

# 10

OVERVIEW

AIR QUALITY

WATER RESOURCE QUALITY

AREAS OF SIGNIFICANCE

SUMMARY: ENVIRONMENTAL PROBLEMS &  
CONCERNS

ISSUES

OBJECTIVES & TOOLS



# Environmental Quality



# ENVIRONMENTAL QUALITY

## Environmental Quality Goal

Maintain a healthy and attractive natural environment that supports clean air, water and soil, and recognizes the need to provide a good quality of life, helps to maintain property values, and promotes tourism while allowing new development.

## Overview

Gastonia's natural environment and features help define its quality of life and are linked to both social and economic facets of the community. The presence of clean air, water, and soil is important to maintain people's health as well as to promote a healthy business environment. Therefore, the conservation of Gastonia's natural resources will help to ensure that future residents and businesses have resources necessary for the community's continued vitality.

The Environmental Quality element provides a policy basis for the protection and enhancement of Gastonia's natural environment. While the Environmental Quality element contains policies that relate directly to many aspects of the natural environment, the concept of environmental protection and preservation is integrated into all aspects of the Comprehensive Plan.

### ENVIRONMENTAL SUSTAINABILITY

Environmental sustainability means the prudent use of physical qualities which are most valued in the natural environment without compromising the ability of future generations to meet their needs. It implies preserving, conserving, and intensively managing resources to minimize the impact of development on the environment. It also means ensuring that all residents live in areas free from the unhealthy effects of environmental pollution. Gastonia's challenge for the future will be to accommodate growth while slowing the loss of land, the

consumption of resources, the pollution of waterways, congestion, and stress created by urban sprawl.

The 2025 Plan is based on sound principles of sustainability and offers a reasonable direction toward enhancing the City's environmental quality and livability. Over the long term, efforts to prevent pollution, increase energy efficiency and conserve water will produce economic benefits. Some of the Plan's other elements include goals and policies addressing how environmental values specifically relate to the topics covered in those elements. For instance, the Land Use element includes policies governing development near environmentally critical areas such as wetlands and stream corridors, and the Transportation element addresses possible environmental impacts and improvements associated with transportation choices. Environmental stewardship is a core value of this Plan, and it plays an integral role in guiding how the City accommodates growth and provides services. The City can protect environmental quality by ensuring its land use policies, codes, and standards are up-to-date with contemporary best management practices; that it is compliant with state and federal environmental laws and administrative rules; and, that it leads by example in employing environmentally sound and sustainable practices in its municipal operations. Furthermore, the City also has an opportunity to inform its citizens on how changes in daily life can improve environmental quality through our quarterly newsletter communications, and other outreach opportunities. This element of the 2025 Plan contains broad environmental goals and policies.



This plan recognizes that the suitability of land for conservation or development is influenced by topography, geology, and soils; surface water and groundwater resources; wildlife and its habitat; flood hazards; and, air quality. One is related to the other, and as an urban community with considerable environmental resources, Gastonia continues its long-standing effort to maintain that fragile ecological balance.

## Air Quality

Air is a resource we take for granted because it is everywhere around us, and we involuntarily breathe twelve times each minute. However, since the 1970s, there has been a heightened public awareness of the quality of the air we breathe. This awareness can be attributed to the various studies and news media reports that have linked ozone and fine particle pollution to premature death, cardiac arrhythmias, asthma attacks, and the development of chronic bronchitis and progression of chronic obstructive pulmonary disease (COPD). In fact, although rarely talked about, poor air quality poses one of the greatest threats to public health and is particularly burdensome to children, the elderly, those with lower incomes, and those with chronic respiratory disease.

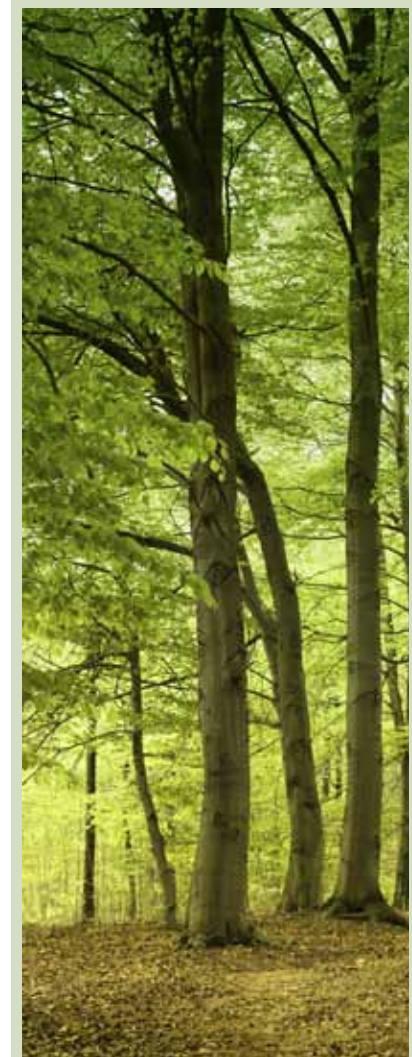
## Standards & Measures

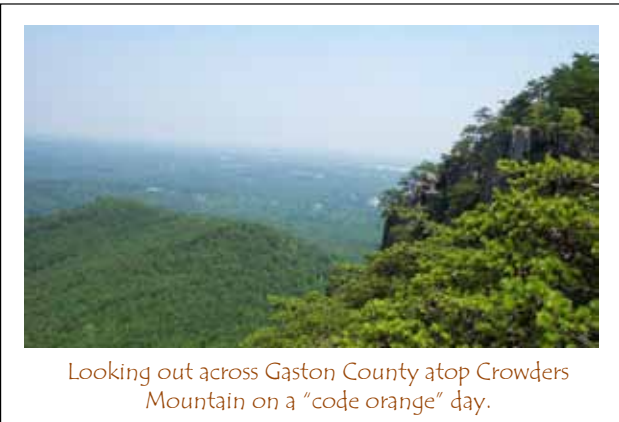
To ensure access to clean air, the federal Clean Air Act was created as the primary regulatory framework for national, state, and local efforts to protect air quality. Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) is responsible for setting standards, known as National Ambient Air Quality Standards (NAAQS), for pollutants considered harmful to people and the environment. Air quality planning is focused on meeting the NAAQS and setting deadlines for meeting these standards.

The Division of Air Quality (DAQ), of the N.C. Department of Environment and Natural Resources (DENR), is responsible for protecting North Carolina's air quality by issuing permits, developing programs, and monitoring air pollution to ensure communities meet the NAAQS. The Air Quality Index is determined by measuring for five major air pollutants: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Air pollutants identified in the 2007 DAQ Air Quality Report as the greatest concern in the Charlotte MSA are:

- ◆ Ground-level ozone, the major component of what we commonly call smog, mostly from automobile traffic, and industrial pollution;
- ◆ Fine particulate matter, PM 2.5, mostly from electricity generation in Gaston County, but statewide and national major sources also includes waste disposal, smoke, wood combustion fires, industry and vehicles);
- ◆ Hazardous air pollutants, also called Air Toxics; and,
- ◆ Carbon monoxide, mostly from motor vehicles.

Gastonia's air quality is measured along with other municipalities within the Charlotte local network. The Charlotte local network includes Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union, Iredell and York (S.C.) counties. Regional trends such as population growth, greater increases in vehicle miles traveled, and growing electrical power demands have had a negative impact on the quality of air in the region. Specifically, the eight counties in the Charlotte region are designated by the EPA as a non-attainment area because it exceeded, or has contributed to exceeding, the national eight-hour ozone standard over a three-year period for ground-level ozone. This means that on many days each year, air





Looking out across Gaston County atop Crowders Mountain on a "code orange" day.

pollution exceeds healthy levels. This designation also means that the region could face serious penalties involving the loss of federal funds if the air quality isn't improved. Poor air quality not only impacts residents of the region, but also impacts businesses in the form of lost productivity and the possibility of more stringent federal regulations. Once designations take effect, they become an important component of state and local government efforts to control ground-level ozone.

The Charlotte Urban Area recognizes that the problems with air quality are due to high levels of ground-level ozone caused by automobile traffic and industrial pollution. It is estimated that more than 55 percent of ozone air pollution in the region is caused by emissions from cars and trucks. The American Lung Association's 2003 *State of the Air Report* identified the Charlotte MSA as the 10th smoggiest metro area in the United States. Ground-level ozone is not a primary pollutant, meaning it doesn't come directly from a source such as smokestacks or tailpipes, but is created when two primary pollutants, oxides of nitrogen (NOx) and volatile organic compounds (VOCs), are "cooked" by sunlight and high temperatures. This means we are most likely to see high ozone levels during the hot spring and summer months, May 1–September 30 each year. During this time, partners across the region

post the color-coded Air Quality Index used by the DAQ to warn citizens of unhealthy air quality as illustrated in Figure 10-1.

Over the past six years, the Charlotte MSA has experienced an average of 35 days per year of unhealthy air. These unhealthy air days include orange, red, or purple coded days. Cars and other vehicles are the largest single sources for ozone problems. While Gaston County has little control over vehicle use in other counties in the region, Gastonia can contribute to the reduction of ozone by exercising its leadership role in transportation planning. Managing growth in ways to locate residences closer to and among employment centers, and encouraging carpooling and alternate sources of transportation is also an effective tool for addressing air quality. Public education regarding reducing ground level ozone is needed. As the region continues to grow, these efforts will be required on a regional basis to prevent an increase in ozone exceedances. Also, improvements to traffic flow and public transit, clean fuels for City vehicles, and regional bus service between Gastonia and Charlotte are all steps the City can advocate.

Figure 10-1: The Color-Coded Air Quality Index

Air Quality	Air Quality Index	Health Effects
Good (green)	0-50	None expected
Moderate (yellow)	51-100	Unusually sensitive people should consider limiting prolonged outdoor exertion.
Unhealthy for sensitive groups (orange)	101-150	Active children and adults, and people with respiratory diseases, such as asthma, should limit prolonged outdoor exertion.
Unhealthy (red)	151-200	Everyone, especially children, should limit prolonged outdoor exertion.
Very unhealthy (purple)	201-300	Everyone, especially children, should avoid all outdoor exertion.

Source: Division of Air Quality, NCDNR



The Charlotte local network is a collaborative group of multi-agency partners responsible for ensuring the region meets national standards, and develops the necessary plans to continue compliance. This network collectively addresses the air quality issues in the region through programs and public outreach activities. Gastonia can contribute to the reduction of ozone by exercising its leadership role in the local transportation-planning network. Network partners work together to educate the public about the air quality issues faced in the community, and develop policy options that help to address air quality. Examples of policies that are effective in addressing air quality issues include growth management tools, such as locating residences closer to and among employment centers and encourage carpooling and alternate sources of transportation. Most recently, the Gaston MPO placed Air Quality signs throughout the City of Gastonia. These signs were located at all municipal Fire Stations, Police Department buildings, City Hall, and various parks and recreation facilities. As the region continues to grow, these efforts will be required on a regional basis to prevent an increase in ozone exceedances. Also, improvements to traffic flow and public transit, clean fuels for City vehicles,

*Air Quality notice signs found throughout the city.*



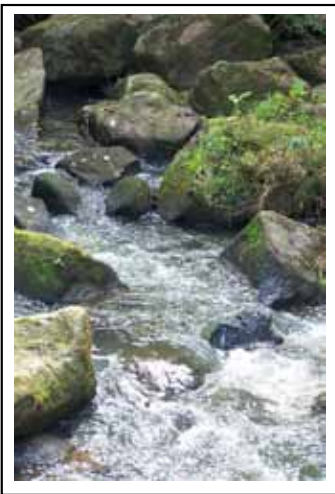
and regional bus service between Gastonia and Charlotte are all steps the City can advocate.

## Water Quality

Clean, fresh water is necessary for drinking, bathing, swimming, fish and wildlife habitats, irrigated crops, food processing, and a number of manufacturing processes. Clean water is first and foremost a public health issue. Water quality refers to the ability of our water resources to support human, animal, and plant life, while water quantity refers to the volume and rate of runoff. Reliable, long-term supplies of clean water are essential for sustaining livable communities and regions. Therefore, the quality of the water in Gastonia is very important because of the strong relationship to the health and welfare of the community.

To limit harmful impacts from human activities on water quality, the Clean Water Act (CWA) was enacted. The Clean Water Act is the nation's primary legislation to establish surface water quality standards, protections, and pollution clean-up. In the State of North Carolina, the Department of Environmental Quality (DEQ) has been charged with establishing standards, regulating, and monitoring North Carolina's waters for compliance with the CWA standards. The DEQ uses a non-regulatory basinwide water quality planning watershed based approach to restoring and protecting the quality of North Carolina's surface waters. The North Carolina Division of Water Quality (DWQ) prepares basinwide water quality plans (basin plans) for each of the 17 major river basins in the state. Their implementation, and the protection of water quality, requires the coordinated efforts of many agencies, local governments and stakeholders throughout the state.





Long Creek flowing near Rankin Lake.



Avon Creek restoration project at Lineberger Park.

Water supplies can be thought of as belonging to specific watersheds or river basins. Watersheds consist of the land area that drains into a particular river system, including tributaries. These areas rarely reflect political boundaries. Six watersheds cover Gaston County: Indian Creek, Upper South Fork, Dutchman's Creek, Catawba Creek, Crowders Creek and Long Creek. The City of Gastonia and the planning area are located in the Catawba, Crowders and Long Creek watersheds. All of the watersheds in Gaston County eventually empty into Lake Wylie, and the water quality in Gaston County has a direct effect on the water quality in the Lake. There are a number of factors that influence the condition of the watersheds, which include the functionality and integrity of local rivers, streams, floodplains, and wetlands as well as impervious surface cover, topography, tree cover, and soils and hydrology. These factors are described in the following subsections.

## Water Resources

The water resources in the planning area are part of an ecosystem with two interrelated components that rely on precipitation for recharge and replenishment. The first major water resource component is surface water, which includes all the water we can see, including creeks, rivers, lakes, wetlands, riparian areas, and ponds. The second water resource component is groundwater, which is stored in underground spaces between deposits of sand, gravel, and silt, and in the cracks in bedrock. Nearly all surface waters interact with groundwater. As a result, removing water from streams can deplete groundwater supplies, and likewise, groundwater pumped from an aquifer can deplete water from streams, lakes or wetlands. For these reasons, polluted surface water can degrade groundwater just as contaminated groundwater can degrade surface water. These interactions influence water supplies, water quality and aquatic environment characteristics.



Mountain Island Lake, source of the Gastonia's drinking water.

Therefore, consideration of both groundwater and surface water is essential for watershed management and water quality protection.

## Surface Water

The City has an abundance of surface waters, depicted on Figure 10-2, that are used for a variety of purposes including a wide range of recreational activities. Fish, wildlife, and native vegetation depend on these waters for survival. There are three sources of raw water for the 2025 Planning Area; South Fork River, Mountain Island Lake and Rankin Lake. However, South Fork River and Rankin Lake are not used as municipal drinking water sources. The City established Mountain Island Lake as the primary source of raw water in 1995. The lake has a significantly better water quality, largely due to the fact that Lake Norman, located immediately upstream, acts as an enormous settling basin helping to remove pollutants before the water flows into the lake. Approximately 114,000 residents in Gaston County draw their drinking water from a municipal surface water supply system, while the remaining 76,000 draw water from private or community wells. South Fork and Rankin Lake are used only for emergency backup.



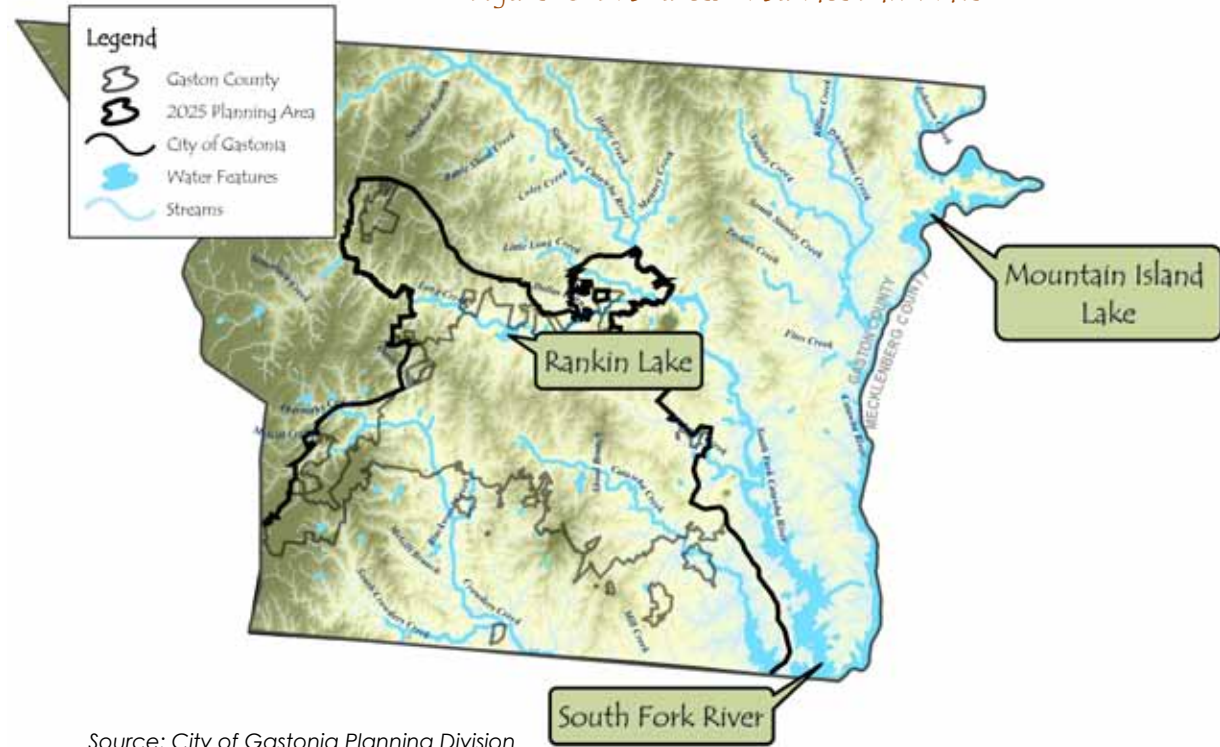
Figure 10-2: Sources of Surface Raw Water

All surface waters in North Carolina are assigned a primary classification. The state rates waters according to how well they are supporting their intended uses, whether that use is for providing animal habitat or drinking water. The rating takes into account water quality measures, such as fish and aquatic insect habitat, monthly chemical samples, fish tissue analyses, monitoring data from other agencies, and information from natural resource staff and citizens.

The following ratings are assigned to waters:

- ◆ **Fully Supporting:** waters meet designated use criteria,
- ◆ **Partially Supporting:** waters fail to meet designated use criteria at times, so are considered impaired,
- ◆ **Not Supporting:** waters frequently fail to meet designated use criteria, so are considered impaired, and,
- ◆ **Not Rated:** streams lacking data or having inconclusive data for rating.

Within the 2025 Planning Area, the state rates most streams as Class “C”, meaning their intended uses include fishing and boating, agricultural uses, and wading. Swimming is not included as a use of Class “C” waters. Mountain Island Lake, parts of the South Fork River, and other waters located upstream of municipal drinking water intakes, are classified as “Water Supply Watersheds.” Since their intended use is drinking water, these areas must meet higher standards in order to meet their intended use. The judgments, or assessments, to rate the quality of surface water are based on a variety of information, including data collected from monitoring programs, land use information and hydrologic connectivity.



Source: City of Gastonia Planning Division

## Groundwater

Groundwater is the other component of overall water quality. It is an important source of drinking water for private and community wells. The geological characteristics of Gastonia, in which the groundwater supplies reside, are typical of the central piedmont region. Groundwater is the water that seeps through the ground after a rain or snow that settles to a level called the water table. Below the water table, groundwater fills the spaces between the soil particles and within the cracks of the bedrock. These layers of soil, rock, and water are called aquifers. Groundwater contamination is just as possible as surface water contamination. Groundwater contamination can occur if pollutants seep through the soil and enter the

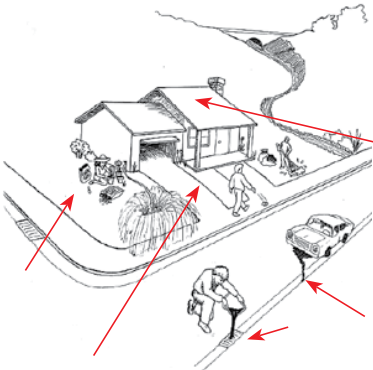
### Surface Water Facts

Surface water is naturally replenished by precipitation and naturally lost through evaporation and sub-surface seepage into the groundwater.





aquifer. Potential sources of pollution include leaks from underground storage tanks, landfills, septic systems, excessive fertilizer application, oil or chemical spills, and animal waste.



Non-point source pollution

Increasing concern in the State has been placed on underground industrial gasoline and domestic fuel oil tanks buried during the 1940s, 1950s and 1960s that are failing and creating potential groundwater pollution. Within Gaston County's 356 square miles, groundwater supplies the 185,000 residents with half of their drinking water. Approximately 17,000 public wells and 220 private wells serve the population. Current groundwater related concerns for the area include the preservation of open space, groundwater contamination, and watershed protection. Groundwater monitoring has been limited to well sampling in Gaston County. However, Gaston County uses the Groundwater Guardian Program to raise public awareness through educational programs.

### General Sources and Types of Pollution

Pollutants that enter waters fall into two general categories: point sources and non-point sources. While some pollutants may occur naturally, most water pollutants are the result of human activities. In fact, North Carolina Water Quality monitoring has identified non-point source stormwater runoff that is directly related to land use activities as a major source of water pollution. Point sources can be traced directly to sites such as sewage outfall pipes emptying into streams, rivers and lakes, while non-point sources come from dispersed and less identifiable locations such as lawns, golf courses, motor vehicles, parking lots, roof tops, etc. Non-point source pollution occurs when stormwater runoff carries pollutant particles

into streams, rivers and lakes. These sources are from a broad range of land use activities. However, factors that affect stormwater runoff and non-point source pollution are generally development related. For example, as rural land uses in the planning area give way to residential and commercial development, there is an increase in the amount of impervious surface area. Impervious surfaces are areas, such as pavement or roofing, that do not allow stormwater to be absorbed into the ground.

The 2001 *Catawba River Basin Natural Resources Plan* found that approximately 7.4 miles of the Catawba Creek was impaired due to both point and non-point sources of pollutions. The Plan found that the Gastonia Catawba Creek Wastewater Treatment Plant impacted the creek, along with urban runoff, and was therefore decommissioned. The removal of the discharge, and the operation of the Catawba Creek facility, improved the water quality of Catawba Creek. Much work has been done to address point source discharges in Catawba Creek and Crowders Creek.

However, as population increases within the planning area, so does the rate of urbanization and increased amounts of impervious surface will yield increased stormwater runoff. Stormwater runoff pollution is recognized by the EPA as the number one water quality problem in the United States. In the future, careful land use planning emphasizing pollution prevention and minimization will be necessary to maintain current water quality and to prevent further degradation.

The City has an important role in improving water quality. For example, in 2001, the City of Gastonia Wastewater Treatment Division became the first certified public agency in North Carolina to develop and successfully implement an ISO 14001 Environmental Management System. The City is also involved in ongoing efforts to restore stream



Point source pollution



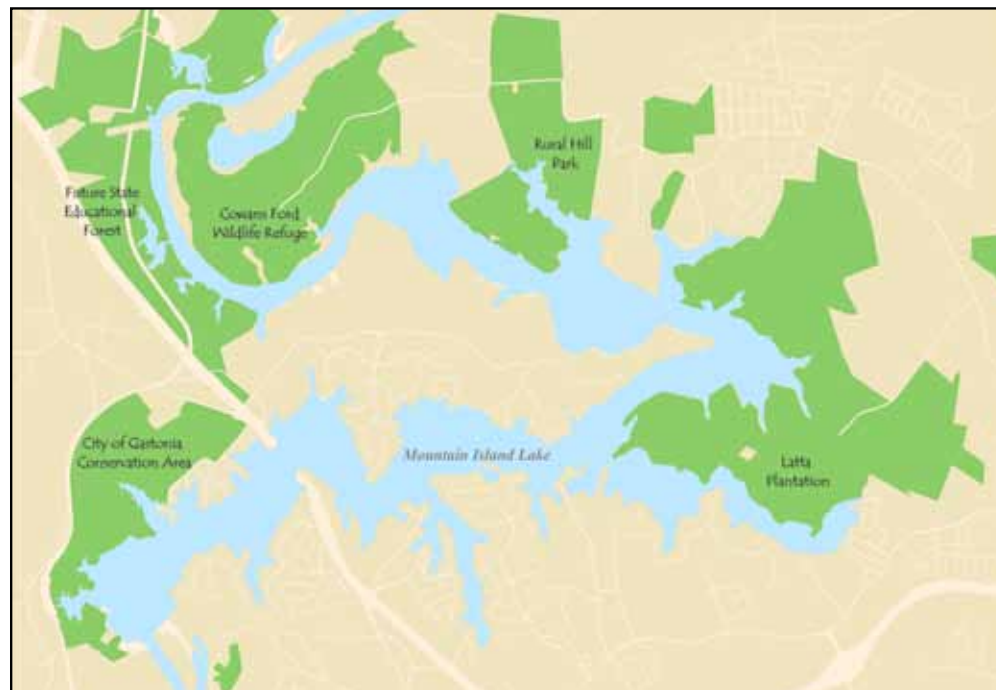
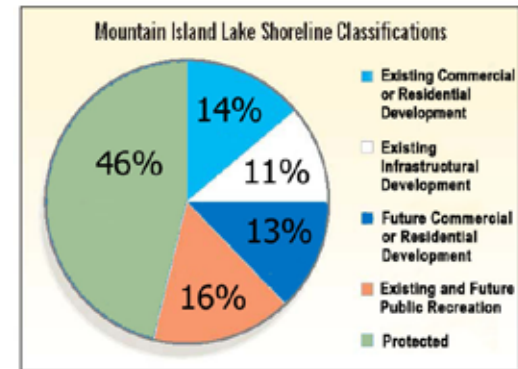
health and associated riparian areas, educating the public about how individual actions can improve water quality, and coordinating policies and actions with other jurisdictions and agencies. Currently Mountain Island Lake has excellent water quality; however, as the area around the lake continues to develop the sources of water pollution will increase as will the potential for negative water quality impacts. In 2004, officials from Mecklenburg and Gaston counties realized that removing pollutants from Mountain Island Lake would be extremely costly, inconveniencing many people, a broad coalition of local government offices and non governmental organizations was formed with a goal of protecting the critical areas of land around Mountain Island Lake. The outcome of several meetings was the Memorandum of Understanding (MOU) establishing a framework for coordination of efforts to protect water quality conditions and creation of the Mountain Island Lake Watershed Protection Guidelines. The purpose of the guidelines is to provide the jurisdictions around Mountain Island Lake with watershed protection strategies and guidelines for use at their discretion in the protection of water quality conditions in the lake. This source water protection project is ongoing, but to date 2,361 acres of the lake's watershed have been protected, including nine miles of shoreline.

Each year, as required under the federal Clean Water Act, the North Carolina Division of Water Quality releases a listing of streams, or stream segments, not meeting water quality standards for their classified use, which is generally, to be "fishable and swimmable." Illustrated in Figure 10-3, the list of impaired waters for 2006 in Gastonia includes:

- Catawba Creek,
- McGill Creek,
- Crowders Creek,
- Dallas Branch, and,

- Blackwood Creek.

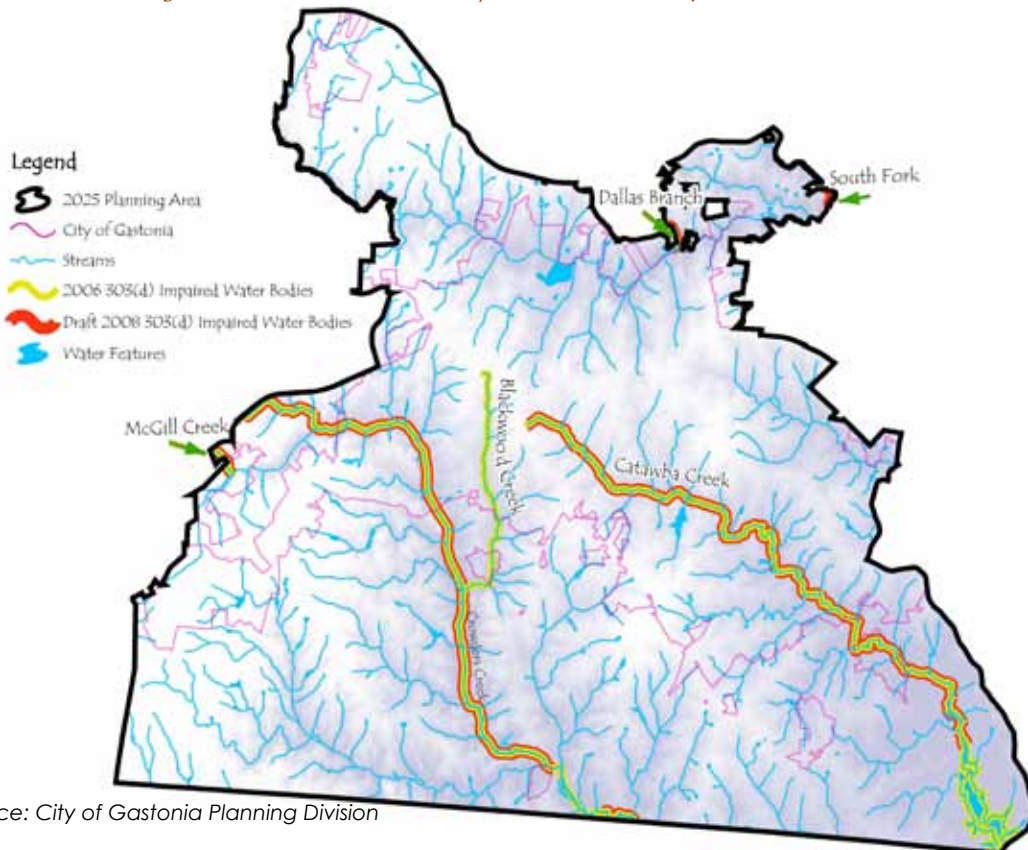
The report recognizes that stormwater runoff pollution is a potential source of water quality problems along these creeks. The creeks are plagued with sediment pollution, the most common type of physical water pollution in the region and in fast-urbanizing areas. Sedimentation makes water gritty, turbid (cloudy), and unfit for drinking and swimming. The South Fork River has a very high turbidity level. Again, careful land use planning that emphasizes pollution prevention is necessary to maintain a high quality water current water quality and to prevent further degradation.



Mountain Island lake is blue. Protected land bordering the lake is green.



Figure 10-3: NC Water Quality Assessment & Impaired Waters List



Source: City of Gastonia Planning Division

Both stormwater runoff pollution and sediment pollution are potential sources of water quality problems along our creeks, lakes, ponds, rivers, and streams. Sediment pollution is usually the product of accelerated erosion, which can come from any activity involving significant earth disturbance, such as crop planting and construction of buildings and roads.

The City also plays an important role in improving water quality. The City of Gastonia is a co-implementer of permits and associated plans through an Intergovernmental Agreement (IGA) with Clean Water Services (CWS). This agreement outlines the functions the City must perform that are critical to the operation, maintenance, and management of stormwater and wastewater facilities, and to ensure compliance with the Clean Water Act. Separate from the NPDES permit process, CWS has developed a surface water management program to manage non-point source pollution impacts on water quality. The Healthy Streams Plan, a public education program, and watershed restoration projects are among several activities undertaken to improve water quality of

streams and wetlands within the Catawba River basin. Gastonia also seeks to improve water quality by adopting land use policies and regulations to prevent erosion and protect floodplains and other sensitive lands including tree groves, wetlands, and stream corridors. Land use regulations can also help reduce water pollution by reducing impervious surfaces, and requiring stormwater retention and treatment on-site.

## Stormwater

In July 2001, the City of Gastonia established a Stormwater Utility charged with protecting local creeks and streams. The utility focuses on compliance with the EPA Phase II mandates, maintenance of the City's storm drainage system, and assisting property owners dealing with problems associated with increased runoff. According to the Stormwater Phase II Rule, the City must reduce pollutants in stormwater to the maximum extent practicable to protect water quality. In addition, the City can provide education regarding low-impact development and green building techniques to conserve water and protect water quality. Furthermore, the City maintains a sewer extension program connecting properties to the City sewage system that reliant upon septic tanks and drain fields.

Human activities can negatively impact surface water quality, even when the activity is far removed from the waterbody. Water quality is affected by a number of factors including, sediment washed downstream, storage capacity of reservoirs and aquatic habitat.

Stormwater drainage is the overland flow of water during, and immediately following, a storm. In a natural environment the water flows by gravity toward the local point of lowest elevation. The areas of peak elevation—

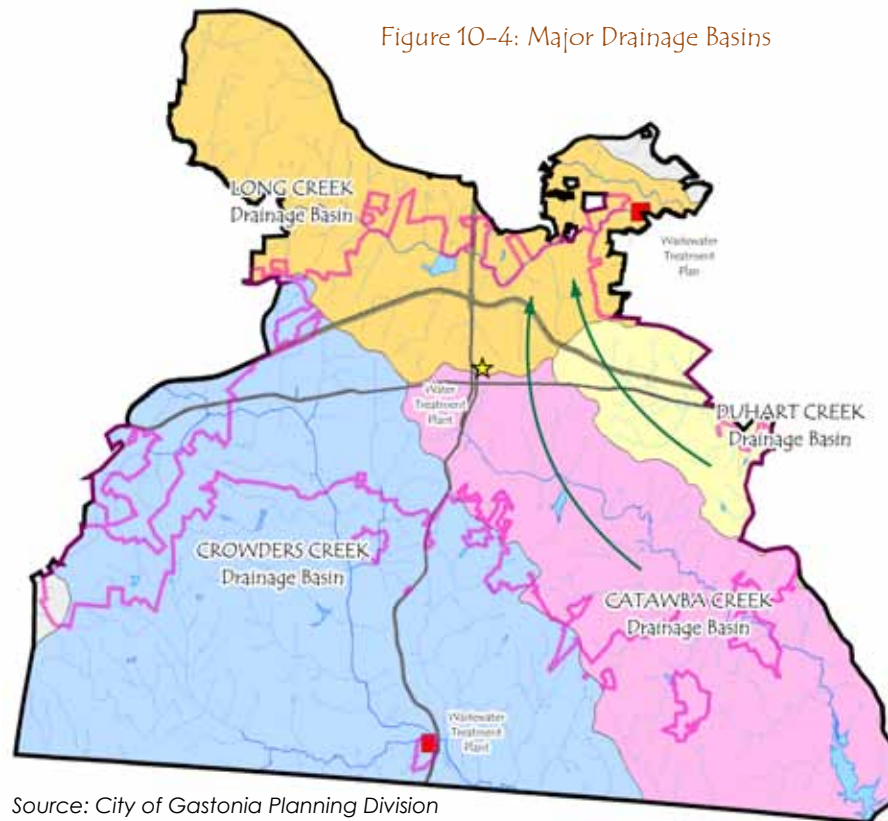


ridges—define the boundaries of a drainage basin. The basins direct the water toward a stream, river or lake. The land also absorbs rain in a number of ways. First, the trees, shrubs and ground cover absorb the impact of rain drops, allowing the water to slowly reach the soil, where most of it is absorbed and some of it flows along the surface to streams and rivers. The natural rise and fall of the land determines where the water will go. Vegetation slows the water and the roots help hold the soil in place; both retard erosion. Also, plants absorb the water through their roots and release it back into the air. The major drainage basins in the 2025 Planning Area are shown in Figure 10-4.

The current emphasis in drainage is on-site management of stormwater. Rather than draining away all of the water at once during a storm, a portion of it is detained on the property for a period of time, then released slowly to the drainage system. Detention provides two benefits. First, the volume of water sent to the stream during the critical period of the storm is reduced. Second, some of the water is removed naturally on site by absorption into the soil and evaporation. Another related trend is the movement toward natural (rather than structural) drainage systems, such as swales and retention ponds that also allow the water to evaporate and percolate into the soil.

The need for an urban drainage system arises when land is developed. Water generally cannot percolate through construction materials and pavement. The natural situation is reversed: almost all of the water stays at the surface and very little is absorbed. Furthermore, the water running off is not slowed by vegetation. During a heavy storm, water can accumulate very quickly, and as it drains, can contribute to erosion and flooding downstream. Water that is not drained off, absorbed into the soil, or soon evaporated, can flood immediate areas for extended lengths of time. For this reason it has become necessary for cities to build drainage systems to efficiently remove the water and carry it to a stream or river.

Urban drainage and flood control have traditionally focused on removing the water as quickly as possible through structured systems such as curbs, gutters, pipes and culverts. We have come to realize, however, that emphasizing quick drainage can cause flooding and erosion downstream from the City as fast delivery of stormwater overwhelms the natural drainage systems.



Source: City of Gastonia Planning Division



Stormwater public education and awareness campaign involved Boy Scouts cleaning debris from storm drains and applying “no dumping” markers on storm drains.





Natural drainage system: retention ponds allow water to evaporate and percolate into the soil.



On-site management of stormwater: detention ponds detain stormwater for a period of time and releases it slowly to the drainage system.

The major problem with the drainage system has been maintenance. Currently the only drainage structures regularly maintained are those on public property, such as street right-of-ways or easements. Most drains, pipes and ditches, however, are on private property. Broken or blocked pipes and drains can cause regular flooding, sinkholes, erosion, polluted water and unsafe road conditions. The City requires all new commercial developments one-acre or larger to incorporate stormwater detention. Detention is not required for small commercial developments, single-family residences or streets.

On September 1, 2005, the City of Gastonia was permitted to discharge stormwater runoff from the municipal separate storm sewer system to the waters of North Carolina in compliance with the EPA's Phase II Stormwater Program. The permit regulations require the City to implement six minimum control measures to reduce the discharge of pollutants in stormwater, to the maximum extent practicable, and to protect water quality. These six measures are:

1. Public education and outreach about stormwater impacts.
2. Public involvement and participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control.
5. Post-construction stormwater management for new development and redevelopment.
6. Pollution prevention and good housekeeping for municipal operations.

In order to meet these requirements, the City developed a Storm Water Management plan (SWMP). The SWMP is the action plan by which the City will execute Best Management Practices identified in the permit to meet the six minimum measures. The plan includes: (1) Best

Management Practices proposed to achieve each of the six minimum control measures; (2) measurable goals for each minimum control measure; and, (3) the timeline for starting, completing and addressing each minimum control measure.

Erosion control and stormwater management efforts in both the County and City are paramount for protecting our waterways from the adverse effects of development. These efforts can be expanded by improving surface water mapping and collecting additional water quality data to inform development management efforts. Also, more emphasis should be placed on educating homeowners and existing business owners on the benefits of retrofitting properties with small-scale Low Impact Development (LID) best management practices such as the use of permeable and porous pavements; bioinfiltration swales, rain gardens, xeriscaping or lowmoisture landscape plantings rain barrels.

## Flood Control

Flooding in Gastonia's streams and watercourses has generally not been a critical problem as it has been in some areas, such as cities in mountain valleys and on plains along major rivers. The topography and soils of the Piedmont Region provide a relatively flood-resistant environment. Valleys are broad, and water rises slower and spreads further than it does in the mountains. In addition, Gastonia historically developed along natural ridges rather than valleys, following the pattern set by the location of the railroads. More recently, the City has grown into the lower areas between the ridges.

Flood control in Gastonia has been accomplished through participation in the National Flood Insurance Program. In exchange for guaranteeing flood insurance to people



who have property in the floodplain, the program requires cities to restrict development in the areas where floods cause the most damage. Gastonia restricts development in the floodplain by permitting construction and fill only when it will not increase the base flood elevation.

As the City continues to develop, more impervious surface will be added, more forested areas will be removed, and more development will occur close to the floodplains. Measures the City can take to lessen these impacts include thorough maintenance of the drainage system, stormwater detention for all new development, and maintenance of streams receiving the stormwater.

Some land use and design issues also have an impact on stormwater management. Establishing greenways around floodplains can give the City easier access to the streams for maintenance, as well as allowing residents to use the flood-prone land for trails. Clustering new developments away from streams, and reserving that land as open space, helps control floodplain development. Cluster development can also reduce flooding by reducing impervious street surfaces.

## Soils

Soil conditions need to be considered in the planning and development process for several reasons. One is to ensure buildings and structures are adequately supported. Another reason focuses on soil conservation. Minimizing soil erosion can help control airborne dust as well as sediment deposition in watercourses. Soil depths must also be adequate for water to infiltrate into the ground and maintain groundwater levels in aquifers. Soils host a community of insects, fungi, roots, and bacteria integral to every natural ecosystem. Disturbances to this ecosystem may affect vegetation and decomposition, promote the colonization of invasive species, decrease water quantity,

or degrade water quality.

Soils in the Gastonia vicinity can be grouped into five general categories, with varying suitability for land development, roads and septic fields. Soils have different capacities for drainage, load bearing, and fertility. Identifying soil characteristics allows us to evaluate land development with regard to its physical suitability. The following soil types are found in the 2025 Planning Area:

- ◆ Cecil-Pacolet: Mostly used for pasture and cropland. Erosion is a concern, particularly on steep slopes. These soils cover 11% of the planning area.
- ◆ Cecil: Similar in characteristics to Cecil-Pacolet, Cecil is formed from granite, gneiss, and mica schist. This soil is acidic and well drained. Slope varies from 2-25%. This soil type covers 27% of the planning area and is found mainly in the commercial, industrial and residential areas of Gastonia, radiating outward from downtown.
- ◆ Tatum: This soil presents hazards of erosion and shrinking-swelling. It is covered mainly with woodland, cropland and pasture. The soil covers 33% of the planning area and is found mostly at Crowders Mountain and the Northwest Sector.
- ◆ Madison: Found mainly in the Northern and Southwest Sectors of the planning area. This soil is covered with cropland or pasture on gentle slopes and woodland steep slopes. It is relatively unsuitable for urban development, due to erosion on steep slopes. Madison soils cover 14% of the planning area.
- ◆ Cewalca-Congaree: This soil group is found along major streams in the planning area. It is poorly drained and prone to flooding—the least suitable of the

### Flood Control Measures:



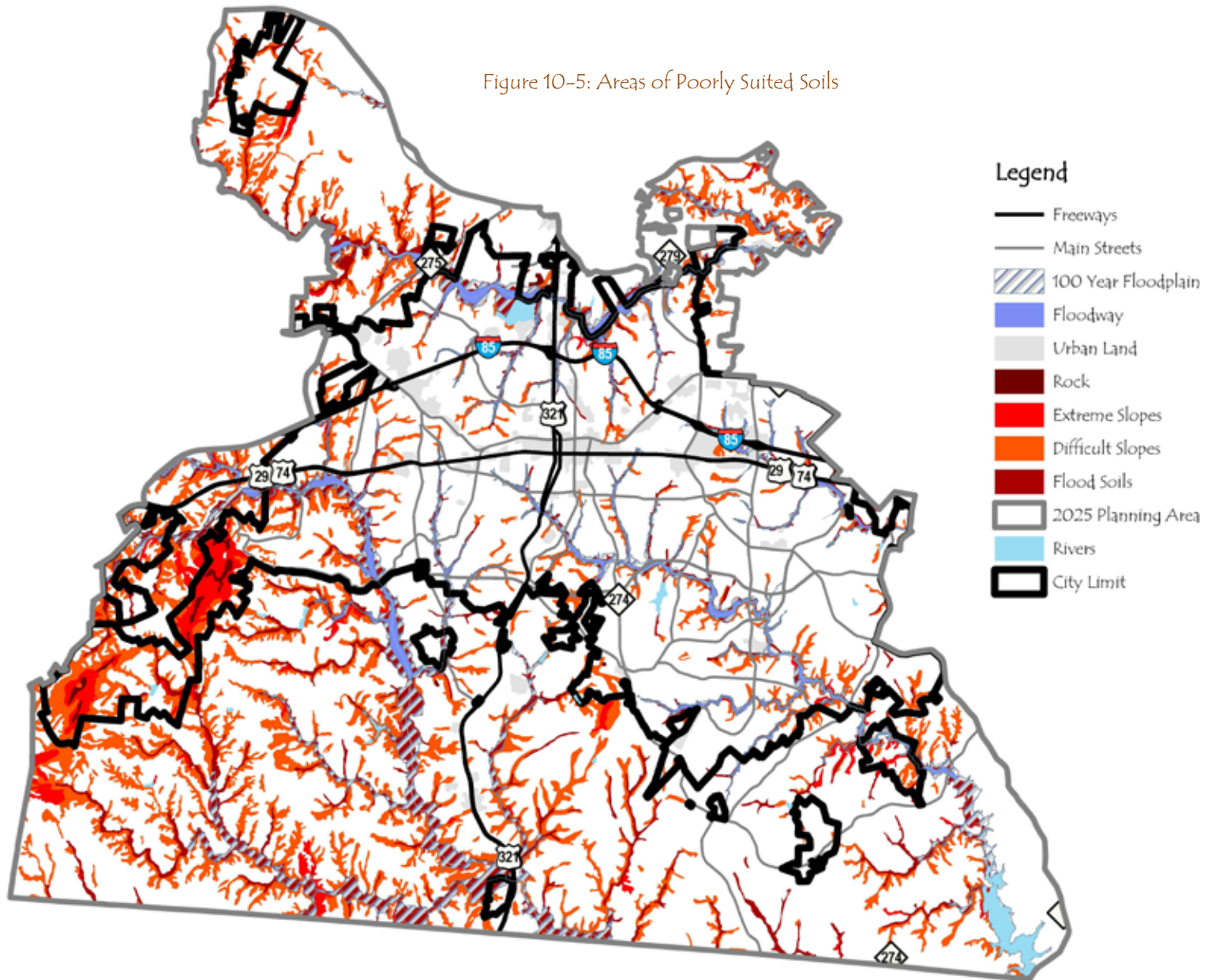
Greenways conserve land along streams allowing for better flows.



Cluster development can reduce flooding by reducing impervious street surfaces.



Figure 10-5: Areas of Poorly Suited Soils



Source: City of Gastonia Planning Division



planning area soils for urban development. This soil group covers 15% of the planning area.

Suitable soils are important to successful urban development. Certain soils have qualities that render them suitable for certain activities or unsuitable for others. Therefore, choosing an area with good soil for a building site can help property owners avoid flooding, erosion, foundation problems and septic tank failure. All of these problems can appear if a site has unsuitable soils. Areas with soils poorly suited for development are shown in Figure 10-5.

The prevalence of wells and septic tanks in Gaston County is an increasing problem as the County urbanizes. Gaston County contains the highest number of community wells in North Carolina and it is near the top in the number of septic fields. This can be a disastrous combination, especially at suburban densities. An excess number of septic fields, in close proximity to wells, can lead to contamination of those wells. Although individual wells and septic tanks are generally regarded as inappropriate for development that is denser than one unit per five acres, much higher density development supported by wells and septic tanks typically occurs.

## Areas of Significance

### Wetlands

Wetlands are areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. The ecological parameters for designating wetlands include hydric soils, hydrophytic vegetation, and hydrological conditions that

involve a temporary or permanent source of water to cause soil saturation.

### Farmland

An important component of the environment in Gaston County is open land used for agriculture. The Soil Conservation Service estimates that 42% of the soils are highly suitable for farming. Agriculture is on the decline, however, with just 2% of the rural population involved in farming. Many of these remaining farmers are part-time, with 65% working in some other occupation. As the County urbanizes, more and more farmland is converted to urban use. In some jurisdictions, tracts of prime farmland are being preserved by purchasing or accepting donations of development rights or easements, or the outright purchase of the land. In some urban areas, local private conservancies have been established to achieve this goal.

### Crowders Mountain State Park

This park is of regional importance and it offers the closest mountain environment in the area. As Gastonia grows to the southwest, suburban development is occurring adjacent to the park. Since vistas are so important to the enjoyment of Crowders Mountain, the visual quality of this development is important to the future of the park. Further, Crowders Mountain offers a unique view of Gastonia. Future generations will be grateful to citizens who have the vision to work for the acquisition and protection of this unique natural feature for public enjoyment and conservation.



A preserved wetland area in Gastonia that catches runoff from Ashbrook High School and the surrounding residential area before it runs into Armstrong Branch.



Useable farmland is plenty in Gaston County, however very few farms are in production full time.

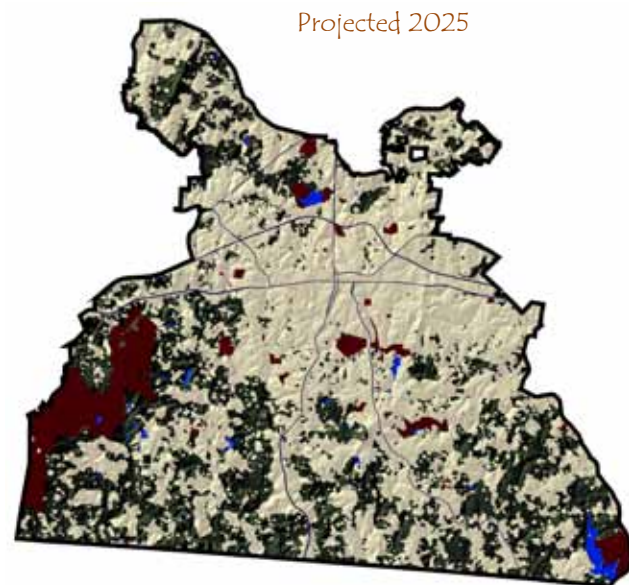
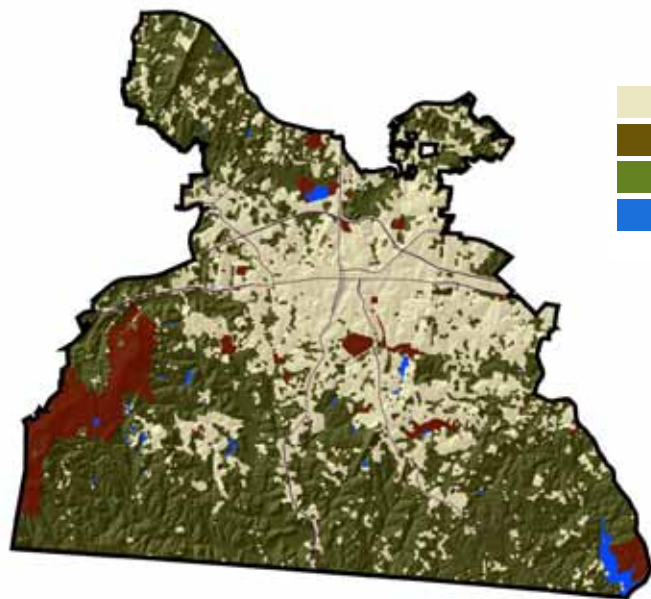
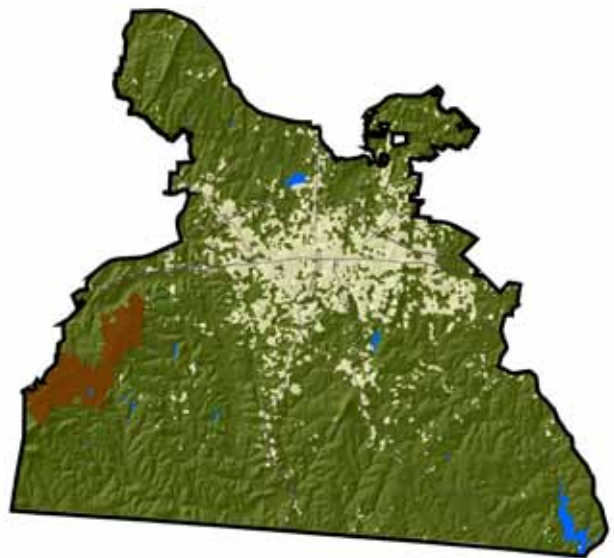


Crowders Mountain State Park offers unique vistas of Gaston County.





Figure 10-6: FUTURES regional growth model illustrating the spread of developed areas in the 2020 planning area. 1985, 2006 and projected to 2025



## Trees & Development

Trees improve our environment by making oxygen, removing pollutants from the air, buffering noise, providing wildlife habitat, reducing stormwater impacts, and lowering air temperatures during hot summer months. Trees also provide psychological benefits and increase real estate values by as much as 15%, according to the National Association of Home Builders. For instance, the presence of large trees in urban neighborhoods has been linked to less crime. A 2010 U.S. Forestry study suggests that large trees make a home seem more cared for, hence its residents seem more vigilant. For Gaston County as a whole, 25% of the total land area was developed between 1985 and 2006, according to analysis of satellite imagery by UNC Charlotte researchers. Figure 10-6 illustrates this trend for the Gastonia planning area, and suggests that as the city continues to develop, trees must be integral to that development.



Source: ©2011 RENCI at UNC Charlotte

# Summary

## Environmental Problems & Concerns

As a community becomes urbanized, the natural environment suffers. Increased impervious surface creates more rapid runoff causing siltation problems in lakes and streams. Rooftops, streets and parking lots also cause a warming affect on cold-water streams, changing the habitat conditions and hindering the survival of some species. Increased residential development creates more lawns, which often means fertilizer, pesticide and herbicide. Fertilizers containing phosphorus wash into wetlands, lakes and streams and create new forms of growth hazardous to existing and native plant life. Urban growth creates more noise and air pollution as freeways and roads become more congested and more and more industry is developed to provide jobs and a source of living. Most of these problems are not new to Gastonia, nor are they unique. They are just as much of a regional issue as they are a local issue.

Virtually all of us want to meet our own basic needs and to see our City develop in a positive way. The trends as discussed in this chapter, if continued, will guarantee that in the near future more people will be competing for fewer resources in an increasingly polluted City. This can ultimately diminish the quality of life for future generations. While some of the damage cannot be corrected, making better choices to minimize impacts to the environment can put us on a path towards building a sustainable community enjoyed by generations to come.

The path towards sustainability starts by understanding the human modifications that have damaged the environment and working to develop policies that provide more emphasis on preserving the natural environment with less emphasis on the built environment. Simple steps include:

- Recognizing that a healthy environment is integral to the City's long-term economic and societal interests.
- Adopting principles of green infrastructure to improve levels of urban services for drainage, sewerage, public transportation and solid waste management.
- Promoting environmental values and understanding to help the community take responsibility for keeping the air and water clean and reducing carbon emissions.
- Ensuring well conserved and managed land with zero percent deforestation.
- Recognizing and addressing regional issues which contribute to poor water and air quality.
- Acting locally to address issues related to climate change and other global environmental issues, incorporating environmental considerations at all stages of the development review process, and supporting and implementing innovative programs that promote Gastonia's leadership as a sustainable City.
- Enhancing the participation of the public in the planning and implementation of natural resource preservation and protection programs.



# ISSUES

## Issues

- Past development patterns, including low-density single-family neighborhoods, jobs located far from the home, and the regionalization of shopping, have caused us to become dependent on our cars. This dependence has contributed to the air pollution problem in the area. Future development will likely need to employ design strategies such as clustering and mixed uses in order to reduce car trips and air pollution.
- Gaston County has more wells and septic tanks than any other county in North Carolina. Although groundwater quality has generally been good, little is known about the long-term viability of the wells. Threats to groundwater include landfills, hazardous waste sites, underground storage tanks and failed septic tanks. In the event of contamination, well sources (particularly community wells) may have to be abandoned in favor of City water. A regional approach to water supply is favored by the EPA, and it will present the best long-term supply of water for the area.
- As land is cleared for development, rare species are replaced by more common "backyard" species. Where once neotropical songbirds nested in the interiors of forests, common and sometimes non-native species such as starlings and cowbirds have moved in after development due to their better tolerance of disturbed habitats.
- Drainage structures are only maintained by the City if they are in the street right-of-way or an easement. The majority of structures, however, are located on private property and typically suffer from lack of maintenance.
- Our region is subject to periodic exceptional drought conditions, resulting in widespread record-low streamflow and ground-water levels. This is consistent with recent and emerging weather patterns, predicted to be evidenced by longer and more frequent droughts, coupled with shorter and more intense rainy seasons. In the face of emerging climate changes, the management of water, wastewater and stormwater systems will be essential.
- Stormwater drainage is a significant source of water pollution. Over the past decade the EPA has implemented new regulations that provide stricter controls on management of stormwater. Through the Stormwater Utility, the City focuses on the maintenance and expansion of the storm drainage infrastructure, compliance with EPA guidelines for Phase II MS4s, and a rigorous stormwater impact attenuation program. Managing stormwater is an essential component for providing public safety and protecting the quality of our local water sources
- As the region grows in population and development occurs, more impervious surfaces, such as parking lots, rooftops and roads appear, and sediment and nutrient pollution become a greater water quality concern. The volume and speed of the water reaching streams and rivers has increased, creating flood hazards and stream bank erosion. These conditions make the protection of our watersheds critical.
- Soils in Gastonia are generally well-drained, have good support for buildings, and are suitable for urban development. Soils that present problems for development are generally limited to floodplains and steep slopes. Some soils in our area are also unsuitable for septic tanks.



# Objectives & Tools

## Objective 1.

Protect watersheds, streams and wetlands to ensure excellent water quality that meets community needs.

### Tools

- a. Promote building methods that reduce the amount of impervious surface, such as pervious pavement, multi-story development and structured parking.
- b. Continue to monitor water quality conditions to determine the effectiveness of regulations and recommend changes as needed.
- c. Conserve wetlands and riparian areas that provide flood protection, sediment and erosion control, water quality, groundwater recharge and discharge, and fish and wildlife habitat.
- d. Appropriately protect significant water bodies, riparian areas, and wetlands so that their important functions and values are retained as new development occurs.
- e. Use best management practices to control sedimentation.

## Objective 2.

Protect and improve Gastonia's air quality by reducing the amount of airborne contaminants.

### Tools

- a. Enable a variety of transportation alternatives such as walking, bicycling, ridesharing and public transit.

- b. Promote land use patterns that reduce the number of vehicle miles traveled, such as, infill, quality design, mixed-use and transit oriented developments.
- c. Develop a connectivity policy to improve efficiency of travel throughout the City for automobiles, bikes, and pedestrians. Explore ways to provide connections between non-residential uses linking residential areas to major destinations. Require new neighborhoods to connect to existing neighborhoods and undeveloped tracts, and provide multiple access points for large residential subdivisions.
- d. Develop a collector street network plan to provide safe and efficient movement of all types of traffic.
- e. Encourage the use of clean fuels, such as compressed natural gas and electric power, for public transit, school buses and personal vehicles.

## Objective 3.

New development will be sensitive to the natural environment.

### Tools

- a. Promote development standards to protect the natural environment.
- b. Consider a tree management program to reduce the negative effects of clear cutting and save heritage trees.
- c. Encourage developments designed to maximize protection of ecologically valuable land.
- d. Encourage a minimum density for new development along future transit corridors, specifically Franklin Boulevard.

# OBJECTIVES & TOOLS



# OBJECTIVES & TOOLS

- e. Require greenway construction when new developments occur along planned routes.
- f. Support lighting policies that address glare and light pollution.
- g. Balance the conservation of significant natural resources with the need for other urban uses and activities through evaluation of economic, social, environmental, and energy impact assessments.

## Objective 4.

Use well-reasoned environmental regulations to ensure the protection of natural resources.

## Tools

- a. Practice fair, consistent and effective code enforcement.
- b. Ensure adequately trained staff is available to monitor and enforce regulations.
- c. Prepare and maintain a list of properties, in order of priority, desirable for public acquisition to ensure long-term natural resource conservation.
- d. Actively solicit donations of property or easements to protect and enhance identified resources.
- e. Actively manage the pruning and cutting of trees and shrubs on public lands with scenic designations and improve policies on clearing vegetation along utility lines and easements.

## Objective 5.

Improve environmental awareness throughout the community.

## Tools

- a. Use all available media outlets to educate landowners and businesses about the benefits of

- best management practices.
- b. Continue to enhance existing public educational programs to improve community wide advocacy and appreciation of water quality protection.
- c. Continue to cooperate and pursue the development of inter-jurisdictional agreements to protect water sources, improve our air quality and minimize variability among environmental standards and regulations across the region.
- d. Develop partnerships with land conservancies, and other public and non-profit environmental agencies, to protect environmentally sensitive areas.

