an asset-management system.**
   The steps in establishing an asset-management system should include:
   - a report and presentation documenting the long-term costs and benefits of implementing asset-management system and funding
   - a plan for training personnel after acquisition of system, but before department-wide installation and implementation

An asset management system will save money over time by extending the life of infrastructure through programmed maintenance and repair.

Goal 6

Public safety facilities (police, fire, EMS) that meet best practices performance standards in all areas of Shreveport/ Caddo.

Policies:

- *Fund all public safety departments so they are able to meet best-practice standards through five-year plan cycles in coordination with the capital improvement program.*
- *Support community-based public safety programs.*
- *Support interagency incident management teams and training first responders.*

STRATEGIES

A. Seek more efficient fire company coverage by implementing recommendations in the Shreveport Fire Department Strategic Plan in light of current population patterns and master plan policies.

Changing development patterns have resulted in a decrease in Fire Department response times in some

areas. The Fire Department master plan recommends replacement of older facilities and construction of additional facilities in areas with lagging response time to improve those times and provide better fire coverage.

Actions

1. **Evaluate Fire Department needs, and develop an incremental plan to secure funding, acquire sites and implement new facility recommendations through capital improvement program budgeting.**
   Because of the many demands on limited capital funds, Fire Department needs should be included in an overall capital planning process that includes criteria for priority setting and long-term, incremental planning.

2. **Ensure operating funds for any new staffing and facilities.**
   Construction of new facilities must be accompanied by a plan for any new staffing or future maintenance costs.

B. Improve and extend EMS service.

The SPRINT program (Single Paramedic Intervention) has enhanced EMS service and saved money by employing SUVs that are faster and much more fuel-efficient than ladder trucks, which the department has traditionally used. The SPRINT vehicles allow EMS personnel to respond to medical emergencies quickly, rendering life-saving treatment before an ambulance reaches the scene.

Actions

1. **Extend the SPRINT concept to all fire stations over time.**
   Acquire equipment through the capital planning process and through using projected savings obtained by converting to the smaller, less costly, and more fuel-efficient SPRINT vehicles.

2. **Consult other cities, such as Boston and Washington, for EMS best practices; provide advanced training and continuing education through partnerships with local universities; and offer incentives for increased performance.**
   Continuing education and learning from best practices will make the EMS system more effective and efficient.

C. Support Shreveport Police Department planning, facility and equipment priority needs and enhanced collaboration with other agencies.

Actions

1. **Establish a five-year strategic planning cycle for the Police Department.**
   A strategic planning process will help the department in effectively using its data and communicating its needs to the community.

2. **Improve the Police Department's ability to respond effectively to emergency calls.**
   The number of police personnel assigned to handle police calls in the Communications Center has not increased in 15 years; however, the number of calls received has increased 5 percent to 8 percent annually, placing a strain on both personnel and equipment, which has not been upgraded. The situation should be studied to evaluate the equipment, management systems, and number of personnel need for effective response, and the results of the study implemented.

3. **Create a long-term plan to meet Police Department facility and equipment needs through an annual CIP process.**
   Because of the many demands on limited capital funds, Police Department needs should be included in an overall capital planning process that includes criteria for priority-setting and long-term, incremental planning.

4. **Organize relevant governmental systems/ services to garner support from other agencies to promote and support community policing efforts, such as more effective code enforcement, liquor licensing notices, and so on. including ticketing/citations for "quality of life" offenses.**
   See Chapter 6 for recommendations.

D. Promote interagency cooperation for management team and training to improve first response to emergencies throughout the Shreveport-Caddo planning area.

Actions

1. **Require mandatory interagency management teams and training for all first responder agencies in the Master Plan Area.**
   Because first responders from various agencies can be involved in emergency situations, previous training and organization in interagency teams can enhance performance.

Goal 7

All City and Parish facilities and operations to become models of energy and resource efficiency.

Policies:

- *Where possible, meet new needs and demands by enhancement/expansion of existing facilities, rather than building new.*
- *Use best practices for long-term, life-cycle energy and resource efficiency in improvements, renovations, or new facilities.*

STRATEGIES

See Chapter 4 for discussion of the City's energy-efficiency plan.

A. Develop and showcase City and Parish facilities, buildings, and operations as models of resource efficiency by establishing a set of policies for facility operations, maintenance, renovation and new construction.

Actions

1. **Re-use existing buildings before building new, if possible, and use recycled and locally-sourced content in municipal construction where practical.**
   Existing buildings contain "embodied energy" that has already been invested. Retrofitting existing buildings can be more energy-efficient than building new. However, some buildings will need to be replaced, and use of recycled materials and locally-sourced materials that do not require high transportation costs should be pursued in those cases.

2. **Design municipal buildings to maximize energy efficiency by attention to ventilation, windows, site orientation, use of trees on the south and west sides of buildings for shading, "green" roof construction where feasible, and similar energy-efficient construction methods.**
   Although these design elements may cost more to construct, they save municipalities more money over time through lower heating and cooling costs. City and Parish buildings should strive to meet the highest resource-efficiency standards, possible through application of benchmark systems such as LEED (Leadership in Energy and Environmental Design) or similar standards.

3. **Identify and implement water conservation measures for all public buildings and services, including re-use of non-potable water.**
   Water conservation is a prudent practice that saves resources. It can be implemented through renovations and new building projects by the use of water-conserving fixtures and systems. Use of non-potable water where drinking water is not needed can save money over time as unnecessary water treatment is avoided.

4. **Evaluate use of non-potable water for irrigation at all municipal golf courses.**
   Golf course irrigation is a water-intensive use. Many golf courses around the country have adopted water-conservation measures.

5. **When repaving municipal parking areas, explore permeable surface construction and other stormwater best management practices.**
   Where the underlying soils are suitable, permeable parking areas will reduce stormwater runoff. Strategies such as the use of permeable surfaces in parking spaces while retaining impervious circulation areas can be one way of balancing conditions to promote more natural drainage.

6. **Implement a municipal procurement policy that minimizes use of toxic materials.**
   Many communities have instituted procurement policies that require non-toxic materials, when available, for cleaning agents, construction materials and similar uses.

Goal 8

Solid waste reduction of 20 percent from 2010 levels

Policies

- *Extend life of the landfill to 2030.*
- *Support phased expansion of the landfill if feasible.*
- *Support measures to reduce the amount of solid waste.*
- *Explore viable options, including best practices, for solid waste disposal.*
- *Explore regional solid waste disposal solutions.*

STRATEGIES

A. Expand the recycling program and re-establish the composting program in Shreveport to extend the life of the landfill.

Each ton of recyclables collected keeps a ton of refuse from entering the solid-waste stream destined for the landfill. The 750 tons of recyclables collected weekly represents approximately 9 percent to 10 percent of the solid waste ending up in the landfill. Doubling the tonnage of recyclables through more intense public education and expanding the program throughout the city by increasing the level of participation would divert another 39,000 tons of garbage from the landfill annually. This amount, added to current collections through the recycling program, could reduce the solid waste entering the landfill by about 20 percent. This reduction, if sustained, could add about three years to the life of the landfill, potentially extending its useful life to 2028 if the height-expansion permit is not exercised. It is important that public education campaigns tie recycling to the overall cost of handling trash and refuse, the value of extending the life of the landfill, and the costs of managing a closed landfill. Often recycling is evaluated only in terms of variable market prices for recyclables, which is too narrow a criterion. Promoting residential composting and establishing a municipal compost program can help reduce solid waste by even more than 20 percent. Food waste, garden and grass clippings, tree leaves and limbs put large amounts into the waste stream.

Actions

1. **Continue and expand public information programs to encourage additional recycling in the community.**
   Working with organizations like Shreveport Green to promote recycling across the community can lead to positive results. For example, Shreveport Green is actively engaged in educating Shreveport's children about the importance of recycling by providing materials at in-school presentations like coloring books and pens made from recycled tires, and gives guided tours of the Pratt Industries' recycling center. Additional programs should be explored to further encourage and educate the community about the value of recycling.

A combination of increased recycling, composting, and fees for garbage collection will reduce solid waste and extend the life of the Woolworth Road landfill.

2. **Reorganize monetary incentives to promote recycling over trash and garbage disposal.** By charging for trash pickup, while reducing recycling fees, the City could give a clear incentive for households to recycle.

3. **Allow composting on residential properties and create a municipal compost program.** Composting ordinances have been adopted in many U.S. cities to allow and regulate small-scale compost operations to reduce solid waste in a way that is cost-effective, and encourages gardening by creating good soil.

   Municipal compost programs require property owners to put garden waste (leaves, clippings, branches) into paper bags, which are then collected separately and taken to a municipal compost area where they are shredded and composted. This compost is typically made available to residents for free and is also used by the municipality for public landscaping needs.

B. Establish practices in collaboration with merchants to reduce solid waste.

Action

1. **Explore and evaluate programs and incentives for greater commercial involvement in recycling.** The City government participates in the recycling program and can provide technical assistance to businesses in setting up their own internal systems for recycling.

C. Further explore an equitable system of charges for residential garbage pick-up.

Starting in 2011, Shreveport will begin charging for trash pickup. The system should be evaluated to see how revenues compare with actual costs. In addtion, the fee system could establish thresholds at which fees would increase. (i.e., anything over one container would require a higher fee.)

Actions

1. **Evaluate the implementation of fees to cover the operational and capital needs of the solid waste operation.** Fees could be raised gradually over a few years until most or all of the actual operating and capital costs of garbage collection are covered, and, perhaps, a certain amount of the direct costs such as a proportional share of the landfill's operating costs.

2. **Explore the potential to solicit garbage disposal business from more communities in east Texas and southwest Arkansas in order to generate additional income to offset solid waste expenses.** Because such an action would hasten the current landfill's closure, this could only be implemented

if the adjacent property to the landfill were purchased.

D. Take steps to implement alternatives for replacing or expanding the landfill in a timely manner.

Action

1. **Set aside in the annual budget a portion of the funds necessary to purchase the adjacent 230 acres for future expansion of the landfill.**
   A portion of future residential garbage collection fees could be allocated to purchase the additional acreage.

E. Explore regional solid waste management, disposal method and funding mechanisms.

Action

1. **Explore with LDEQ the concept of a regional landfill authority enlisting participation of local city and parish governments (Caddo, Bossier and DeSoto Parishes).**
   A regional landfill authority could be beneficial in terms of efficiency and reducing the impacts from multiple landfills in the region.

Goal 9

Compliance with accessibility standards under ADA in both public and private facilities.

Policies:

- *Support funding to meet all outstanding ADA deficiencies in public facilities.*
- *Continue to make ADA accessibility information available to the public.*

STRATEGIES

A. Use dedicated funds to remedy existing ADA deficiencies in public buildings and ADA needs in new public construction.

ADA compliance is a legal necessity as well as a moral imperative so that all citizens can participate in public life.

Actions

1. **Update the 1991 ADA Transition Plan to document ADA compliance and deficiencies and request funding.**
   Evidence of compliance is valuable in requesting federal and other funding for public projects.

2. **Establish a policy for using "universal design" criteria in the design of any new government buildings.**
   Universal design is the next step beyond handicap-accessible or barrier-free design. It is predicated on the idea of designing spaces to be usable and attractive to everyone, without specialized elements specifically for disabled people. Principles of universal design include:[4]
   > equitable use
   > flexibility of use
   > simplicity and intuitive nature of design;
   > making information perceptible
   > building in tolerance for error
   > designing to reduce physical effort required
   > provision of sufficient space and size for approach and use.

3. **Complete outstanding ADA deficiencies identified in public buildings.**
   Some funds should be allocated every year toward eliminating deficiencies.

[4] *www.design.ncsu.edu/cud/about_ud/udprinciplestext.htm* (The Center for Universal Design, North Carolina State University).

4. **Continue to update ADA information available to the public and to private sector developers.** Keep ADA accessibility updated on the SPAR webpage and provide informational brochures or web-based information to guide the private sector (public and developers) about ADA standards, compliance, and permitting issues.

5. **Dedicate a small portion of ticket sales, rental fees, etc., received at public facilities to underwriting ADA needs at public buildings.** Adding a small fee to SPAR facility use fees to build up an ADA fund is a simple way to create a dedicated funding source for some improvements. If fees are raised, a public statement that the increment is dedicated to making all public facilities accessible to everyone can help mitigate the impact.

D. Getting Started

Early actions that are not costly will provide a foundation for more ambitious activities.

ACTION	RESPONSIBLE PARTY
Develop stormwater management resource content for residential property owners and publicize the Caddo Parish Stormwater Partnership web presence	Partnership members through appointment of a volunteer committee
Review and write a report on best practices for asset management, costs, and recommend implementation steps for the City and possibly the Parish	Shreveport Department of Operational Services
Advance the regional water district initiative by creating a district and appointing a board	City and Parishes
Give priority to sewer and water infrastructure needs, including sewer and water master plans, in the next bond issue	Citizens Bond Committee; Mayor and City Council
Write a Request for Proposals for a study of impact fees and differential pricing	Mayor's office with assistance from Department of Operational Services

Shreveport-Caddo Master Plan at the Sustainable Cities Design Academy

Innovative Pilot Projects for the Shreveport Area

The Shreveport-Caddo master plan was chosen as one of twelve projects to participate in the 2010 Sustainable Cities Design Academy (SCDA) sponsored by the American Architectural Foundation. SCDA is an intensive, 2.5-day, expenses-paid workshop that connects multidisciplinary project teams with international experts in sustainability to help advance the green infrastructure and community development goals of real projects that are already under way. The Shreveport-Caddo Master Plan SCDA team included representatives of the Metropolitan Planning Commission, the Shreveport Department of Environmental Affairs, and the master plan consultant team. The sustainability experts included an engineer who specializes in innovative stormwater management. On returning from the SCDA, the consultants and Shreveport participants met with City staff to develop a short list of possible pilot projects.

The Shreveport-Caddo discussions at the SCDA focused on innovative approaches to stormwater management and mitigation of nonpoint source pollution using natural processes. During the discussions, the group developed a list of criteria for evaluating potential projects, shown in the matrix below. A precondition of inclusion on the list was that a potential project had to satisfy multiple criteria.

SUSTAINABILITY PILOT PROJECTS

PROJECT NAME	MOTIVATED STAKEHOLDERS	DIVERSE STAKEHOLDERS	ENVIRONMENTAL IMPACT	INFRASTRUCTURAL EFFICIENCY	LOW COST	COST EFFECTIVENESS	COMMUNITY REVITALIZATION	VISIBILITY AND EDUCATIONAL VALUE	FLOODING IMPACT	PILOT / DEMONSTRATION	RECREATION	TIME FRAME FOR COMPLETION
Medical District stormwater management amenities	x		x	x		x	x	x	x	x	x	3-7 years
Stoner Hill South Stormwater Park		x	x	x		x	x	x	x	x	x	3-5 years
Cross Lake constructed wetland—nonpoint source pollution mitigation	x	x	x	x		x				x	x	1-5 years
Texas Street "green street" or parking lot	x	x		x	x	x	x	x		x		1-2 years
Downtown Green Spot (aka Greyhound Park)	x	x			x	x	x	x		x	x	3-5 years
Cross Bayou/Bridge Trail	x	x	x		x	x	x	x			x	1-5 years

Project Benefits Criteria

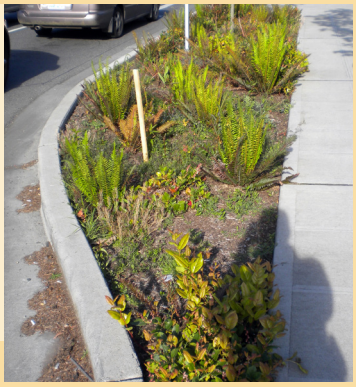
- **Motivated Stakeholders:** Stakeholder groups are likely to take an active role in project implementation, or are already involved in formulating the project.
- **Diverse Stakeholders:** Stakeholder groups represent a diversity of perspectives and interests.
- **Environmental Impact:** The project would have significant impact in restoring and improving ecological and environmental conditions.
- **Infrastructural Efficiency:** The project would significantly help to alleviate pressures on existing infrastructure systems.
- **Low Cost**
- **Cost Effectiveness:** High financial return on investment over time.
- **Community Revitalization:** The project would help revitalize disinvested neighborhoods and/or support community-based economic development.
- **Visibility/Educational Value:** The project is highly visible and can be used as a tool for environmental education.
- **Flooding Impact:** The project would help alleviate existing flood risk in inhabited areas.
- **Pilot:** The project can be used as pilot/demonstration and can be replicated over time.
- **Recreation:** The project would provide new or improved recreational opportunities.

Examples of these projects include stormwater management in the Medical District and use of natural systems to control nonpoint source pollution at Cross Lake.

Medical District Stormwater Management

This area, between I-49 and I-20 around Kings Highway, presents an opportunity to mitigate one of the most significant repetitive flooding problems in the city, contribute to neighborhood improvements and revitalization by providing open space amenities, and incorporate public education elements in a very visible area through which thousands of employees and patients travel every day. Elements of the project would include:

- stormwater parks on currently vacant parcels
- a boulevard treatment for Kings Highway with trees and vegetated bump-outs and swales
- trees and vegetated infiltration areas in parking lots
- public art and interpretive signage to communicate the stormwater benefits of these treatments



Existing flooding problems pose a barrier to development of some of the existing vacant parcels south of Kings Highway—condemning most of them to permanent parking lots (whose impervious surfaces exacerbate stormwater runoff). These improvements would transform the medical district into a model district for innovative stormwater management.

A considerable amount of land in this area is already publicly owned. Not including any possible land acquisition costs, the project could be completed for an estimated $4 million in approximately three years.

Cross Lake Pollution-Mitigation Through Constructed Wetlands

Constructed wetlands in the Cross Lake watershed would help prevent eutrophication, sedimentation, invasive species, and pollution. A constructed wetland of this type functions by circulating water from the lake or a tributary into the wetland, where it stays for several days, slowly depositing sediment and being cleaned by plants and animals before re-entering the lake. The size of the wetland can vary—the bigger it is, the greater the impact on water quality. The wetland could be helpful in combating the conditions that allow the invasive plant *Salvinia molesta* to thrive.

Caddo Parish, the City of Greenwood and the City of Shreveport could collaborate on this project. Two locations could be used for constructed wetlands: the southwest corner of Cross Lake and the area formerly designated for the Greenwood Industrial Park. The Greenwood location has several benefits. It is no longer being considered for use as an industrial park and the location has a very low elevation with two streams. Caddo Parish Parks and Recreation could make the wetland an educational nature park. It would attract birds, so the local birding community could also be a partner. In addition to funding from Caddo Parish, state funding from the state wildlife and fisheries agency might be available as part of their efforts to eliminate invasive species.