SECTION 6

Mitigation for Secondary and Cumulative Impacts

The Town of Cary is a thriving community in the heart of the Triangle area of North Carolina, between the City of Raleigh and RTP. The Triangle area has repeatedly ranked among the top regions in the country in which to live or work, find a home or start a business, raise a family, or retire. Cary embraces the best of city life and small town environment by supporting the following values:

- Sense of security – continually ranks as one of the top 20 safest large cities nationally
- Livability – tree-lined streets and well-groomed subdivisions and office parks
- Vibrancy – home to world-class businesses and fast-growing Parks, Recreation, and Cultural Resources (PRCR) program that offers something for everyone
- Diversity – variety of demographics
- Proactive – progressive approach to protecting the environment, preserving open space, protecting habitat, and conserving drinking water

To ensure a high quality of life for its residents and to continue to be an attractive place to live and raise a family, the Town is managing its growth using innovative planning approaches and techniques. The Town is always working to address environmental concerns related to open space, water and wastewater infrastructure, transportation, and stormwater. The Town has implemented programs to direct denser development to designated activity and employment centers, preserve open space, protect floodplain and riparian buffers, and maintain water quality through Erosion and Sediment Control and Stormwater Programs.

This section identifies and discusses the federal, state, and local programs. These programs mitigate the potential SCI discussed in Section 5.

6.1 Summary of Federal and State Regulations and Programs

There are several federal and state regulations and programs that mitigate impacts related to growth. These include: the ESA, the Clean Water Act (CWA), the National Flood Insurance Program (NFIP), stormwater regulations, programs to reduce nutrient loading in the Neuse River basin and Jordan Lake watershed, various laws and programs related to archaeological protection, the Sedimentation and Pollution Control Act, the WSW Protection Program, the Clean Water Management Trust Fund (CWMTF), and the Ecosystem Enhancement Program (EEP). Table 6-1 summarizes these programs and indicates whether local involvement is needed to fully implement them. Where local programs are needed to implement the state and federal regulations/programs, the program description is provided under the Town regulations and programs discussion later in this section.

6.1.1 Endangered Species Act

The 1973 ESA conserves ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, through federal action and state programs (16 U.S.C. 1531-1544, 87 Stat. 884). The ESA:

- Authorizes the determination and listing of species as endangered and threatened
- Prohibits unauthorized taking, possession, sale, and transport of endangered species
- Provides authority to acquire land for the conservation of listed species, using land and water conservation funds
- Authorizes establishment of cooperative agreements and grants-in-aid to states that establish and maintain active and adequate programs for endangered and threatened wildlife and plants
- Authorizes the assessment of civil and criminal penalties for violating the ESA or regulations
- Authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the ESA or any regulation issued thereunder
- Requires federal agencies to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat

6.1.2 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act states that whenever the waters or channel of a body of water are modified by a department or agency of the US, the department must first consult the USFWS, the National Marine Fisheries Service (NMFS), and the lead state wildlife agency. The purpose of the Fish and Wildlife Coordination Act is to prevent or minimize impacts to wildlife resources and habitat due to water or land alterations. When modifications occur, provisions must be made for the conservation, maintenance, and management of wildlife resources and habitat in accordance with a plan developed with the wildlife protection agencies noted above.

6.1.3 Clean Water Act

In 1972, the CWA (33 U.S.C. 1251 et seq.) was enacted to "restore and maintain the chemical, physical, and biological integrity of the Nation's water." The CWA includes a number of sections that are relevant to the SCI study.

- Section 303(d) of the CWA established a program to identify waters that do not support their designated uses and develop plans to address the impairments of these waters.
- Section 401 of the CWA requires certification that a project does not violate the state's water quality standards as administered by NCDENR.
- Section 404 of the CWA established a program to regulate the discharge of dredged and fill material into waters of the US, including wetlands.

Additionally, the CWA provides the regulatory authority for managing sanitary sewer overflows and NPDES stormwater programs.

6.1.3.1 Section 303(d) of the Clean Water Act

Section 303(d) of the CWA requires states to identify waters that do not support their classified uses. These waters must be prioritized, and a total maximum daily load (TMDL) must subsequently be developed. TMDLs are calculations that determine the maximum amount of a pollutant that a water body can assimilate and still meet water quality standards, and an allocation of that amount to the pollutant's sources. As part of the TMDL development process, the sources of the pollutant must be identified and the allowable amount of pollutant must be allocated among the various sources within the watershed.

TABLE 6-1
Summary of Existing State and Federal Programs and the Environmental Resources They Protect

Program or Regulation	Local Govt. Program Required	Wetlands	Land Use	Fish and Wildlife	Sensitive Species	Water Quality and/or Quantity	Air Quality	Ground -water	Noise	Toxics
ESA		X	X	X	X	X				
Fish and Wildlife Coordination Act				X	X					
CWA Section 303(d)		X		X		X	X			X
CWA Section 404		X	X	X	X	X				
CWA Section 401		X	X	X	X	X				
Sanitary Sewer Overflow Regulations.		X	X	X	X	X		X		X
NPDES Stormwater	X	X		X	X	X				X
Protection of Wetlands		X	X	X	X	X				
Isolated Wetland Protection		X	X	X	X	X				
Safe Drinking Water Act		X	X			X		X		X
Clean Air Act (CAA)							X			
Floodplain Management		X	X			X				
National Flood Insurance Program (NFIP)		X	X	X	X	X				X
Wild and Scenic Rivers Act			X	X	X	X				
Archaeological Protection			X							
Archaeological and Historic Preservation Act			X							
National Historic Preservation Act			X							
Protection and Enhancement of Cultural Environment			X							
Farmland Protection Policy Act			X							
Sediment and Erosion Control	X	X	X	X	X	X				
CWMTF/ State Revolving Fund (SRF)		(X)	(X)	(X)	(X)	(X)				
Ecosystem Enhancement Program (EEP)		X		X	X	X				
Groundwater			X					X		X
Neuse NSW	X	X		X	X	X				
Jordan Lake Nutrient Management Strategy (Jordan Rules)	X	X		X	X	X				
WSW Protection Program	X	X	X	X	X	X				
Land Conservation Incentives		(X)	(X)	(X)	(X)	(X)				

X = Demonstrates clear environmental benefits
(X) = Shows potential for environmental benefits (policy only, program not mandatory, or regulation not yet adopted)

NCDWR is responsible for developing TMDLs or management strategies for the waters identified in Section 4.10. In addition, NCDWR developed a TMDL for the upper New Hope Creek arm of Jordan Lake and a nutrient management strategy for other portions of the lake. This TMDL and strategies require nonpoint source reductions of nitrogen and phosphorus as discussed later in this section.

The Town will continue to work with NCDWR to implement other TMDLs as they are developed. Similarly, the Town will work with NCDWR on management strategies developed for any impaired waters within its jurisdiction. For example, when the EEP developed a management plan for the Swift Creek watershed, the Town met with EEP to discuss the results of the plan and locations of planned BMPs. The Town has worked with NCDWR and EEP to implement that plan as funding has become available.

6.1.3.2 Sections 404 and 401 of the Clean Water Act

Two main regulatory programs currently regulate impacts to jurisdictional waters, including streams and wetlands in the project area, both of which originate from CWA: Section 404, regulation of dredge and fill activities (which is administered by the USACE), and Section 401, certification that a project does not violate the state's water quality standards (which is administered by NCDWR). All private and public construction activities over a specific acreage or stream length that affect jurisdictional waters are required to obtain certifications and permits from NCDWR (Section 401 WQ Certification) and USACE (Section 404 Permits).

The state's 401 Water Quality Certification Program and the federal 404 Wetlands Protection Program protect jurisdictional waters by requiring avoidance and mitigation for wetlands and streams across the state. However, it is possible for permits to be issued under both the state and federal programs that allow small impacts to jurisdictional waters.

Section 401 of the CWA (33 U.S.C. 1341) requires any applicant for a federal license or permit that conducts any activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification from the state in which the discharge originates or would originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the affected waters. The jurisdiction is determined at the point where the discharge originates or would originate, and the discharge is required to comply with the applicable effluent limitations and water quality standards.

In 2006, the Supreme Court addressed the jurisdictional scope of Section 404 of the CWA specifically in terms of the scope of "the waters of the U.S." statement, in *Rapanos v. U.S.* and in *Carabell v. U.S.* The rulings of each case provide analytical standards for the determination of jurisdiction of water bodies that are not traditional navigable waters (TNW) or wetlands adjacent to TNWs. Wetlands adjacent to non-TNWs are subject to jurisdiction of the CWA if (1) the water body is a relatively permanent water (RPW), i.e., flows year-round or at least 3 months of the year, or is a wetland that directly abuts an RPW; or (2) a water body, including adjacent wetlands, has a significant nexus, based on the biological, physical, or chemical integrity, with TNWs.

6.1.3.3 Sanitary Sewer Overflows

The USEPA prohibits discharges to waters of the United States from municipal separate storm sewer systems (MS4s), unless authorized by an NPDES permit. In April 2000, the USEPA released the *Compliance and Enforcement Strategy Addressing Combined Sewer*

Overflows and Sanitary Sewer Overflows (USEPA, 2000). In summary, each USEPA region is responsible for developing an enforcement response plan, which includes an inventory of sanitary sewer overflow (SSO) violations. Municipalities typically obtain guidance from the NCDENR and USEPA for their systems. For public health, environmental, and regulatory reasons, eliminating SSO is a high priority for the Town, as it is for the State of North Carolina. The Town seeks not only to comply with the minimum requirements regulating its operations, but also to eliminate SSOs in the Town system to the maximum extent feasible.

State regulations (15A NCAC 2B.05.06) require municipalities and other wastewater treatment operators to report wastewater spills from discharges of raw sewage from broken sewer lines and malfunctioning pump stations within 24 hours. NCDWR adopted policies that include strict fines and other enforcement programs to protect surface water quality from wastewater spills.

The North Carolina Clean Water Bill of 1999 provides for the development of permits for collection systems. These permits include requirements for inspections, sewer maintenance, and other operational items. The Town's Wastewater Collection System Permit was most recently renewed on June 21, 2010.

6.1.3.4 NPDES Stormwater Regulations

NPDES stormwater discharges are controlled by federal NPDES regulations and enforced by NCDEMLR. The program regulates all major discharges of stormwater to surface waters. NPDES permits are designed to require the development and implementation of stormwater management measures. These measures reduce or eliminate pollutants in stormwater runoff from certain municipal storm sewer systems and industrial activities.

The NPDES stormwater permitting system is being implemented in two phases. Phase I was implemented in 1991 and applied to six MS4s in North Carolina with populations exceeding 100,000 at that time (and thus, did not include the Town). The NPDES Phase II rules were finalized on October 29, 1999, and published in the Federal Register on December 8, 1999. Under these regulations, the Town was required to develop and implement a stormwater management program.

In 2006, the North Carolina General Assembly enacted Session Law 2006-246 to provide for the implementation of NPDES Phase II stormwater management requirements. Session Law 2006-246 is related to, but is not a part of, the NPDES stormwater program and recognizes that urban development can impact surface waters regardless of whether the NPDES stormwater requirements apply. The Session Law established post-construction stormwater management requirements for development activities in areas outside of municipalities that operate permitted MS4s. The Session Law requires that new development and redevelopment in these areas meet the post-construction requirements of the NPDES Phase II stormwater management program beginning on July 1, 2007. Permits under this program are issued by NCDWR. This law is applicable to new development and redevelopment activities that will result in a cumulative disturbance of 1 acre or more of land.

Under Session Law 2006-246, all unincorporated and incorporated areas within Wake County must meet the post-construction requirements of the NPDES Phase II stormwater management program beginning on July 1, 2007. The post-construction stormwater permit conditions, included in permits issued by NCDEMLR or other delegated agencies, regulate

the design, construction, operation, and maintenance of the post-construction stormwater control measures implemented by regulated developments.

An operation and maintenance plan that ensures the adequate long-term operation of the program's structural BMPs is required. The operation and maintenance plan requires the owner of each structural BMP to submit a maintenance inspection report on each structural BMP annually to the local jurisdiction. Because the Town is located in the Cape Fear and Neuse River basins, additional rules apply. These include the Neuse River Basin Nutrient Sensitive Water Management Strategy and the Jordan Lake Water Supply Nutrient Strategy, as discussed below.

The Town renewed its NPDES Phase II permit, effective November 2011. The Town's stormwater programs are discussed later in this section.

6.1.4 Protection of Wetlands, Executive Order 11990

Executive Order (EO) 11990 (Protection of Wetlands) was issued to avoid long- and short-term adverse impacts associated with the destruction or modification of wetlands. Every federal agency must minimize the destruction, loss, and degradation of wetlands, as well as work to preserve and enhance the natural and beneficial values of wetlands. Federal projects must avoid wetland impacts to the extent possible and, where avoidance is not possible, minimize impacts to wetlands.

6.1.5 Isolated Wetland Protection

Isolated wetlands are those that have no visible connection to surface waters, and are therefore not regulated under Section 404 of the CWA. NCDWR has jurisdiction over isolated wetlands within the state's boundaries. According to NCDWR, any activity that results in the loss of wetland function, including filling, excavating, draining, and flooding, shall be considered a wetland impact. Impacts to isolated wetlands are subject to the requirements of NCDWR permitting and mitigative measures.

6.1.6 Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) provides protection of public health by regulating the nation's drinking water supply. The SDWA authorizes the USEPA to set national health standards for drinking water to protect against natural and man-made contaminants that may be found in public drinking water. The USEPA is charged with the responsibility of assessing and protecting drinking water sources, as well as ensuring the appropriate treatment of water by qualified operators. The USEPA is also responsible for ensuring the integrity of water delivery systems and informing the public of the quality of their drinking water supply.

6.1.7 Clean Air Act

The CAA (42 U.S.C. 7401 et seq.) is intended to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." Section 118 of the CAA (42 U.S.C. 7418) requires that each federal agency with jurisdiction over any property or facility engaged in any activity that might result in the discharge of air pollutants comply with "all Federal, state, interstate, and local requirements" with regard to the control and abatement of air pollution.

On April 15, 2004, the USEPA designated ozone nonattainment areas. These nonattainment areas have either violated the national 8-hour ozone standard or have contributed to its violation. The USEPA categorized these nonattainment areas into five groups ranging from basic to severe, with basic having the least stringent requirements and severe having the most stringent. As of June 2005, Wake County, which is identified as a maintenance area, is no longer subject to the 1-hour standard (USEPA, 2013).

As of December 26, 2007, USEPA approved the request of NCDENR to redesignate the Triangle area 8-hour ozone nonattainment area to attainment for the 8-hour ozone NAAQS (FR 72948).

In 2008, the 8-hour ozone NAAQS was revised to 0.075 parts per million (ppm). The USEPA is moving forward with implementation of the 2008 ozone standard and requested that states wishing to revise their boundary recommendations submit their revisions by October 28, 2011. North Carolina made its revised boundary recommendations based on the 2009-2011 data. These data did not show nonattainment of the ozone standard for the Triangle area. On December 8, 2011, the USEPA sent North Carolina its response, stating that the agency intended to support North Carolina's recommended area designations and boundaries for all areas (NCDENR, 2013a).

NCDAQ has implemented an aggressive Air Awareness Education Program that encompasses daily reports on the ozone forecasts by meteorologists reported using media such as the internet, television, newspapers, and radio. The public has become very informed of ozone issues and steps they can take to reduce ozone emissions, which include combining errands into one trip, maintaining vehicles and lawn equipment, and using lawn equipment in the evening.

The Clean Smokestacks Act of 2002 required coal-fired power plants to achieve a 77 percent reduction in NOx emissions by 2009. NOx is the main cause of ozone, one of North Carolina's biggest air quality problems, and it contributes to haze and acid rain. Under the Clean Smokestack Act, utility companies must achieve these emissions goals through actual reductions and not by buying or trading emissions credits from utilities in other states, as allowed under federal regulations. The utilities also cannot sell credits for their emissions reductions (NCDENR, 2009).

In 2013, North Carolina had its lowest ozone levels since air monitoring began in the early 1970s. The declining ozone levels coincided with lower emissions from the state's power plants. The state's coal-fired power plants have reduced their NOx emissions, a primary industrial contributor to ozone pollution, by more than 80 percent since the General Assembly enacted the Clean Smokestacks Act in 2002 (NCDENR, 2013a).

In addition to the effects on transportation, new and expanding industries in the County are subject to strict emission control requirements.

6.1.8 Floodplain Management, Executive Order 11988

EO 11988 (Floodplain Management) addresses the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. Federal agencies must take action to reduce the risk of flood loss and flood impacts on human safety, health, and welfare. Agencies are also charged with the responsibility to restore and preserve the

natural and beneficial values of a floodplain. Federally supported projects that directly impact floodplains need to consider alternatives which avoid the floodplain.

6.1.9 National Flood Insurance Program

The NFIP, managed by FEMA, was created in the 1960s in response to the rising cost of taxpayer-funded disaster relief for flood victims and the increasing amount of damage caused by floods. Floodplain management under the NFIP is an overall program of corrective and preventive measures for reducing flood damage. It includes, but is not limited, to emergency preparedness plans, flood control works, and floodplain management regulations; and it generally covers zoning, subdivision, or building requirements and special-purpose floodplain ordinances. One aspect of the program is that it aids in the protection of stream riparian areas and wetlands, and serves to protect water quality by restricting development in the floodplain. Information on the Town's flood protection programs is presented in Section 6.2.

6.1.10 Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act charges regulatory agencies with the protection of selected rivers of the nation. These rivers include those that possess remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. These rivers should be preserved for the benefit and enjoyment of future generations. The Wild and Scenic Rivers Act prescribes the method for designating standards for selection of rivers to be protected under this policy. Rivers under the Wild and Scenic Rivers Act are classified in one of three categories depending on their characteristics:

- Wild river areas: Rivers or sections of rivers that are free of impoundments and are generally inaccessible except by trail. Watershed and shorelines surrounding this river class are essentially primitive and waters are unpolluted.
- Scenic river areas: Rivers or sections of rivers are similar in character to wild river areas, but can be accessed in places by roads.
- Recreational river areas: Rivers or sections of rivers that are readily accessible by road or railroad, and may have development along their shorelines. These rivers may have undergone some impoundment or diversion in the past.

No rivers protected by the Wild and Scenic Rivers Act exist in Wake County.

6.1.11 Archaeological Protection

Archaeological resources are protected on private and public lands through the North Carolina Archaeological Resources Protection Act, the Unmarked Human Burial and Human Skeletal Remains Protection Act, the North Carolina Archaeological Record Program, SEPA, and various federal laws. These laws are only applicable to projects that are state or federally approved, permitted, or funded, or exist on state or federal lands. Although this often exempts many private development projects, USACE does require archaeological reviews for any project that needs a CWA Section 404 permit.

6.1.11.1 Archaeological and Historic Preservation Act

The Archaeological and Historic Preservation Act of 1974 provides protection of historical American sites, buildings, objects, and antiquities of national significance, as well as protecting all historical and archaeological data that could potentially be lost due to:

- Flooding
- Building of access roads
- Erection of laborer communities
- Relocation of highways and railroads
- Alteration of terrain caused by the construction of dams (by the US government and private corporations)
- Any alteration of terrain as a result of any federal construction project or any federally licensed project

If any federal agency finds that a federally supported project may cause irreparable loss or destruction of scientific, prehistorical, historical, or archaeological data, the agency must notify the Department of the Interior so it may undertake recovery, protection, and preservation of the data.

6.1.11.2 National Historic Preservation Act

The National Historic Preservation Act (NHPA) is the central act that establishes historic preservation law. The NHPA sets the policy for the US government to promote conditions in which historic properties can be preserved in harmony with modern society. The NHPA authorizes the Department of the Interior to establish, maintain, and expand the National Register of Historic Places (NRHP). The NHPA establishes responsibility to the NCSHPO to develop a statewide plan for preservation, surveying historic properties, nominating properties to the NRHP, providing technical assistance to federal, state, and local agencies, and undertaking the review of federal activities that affect historic properties.

6.1.11.3 Protection and Enhancement of the Cultural Environment, Executive Order 11593

EO 11593 (Protection and Enhancement of the Cultural Environment) requires the federal government to provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the nation. Federal agencies, in cooperation with state historic preservation agencies, are to locate, inventory, and nominate sites, buildings, districts, and objects as candidates for the NHRP. All sites listed within the NRHP shall be maintained to professional standards set by the Secretary of the Interior. Federal agencies that are directly or indirectly involved with the alteration or destruction of property listed on the NHRP will take timely steps to make a record of all data present in that property. That record is kept in the Library of Congress.

6.1.12 Farmland Protection Policy Act

The purpose of the Farmland Protection Policy Act is to minimize the extent to which federal programs contribute to unnecessary and irreversible conversion of farmland to non-agricultural uses. The Farmland Protection Policy Act, enforced by the USDA, assures that

federal programs will be administered in such a manner that they are not incompatible with state and local governments, as well as private programs with policies to protect farmland.

6.1.13 Sediment and Erosion Control

The North Carolina Division of Energy, Mines, and Land Resources (DEMLR) administers programs to control erosion and sedimentation caused by land-disturbing activities on one or more acres of land. Control measures must be planned, designed, and constructed to protect from the calculated peak rate of runoff from a 10-year storm. Enforcement of the program is at the state level, but may be delegated to local governments with certified erosion control programs. The Town enforces its own Erosion and Sediment Control Program, which is discussed further in Section 6.2.

6.1.14 North Carolina Clean Water Management Trust Fund

The Clean Water Management Trust Fund (CWMTF) was created by the 1996 Legislature to help finance projects that specifically address water pollution problems. Its purpose was modified through the passage of the 2013-2014 North Carolina budget. It is a non-regulatory program that focuses its efforts on upgrading surface waters in distress, eliminating pollution, protecting and conserving unpolluted surface waters, and establishing a network of riparian buffers and greenways for environmental, educational, recreational benefits as well as acquiring lands of cultural and historic significance.

CWMTF monies could be used for wetland and/or riparian corridor identification and preservation (through acquisition and easement techniques), to allow comprehensive protection of wetlands and riparian buffers in the project area, and to protect water quality and sensitive aquatic species.

The Town received CWMTF money to acquire and protect riparian buffer and floodplain areas within the White Oak Creek watershed. The Town has constructed wetlands at the headwaters of Swift Creek and performed stream restoration.

6.1.15 State Revolving Fund

In previous years, the CWMTF had been used to fund wastewater improvements and conventional stormwater projects as well as the acquisition of lands. As part of Session Law 2013-360, the funding of wastewater improvements and conventional stormwater projects is now handled through the SRF and is administered by the Division of Water Infrastructure and the State Water Infrastructure Authority.

6.1.16 North Carolina Ecosystem Enhancement Program

The EEP was established as a non-regulatory program within NCDENR to:

- Provide a systematic approach for meeting NCDOT's compensatory mitigation requirements.
- Maximize the ecological benefit of compensatory mitigation projects.
- Reduce delays in the construction of transportation improvement projects associated with compensatory mitigation requirements.

The EEP also provides a compensatory mitigation option for permit applicants other than the NCDOT, administers the Mitigation Program for Protection and Maintenance of Existing Riparian Buffers in the Neuse, Tar-Pamlico, and Catawba River basins, and provides a repository for nutrient offset payments in the Neuse River basin.

The Town works with EEP to implement plans EEP develops within its jurisdiction. For example, EEP recently developed a management plan for the Swift Creek watershed; the Town met with EEP to discuss the results of the plan and locations of planned BMPs. The Town will work with EEP to implement that plan as funding becomes available.

6.1.17 Groundwater Protection

Several regulations and programs exist at the state and local levels that protect groundwater from urban growth:

- Wellhead Protection Program
- Regulation of potential contamination sources
- Management of groundwater contamination incidents
- Ambient groundwater monitoring
- Regulation of well construction

These regulations and programs may afford some protection to groundwater wells from the most common forms of groundwater pollution—point sources such as chemical manufacturing facilities, underground storage tanks, and accidental spills. However, more diffuse and evasive groundwater pollutants from agricultural uses (livestock facilities and chemical application on crops) and urban land uses (over-application of fertilizers and improper use of toxic household chemicals) may not be well managed under these regulations and programs.

6.1.18 Neuse River Basin Nutrient Sensitive Waters (NSW) Rules

The entire Neuse River basin was classified as NSW in 1988. As a result of the NSW classification, a nutrient management strategy was initially developed to manage phosphorus from point-source dischargers, and nitrogen and phosphorus from nonpoint sources. At that time, most of the nutrient problems were occurring in the lower freshwater portion of the river, and phosphorous was considered the controlling nutrient.

Increasing algal blooms and fish kills in the estuarine portion of the Neuse River, attributed to nitrogen over-enrichment, led to a revision of the NSW strategy to address nitrogen inputs to the estuary. The Neuse River NSW Strategy Rules became effective on August 1, 1998. New development and redevelopment that drains in whole or in part to NSW must implement stormwater BMPs that reduce nutrient loading. NCDENR has specified basinwide stormwater requirements for the Neuse River basin as described in 15A NCAC 02B .0235.

The Neuse River NSW rules require that existing riparian buffer areas be protected and maintained on both sides of intermittent and perennial surface waters. A 50-foot buffer consisting of 30 feet of undisturbed forest and 20 feet of grassed/vegetated area must be maintained. The rule does not require restoration of buffers that no longer exist. Perennial and intermittent stream determinations are to be based on soil survey maps prepared by the

Natural Resources Conservation Service (NRCS) or the most recent version of USGS topographic maps (7.5 minute quadrangle).

While this revised strategy places more stringent nutrient removal requirements on point-source dischargers, it also addresses other sources of nutrients, including urban stormwater, agricultural sources, and nutrient application management. In addition, the strategy includes special provisions to protect stream buffers to prevent further degradation of the watershed's ecological integrity.

The Neuse River NSW Rules were designed by the state and stakeholders to:

- Hold nitrogen loading from new development at 70 percent of that contributed by 1995 land uses in the non-urban areas of the Neuse River basin (using an export coefficient of 3.6 pounds per acre per year [lb/ac/yr]).
- Offset total nitrogen loads by funding wetland or riparian area restoration projects through payments to the EEP.
- Hold the increase in peak flow leaving the site during the 1-year, 24-hour storm to its levels under predevelopment conditions.

In general, the nitrogen control stormwater rules apply to any new development which exceeds 24 percent imperviousness, and most new development within the Town's jurisdiction requires stormwater controls. As part of this program, developers must determine the nitrogen loading attributed to the new development, and must meet a target of 3.6 lb/ac/yr through site design and BMPs. In the Neuse River basin, residential development may achieve 6 lb/ac/yr and buy down the difference. Commercial development may buy down after achieving 10 lb/ac/yr.

Rules specific to the Town are discussed further in Section 6.2.

6.1.19 Jordan Lake Nutrient Management Strategy

The Jordan Lake Nutrient Management Strategy (Jordan Rules) was developed to restore and maintain nutrient-related water quality standards in B. Everett Jordan Reservoir and are described in 15A NCAC 02B.0262 through 02B.0311. The Jordan Lake TMDL was developed by NCDWR to identify the causes of impairment and strategies to meet the reservoir's designated uses. To meet the requirements of the TMDL, the Jordan Rules splits the reservoir and its drainage into three discrete areas:

- Haw River Arm - the watershed draining to the Haw River and the reservoir area immediately upstream of the Jordan Dam
- Upper New Hope Arm - the upper end of the reservoir (above Hwy 1088) and the watershed draining to it. This includes the portions of the Town within the Northeast Creek subwatershed and areas that drain directly to Jordan Lake.
- Lower New Hope Arm - the part of the reservoir below Hwy 1088 and above the Jordan Dam (excluding the Haw River Arm) and the watershed draining to it. This includes the portions of the Town within the White Oak Creek subwatershed.

There are specific nutrient reduction targets for each of these arms. These are expressed as loading targets as well as percent reductions compared to the estimated annual average load from 1997 through 2001. Within the Town, the White Oak Creek subwatershed falls within the Lower New Hope Arm, while the remaining portion of the Town within the Cape Fear River basin falls within the Upper New Hope Jordan Arm. The percent reductions for the areas relevant to the Town are:

- Upper New Hope Arm – 35 percent reduction in nitrogen and 5 percent reduction in phosphorus compared to the baseline 1997 through 2001 levels.
- Lower New Hope Arm – no increase in nitrogen or phosphorus compared to the baseline 1997 through 2001 levels.

The rule also has specific guidance for both point and nonpoint sources including agriculture, existing development, and new development. In general, the agriculture and existing development rules require achievement of the percent reductions as an aggregate from that source, e.g., existing development in the Upper New Hope Arm watershed as a whole must reduce its nitrogen load by 35 percent. New development has specific loading targets similar to those in the Neuse NSW Rules. They are as follows:

- Upper New Hope Arm - limit nitrogen unit area mass loading from new development to 2.2 lb/ac/yr and limit phosphorus unit area mass loading from new development to 0.82 lb/ac/yr.
- Lower New Hope Arm - limit nitrogen unit area mass loading from new development to 4.4 lb/ac/yr and limit phosphorus unit area mass loading from new development to 0.78 lb/ac/yr.

Developers have the option to offset their nitrogen loads by funding offsite management measures. Residential development must first achieve 6 lb/ac/yr and then can buy down the difference. Commercial development may buy down after achieving 10 lb/ac/yr. Implementation of the Jordan Rules regarding nutrient management has been delayed by the state until 2016 to allow for the completion of a pilot in situ nutrient management study. The Town implements these rules throughout the Town's jurisdiction.

The rules also require the preservation of a 50-foot wide riparian buffer on all surface waters in the watershed, including intermittent and perennial streams, lakes, ponds and reservoirs. The portion of the regulation relating to buffers was not put on hold. The buffer component of the Jordan Lake Watershed Rules is applied by the Town throughout the Town's jurisdiction, as discussed in Section 6.2.

6.1.20 Water Supply Watershed Protection Program

The EMC and NCDWR have administered the WSW Protection Program since 1986. Initially, the program was administered voluntarily by counties and municipalities pursuing protective measures for their WSWs. The measures included limitations on the number and type of wastewater discharges that were allowed in the WSWs.

In 1989, the North Carolina General Assembly ratified the Water Supply Watershed Protection Act, codified as General Statutes 143-214.5 and 143-214.6. The WSW Protection Act mandated the EMC to adopt minimum statewide water supply protection standards by

January 1, 1991, and to reclassify all existing surface WSWs to the appropriate classification by January 1, 1992. The goals of the WSW Protection Program include:

- Protection of surface drinking water supplies in North Carolina from nonpoint source and point source pollution from urban runoff and wastewater discharges.
- Provision of a cooperative program of watershed management and protection that is administered by local governments consistent with minimum statewide standards.

The NCDWR Water Quality Program manages the WSW program through oversight of local planning ordinances and monitoring of land use activities. Local WSW programs must be approved by the EMC. The WSW program requires local governments to adopt a number of land use controls and limitations based on watershed classifications. Specifically, this program:

- Limits impervious surfaces around water supplies unless stormwater controls are used.
- Requires protection of riparian buffers (100-foot buffers in all development that exceeds the low-density option, or 30-foot buffers otherwise along perennial waters).
- Limits some land uses.
- Limits dischargers (NPDES permits in certain situations).
- Allows the use of clustering and density-averaging to meet overall development density limits.

Watersheds in the WSW Protection Program have a classification of WS-I through WS-V, where WS-I has the most restrictive controls.

A portion of the study area is within the Swift Creek WSW. The state has developed watershed protection overlays and restrictions associated for development in this watershed. The local application of these rules is described further in Section 6.2.

Another portion of the study area is within the Jordan Lake WSW. The state has developed special rules under 15A NCAC 02B .0263 through .0273 and .0311(p) designed to restore and maintain nutrient-related water quality standards in B. Everett Jordan Reservoir. The reservoir's classified uses are set forth in 15A NCAC 02B .0216, including use as a source of water supply for drinking water, culinary, and food processing purposes; and maintenance or enhancement of protections currently implemented by local governments in existing WSWs. Rules specific to the Town are discussed in Section 6.2.

6.1.21 Conservation Reserve Enhancement Program

The USDA and NCDENR manage the Conservation Reserve Enhancement Program. USDA and NCDENR, with the participation of the NRCS, the Farm Service Agency, EEP, and the CWMTF, have protected 5,000 acres of buffers and conservation areas in the Jordan Lake watershed. The Conservation Reserve Enhancement Program is also available in the Neuse River basin. This program uses financial incentives to encourage farmers to voluntarily remove sensitive land from agricultural use or implement BMPs.

6.1.22 Miscellaneous Land Conservation Incentive Programs

Other voluntary strategies exist at federal and state levels that provide incentives to protect natural lands, wetlands, agricultural lands, and sensitive species habitat and forest lands from development. These non-regulatory approaches include providing tax credits for donating lands to specific organizations (usually land trusts) and offering funding for various grants and trust funds to purchase or protect undeveloped lands.

6.2 Local Regulations and Programs

Environmental protection is a cornerstone value for the Town. The Town has developed several programs to meet its internal goals to be a highly regarded and well-managed community that puts the interests of its residents at the forefront of its policies and public investment (Town of Cary, 2013c). To meet those goals, the Town has established the following:

- PRCR Master Plan (adopted November 2012)
- Historic Preservation Master Plan (adopted May 2010)
- Open Space Plan (adopted in 2001, renamed in 2010)
- Land use plans that encourage mixed use areas along with growth in certain areas while discouraging growth in other areas (various adoption dates)
- Comprehensive Transportation Plan (adopted September 2008)
- Wastewater Collection System Master Plan (adopted June 2013)
- Reclaimed Water Master Plan Update (adopted July 2013)
- Water Distribution System Master Plan (adopted June 2009)
- Long Range Water Resources Master Plan (adopted January 2013)

The Town is in the process of updating its Comprehensive Plan; when complete it will be known as the Cary Community Plan. The Cary Community Plan will connect many specific topic plans, including Land Use and Transportation, into a single, integrated policy guide for the future. The planning process, known as Imagine Cary, emphasizes community involvement and input. The Cary Community Plan is projected to be completed by late 2015.

The Town's land use plans are implemented through a comprehensive Land Development Ordinance (LDO) and zoning process that guides development within the Town's jurisdiction. The LDO allows for cluster development to encourage higher-density in parts of a given development and greater preserved open space in other areas. An element of the Town's land use planning is the designation of mixed-use areas, called "activity centers," which generally include a mix of commercial, office, and residential uses, designed in a cohesive, walkable, and pedestrian-friendly manner. Benefits of this approach to development will help concentrate land uses, reduce sprawl, promote a more efficient pattern of land uses, provide needed goods and services, reduce vehicle trips, and facilitate convenient and safe circulation. In addition, the Town has developed a Riparian Protection Program, Floodplain Program, Erosion and Sediment Control Program, and Stormwater

Program to protect water quality and instream habitat. Table 6-2 summarizes the programs that affect development procedures. Excerpts of relevant ordinances are found in Appendix F. This summary addresses relevant regulations and programs from an environmental management and land use policy analysis perspective. These local initiatives seek to prevent or offset impacts to natural resources resulting from growth. Table 6-3 illustrates the environmental resources protected by the various Town programs; sections following the table provide additional detail on each program.

TABLE 6-2
Summary of Existing Local Programs

Program	Summary
Riparian Buffers LDO Section 7.3.2 LDO Section 7.2.14	➢ The LDO requires 100-foot-wide buffers on all perennial and intermittent streams that are indicated on the most recent version of a USGS quadrangle topographic map. ➢ The buffers have 3 zones: Zone 1 (inner 30 feet) has severe development restrictions; Zone 2 (the next 20 feet) has strict development restrictions; and Zone 3 (the outer 50 feet) has moderate development restrictions. ➢ All other surface waters indicated on the Soil Survey for Wake County are required to have 50-foot wide riparian buffers. ➢ All residential lots must be platted outside the riparian buffers.
Floodplain Protection LDO Section 7.5 LDO Section 3.12	➢ Residential development in the 100-year floodplain has been prohibited since 1978. All residential lots shall be platted outside of floodplains and riparian buffers. New construction or substantial improvements to any residential structure must be located outside the flood hazard area, and the lowest floor must be at least 2 feet above the base flood elevation. ➢ Non-residential development in floodplains is allowed if the first floor is 2 feet above the floodplain elevation, but only through a special use permitting process that discourages most development from occurring in the floodplain. No encroachment, including fill, is allowed in the floodway unless a Special Use Permit is issued. ➢ A floodplain development permit application is required for all development; a flood study and back water study is also required for developments larger than 50 acres where no floodplains are noted on a FEMA floodplain map.
Erosion and Sediment Control Program LDO Section 7.4 LDO Section 3.13 LDO Section 7.2.5 LDO Section 3.22	➢ The Town has a delegated Local Program for enforcement of the state's Soil Erosion and Sedimentation Control standards. ➢ The Town's sediment and erosion control practices support an overall stream protection plan by limiting in-stream suspended sediment and sediment deposition. Land-disturbing activity over 12,000 square feet or 1 acre for construction of single family residence on a single lot must comply with sedimentation and erosion control requirements. ➢ The Town does not allow any land-disturbing activity in proximity to a lake or natural watercourse unless erosion and sedimentation control measures are present. ➢ The Town prohibits grading of low-density single-family lots (except for infrastructure installation) until a building permit is issued; and limits grading in medium density residential developments to no more than 25 acres at a time. ➢ Soil stabilization by establishing a grass cover or mulching and tacking must occur within a maximum of 7 calendar days for slopes (14 calendar days for non-slopes). Failure to protect slopes within 15 calendar days results in a fine of $2,500 per day. ➢ The 10-year storm event is the minimum design standard for planning, designing, and construction of S&E measures, structures, and devices. ➢ Phased construction is reviewed in the sediment and erosion control plan submittal process on a site-specific basis. The Town also limits mass grading to 25 acres at a time for residential developments with between 3 and 8 dwelling units per acre. ➢ A Preconstruction Conference is required for all new projects. ➢ Approvals are not issued to begin grading on a project in jurisdictional areas until written documentation of all required state and federal permits for the project is provided. ➢ A final "Site Inspection" is required prior to issuance of a Certificate of Occupancy (CO) for all residential and non-residential structures. At this inspection, environmental staff reviews the site for sufficient groundcover, stabilization, buffers, and installation of stormwater devices prior to approving a CO. ➢ The Town requires a Tree Clearing Certificate and specifies required buffers and vegetation protection areas. Tree-protection fencing and silt fencing are required as erosion and sediment control measures, along with perimeter ditches or perimeter swales, if practical (Planning Department). ➢ The Town also encourages contractor education and training related to erosion and sediment control.

TABLE 6-2
Summary of Existing Local Programs

Program	Summary
Stormwater Program and Impervious Surface Limitations LDO Section 7.3.3 to 7.3.8 LDO Section 4.4.6 LDO Section 8.1	➢ The Town's NPDES Phase II stormwater permit was renewed, effective November 17, 2011. The NPDES Phase II program regulates discharges of stormwater to surface waters and requires control of TSS, fecal coliform, and nutrients town-wide. ➢ Developers must determine the nitrogen and phosphorus loading levels attributed to new development, and they must install BMPs to meet established goals. The Jordan Lake Watershed Rules are applied throughout the Town's jurisdiction. ➢ The pre-development peak runoff rate must be maintained for the 1-year, 24-hour storm. A Downstream Impact Analysis is required for sites that generate post development discharges greater than 10% of the pre-development discharges for the 2-, 5-, and 10-year events. This analysis requires identification of a point downstream where the impact becomes less than 10% and an analysis of what impact the increased discharge will have between the two locations. Mitigation of that impact is required. ➢ Runoff volume drawdown shall be a minimum of twenty-four (24) hours, but not more than one hundred twenty (120) hours. ➢ Street drainage pipe sizing must convey the 10-year storm event without surcharging into manholes or overtopping roads. For cross-street drainage, this increases to the 25-year storm, ➢ Impervious surfaces are limited in WSWs. For low-density development options without stormwater controls, the impervious surface limitations range from 12 % to 36 %. Per the NPDES Phase II permit, any new development that exceeds 24 % built upon area must implement storm water BMPs. ➢ Post-construction run-off controls are required for Walnut Creek, Middle Creek, and Crabtree Creek watersheds (High-density projects above 24% impervious surface must achieve 85% TSS reduction and control the 1-year, 24-hour storm event). ➢ The Town maintains a map of all structural BMP structures. ➢ The Town requires a financial security of 15 % of the total cost of the structure or the estimated cost of maintaining th structure for a 10 year period. ➢ The owner of each stormwater control structure shall submit a Maintenance Inspection Report annually. All Town-owned BMPs are inspected annually. ➢ The Town has an Illicit Discharge Detection and Elimination (IDDE) program, as a part of the NPDES Phase II permit. ➢ Street sweeping occurs once every 3 months, with main thoroughfares swept monthly. ➢ Cary has an active stormwater education program.
Open Space Preservation LDO Section 8. 2 and 8.3 Land Use Plans (Appendix D)	➢ Cluster-type development is encouraged to promote the development of the same number of housing units as conventional development but with a smaller footprint so as to preserve more contiguous open space. ➢ In the Southwest Area, a Conservation Residential Overlay District helps to protect open space and sensitive areas. ➢ New developments must set aside areas for recreation; up to 50% of this area requirement can be met with buffers. ➢ Land use plans and zoning direct more intense uses toward planned activity and employment centers; development densities are lower in the more rural southwest portion of the Town.

TABLE 6-3
Summary of Existing Local Programs and the Environmental Resources They Protect

Program	Terrestrial Habitat Protection	Aquatic Habitat Protection	Water Quality and/or Quantity Protection	Air Quality Protection	Noise Prevention
Open Space Plan	X	X	X	X	X
Land Use Plans	X	X	X	X	X
Land Development Ordinance and Zoning	X	X	X	X	
Transportation Planning				X	X
Parks, Greenways, and Bikeways Plan	X	X	X	X	X
Riparian Buffers and Floodplain Protection	X	X	X	X	X
Water Supply Watershed Protection	X	X	X		
Erosion and Sediment Control		X	X		
Stormwater Program and Impervious Surface Limitations		X	X		
Water Conservation		X	X		
Water Reuse		X	X		
Air Pollution Prevention				X	X
Tree Protection	X	X	X	X	X

6.2.1 Growth Management

6.2.1.1 Growth Management Plan

The Town Council adopted the Growth Management Plan on January 13, 2000 to help manage Cary's then-rapid growth (Clarion Associates, 2000). In the ensuing decade, the Plan served as a guide for the implementation of several important planning and zoning initiatives including the adoption and implementation of area plans to manage growth in rapidly developing west Cary, new zoning to create walkable mixed-use activity centers at major intersections, and the completion of a new set of site design standards that require pedestrian-friendly layouts for new commercial centers. Between 2007 and 2010, the town saw a natural slowing of growth due to the economic downturn; in 2012, state legislation was enacted that re-structured annexation laws, making town-initiated annexation-related growth unlikely. In 2013, the Town began an update to the Comprehensive Plan that, when complete in 2015, will reflect a more holistic planning approach – integrating growth management into future land use and transportation policies, and thus effectively replacing the 2000 Growth Management Plan.

TABLE 6-4
Growth Management Plan Tasks Implemented

Task
Identify a sustainable, long-term rate of growth (3 to 4 %) and develop suitable implementation mechanisms to ensure that the Town's infrastructure and services are not unduly burdened by new development.
Implement conservation and preservation of high-priority lands and open space to prevent the loss of the Town's most important natural resources, through direct acquisition by the Town and through support of private efforts.
Implement the parks and recreation element of the Cary Comprehensive Plan to ensure that sufficient park and recreation resources are available to serve new growth.
Enforce expanded buffer requirements (50 and 100 feet) to protect watershed and water quality.
Continue preparation of the Design Guidelines Manual to ensure that new development meets the Town's design standards.
Prepare a clear-cutting ordinance to preserve and protect trees and vegetation during the development process.
Monitor Cary's ultimate build-out population as new plans, policies, and regulations are adopted to ensure that the Town's ultimate size conforms with its growth management goals.
Amend the Unified Development Ordinance (UDO) to require higher minimum densities in preferred growth areas: – Amend the seven Planned Unit Development (PUD) requirements to ensure compatibility with surrounding land uses – Encourage or require cluster development to protect sensitive natural resources and open space on a site-specific basis – Locate and clarify vague and/or unclear development standards
Work cooperatively with landowners to develop PUDs so that the Town may more easily impose conditions on new development to ensure compatibility with surrounding land uses.
Pursue intergovernmental cooperative planning agreements to foster a regional approach to growth management.
Revisit the Land Use Plan to confirm previously identified areas for additional growth and to identify new areas where future concentrated development might occur.

6.2.1.2 Land Use Planning

Land use plans contain a town's official policy on the form and pattern of future development within its jurisdiction. These plans are used to direct growth by serving as a reference to guide Town staff and official boards as they develop new standards and ordinances and when considering rezoning, annexation, subdivisions, and site plans. The plans are also used to direct public infrastructure and aid decisions for private sector investment.

Cary's existing Land Use Plan was adopted in 1996, updated in 2009 (Town of Cary, 2009a) and has been amended several times to incorporate the following small area plans, shown in Figure 6-1:

- Northwest Cary Area Plan (adopted in 2002).
  - Included in this area are the Carpenter Community Plan (adopted in 2005) and Alston Regional Activity Center Plan (adopted in 2006, revised in 2012)
- Southwest Area Plan (adopted in 2004, revised in 2009)
- Town Center Area Plan (adopted in 2001)
- Southeast Area Plan (adopted in 1998, revised in 2004)
- Walnut Street Corridor Plan (adopted in 1998, revised in 2002)

- Northwest Maynard Activity Center Land Use Plan (adopted in 2006)
- Chatham-Cary Joint Land Use Plan (adopted in 2012)

Excerpts from the small area plans are included in Appendix D. Following is a discussion of the land use planning objectives for the Town and the small area plans.

Specific land use planning objectives established by the Town relate to managing growth to prevent urban sprawl, protect natural resources, and prevent environmental degradation. The Town is working to:

- Preserve open space.
- Promote and preserve trees, urban forests, and natural open space during development.
- Emphasize pedestrian-oriented development to achieve a comprehensive system of bicycle lanes, greenways, and sidewalks that connect to neighborhoods, parks, schools, offices, commercial areas, and other public spaces.
- Effectively manage long-term growth through a comprehensive and proactive planning process.
- Actively participate in regional planning efforts.
- Support effective zoning, land use, and development regulations and enforcement.

To achieve these goals, the Town has implemented zoning that directs more intense development to planned employment centers and designated walkable mixed-use activity centers. Lower-density development remains in areas closer to Jordan Lake to protect the drinking water supply and important habitat areas. The policies not only help protect the drinking water supply and habitat, but also help reduce air quality impacts by concentrating the population in areas near employment and commercial centers (Town of Cary, 2009a).

6.2.1.2.1 Northwest Area Plan

The Northwest Area Plan adopted on September 12, 2002 by the Town Council regulates development and land use for over 8,100 acres and establishes riparian buffers and critical areas in the watershed. Selected guiding principles of the plan are to minimize water quality impacts to Jordan Lake by balancing the amount of future development with the capacity of the ecosystem while accommodating higher-density growth near RTP and transportation corridors.

Open space corridors that follow Kit Creek, Panther Creek, Morris Branch, and Nancy Branch are recommended to be wider than otherwise required to accommodate a multi-use path. The plan recommends 140- to 160-foot wide riparian buffers, which is beyond the required 100-foot buffers, and recommends impervious surfaces in new developments be limited to 12 percent in the watershed without stormwater controls. The plan recommends higher-density development in proximity to RTP to encourage shorter commuting, as well as trails to RTP for alternative transportation. Lower-density development is planned near Jordan Lake to protect the drinking water supply (Town of Cary, 2006). Through the rezoning process, the Town has

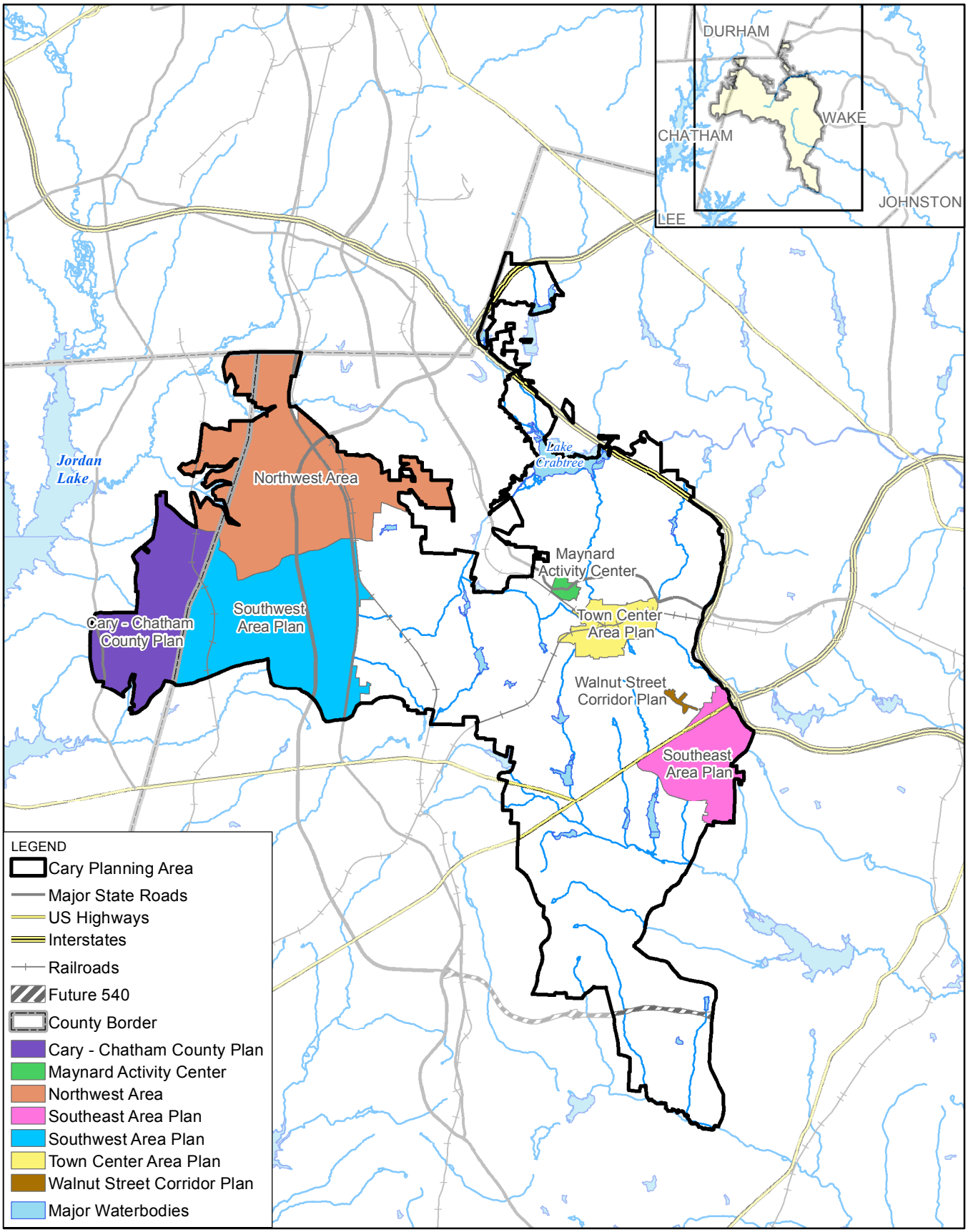

FIGURE 6-1
Small Area Plans
2015 Secondary and Cumulative Impacts
Master Management Plan - Town of Cary

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acquired land for several parks, including a future New Hope Church Rd trailhead, adjacent to the American Tobacco Trail (ATT). Open space and greenways are also preserved through land dedication in new subdivisions (Town of Cary, 2002a).

6.2.1.2.2 Carpenter Community Plan

On September 8, 2005, the Town Council adopted the Carpenter Community Plan (CCP) as an amendment to the Northwest Area Plan, constituting a neighborhood-scale implementation of the Land Use Plan. One of the main objectives of the Plan is to protect the community's historic and natural resources while revitalizing the Carpenter crossroads area as a destination focus area. The prevalence of areas designated as low-density residential provides greater opportunities for creative designs to preserve open space and protect the historic resources that are vital to the rural character of Carpenter. The Plan also calls for 100-foot open space buffers along key thoroughfares, plus retention of most of the farm ponds in the area.

The CCP applies to 475 acres in the northwestern section of the Town south of a future section of McCrimmon Parkway (south of the existing Old Maynard Road) and north of Morrisville Parkway. The plan boundary extends eastward of NC Highway 55 to just beyond the future Louis Stephens Drive (Town of Cary, 2005).

6.2.1.2.3 Alston Regional Activity Center Concept Plan

The Northwest Area Plan called for a mixed-use regional activity center at this location. In 2006, the Town Council approved a detailed Concept Plan and Overlay District for the Alston Regional Activity Center, which is located around the interchange of NC 55 and NC 540. The Alston Regional Activity Center Concept Plan (ACCP) created and applied specific design standards over the entire Overlay District, including requirements for wider open space buffers along Nancy Branch and Morris Branch within the ACCP. The design standards effectively codified a requirement for 140- to160-foot buffers on either side of these two perennial streams within Alston. The ACPP was amended in 2012 to include a more general mixed use design standard, used with main streets found in the Town Center, Neighborhood Center, and Special District Design Zones (Town of Cary, 2012b).

6.2.1.2.4 Southwest Area Plan

The Southwest Area Plan was adopted by the Town Council on August 12, 2004. The southwest area of the Town is closer to Jordan Lake and farther from higher growth areas such as RTP. While the northwest is expected to have development associated with RTP, the Southwest Area Plan emphasizes environmental protection, lower development density, and preservation of rural land patterns.

Open space corridors are fundamental concepts in the Southwest Area Plan. These include a segment of the American Tobacco Trail (ATT) corridor within Wake County, proposed Cary greenway corridors, and a multipurpose trail paralleling NC Hwy 55. In 2005, the Town Council implemented a recommendation of the Southwest Area Plan by adopting the Conservation Residential Overlay Zoning District for a large portion of the southwest area. Properties falling within one of the three sub-districts of the overlay zone could receive density bonuses in return for preserving open space. In 2009, based on several years of staff experience in applying the concepts, Town Council adopted refinements to the Conservation Residential Overlay Zoning District that condensed the overlay district from three to two designated sub-districts: 1) The Conservation Residential, Very Low Density (VLCR) sub-district, where if a site is developed using conservation subdivision design principles, density may increase up to a maximum of 1 unit per acre, with lot sizes ranging from 20,000 square feet,"and 2) The Conservation Residential, Low Density (LCR) sub-district, where if a site is developed using conservation subdivision design principles, density may increase up to a maximum of 2.5 units per acre, with lot sizes ranging from 10,000 square feet." Other 2009 Plan amendments included changing one of the guiding principles of the plan from "preserving rural character" to "preserving open space and environmental resources," increasing the maximum density recommended for the Very Low-Density land use category, and recommending an increased amount of bonus open space required for dwelling unit bonuses (Town of Cary, 2009b).

6.2.1.2.5 Town Center Area Plan

The Town Council adopted the Town Center Area Plan in August 2001 to provide a long-range master plan for downtown Cary and its neighborhoods. The plan provides recommendations for the long-term pattern of land uses, development and redevelopment, transportation, housing, and parks and greenways. The Town Center Area Plan was needed to encourage a vital downtown at the heart of the community, address pressing traffic concerns, and prepare for the development that commuter rail service may spur. The Capital Area Metropolitan Planning Organization (CAMPO) 2035 Long Range Transit Plan, released in May 2009, envisions a downtown Cary station as part of a light rail system that would begin in 2025, linking Raleigh, Cary, Morrisville, RTP, and Durham.

Some of the guiding principles of the Plan are to encourage a diverse mix of business, office, institutional, recreational, open space and residential uses; encourage pedestrian-friendly development within walking distance of the regional transit station at sufficient densities to support the station and downtown businesses; develop a multi-nodal transportation system; encourage re-development of declining residential properties and neighborhoods; and provide sufficient park and open space facilities to serve residents and visitors (Town of Cary, 2001).

6.2.1.2.6 Southeast Area Plan

The Southeast Area Plan was adopted in 1998 for portions of the Walnut Street corridor and the vicinity of the Crossroads Plaza shopping center and was revised in September 2004. The Plan covers over 2,000 acres in the southeastern portion of the Town's Planning Area. Selected guiding principles of the Plan are to balance the amount of future development with the extended capacity of the planned transportation system; plan for a highly connected multi-modal transportation system; provide sufficient park and open space facilities; and focus the higher-intensity land uses into mixed-use, pedestrian- and transit-

friendly "activity centers" to minimize the number and distances of vehicle trips and promote alternative transportation modes.

A transportation network analysis was performed using the new regional transportation model to model the capacity and performance of the proposed arterial and collector roadway system (Town of Cary, 2004).

6.2.1.2.7 Walnut Street Corridor Plan

The Walnut Street Corridor Plan was developed in conjunction with the Southeast Area Plan to provide special consideration to roughly 50 acres along Walnut Street between Ivy Lane Rd and Kingston Ridge Road, west of U.S. Highways 1 and 64. The plan involved preparing site-specific design standards for redevelopment and zoning districts (Town of Cary, 2002b).

6.2.1.2.8 Northwest Maynard Activity Center Land Use Plan

The Northwest Maynard Activity Center Land Use Plan, adopted in 2003 and amended in 2006, was developed for the area around the intersection of Chapel Hill Road and Northwest Maynard. The intent of the plan is to create a concentrated node of development that contains a mix of shopping, office, and institutional uses and high- or medium-density housing (Town of Cary, 2006).

6.2.1.2.9 Chatham-Cary Joint Land Use Plan

In response to increased growth and development pressure in the area located east of Jordan Lake in Chatham County, the Town Council and the Chatham County Board of Commissioners adopted the Chatham/Cary Joint Land Use Plan in June 2012. The Plan covers over 18,000 acres in an area bounded by the Town of Cary on the east, Durham County on the north, White Oak Creek on the south, and Jordan Lake on the west. By guiding and limiting future development and infrastructure improvements, the Plan aims to maintain the rural character of most of the area, while still accommodating a limited amount of suburban growth in the area closest to RTP. The Plan includes a land use map that designates land use categories and densities. In general, outside of the approximately 60,000 acres controlled by the USACE, most of the planning area is envisioned as remaining residential in nature (with provisions for civic and institutional uses). The Plan Map, found in Appendix D, includes a Rural Buffer Boundary line running north-south through the planning area. This line is used to indicate the limits of where public utilities (water and sewer) may be extended to serve future growth. Very low-density residential development is planned on the west side of the boundary where public utilities would not be available, and higher residential densities or mixed use development is envisioned on the east side of the boundary where public utilities may be provided. The land use categories can be broken down by acreage as follows:

- Approximately 7,622 acres are designated for very low-density residential (defined as up to one dwelling unit per acre) in the mile east of Jordan Lake, and in several places well beyond the mile point.
- Approximately 2,900 acres are designated for low-density residential (up to two dwelling units per acre) in the area located roughly between NC 751 and the Wake County Line.

- Approximately 370 acres are designated for medium-density residential (up to four dwelling units per acre) in the area closest to the Wake County line – an area in and around the existing Amberly Planned Development, bounded on the north by O'Kelly Chapel Road and on the south by New Hope Church Road.
- Approximately 120 acres are designated for non-residential or "mixed" uses, which reflects a couple of small existing commercial and industrial uses, and a possible future "mixed-use" node around the intersection of NC 751 and Holland's Chapel Road/Lewter Shop Road. The Plan defines mixed-use as an area where a mix of commercial, office, and higher-density residential uses could be accommodated in a cohesive and pedestrian-friendly design.
- Approximately 486 acres are designated for open space uses: an existing golf course and planned parks and natural areas.
- Approximately 556 acres are in road rights-of-way.

The Plan recommends that areas west of the Rural Buffer Boundary Line not be eligible to receive public sewer or water utilities regardless of provider (public or private), except in some cases when a property has a failed private system and needs "rescuing." The Plan states that properties on the east side of the boundary line may be eligible to receive public water or sewer utilities from the Town of Cary. The general policy of the Town of Cary is to require property owners to request annexation as a condition of utility service, and to require property owners to construct utility extensions to Town standards.

The Plan was adopted by Chatham County and the Town of Cary to guide development and policy for this area for the next 20 years. The Plan will be used by both the Town and the County in making decisions on subdivision and zoning/re-zoning requests, and in the Town's case, for making utility extensions and ruling on annexation requests. By interlocal agreement, any amendments to this plan will require approval of both Chatham County and the Town of Cary (Town of Cary, 2012a).

6.2.2 Open Space Preservation

One of the goals of the Town is to develop an interconnected open space system. The Town has several programs to preserve open space. These include an open space plan and initiatives, land use plan, the LDO, and the PRCR. Each of these initiatives is described below.

To achieve this goal in an urbanizing area, the Town negotiates open space preservation during the development review process. Riparian buffers and protected floodplains, as described later in this section, also serve to connect open space.

The framework for the open space program was established by the Open Space and Historic Resources Plan (OSHRP), adopted in 2001 and renamed the Open Space Plan (OSP) in 2010, upon the adoption of the Historic Resources Master Plan which replaced the historic resources portion of the original OSHRP. The open space program is implemented through the PRCR Master Plan, which is discussed below. Because the OSP framework remains relevant, it is included for discussion here.

6.2.2.1 Open Space Plan (OSP)

The OSP guides the process of identifying and protecting the Town's natural resources, historic areas, and other special environmental and cultural features (Ecoscience Corporation, 2001). The purpose of the Plan is to identify, evaluate, and prioritize resources; establish preservation goals; and guide the implementation of the open space program.

Preparation of the OSP included coordination with North Carolina Wildlife Resources Commission (NCWRC), state parks, USACE, Wake County (Parks and Planning), resident input, non-profit organization input, and other applicable state, federal, and local agencies for lands around Jordan Lake, Crabtree Creek, and Umstead State Park. By working with other agencies, the Town was able to ensure that its plans would result in interconnected open space with other planned open space lands. The Town uses the OSP and subsequent plans for guidance on working with these and other agencies to jointly preserve open spaces in these areas.

Goals of the OSP are to:

1. Create an interconnected system of preserved open spaces.
    - Conserve a contiguous network of open, natural areas – a green infrastructure.
    - Create trail corridors and greenways between open space areas.
    - Create efficiency of scale for land management.
    - Provide recreational and educational benefits to residents.
2. Protect environmentally significant areas.
    - Conserve contiguous forests.
    - Protect wildlife corridors.
    - Protect habitat and species diversity.
    - Protect significant natural features.
    - Preserve wetlands and stream buffers.
3. Protect cultural resources.
    - Preserve historic landscapes that reflect rural heritage of the area.
    - Protect working farms.
    - Preserve viewsheds and scenic vistas that provide relief from the built environment.
4. Inform resource landowners about the values, benefits, and opportunities of preservation.
    - Encourage resource landowners to do long-range planning for their land.
    - Provide technical assistance and preservation incentives to resource landowners.
    - Keep landowners informed of preservation programs and opportunities.

The Town Council budgeted $12.5 million in fiscal year (FY) 2002 to begin implementation of the OSP. The Town has used much of this funding as matching funds on grants to maximize the amount of land they can protect. The Town Utility Fund allows approximately $1 million per year to be used as matching funds for open space preservation. In May 2005, the Town held a successful bond vote for $10 million to acquire open space. In November of 2012, the Town held a successful bond for $16 million for Parks and Recreation. This bond allows for

implementation of the Town's Parks and Recreation Master Plan, including greenway projects that will preserve open space and promote interconnectivity, discussed later in this section.

The Town would also like to protect agricultural land within its Planning Area. Thus, it has included farms in the Plan to try to protect these areas as open space. Farm protection programs to help preserve these areas as open space also reside at the County level; these programs include tax incentives for farmers and the creation of Voluntary Agricultural Districts as described in Appendix B.

6.2.2.2 Land Use Planning

Much of the Town's Land Use Planning goals involve the natural environment, including the preservation of open space, the promotion and preservation of trees, urban forests, and natural open space during development, and the emphasis on pedestrian-oriented development including a comprehensive system of bicycle lanes, greenways, and sidewalks that provide connectivity. The list of small area plans also shows how land use planning at the smaller scale aids in the set aside of open spaces. Further detail was included previously in this section.

6.2.2.3 Historic Preservation Master Plan

The Town adopted a Historic Preservation Master Plan in May 2010, which replaced the historic preservation component of the OSHRP. The plan synthesizes existing preservation efforts and recommends actions for further integrating historic preservation into Town policies (Town of Cary, 2010).

The goals of the plan are:

- Establish fair and effective processes and policies for preservation
- Preserve and protect the Town's historic structures
- Preserve historic context
- Raise awareness of historic preservation
- Document, preserve, and share the Town's culture & heritage

The preservation of historic buildings not only protects the open space on that property, but also reduces waste in landfills. An example of historic and open space preservation is the Bartley Homestead, a 50-acre parcel purchased by the Town in 2000, for re-use as a park and community center. Another example is the AM Howard Farm, 50 acres of farmland and historic structures, purchased by the Town in 2008, with plans to develop a neighborhood park and also have an area focusing on the area's agricultural history and farming practices.

6.2.3 Land Development Ordinance

The Town's LDO includes key growth management tools and revised environmental protection regulations. It took effect on July 1, 2003 and has been amended as needed since then. The LDO's key mitigative components are summarized below:

- Identify as activity centers preferred growth areas that contain existing or planned concentrations of employment, housing, shopping, and recreational opportunities.

- Focus higher-density residential and nonresidential development in an around these preferred growth areas.
- Add new language to the LDO to enhance interconnections of sidewalks, trails, multi-use paths, and bike lanes across all land uses and new subdivisions in an attempt to increase alternative transportation options.
- Continue implementation of design guidelines that control building location, placement, orientation, and retention; and improve integration of existing onsite natural resources like streams, wetlands, tree protection areas, and other natural features.
- Expand the number of parcels and total amount of area zoned for recreation and resource conservation uses with a renewed emphasis on preservation of natural resources and limited development. Modify the range of permitted uses to allow low-intensity recreational and governmental uses.
- Strengthen tree preservation provisions, including incentives to prevent clear-cutting on vacant parcels prior to development.

As part of the LDO, new subdivisions are required to set aside riparian buffers, setbacks and perimeter buffers as natural open space, but these cannot exceed 50% of the total open space area. As outlined in LDO Section 8.2 (Appendix F), additional land or a fee in lieu must be set aside to meet the recreational needs of the community, which may include parks and greenways. In the case of different adjacent land uses, the Town may require additional plantings in the perimeter buffer.

The Town's LDO allows for cluster development, outlined in LDO Sections 4.4.6(H) and 8.3 of LDO (Appendix F). The intent of the Cluster Development Ordinance is to develop less land area while allowing the same number of housing units allowed under a conventional development. This allows the Town to minimize imperviousness on a given development site, protect open space, and protect other important features identified in the PRCR Master Plan. In another effort to minimize imperviousness, the LDO requirements for retail parking space were reduced following a 2011 parking utilization study in order to encourage mass transit and further reduce total impervious area.

Additional LDO measures affecting water quality and quantity include more stringent post construction runoff controls for the Walnut Creek, Middle Creek, and Crabtree Creek watersheds. The LDO also requires the calculation of peak flow and downstream impact analysis for the 2-, 5-, and 10-year storm peaks from each discharge point and mitigate the peak discharge to pre-development conditions.

In September 2005, the Town adopted and applied a Conservation Residential Overlay District (outlined in Section 4.4.3 of the LDO) for much of the Town's southwest planning area, which allows for residential density bonuses in the southwest planning area in return for preserving additional useable open space or for preserving certain historic structures. In March 2009, the Town adopted significant amendments to this overlay district to make it simpler and more user-friendly. Additionally, the amendments changed the method by which density bonuses are awarded in exchange for open space so as to 1) gain higher quality open space, 2) ensure more open space contiguity, and 3) increase the amount of open space required for dwelling unit bonuses.

In August 2012, upon staff's completion of the Site Design Standards Project, Town Council amended the LDO to incorporate new site design requirements for commercial development, while an associated Site Design Standards Document illustrates ways to achieve the requirements. Included in the new site design standards are new pedestrian and vehicular circulation requirements that have potential for mitigating the impacts of new development.

6.2.4 Parks, Recreation, and Cultural Resources Master Plans

The Town of Cary, the Town of Morrisville, and Wake County have been working together as well as with the Triangle Land Conservancy, the Triangle Greenways Council, and the North Carolina Division of Parks and Recreation (Trails) to ensure connectivity of their greenways and other trails on a regional basis. The Town describes its greenways as linear parcels of land set aside to preserve open space and connect open space and park areas.

6.2.4.1 Parks, Recreation, and Cultural Resources Master Plan

The Town adopted its PRCR Master Plan in 2012. This Master Plan contains recommendations that were shaped through an extensive public and stakeholder input process and needs assessment. The PRCR Master Plan provides a vision for the shaping of parks and recreational opportunities in the Town for the next two decades, with a focus on recommendations for the first 10 years.

There are a total of nine goals and 51 objectives affiliated with these goals, as well as Capital Improvement Priorities identified for the short, mid- and long-term. Goals of the plan include (1) maintain a diverse and balanced park and open space system as the Town grows, and (2) provide residents with a highly functional, safe, well-maintained greenway network that provides recreation, transportation, and education opportunities as well as wildlife benefits.

6.2.4.1.1 Greenways and Pedestrian Corridors

The Town currently has 70 miles of existing greenway, which is an increase of 50 miles since the 2003 Parks and Recreation Master Plan (GreenPlay, LLC, 2012). The master plan also includes over 200 miles of planned greenways, reflecting a progressive and comprehensive planned Greenway Trail Network. This Network includes approximately 144 miles of greenways, 55 miles of street-side trail, and eight miles of sidewalk connectors. Some of the key trail connections include the following.

American Tobacco Trail – The ATT is an over 22-mile trail that runs north/south from downtown Durham to New Hill. The ATT has been designated as part of the East Coast Greenway, a vision for a 3,000-mile trail that links Maine to Florida. There are plans to link the Town's greenways with the ATT as well as trails at Umstead Park, Lake Crabtree, and Lake Johnson. There is a continuous trail from Bond Park to Crabtree Lake and Umstead State Park, a distance of approximately 7 miles. The Town is coordinating with the Town of Apex and Wake County to complete the White Oak Greenway which will connect to the ATT and is expected to be complete in 2016. The Town's other planned connection is with the Panther Creek Greenway. Cary is actively working on these connections and expects to have these greenway connections complete by 2016.

East Coast Greenway – The East Coast Greenway is similar to the Appalachian Trail, but is envisioned to be a predominantly off-road trail suitable for bicycles and walkers. The routing of the East Coast Greenway leaves the ATT and connects with the Town's White Oak Greenway. While the Town has invested in the design of this connector, the project is within the Town of Apex's jurisdiction. Discussions are ongoing regarding this connector.

Mountains–to-Sea Trail – The Mountains-to-Sea trail extends from Murphy in the western-most part of the state to Manteo on the coast. This trail is intended to be predominantly a hiking trail similar to the Appalachian Trail. Cary connections to the Raleigh greenway system will enable users to also connect to the Mountains-to-Sea trail.

The Town has a process established to allow developers to receive credit for constructing greenways. More than 10 miles of greenway have been built using this process, at a value of over $5 million. There are an additional 20 developer-built greenway projects planned for construction totaling 15 miles of greenway.

The Town's short-term and mid-term CIP appropriates almost $40 million to greenway improvements and connections. The Town has used some of the funding to complete the design of five greenway and stream restoration plans for major greenway corridors (White Oak Creek Phase V, Green Level, Swift Creek Greenway Phase III, Higgins Greenway Phase III, and Lower Williams Greenways). The West Cary Stream Restoration project includes the design and implementation of stream restoration and/or stabilization measures at five different locations along the White Oak Creek Greenway. The project was designed and is being constructed by the USACE, and was primarily funded through its Section 206 Aquatic Ecosystem Restoration program.

Greenways must be constructed in a manner that allows passage of emergency vehicles when needed. Greenways are allowed in the outer zones of the riparian buffer, but are designed and located to minimize disruption to the buffer and to protect the water quality and habitat functions of the buffer. The Town will acquire land needed for the greenway system through easements and acquisition at the time of site development. Land acquisition will be in accordance with the PRCR Master Plan. Landowners will be compensated by the Town at fair market value.

6.2.4.1.2 Parks and Open Space

The Town is home to approximately 2,500 acres of combined parks, recreation areas, open space, greenways, and cultural arts facilities to serve its residents. Cary currently has 22 public parks, 1 nature preserve that includes a nature center, 4 special-use facilities, and 8 staffed facilities that provide a variety of programs and services for all ages. From recommendation in the November 2012 PRCR Master Plan, the Town's current CIP includes approximately $50 million allocated in the short-term for acquisition, and development of parks and greenways. These projects can be funded by grant funding, bond funding, or through partnerships like the one developed with USA Baseball for Phase II of the Thomas Brooks Park.

The 2012 PRCR Master Plan proposed a new standard of 11.1 acres of parkland per 1,000 residents. An additional 402 acres of parkland is the projected need to meet the new proposed standard by 2020. The Town currently has 8.8 developed park acres per 1,000

residents. Currently, the Town has 1,200 acres of developed parkland and 1,306 acres of undeveloped parkland.

The White Oak Creek Conservation Area, which has been a partnership between the Town of Apex and Wake County, was included in the Southwest Area Plan as a conservation corridor, because of its significant extent of adjacent wetlands and floodplain, and because it represents a major greenway corridor. The project includes several properties adjacent to the Batchelor Branch Greenway which links with Thomas Brooks Park.

In addition to the Town parks, Section 8.2 of the LDO (Appendix F) requires new development to set aside area for recreation. Up to 50 percent of this requirement can come from riparian buffers, but additional land must be set aside to meet the recreational needs of the community.

6.2.4.2 November 2012 Bond Referendum

In November 2012, the Town passed a $15.86 million Parks and Recreation community investment bond. Funds were appropriated for the following projects:

- **Bartley Park** - a 50-acre tract, purchased by the Town in 2000, on the south side of Penny Road near Holly Springs Road. A master plan for this site was adopted by Council in 2004.
- **Carpenter Park** - an approximately 16-acre parcel, purchased by the Town in 2007, designated as a future neighborhood park. The parcel is located on the south side of Morrisville Carpenter Road and the east side of Louis Stephens Drive. This project should be completed in 2015.
- **Downtown Park** - This project includes the development of a downtown park to be located on Town-owned land bounded by South Academy Street, East Park, Walker, Walnut, and Kildaire Farm Roads. Construction is expected in 2015.
- **Mills Park** - In January 2000, the Town purchased the 240-acre Hawes tract, located in west Cary on Green Level Church Road and in close proximity to Cary Park. The current park, a joint-use facility with Wake County Public School System located in west Cary, includes three multi-purpose fields, a softball field, a running track, and basketball courts. The next phase of Mills Park will develop an additional 5 acres of the existing 118-acre park. Mills Park is adjacent to the Mills Park Middle and Elementary Schools, which are located west of NC 540. Construction is expected to be complete in 2017.
- **Panther Creek Greenway** - This project provides funding for the design, engineering, and construction of approximately 1.5 miles of the Panther Creek Greenway that will extend from the Cameron Pond Planned Development District (PDD) to Cary Park Lake. Construction is expected to be complete in 2017. The proposed 4.9-mile long Panther Creek Greenway is to extend from Highway 55 to the ATT, ultimately linking together three parks, two schools, and seven other greenways. The project includes construction of the 0.3-mile Mills Park Greenway that connects Panther Creek Greenway to Mills Park Elementary and Middle Schools, as well as to Mills Park.

- **Sports Turf Fields** - The project is to install two sports turf fields (synthetic turf) with lighting for night play on existing natural grass fields. Mills Park and Middle Creek Park are designated to receive the new turf fields. Construction is expected in 2015.
- **White Oak Creek Greenway** - This project consists of completing the last two missing segments of the White Oak Creek Greenway. Once these connections are completed, this 7.3-mile trail will connect Bond Park to the ATT.
  - The first segment includes trail construction from Green Level Church Road to the ATT, a distance of approximately 2 miles. This section of greenway will consist of an asphalt trail and a series of boardwalks; construction is anticipated to begin in 2015.
  - The second segment, 0.4 mile from MacArthur Drive to Davis Drive, includes the design and construction of a grade-separated trail crossing over a CSX rail line and Davis Drive. This segment of trail will pass through Davis Drive Park, which is located between the rail line and Davis Drive. Construction may begin by 2016.

6.2.4.3 Center of the Region Enterprise (CORE) Pedestrian- Bicycle-Green Space Plan

Regional plans include the CORE Pedestrian-Bicycle-Green Space Plan developed by the Triangle J Council of Governments in February 2013. According to this plan, the CORE area currently has 153 miles of pedestrian facilities, primarily mixed-use greenways and trails, and 191 miles of planned pedestrian facilities yet to be built. The plan also identifies the following pedestrian corridors as top priority in the Core Area, portions of which are within the Town's jurisdiction:

- Davis Drive, a key north-south spine in the CORE pedestrian network.
- White Oak Creek Greenway, linking Umstead State Park, Lake Crabtree County Park, and the ATT. This is a major regional opportunity which, when completed, will help link Raleigh and Durham by multi-use trails, providing significant local and regional recreation opportunities.
- Crabtree Creek Greenway, a key east-west link that connects Umstead State Park and Lake Crabtree with Davis Drive and significant existing pedestrian facilities in RTP and Durham.

6.2.5 Riparian Buffers and Floodplain Protection

6.2.5.1 Riparian Buffers

The Neuse River NSW rules and the Jordan Rules require that existing riparian buffer areas be protected and maintained on both sides of intermittent and perennial surface waters. These rules, which are incorporated into Section 7.3.2 of the Town's LDO, require 100-foot-wide buffers on all perennial and intermittent streams indicated on the most recent version of a USGS quadrangle topographic map. The inner 30 feet of these buffers is forested, and the outer 70 feet is vegetated; allowed uses are in accordance with the Neuse riparian buffer rules (15A NCAC 2B. 0233). All other surface waters in the Town indicated on the Soil Survey for Wake County are required to have 50-foot-wide riparian buffers (30-foot forested and 20-foot vegetated). Single-family lots created through a site and/or subdivision plan cannot be platted into the riparian buffers.

The Wake County Soil Survey maps and USGS topographic maps do not include accurate depictions of streams. To help address this issue, the Town delineated all streams within the Maynard Loop, an area of high development. In addition, the Town has delineated streams for some other smaller developments. For large parcels, the Town requires the developer to delineate waters. NCDWR's methodology to determine whether a stream is present is followed. In the Neuse River basin, where conflicts exist between actual field conditions and USGS and Soil Survey maps, appeals are submitted to NCDWR. In other portions of the Town, appeals may be submitted to the Town Manager. The Town has found that the maps typically show more streams than actually exist, and thus provide a conservative approach to implementing its buffer ordinance.

Section 7.2.1 of the LDO establishes three zones of the riparian buffer. Zone 1 (the inner 30 feet) has severe development restrictions (undisturbed forested buffer), Zone 2 (the next 20 feet) has strict development restrictions (must be vegetated, but grading can occur), and Zone 3 (the outer 50 feet) has moderate development restrictions (must be vegetated; the Town may allow minor variances in Zone 3 since it is outside NCDWR's jurisdiction). In general, these restrictions are based on development allowed by the Neuse riparian buffer rules (15A NCAC 2B. 0233). Since the Town does not allow residential lots to be platted in the buffers, the undisturbed zone is often wider than what is required under the riparian buffer ordinance. Open space corridors often provide additional area to riparian buffers. Examples are the open space corridors that follow Kit Creek, Panther Creek, Morris Branch, and Nancy Branch in the Northwest Planning Area. These corridors are approximately 400 feet wide on average. The Neuse buffer rules and the riparian buffer ordinance do not require that riparian buffers be restored where they no longer exist. However, the Town's ordinance requires that, when the land use is modified, the riparian buffer be restored to the maximum extent practicable.

6.2.5.2 Floodplain Development Regulations

The Town's floodplain ordinance, Section 7.5 in the LDO, has prohibited any residential development in the 100-year floodplain since 1978. This includes prohibiting development where the first floor elevation is above the 100-year floodplain. The Town's LDO requires that all residential lots platted after May 2001 be platted outside of floodplains and stream buffers. New construction or substantial improvements to any residential structure must be located outside the flood hazard area, and the lowest floor must be at least 2 feet above the base flood elevation. The Town allows non-residential development in floodplains if the first floor is 2 feet above the floodplain elevation, but only through a special-use permitting process that discourages most development from occurring in the floodplain. The Town averages less than one Special Use Permit each year that allows commercial development in the floodplain. In fact, the only permit in recent years has been issued for the Town to build a boathouse for recreational purposes. No encroachment, including fill, is allowed in the floodway unless a Special Use Permit is issued.

Very little property damage has occurred in the Town as a result of flooding because these strict regulations have kept most development out of the floodplains. Some nuisance flooding (e.g., over roads) has occurred. To address this, the Town adopted an amendment on August 12, 1999, now incorporated into its LDO, requiring delineation of "backwaters" (areas where floodwaters back up onto adjacent lots where culverts, pipes, or bridges restrict heavy stormwater flows). Such delineations are used to ensure that structures are

located away from "backwater" areas to prevent flooding problems at culverts in subdivisions and also to prevent floodplain areas from being used to meet minimum lot size requirements.

According to the LDO, if the base flood elevation is unknown, no encroachments, including fill, new construction, substantial improvements, or new development, shall be permitted within a distance of the streambank equal to five times the width of the stream at the top of the bank or 20 feet from each side from the top, whichever is greater. Otherwise, LDO Section 7.5.2 specifies when a study is needed to identify floodplains where none were noted on a FEMA Floodplain Map. The Town requires a floodplain study when a development has a significant watercourse that has a proposed contributory drainage area of 50 or more acres. The study must be performed by a qualified professional and must be signed and sealed, and determines the flooding limits associated with the 1 percent annual flood occurrence.

As seen in Section 7.5.2 of the LDO, the Town requires a floodplain development permit application and may require an engineering study to determine that there will be no adverse impact from any work in the flood fringe area of the Special Flood Hazard Area. Section 7.5.3 clarifies whether a structure is a pre-FIRM or post-FIRM structure and includes impacts to both the Special Flood Hazard Area and Future Conditions Flood Hazard Area.

FIRMs for the Neuse and Cape Fear River basins in Wake County, currently dated April 2007, are in the process of being updated and are expected to be available for public review in 2014.

6.2.6 Water Supply Watershed Protection Regulations

A large portion of the Town (49 percent) is within the Jordan Lake and Swift Creek WSWs. The Town developed watershed protection overlays and limitations on impervious surface areas and density associated with these areas (see Section 4.4.6 of the LDO). There are two development options in the watershed protection overlay—a low-density and a high-density option, each with different provisions related to either the Swift Creek watershed or the Jordan Lake watershed.

Jordan Lake is classified as WS-IV waters. WS-IV generally represents a large river or lake water supply. The entity using the water supply usually does not have control over a large area of the watershed; for this reason, there is a state WSW Protection Program. The Jordan Lake water supply protection regulations recognize two subareas: the Critical Area and the Protected Area. A small "critical area" near the water supply intake can be protected, and the water requires a high degree of treatment. Municipal and industrial point source discharges are allowed in WS-IV waters. The area defined as a WS-IV protected area extends 5 miles from the normal pool elevation of Jordan Lake (i.e., 216 feet above mean sea level).

Section 4.4.6 of the LDO includes a low-density option for development in the Jordan Lake watershed. This option is 2 dwelling units per acre and 24 percent impervious surface limitations, or 3 dwelling units per acre and 36 percent impervious surface limitations for projects containing streets built without curbs and gutters. In the Jordan Lake Watershed Critical Area, non-residential and single-family residential developments cannot exceed 24 percent impervious surfaces and 2 dwelling units per acre. For the high-density development options, engineered stormwater controls are required to control runoff from the first inch of

rainfall, and development cannot exceed 50 percent impervious surface in the Jordan Lake Watershed Critical Area or 70 percent in the Jordan Lake Watershed Protected Area.

Swift Creek is classified as WS-III waters. WS-III is a common designation for lakes and streams that are used for water supply but have significant activity in the watershed, with some control over the extent of development and discharges in the drainage area. Municipal and industrial point source discharges are not allowed in WS-III waters, but public water and sewer collection lines and facilities are allowed. The Swift Creek regulations (Section 4.4.6 of the LDO) recognize three subareas—new suburban, new urban, and existing urban development. Table 6-5 illustrates the LDO limits for the low- and high-density development options in the Swift Creek watershed. These options are in line with the Swift Creek Land Management Plan developed by the County and local governments with jurisdiction in the Swift Creek watershed in 1988 (Appendix F).

TABLE 6-5
Summary of Development Options in Swift Creek Watershed

New Suburban		New Urban		Existing Urban
Residential	Non-Residential	Residential	Non-Residential	Residential and Non-Residential
Low-Density				
2.5 dwelling units per acre not to exceed 12% impervious surface	Not to exceed 12% impervious surface	6.0 dwelling units per acre east of Holly Springs Road, greater than 6.0 units west of Holly Springs Rd., not to exceed 12% impervious surface	Not to exceed 12% impervious surface	Not to exceed 12% impervious surface
High-Density				
2.5 dwelling units per acre not to exceed 30% impervious surface	Not to exceed 30% impervious surface	6.0 dwelling units per acre east of Holly Springs Road, greater than 6.0 units west of Holly Springs Rd., not to exceed 70% impervious surface	Not to exceed 70% impervious surface	Not to exceed 70% impervious surface

6.2.7 Erosion and Sediment Control

The Town has a delegated Local Program for enforcement of the state's Soil Erosion and Sedimentation Control standards. Section 7.4 of the LDO presents the Town's erosion and sedimentation control requirements as well as those from the NPDES Stormwater General Permit (NCG 010000) for construction-related activities. Erosion and sediment control plans must be submitted for most properties that disturb over 12,000 square feet of land. However, single family homes may disturb up to 1 acre without obtaining a permit. The Erosion and Sediment Control Program has eliminated a substantial amount of sediment transport to local streams.

The six basic control objectives for the Town's Erosion and Sediment Control Program are listed in Table 6-6.

TABLE 6-6
Six Basic Control Objectives of the Town of Cary's Erosion and Sediment Control Program

Objective	Description
Identify especially vulnerable areas that are subject to severe erosion and ensure they receive special attention	For example, avoid steep slope areas
Limit time of exposure	Maximum time of exposure is 7 calendar days for slopes (14 calendar days for non-slopes)
Limit exposed area	Plan and conduct activities to minimize the size of the area to be exposed at any one time
Control surface water	Control surface water originating upgradient of exposed areas to reduce erosion and sediment loss during the exposure period
Control sedimentation	Prevent offsite damage from sedimentation
Manage stormwater runoff	Control the velocity at the point of discharge to minimize accelerated erosion of the site and increased sedimentation to the stream

The Town's sediment and erosion control practices support an overall stream protection plan by limiting in-stream suspended sediment and sediment deposition. Sediment and erosion control plans are to use the proven latest technology related to erosion and sediment control practices. The erosion and sediment control strategy is discussed at a pre-construction conference through the permit and plan approval process. This process also allows for the review of stormwater controls. The Town may require more stringent controls than are outlined in its ordinance by making them a condition of development plan approval. The Town has used this authority to require shorter time frames for reseeding, phasing of construction, and the use of control devices.

The Town does not allow any land-disturbing activity near a lake or natural watercourse unless erosion and sedimentation control measures are present. An undisturbed buffer may be used, provided the undisturbed zone has sufficient width to confine visible siltation within the 25 percent of the undisturbed zone nearest the land-disturbing activity. The Town has established maximum permitted velocities for stormwater discharges based on soil type.

The Town requires all land-disturbing activities to be planned and conducted to limit exposure to the shortest feasible time and requires the identification of especially vulnerable areas in the development plan; these areas receive special attention in the permit and plan approval process. The possibilities for phased construction are reviewed in the sediment and erosion control plan submittal process on a site-specific basis. Site conditions, topography, soils, and type of construction determine the size of the phases. Soils are stabilized as rapidly as possible by establishing a grass cover and mulching and tacking. The NPDES Stormwater General Permit NCG 010000 for construction activities requires that stabilization occur within 7 calendar days of the last land-disturbing activity for slopes steeper than 3 horizontal to 1 vertical (3: 1) and within 14 calendar days for non-slopes.

The Town also limits mass grading to 25 acres at a time for residential developments with between 3 and 8 dwelling units per acre (LDO Section 3.13). With the exception of infrastructure installation, the Town prohibits grading of low-density single-family lots until a building permit is issued. The Town requires tree-protection fencing and silt fencing as erosion and sediment control measures, along with perimeter ditches or perimeter swales, if practical.

Approvals are not issued to begin grading on a project in jurisdictional areas until written documentation is provided indicating that all required state and federal permits for the project have been obtained. A final site inspection is required prior to issuance of a Certificate of Occupancy (CO) for all residential and non-residential structures. At this inspection, environmental staff reviews the site for sufficient groundcover, stabilization, buffers, and installation of stormwater devices prior to approving a CO.

LDO Section 7.4 sets the 10-year storm event as the minimum design standard for planning, designing, and constructing sediment and erosion control measures, structures, and devices.

The Town also encourages contractor education and training related to erosion and sediment control. The purpose of this educational program is to ensure that contractors understand erosion and sediment control requirements and work to minimize the potential for sedimentation. The Town participates in a regional Clear Water Contractor workshop

annually which includes regulatory and technology updates. Contractors are interested in attending this training, as it provides them with an opportunity to develop a relationship with Town staff, which helps with communication concerning their projects. In addition, contractors who attend training are allowed to advertise as Clear Water Contractors.

6.2.8 Stormwater Programs and Impervious Surface Limitations

The Town has developed a land use plan that includes lower levels of imperviousness in WSWs as well as a Stormwater Management Program to control the rate and quality of stormwater runoff in all watersheds. In addition, ordinances require that nitrogen, phosphorus, and TSS be reduced by stormwater control devices.

The Town created a Stormwater Division in November 2000 to minimize the impacts of stormwater runoff. The staff is charged with upholding the local, state, and federal regulations related to stormwater. These legal requirements include:

- Floodplain Management
- Sediment & Erosion Control
- Watershed Water Supply Protection
- Neuse River Basin Stormwater Rules
- Jordan Lake Stormwater Rules
- NPDES Phase II Stormwater Regulations
- Swift Creek TMDL and Watershed Land Management Plan

The Town established the following goals for its stormwater management program:

- Support a high quality of life by protecting water quality in Cary and in communities downstream.
- Protect the local water resources, residents, and property from the impacts of stormwater runoff by managing the quality and quantity of runoff from construction sites, developed areas, and Town activities.
- Prevent pollution by increasing public awareness and involvement, and by investigating and removing pollution sources.
- Reduce pollutant loading to the waters of the Cape Fear and Neuse River basins.
- Reduce loss of life and property damage caused by flooding, and preserve and restore the natural water resources, floodplains, and riparian areas.
- Extend the life of the storm drainage infrastructure through inspections and proactive maintenance.

In order help meet these goals, assess the program's current condition and to propose a framework for stormwater management for the next 10 to 20 years, the Town developed a Stormwater Master Plan, adopted in April 2013 (Baker, 2013). This master plan is consistent with Town ordinances and stormwater CIP.

The Town is linking its stormwater program with its land use planning program. A coordinated effort between the land use planning program and the stormwater program occurred with the Town Center Area Plan. A Downtown Stormwater Management Plan was

developed for the Town Center area that addresses the issue of stormwater runoff and pollution mitigation on a sub-watershed basis. The Downtown Stormwater Management Plan estimates the overall water quality impact of planned densities for sub-watersheds within the entire Town Center area. As part of this combined planning process, the Town has identified an opportunity for a regional stormwater BMP that would treat both existing and planned development and address flooding issues.

6.2.8.1 Stormwater Regulations

The Town requires that developers conduct an impact analysis to verify that the difference between pre- and post-development runoff for the 2-, 5-, and 10-year, 24-hour storm event is less than 10 percent. If the difference exceeds 10 percent, the developer must capture the entire difference onsite.

Additionally, the Town requires a Downstream Impact Analysis for sites that generate post-development discharges greater than 10 percent of the pre-development discharges for the 2-, 5-, and 10-year events. This analysis requires the identification of a point downstream where the impact becomes less than 10 percent and an analysis of what impact the increased discharge will have between the two locations. Mitigation of that impact is required (LDO 7.3.3).

For the Town, street drainage pipe sizing must convey the 10-year storm event without surcharging into manholes or overtopping roads. For cross-street drainage, this increases to the 25-year storm, and for areas impacting floodplains, the 100-year storm should be conveyed.

The Town requires a financial security in the amount of 15 percent of the total cost of the structure or the cost of maintenance for a 10 year period, whichever is greater. The owner of each stormwater control structure is required to submit a Maintenance Inspection Report annually on the anniversary date of the Operation and Maintenance Agreement recording to the Stormwater Management Engineer. A qualified professional, licensed in the state of North Carolina, must conduct the inspection.

6.2.8.2 NPDES Phase II Stormwater Program

The state mandated that the Town acquire an NPDES Phase II stormwater permit in 2005, requiring the Town to pass ordinances that addressed the six elements of the NPDES Phase II rules. The Town already had ordinances and programs in place that addressed the vast majority of those elements, so the changes and impacts to the program were minimal. The Town received a new NPDES Phase II stormwater permit (NCS000427) in 2011, which is effective from December 1, 2011 through November 30, 2016.

The NPDES Phase II program regulates discharges of stormwater to surface waters and requires the control of suspended solids, fecal coliform, and nutrients town-wide. NCDEMLR's current NPDES Phase II regulations require control of the overall runoff volume for the 1-year, 24-hour storm. The NPDES Phase II permit further requires that any new development that exceeds 24 percent built-upon area must implement stormwater BMPs. These BMPs are required to treat the first 1 inch of rain, remove 85 percent of the average annual TSS, and draw down the treatment volume no faster than 48 hours, but no slower than 120 hours (LDO Section 7.3.4).

The Town further limits impervious surfaces in its WSWs. For low-density development options without stormwater controls, the impervious surface limitations range from 12 percent to 36 percent (LDO 4.4.6).

The Town's illicit discharge detection and elimination program can be found in Section 7.3.6 of the LDO. The objectives of the program are to detect and eliminate illicit discharges, including spills and illegal dumping, address significant contributors of pollutants, implement appropriate enforcement procedures and actions, develop a storm sewer system map and inform employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

As part of good housekeeping and pollution prevention measures, the Town street sweepers make a complete cycle through residential streets once every 3 months. Main thoroughfares are swept monthly (12 times per year).

The Town also has an active stormwater education program. The Town teamed with other municipalities and ran a series of television advertisements to reduce nutrient loading from homeowners as part of the Clear Water Education Partnership. Other elements of the stormwater education program include utility bill inserts and other mailings, newspaper advertisements, workshops, and the internet.

The Town continues to hold annual LID workshops to educate the development community about LID. The Town also sells rain barrels at cost as well as low-cost kits for residents to build their own rain barrel. Stormwater staff is present at most major community events and work directly with students at local schools. Stormwater education materials are provided as part of the information handed out in the Block Leader Program, discussed later in this section.

The Town has a Neighborhood Improvement Grant Program which provides small matching grants to qualified neighborhood organizations as an incentive to encourage neighborhood residents to take on projects that will improve the neighborhood and community at large. Examples include restoration of watershed facilities, streambanks, ponds, or stormwater facilities. Up to $5,000 is available for qualified projects.

The Town maintains a watershed map depicting the location and type of all structural BMPs currently in place. Having these data on a single map is required by the Town's NPDES Phase II permit and is also beneficial in Town stormwater education efforts.

6.2.8.3 Water Supply Watershed

WSW rules apply to new development in the Swift Creek and Jordan Lake watersheds, as discussed in the WSW Protection Regulations section above. These rules, similar to those of the NPDES Phase II permit, require most new development to control the runoff resulting from the first inch of precipitation from storm events and to remove 85 percent of TSS from stormwater runoff using approved BMPs. As discussed above, development in the Jordan Lake and Swift Creek watersheds that exceeds a certain level of imperviousness must control its stormwater runoff. All new impervious area within the Town is being tracked for future analysis.

6.2.8.4 Nutrient Sensitive Waters Management Strategy (Neuse Basin Rules)

In March 2001, the Town adopted its stormwater management program for nitrogen control to meet the requirements of the Neuse basin rules (LDO Section 7.3.3). The Town applies the program to any development that disturbs 12,000 square feet of land or more (1 acre for single family residences) throughout its jurisdiction, including both the Neuse and Cape Fear River basins; targets in the Jordan Lake watershed are more restrictive, as described in Section 6.1. Developers must install BMPs to achieve nitrogen targets to the maximum extent practical.

Cooperative efforts related to 303(d) in the Neuse River Basin include the Regional Watershed Plan in the upper Neuse River Basin. This project, managed by EEP, encompasses 580 square miles across Wake and Johnston Counties, including the upper Middle Creek and Swift Creek Watersheds. The goal of this project is to identify and prioritize potential EEP mitigation projects in the Neuse 01 subwatershed. These projects may include traditional stream and wetland mitigation as well as buffer restoration; nutrient offset; urban stormwater and agricultural BMPs; regenerative stormwater conveyances; fish and aquatic organism passage; aquatic habitat improvements; removal of flow obstructions; and species habitats preservation or enhancement (NCDENR, 2013b)

6.2.8.5 Jordan Water Supply Nutrient Strategy (Jordan Rules)

The Town is subject to the Jordan Rules, as required by the NC General Assembly, to reduce the average annual loads of nitrogen and phosphorus delivered to Jordan Lake from all point and nonpoint sources of these nutrients located within its watershed, including stormwater from new development in this jurisdiction. These rules can be found in LDO Section 4.6.

Within the Town, the White Oak Creek subwatershed falls within the Lower New Hope Arm, while the remaining portion of the Town within the Cape Fear River basin falls in the Upper New Hope Jordan Arm. The percent reductions for the areas relevant to Cary are:

- Upper New Hope Arm – 35 percent reduction of nitrogen and 5 percent reduction of phosphorus compared to the baseline 1997 through 2001 levels; limit nitrogen unit area mass loading from new development to 2.2 lb/ac/yr and limit phosphorus unit area mass loading from new development to 0.82 lb/ac/yr.
- Lower New Hope Arm – no increase in nitrogen or phosphorus compared to the baseline 1997 through 2001 levels; limit nitrogen unit area mass loading from new development to 4.4 lb/ac/yr and limit phosphorus unit area mass loading from new development to 0.78 lb/ac/yr.

When the Neuse Rules were established, the Town was required to adopt ordinances to implement a nutrient removal program for new development and redevelopment. The Town proactively extended those ordinances to the Jordan Lake watershed, as well. The nutrient reduction requirements result in most development projects being required to install stormwater BMPs that remove the nitrogen in the Neuse basin and nitrogen and phosphorus in the Jordan lake watershed. The state has delayed implementation of the nutrient management component of the Jordan Rules until 2016. The Town currently implements the Jordan Rules per Section 7.3.2 of the LDO.

As part of the Jordan Rules, the Town initiated the Jordan Lake Stage I Adaptive Management Strategy Program to address nutrient loading from existing development. In addition to the measures already in place as a result of the Town's NPDES Phase II permit, the Town is required on an annual basis to identify two potential stormwater BMP retrofit locations within existing development. NCDWR will determine in the future if the Town will be required to construct the BMP retrofits previously identified starting in 2011.

6.2.8.6 Swift Creek Watershed Land Management Plan and TMDL

The Swift Creek Watershed Land Management Plan (LMP) was developed in 1988 by a joint committee of the Towns of Apex, Cary, and Garner, the City of Raleigh, and Wake County officials to help the Swift Creek watershed achieve a WSW WS-II Classification. The LMP recommended achieving the WS- II Classification through prohibiting all point source discharges within the watershed, establishing minimum critical buffer areas around bodies of water, and limiting impervious surface and new development in critical areas. The LMP included a land use assessment and recommended performance standards for future development to protect water quality in the Swift Creek watershed. Finally, the LMP recommended further areas of study that would ultimately enhance the water quality of the watershed and its ability to maintain a WS–II Classification. Currently, the Swift Creek and Williams Creek watersheds are classified as WS–III, which carries less stringent development requirements than WS-II.

More recently, the Town has developed a Water Quality Recovery Program (WQRP) for the Swift Creek watershed to address the Swift and Williams Creek TMDL approved by the USEPA in 2009. Many TMDLs, such as those for Jordan Lake and the Neuse River Estuary, have resulted in the state developing rules to reduce the targeted pollutants in the watersheds that drain to the areas under the TMDLs. The Swift and Williams Creek TMDL is different from the Jordan Lake and Neuse River Estuary TMDLs in that there are no comprehensive rules currently proposed by NCDWR to address the TMDL requirements; however, the TMDL includes basic waste load allocations (WLAs) and a surrogate 9 percent impervious surface WLA. The impervious surface WLA is unusual in that it does represent a numeric Water Quality Based-Effluent Limit (WQBEL), but is also not a pollutant that can be measured in stormwater runoff. Impervious surface is considered a surrogate for typical urban stormwater pollutants that were identified in the Swift Creek TMDL as causing the impairments. Additionally, the watershed is subject to the requirements of WS-III, which already has more stringent impervious surface limitations than those of most WSWs in urbanizing areas (typically WS-IV and WS-V).

Excerpts of the Swift Creek LMP, TMDL and WQRP are found in Appendix F.

6.2.8.7 Other 303(d) Water Bodies

Streams identified as impaired on the 303(d) list are identified in Section 4 with their reason for impairment. Streams that do not have TMDLs are still protected by the Town's ordinances and efforts, as well as state and federal regulations. A biological TMDL is planned for Walnut Creek. For Black Creek, two organizations, Watershed Education for Communities and Officials and the Black Creek Watershed Association, are coordinating with the Town to plan monitoring and restoration of Black Creek. Along Middle Creek, the Town currently owns 48 acres of preserved open space, adjacent to 28 acres owned by the Town of Holly Springs. These efforts, along with buffer and open space requirements and

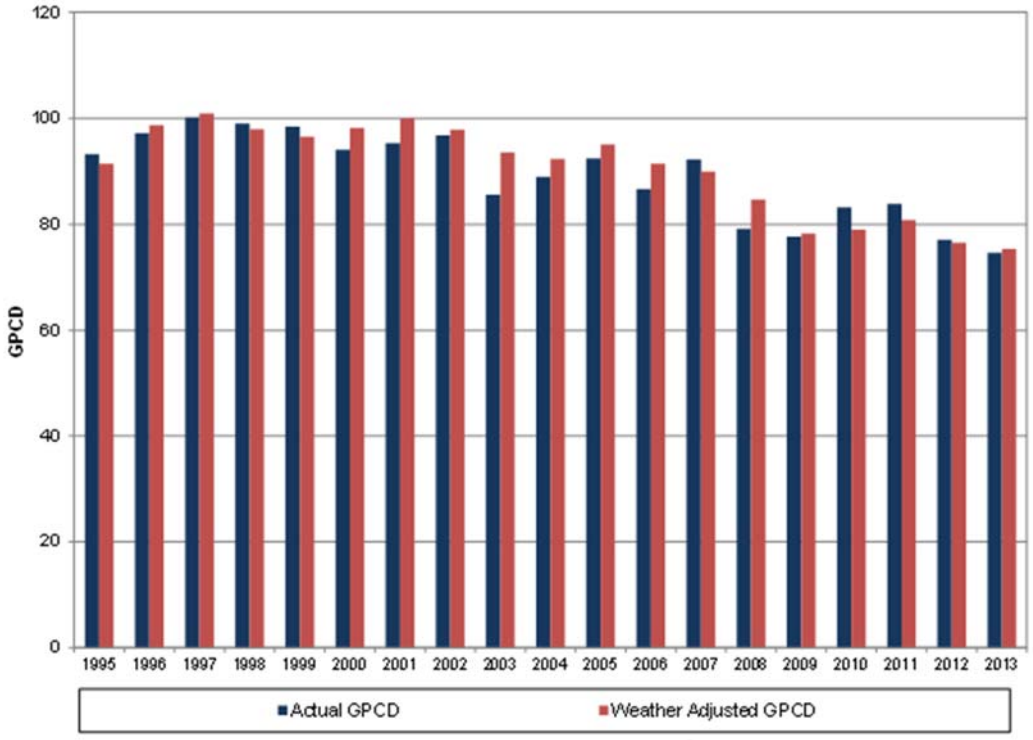
the Town's stormwater program, are in place to protect these streams and improve water quality.

6.2.9 Water Conservation

The Town's Water Conservation Program is overseen by the Water Resources Manager and has multiple staff, including the Conservation Program Supervisor, Water Conservation Program Specialist, Conservation Specialist/Communications, and Water Conservation Technician(s). The program operates through the Town's Water Resources and Public Works Departments.

In 1996, the Cary Town Council established a goal to reduce per capita water consumption by 20 percent by 2015. The weather-adjusted trend data indicate that the per capita consumption values have been reduced approximately 24 percent for the single family residential customer class since 1996, and approximately 20 percent for the combined residential and non-residential consumption over the same time period (CH2M HILL and Brown and Caldwell, 2013). Figure 6-2 presents the trend in overall combined residential and non-residential gallons per capita per day since 1995.

Figure 6-2
Annual Average Overall Water Use in Gallons per Capita per Day, 1995 through 2013



The Water Conservation Program has a threefold approach to achieving water conservation by Town residents and businesses—voluntary, regulatory, and incentive mechanisms. This section provides a summary of the water conservation programs being implemented by the Town; a comprehensive description of each individual program can be found in the Town's LRWRP (CH2M HILL and Brown and Caldwell, 2013).

6.2.9.1 Voluntary Water Conservation

The Town's voluntary water conservation program focuses on education. The Water Conservation Program team has developed a broad spectrum of initiatives to educate the public about water conservation issues. This team employs numerous educational programs designed to reach utility customers. During the Town's summer campaign known as *Beat the Peak*, winter's *EPA Fix a Leak Week* campaign or throughout the year, we use direct mailings, utility bill insert messages, Let's be Water Conscious brochures, flyers, messages in the distribution of Annual Drinking Water Quality Reports, promotional items and information distributed through the Block Leader program, and the Town's website to provide water conservation information to customers. Other educational activities include presentations to local civic groups upon request, distributing low-flow showerheads and aerators at community events, and conducting indoor and outdoor water use audits for residents upon request.

6.2.9.2 Regulatory Water Conservation

The Town requires alternate-day watering through an ordinance adopted on April 24, 2004 (Ordinance Section 36-80). Odd-number addresses may water on Tuesday, Thursday, and Saturday, while even-number addresses may water on Wednesday, Friday, and Sunday. However,

watering by hand (with cans, wands, hand-held hoses) and via drip irrigation is allowed any day of the week. The Town modified its Alternate Day Watering standard procedure in April 2012 to allow customers who are reseeding or installing sod an alternate-day watering exception permit one time per year, irrespective of turf type. Those who violate the alternate-day watering rule receive an oral or written notice. Repeat violations can lead to civil penalties of $100 for the first citation, $250 for the second, and $500 for the third.

Town ordinances (Ordinance 97-027, Section 19-47, June 12, 1997) also prohibit wasting water. Wasting water is defined as water that falls on impervious surfaces or accumulates on the surface of the ground and leaves the property, entering gutters, storm drains, ditches, and other conveyances. Penalties and other enforcement action may be imposed if wasting water is repeated or flagrant. In 2009, the ordinance was amended to include the flagrant waste of water through unrepaired leaks.

The Town requires rain sensors on new automatic irrigation systems that receive Town water (Ordinance 97-032, Section 19-48, August 14, 1997). Once 0.25 inch of rainfall has occurred, the irrigation system must automatically shut off. The Town's LDO also requires the use of drought-tolerant native plants in commercial landscaping. In 2003, the Town began requiring permits for all new customers installing automatic irrigation systems. Additionally, the Town requires the installation of separate irrigation meters for in-ground irrigation systems (Code of Ordinances, Article III, Division I, Chapter 36, Section 36-76).

The Town Manager is authorized by ordinance to invoke water use reduction or rationing measures and to develop and enforce those conservation measures when a water emergency exists. The Town has a Water Shortage Response Plan that outlines the Town's policy to implement water use reductions. Voluntary, mandatory, and water-shortage-emergency measures may be imposed on all Town water customers for the duration of the water emergency.

If restrictions or bans are placed on certain types of water use, the Water Conservation Program team and other Town employees enforce the restrictions or bans. The first violation results in a written notice ordering that the violation be corrected within a specified time. If the violation is not corrected, any of the following penalties may apply: civil penalties, criminal penalties, termination of water service, injunctive relief, or any appropriate equitable remedy issuing from a court of competent jurisdiction.

6.2.9.3 Incentives for Water Conservation

The Town's Water Conservation Program team provides High Efficiency Toilet rebates to encourage wise water use. It also sells rain barrels at cost to residents, as well as low-cost kits and drums for residents to build their own rain barrels.

The Town also has a tiered rate system to provide incentives to use less water. The highest rate tiers are based on a "water budget" that takes into account the amount of water needed for landscape irrigation. The residential water budgets (23,000 gallons per month) are based on a typical lot size, while non-residential water budgets were developed on a site-specific basis. An example is presented in Table 6-7. The Town also charges the lowest rate for use of reclaimed water for non-potable uses, where applicable. Rates are higher for customers outside the Town limits (Town of Cary, 2014c).

TABLE 6-7
2014 Single-Family Residential: Customers Inside Cary or Morrisville Corporate Limits (charge per 1,000 gallons)

Tier	Cost per Kgal
Tier 1 (usage 0 – 5,000 gallons)	$3.60
Tier 2 (usage 5,001 – 8,000 gallons)	$4.08
Tier 3 (usage 8,001 – 23,000 gallons) or up to water budget amount	$5.79
Tier 4 (usage > 23,000 gallons) or over water budget amount	$11.29

Source: Town of Cary, 2014c

6.2.10 Water Reuse

In June 2001, the Town became the first municipality in the state to deliver reclaimed water to homes and businesses for irrigation and cooling, beginning with several hundred customers. The program is intended to provide a safe, cost-effective, and beneficial alternative to using valuable drinking water for some non-potable water needs. The Town's Effective Utilization of Reclaimed Water System policy (Policy Statement 132) specifies that residents and businesses, to the maximum extent possible, will the use the Town's reclaimed water system for secondary plumbing usage, and that new development within the designated service areas will connect to the reclaimed water system (CDM, 2013).

The reclaimed water system reduces the amount of drinking water that is used for irrigation. Thus, the use of reclaimed water reduces the water that needs to be withdrawn from Jordan Lake, the Town's water source. The system also allows the Town to reduce the amount of wastewater that is discharged into Neuse River basin from the Town's WRFs.

The Town completed a Reclaimed Water Distribution System Master Plan Update in July 2013. The plan identifies two service areas (North and South), as shown in Figure 2-2. The North Cary service area includes 12.5 miles of distribution pipeline, which provides reclaimed water to approximately 495 residences and 51 commercial customers. Commercial customers near the North Cary WRF include Worldcom, John Deere, and the North Carolina Bar Association. The South Cary service area includes 4.6 miles of pipeline which provides reclaimed water for irrigation to approximately 85 residential customers in the West Lake area as well as irrigation of the homeowner association common areas. The largest users in the South Cary service area are Middle Creek Park and Middle Creek School, both of which use reclaimed water for irrigation of recreational fields.

In western Cary, the Town of Cary, Wake County, and Durham County are jointly implementing the Jordan Lake Water Reclamation and Reuse (JLWR) Project. This project currently provides reclaimed water from Durham County's Triangle WWTP. Phase 1 of this project, completed in 2012, delivers reclaimed water to McCrimmon Parkway, including RTP South. Phase 2 consists of 21.8 miles of pipeline and will deliver reclaimed water south to Thomas Brooks Park, site of the USA Baseball National Training Center, with construction expected to be complete in 2014 (CDM Smith, 2013). Eventually, a pipeline through Morrisville will connect the distribution system near the North Cary WRF with the western Cary distribution system, such that the entire North Cary service area will be supplied by the North Cary WRF.

The Town's LRWRP (CH2M HILL and Brown and Caldwell, 2013) and the Reclaimed Water Distribution System Master Plan Update (CDM Smith, 2013) outlines the future growth of the reclaimed water system and identifies future areas for reclaimed water service (Figure 2-2) and the infrastructure required to serve the reclaimed water service area. These planning efforts for the future of the reclaimed water system demonstrate the intent of the Town to continue its strong water stewardship, which includes the beneficial utilization of reclaimed water as a resource.

6.2.11 Air Quality Protection

The Town has developed the following objectives related to air quality:

- Minimize travel time among all modes.
- Increase roadway network efficiency and capacity.
- Enhance alternative routes to freeways.
- Reduce growth in peak-period vehicle travel areas.
- Provide reliable alternatives to highway travel.
- Offer modal options for regional mobility.

6.2.11.1 Town of Cary Air Quality Efforts

There are several sections of the LDO that indirectly address air quality. For example, Section 7.10 presents Cary's connectivity requirements. These standards also reduce the overall time a motor vehicle is operating, which positively impacts air quality and lessens noise. In August 2012, upon staff's completion of the Site Design Standards Project, the Town Council adopted a new set of site design requirements. Included in the new site design standards are new pedestrian and vehicular circulation requirements addressed in LDO Sections 7.10.3 and 7.10.4, respectively. These rules will help create an organized and complete street network to improve circulation and connectivity as well as improve pedestrian circulation along public rights-of-way and within new development and redevelopment.

The Town also has an advanced traffic management system which provides reliable, real-time traffic information to residents, and incorporates traffic signal timing plans with state–of-the-art traffic signal controller devices. This system is adjustable for detours and helps to minimize idle traffic.

Trees and vegetation are integral to the improvement of air quality. The Town has landscape buffer requirements and a tree protection ordinance, in Section 7.2 of the LDO and discussed later in this section. This requires preservation of healthy vegetation.

In addition to ordinances protecting air quality, Cary's Comprehensive Transportation Plan (CTP), adopted in September 2008, includes pedestrian and bike elements, which will reduce air pollution by reducing vehicular traffic (Kimley-Horn and Associates, 2008). The CTP pedestrian element highlights the Cary Comprehensive Pedestrian Plan, which was completed in February 2007. The Pedestrian Plan, developed with resident input and the support of a grant from NCDOT, serves as the main source for pedestrian-related future plans and design guidelines (Louis Berger Group, 2007). The Town's Sidewalk Request

Program enables residents to request sidewalks. The program has been funded at $500,000 annually since 2010, and has resulted in the installation of approximately 40,000 linear feet of sidewalk since 2008 (Kimley-Horn and Associates, 2008).

The Bicycle element of the CTP highlights the existing and planned bicycle facilities, which have expanded considerably since the adoption of the 2008 CTP. The Town has a requirement for bicycle parking spaces as part of all new development in LDO Section 7.8.2. Since 2010, the Town has completed 38 miles of striped shared-access bike lanes along Kildaire Farm Road and portions of Maynard Road and Lake Pine Drive. The project promotes shared use of the road. In November 2012, Community Investment Bonds for Transportation were approved and included $1 million for improving bicycle facilities and programs, and updating the Town of Cary Bike and Hike map, which depicts both greenways and bike routes.

Finally, the Town's C-Tran, a transit service, offers inexpensive and reliable transportation around the Town for any day except Sunday. Anyone in the Town may ride, including visitors and out-of-towners who work in the Town. This service began in 2005 and now has six fixed routes with approximately 280,000 one-way passenger trips at the close of FY 2013. Door-to-door service is available by reservation for residents who are at least 60 years old or disabled. Since 2010, the Town has built 17 passenger shelters with benches, bike racks and trash receptacles at the transit stops with the highest passenger counts, implemented a new fare structure and electronic fareboxes that have provided more ways for passengers to purchase passes, and implemented a new "real time" bus information system that provides quick and easy schedule/location information to riders via smart phone technology. All C-Tran buses are equipped with two bike racks on the front of each bus (Town of Cary, 2013d).

For Town operations, a Strategic Energy Action Plan was adopted in June 2012 that outlines a path forward for the Town to reduce operational energy use. The Plan addresses the key energy-using categories of Town operations: (1) water and wastewater, (2) fleet, and (3) buildings and streetlights. The plan also establishes a goal of a 13 percent reduction in energy use from the projected 2020 "business as usual" energy estimate for Town operations, which is an estimated annual reduction of 7,000 metric tonnes of carbon dioxide equivalent (Town of Cary, 2012c).

To achieve this goal, several efforts are underway, including the replacement of street lights with LED light fixtures, fleet efficiency improvements, and green building projects. The Town's fleet efficiency standard procedures include a no idling policy. As part of the Town's strategy to diversify fuel sources, the Town owns one electric vehicle and manages five electric charging stations, available for public use. Cary's first "green-built " project is Fire Station 8, which includes the following sustainable features: a rooftop solar photovoltaic (PV) installation, preferred parking for efficient vehicles, bicycle storage, reclaimed water usage, recycling and composting, low-emitting building materials, an efficient heating, ventilation, and air conditioning system and building envelope, enhanced ventilation systems, and extensive use of daylighting.

The Town, in partnership with FLS Energy, will be installing solar PV equipment on select Town sites. The first phase of this project at the South Cary WRF was placed in service in December 2012 and consists of 5,918 solar panels that generate enough energy to power 174

homes. The Town has leased approximately 8 acres to FLS Energy for up to 20 years for development of solar PV generation. The Town is evaluating the possibility of further installations at the following locations: North Cary WRF, Cary/Apex WTP, Garmon Operations Center, and the Town Hall Campus. These actions limit energy use and therefore reduce the potential for air quality impacts (Pers. comm. Barrett, 2013).

6.2.11.2 Cooperative Efforts

There are several regional activities and planning efforts related to transportation that have the potential to improve air quality by reducing traffic congestion. The Town, in addition to local transportation activities, continues to be active in regional planning through NCDOT, CAMPO, and the Turnpike Authority for the Western Wake Freeway and the Southeast Connector, which refers to the extension of the Triangle Expressway for the completion of NC 540 and I-540 around the greater Raleigh area. This project will link the Towns of Apex, Cary, Clayton, Garner, Fuquay Varina, Holly Springs, and the City of Raleigh. The Triangle Expressway has already improved commuter mobility, accessibility, and connectivity to western Wake County and RTP on the existing north-south routes that serve the Triangle Region, primarily NC 55 and NC 54 (NCDOT, 2013). These regional efforts allow for decreased congestion and alternative transportation. This improved connectivity improves air quality.

In 2006/2007, Triangle Transit, formerly Triangle Transit Authority, brought together the Triangle organizations that were working on and/or funding Transportation Demand Management (TDM) projects with the goal of creating a long-term plan for improving TDM efforts. The result was the Triangle Region 7-Year Long Range Travel Demand Management Plan. The purpose of the Triangle TDM Program is to reduce regional growth in vehicle miles traveled (VMT) by 25 percent between 2007 and 2015 through a moderate package of TDM strategies that encourage alternative modes of transportation. The Triangle J Council of Governments (TJCOG) is now coordinating the marketing and evaluation of this effort through a grant program and promoting commute alternatives such as mass transit, carpooling, biking, teleworking, and vanpooling (TJCOG, 2014).

TJCOG coordinated with CAMPO (of which the Town is a member) and other stakeholders to develop a 2040 Metropolitan Transportation Plan (MTP), which involved an air quality conformity analysis for 2012 to 2018. The 2040 MTP incorporates the recommendations of the 2035 Long Range Transit Plan released by CAMPO, including proposed bus service expansion and enhancement as well as a light rail system, linking the Cities of Raleigh and Durham with RTP and the Towns of Cary, and Morrisville. The project explored and analyzed regional growth scenarios for associated trade-offs and impacts on the transportation network. The Town's long-range planning staff actively participated in the development of the 2035 Long Range Transit Plan. The recommendations in these plans for appropriate sizing of roads are incorporated into the state's Transportation Improvement Program (TJCOG, 2013). Triangle Transit also coordinates a ride-sharing program for regional commuters.

In 2011, Cary's Transit Services Administrator served as the chair of the Wake County Transit Plan working group responsible for finalizing the future bus expansion plan contingent on a proposed half-cent sales tax referendum. The updated draft, released in September 2012, is pending action from the Wake County Board of Commissioners. The

plan was developed in cooperation with several partners, including CAMPO, Triangle Transit, the RTA, and the City of Raleigh's Capital Area Transit. The Plan provides a dual approach to meet expanding transportation demands as the County continues to grow: (1) a core transit plan that broadens local and commuter bus service and includes a rush-hour commuter rail service from Garner to Durham; and (2) an enhanced transit plan that includes building a regional light rail service from downtown Cary through downtown Raleigh, up to Millbrook Road (Wake County, 2012).

The EIS prepared for the regional light rail project indicate that parking areas to serve the light rail system will not impact levels of carbon monoxide. The document also indicates that the light rail system will result in lower levels of vehicle pollutant emissions (USDOT, 2002).

NCDOT is also in the process of planning for a southeast high speed rail service that will connect Washington, DC to Charlotte. The project will be developed incrementally based on available funding. NCDOT has used federal stimulus funding to add commuter routes between Charlotte and Raleigh (SEHSR, 2012). Improved alternative transportation options have the potential to improve air quality by reducing traffic congestion

The RTA, founded by the Cary, Chapel Hill-Carrboro, Durham, and Raleigh Chambers of Commerce in 1999, serves as a regional business voice for transportation initiatives. Currently, the RTA's members include more than 100 businesses, two metropolitan planning organizations (MPOs), Triangle Transit, and the RDU airport. The Town is an active member of this group, which continues to focus on advancing multimodal solutions to sustain prosperity and enhance quality of life (RTA, 2013). The Triangle Clean Cities Coalition was also founded in 1999, and brings together fleet managers, local and state government officials, fuel and vehicle providers, and interested citizen groups, to reduce dependence on petroleum by promoting alternative transportation fuels (TCCC, 2010).

In 2009, the County appointed a sustainability task force to address conservation and reduction goals for solid waste, water, and energy, which are related to improved air quality within the region. The 2011 task force report identified several strategies and performance measures for each of those goals related to air quality (Wake County, 2011). Further information on this program is included in Appendix B.

6.2.12 Tree Protection Ordinance

Tree protection and planting is addressed in Section 7.2.5 of the LDO. Preserving existing healthy vegetation on a site during development enhances the visual character of the community. The Town requires a "champion" and specimen tree survey, and landscape buffers in the plan review process; and requires the preservation of trees to the extent practical and reasonable. Tree-protection fencing is required as a measure in erosion and sediment control. Fencing must extend as far as practical, preferably according to a rule of at least 1-foot distance from the tree for each inch of caliper, but in no case closer than 6 feet to the trunk, with a minimum extension to the dripline for champion trees. Section 7.2.10 of the LDO provides incentives to protect existing trees.

The Town recognizes the need to maintain and preserve the natural environment while allowing development and growth to occur, and therefore developed a landscape ordinance (Section 7.2 of the LDO). The preservation and planting of vegetation, such as that required

by the Town's buffer requirements, serve to protect the environment in numerous ways. The Town requires landscaped areas and perimeter buffers of varied width and types as a function of the site land use class and the adjacent property land use class. The ordinance includes minimum tree requirements for developments.

6.2.13 Sanitary Sewer Installation

The Town's Standard Specifications and Details manual, dated December 10, 2009, addresses the design of pump stations, gravity sewers, and force mains to ensure proper design and installation while limiting spills. The document lists the minimum design standards for construction of these facilities, including standards for separation distances, materials, installation techniques, and overall design. The Town operates its wastewater collection system under a Wastewater Collection and Maintenance permit issued by the NCDWR. As part of its riparian buffer program, the Town avoids installing sewer lines within riparian buffers and avoids installing sewer line stream crossings where practical. If stream crossings are necessary, the Town strives to minimize impacts by evaluating options such as stream boring instead of above-ground crossings. Directional boring is used to the maximum extent practicable. Final location and design are determined during the permitting process.