

SECTION 2

Background and Description of Infrastructure Master Plans

The Town of Cary has developed a comprehensive transportation plan and master plans for providing water and sewer services to its residents in a manner that will protect the environment. The plans outline future transportation corridors and roadway improvements and provide the general sizing and location of facilities such as the water treatment plant (WTP), water distribution lines, booster pump stations, and water towers; gravity sewer lines; wastewater pump stations; and sewer force mains. In addition, regional plans were developed in preparation for wastewater treatment, conveyance, and treated effluent disposal in western Wake County. As of April 3, 2006, the Town of Cary owns and operates the water and wastewater infrastructure assets within the Town of Morrisville's jurisdiction. As such, the Town of Morrisville has adopted the Town of Cary water and sanitary sewer standards.

2.1 Wastewater

2.1.1 Existing Wastewater System

The wastewater collection and treatment system for the Town consists of gravity lines, pump stations, and force mains conveying flows to the North Cary Water Reclamation Facility (WRF), the South Cary WRF, and the Western Wake Regional WRF (WWRWRF).

The North Cary WRF currently discharges approximately 5.7 million gallons per day (MGD) on an annual average basis to Crabtree Creek between the Lake Crabtree dam and Interstate 40, with a maximum day discharge of 8.25 million gallons per day (MGD). The plant has a permitted maximum month discharge capacity and maximum month treatment capacity of 12 MGD. The plant also has a 4.28-MGD permit to distribute reclaimed water for irrigation and other nonpotable uses, as well as a 0.1-MGD permit for bulk use of reclaimed water onsite.

The South Cary WRF currently discharges an annual average of approximately 5.0 MGD to Middle Creek between Sunset Lake and Johnson Pond Road (State Route [SR] 1404) and has a permitted maximum month discharge capacity of 16 MGD. The current maximum day discharge at the South Cary WRF is 7.4 MGD and the maximum month treatment capacity of 12.8 MGD. The plant has a 0.86-MGD permit to distribute reclaimed water for irrigation and other nonpotable uses, as well as a 0.3-MGD permit for bulk use of reclaimed water onsite.

Both the North Cary and South Cary WRF include state-of-the-art treatment with advanced nutrient removal capabilities because they discharge into designated Nutrient Sensitive Waters (NSW) of the Neuse River basin.

The Town is working with the Town of Apex to operate the WWRWRF, which came online in mid-2014 and serves the west Cary service area in addition to portions of the Towns of Apex and Morrisville. The facility, located in New Hill, has an outfall line which discharges

to the Cape Fear River below Buckhorn Dam. This regional facility has an 18-MGD design treatment capacity.

The Town of Cary provides wastewater collection and treatment for the RDU airport and RTP South. These users have existing agreements with the Town of Cary to plan for and provide for flows based on annual user projections. The system serves residential, commercial, institutional, and industrial customers. The Town's industrial community includes several major employers, such as IBM, SAS Institute, Caterpillar, John Deere, and Alcatel-Lucent.

The Town system includes numerous drainage basins, sloping away from the central part of the Town. Sewer lines generally flow by gravity, following the natural drainage, until they reach a WRF or a point where they are pumped out of the basin to another drainage basin. Main sewer lines can receive flows from numerous tributary drainage basins as well as flows pumped from other drainage basins. For this reason, the wastewater collection system in the Town is divided into three service areas: north, south, and west, discharging to the North Cary WRF, the South Cary WRF, and the WWRWRF, respectively. These three service areas are divided into 99 sub-basins served by gravity or pumped to the respective treatment plants. There are 43 subbasins in the north service area and 28 subbasins in the south service area, both in the Neuse River basin. The remaining 28 sub-basins are in the west service area, and are tributary to waters in the Cape Fear River basin that flow into Jordan Lake. The basin boundaries follow hydrologic boundaries in all situations where there are no existing sewer lines (Hazen and Sawyer, 2013).

The Town currently operates and maintains approximately 789 miles of gravity interceptors, approximately 84 miles of force mains, and 40 pump stations. These totals reflect the infrastructure added from its utility merger with the Town of Morrisville. The Town has actively pursued the abandonment of pump stations where possible, resulting in fewer small stations and larger, regional pump stations, but will likely continue to have at least 15 to 20 pump stations to maintain. Figure 2-1 illustrates the locations of the WRF discharges, pump stations, and pipes that are 8 inches or larger. The North Cary WRF collection system has 307 miles of gravity lines, 25 miles of force mains, and 14 pump stations. The South Cary WRF collection system has 211 miles of gravity lines, 20 miles of force mains, and 13 pump stations (Hazen and Sawyer, 2013). Four of the 14 pump stations that service the area in the Cape Fear River basin were redirected to the WWRWRF in 2014 so the new facility could serve the west Cary service area. The new West Cary and Beaver Creek pump stations were constructed to convey flow to the WWRWRF.

2.1.2 Future Wastewater System

The Town will build sewer lines and pump stations to convey additional wastewater to the appropriate WRF as population growth and development occur.

As part of the collaborative effort associated with the WWRWRF, the Towns of Cary, Apex, and Morrisville are also addressing a mandate regarding their interbasin transfer (IBT) certificate that requires the towns to return water to the Haw River or Cape Fear River basins after 2010. The operation of the WWRWRF meets this condition. The current IBT certificate, issued in 2001, allows transfers from the Haw River subbasin (Jordan Lake is the water supply source) to the Neuse River subbasin up to 24 MGD on a maximum day basis. In 2013, the maximum daily IBT amount for the Towns of Cary, Apex, Morrisville, and RTP

South was 19.2 MGD, while the annual average IBT amount was 13.8 MGD (Town of Cary, 2014a). The Towns of Cary, Apex, and Morrisville, and Wake County, notified the Environmental Management Commission (EMC) on September 20, 2013 that they are requesting a modification of the IBT certificate to address water needs through 2045 and consumptive uses in the southwest portion of the Town of Apex. One objective accomplished by this is the shift from a maximum day IBT calculation to IBT calculated as the daily average of a calendar month, per the changes to NCGS 143-215.22L (Regulation of surface water transfers) based on Session Law 2013-388.

The service area for the WWRWRF extends beyond the Town of Cary's Planning Area. This is because the Town provides water and sewer service to RTP South, the RDU airport, and the Town of Morrisville. The Town of Apex's WWRWRF service area is described in its SCIMMP. RTP South is covered by the Wake County programs described in Appendix B. However, RTP South also has more extensive open space and riparian buffer corridors than those required by Wake County. Thus, its planning efforts are also described in Appendix B. RTP's 2011 Master Plan emphasizes sustainability and includes goals to minimize water consumption and maximize opportunities for wastewater treatment and reuse (Research Triangle Foundation [RTF], 2011). These efforts will minimize the impacts of growth in water demand.

As noted in Section 1, the RDU airport is located in Wake County and has an NPDES stormwater permit. In addition, all activities completed by the RDU airport are under the jurisdiction of the FAA and are subject to NEPA. All projects planned at the airport must develop a NEPA document that addresses SCI. The airport has completed an EA for a safety area expansion of a runway and has plans to develop another runway. The environmental documentation indicates that the primary purpose for RDU airport projects is to increase safety or quality of service (Kimley-Horn and Associates, 2003). The RDU airport expects that changes in service would occur in the future if demands for air transportation increase significantly. There are currently no plans for expansion of facilities related to changes in airport capacity (Pers. comm. Cayton, 2014).

The Town completed its most recent Wastewater Collection System Master Plan (Wastewater Plan) in June 2013 (Hazen and Sawyer, 2013). The Wastewater Plan provides a long-term strategy for implementing system improvements to meet the projected wastewater flows for the collection system in several planning periods within Cary's utility service area. The report identified system improvements to provide capacity for peak wastewater flows to minimize the potential for overflows in the collection system. Recommendations were provided for new gravity interceptors, parallel gravity interceptors, new force mains, parallel force mains, new pump stations, and expanded pump stations.

Figure 2-1 shows proposed wastewater infrastructure. A detailed summary of proposed capital improvements is presented in Appendix C. The exact locations of the proposed infrastructure will be determined during the development of environmental documents that examine the direct impacts of the proposed infrastructure. However, general locations are known and are supported by the land use planning documentation and population projections; thus, SCI are identifiable at this time.

2.1.3 Reclaimed Water

The Town recognizes that water resources in the region are becoming increasingly scarce. Cary's reclaimed water program is an initiative to recycle a valuable resource. 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 specifies that residents and businesses use the Town's reclaimed water system for secondary plumbing usage to the maximum extent possible, and that new development within the designated service areas connect to the reclaimed water system. More specific details regarding service areas and proposed infrastructure are presented in the Town of Cary's Reclaimed Water Master Plan Update (CDM, 2013).

In Cary, as much as half of the drinking water used on peak days during the summer can be for non-consumptive uses such as irrigation or cooling towers (CH2M HILL and Brown and Caldwell, 2013). Under this program, reclaimed water is available via bulk distribution and through pipes to certain areas of the Town. Reclaimed water is provided as a replacement for certain types of water uses that do not require potable water, and rates are lower than those for drinking water. Reclaimed water use extends the service life of the drinking water plant and the life of the Town's water supply, recycles a valuable resource, and reduces the amount of treated wastewater discharged to surface waters.

According to the Town's Reclaimed Water Master Plan Update, Cary could have an annual average reclaimed water demand of 4.0 MGD by year 2060 based on the preferred system scenario (CDM, 2013). Cary has defined two reclaimed water service areas in the north, west, and southern portions of its jurisdiction and long-range USA. The reclaimed water program includes two reclaimed water piping systems and two bulk water distribution centers (located at the North Cary and South Cary WRFs). The piping system runs parallel to existing drinking water lines in the vicinity of the North Cary and South Cary WRFs, as well as in RTP South and western Cary. The reclaimed water system was put into service on June 12, 2001. The Town of Cary currently delivers approximately 1 million gallons of reclaimed water on a peak day and up to 20 million gallons of reclaimed water during a summer month to customers within designated service districts (Town of Cary, 2013a).

Expanding the reclaimed water system is consistent with the Town's Effective Utilization of Reclaimed Water System policy, which aims to reduce the non-essential use of potable water (CDM, 2013). Figure 2-2 shows the reclaimed water service areas and proposed infrastructure. Exact locations of the proposed infrastructure will be determined during development of the environmental documents that examine the direct impacts of the infrastructure. However, general locations that are described above are supported by the land use plan and population projections; thus, SCI are identifiable at this time.

The Town's CIP specifically lists reclaimed water projects that will be implemented in the next few years. The 2013 Reclaimed Water Master Plan Update recommended the extension of the distribution system along Green Level Church Road from McCrimmon Parkway to Thomas Brooks Park. The project, currently under construction, will provide reclaimed water from the Durham County Triangle Wastewater Treatment Plant (WWTP) to customers in western Cary. This will include Thomas Brooks Park, the site of the USA Baseball National Training Complex. Additionally, the Town is in the process of designing a connector pipeline that will

bring reclaimed water from the North Cary WRF to RTP South and west Cary, making the North Cary WRF the primary source of reclaimed water to this area.

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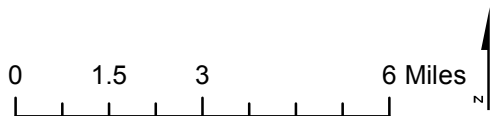
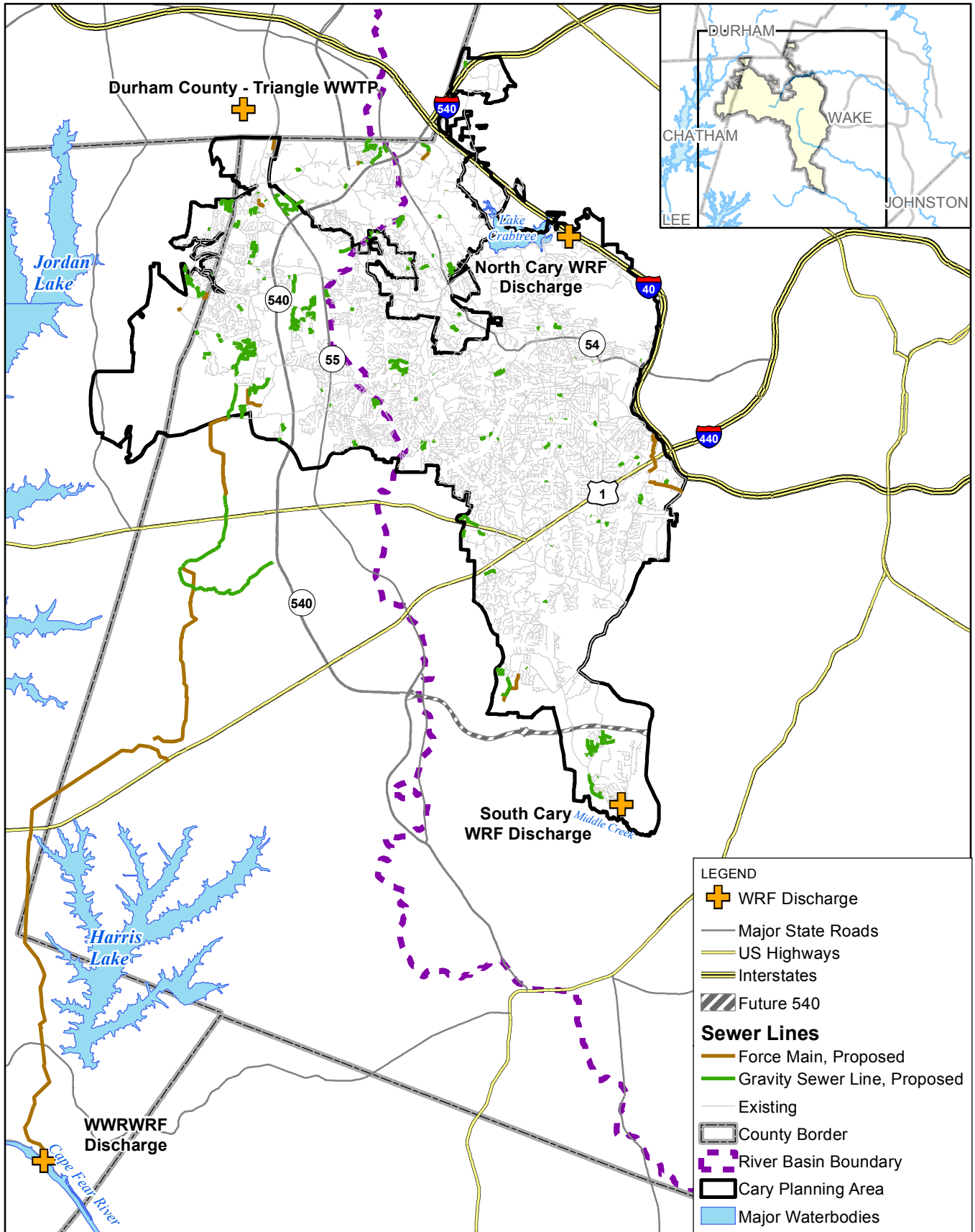
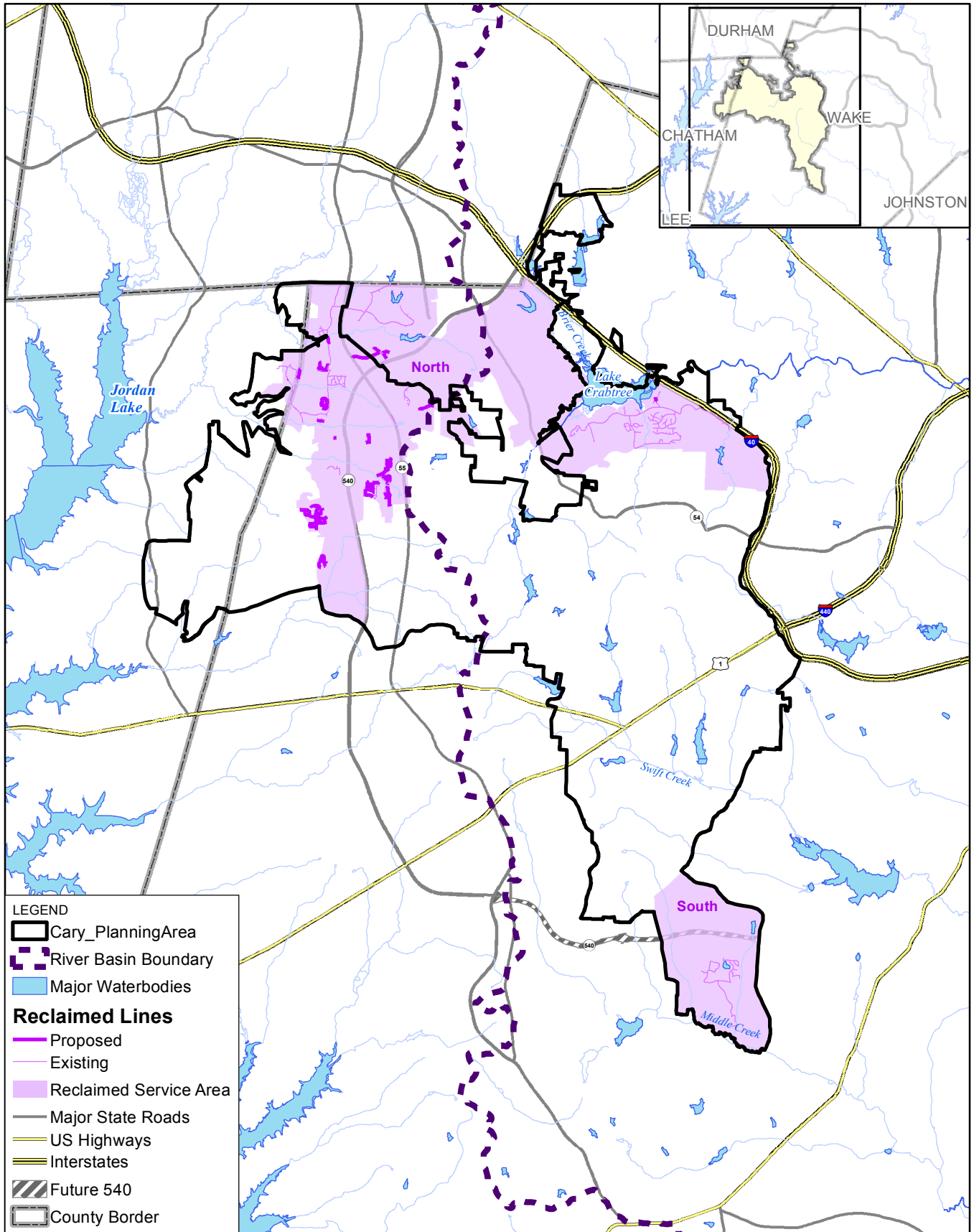


FIGURE 2-1
Proposed Wastewater Infrastructure
 2015 Secondary and Cumulative Impacts
 Master Management Plan - Town of Cary

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0 1 2 4 Miles



FIGURE 2-2
Proposed Reclaimed Water Infrastructure
 2015 Secondary and Cumulative Impacts
 Master Management Plan - Town of Cary

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2.2 Water

2.2.1 Existing Water System

The Town obtains its drinking water from Jordan Lake. The water is treated at the Cary/Apex WTP, which is located in the Town of Apex's jurisdiction, as shown on Figure 2-3. Raw water from Jordan Lake is conveyed about 4 miles to the WTP, which is located on Wimberly Road (SR 1603). The WTP has a current capacity of 40 MGD. Maximum daily finished water production for the Town in 2012 was 22.7 MGD. To distribute water, the Town maintains approximately 919 miles of transmission lines with diameters ranging from 2 to 42 inches within the Town of Cary. The distribution system includes one high service pump station at the WTP and four booster pump stations: Trinity Road, Durham Davis Drive, Old Apex Road, and Penny Road. The Trinity Road pump station provides emergency connection with the City of Raleigh; the Durham Davis Drive pump station provides emergency connection with the City of Durham; and the Penny Road pump station provides emergency connection with the Town of Apex. Storage is provided in seven tanks: North Harrison, Kildare Farm, Ridge View, Maynard, Carpenter, Plumtree Way, and Old Apex Road (CH2M HILL, 2009).

2.2.2 Future Water System

The Town completed its most recent Water Distribution System Master Plan (Water Plan) in June 2009 (CH2M HILL, 2009). The Water Plan evaluated the existing WTP finished water pumping capacity, pressure zones, pumping systems, distribution system, and storage facilities. The Water Plan outlines recommended improvements to upgrade the capacity of the distribution system. These improvements mainly include replacement of existing mains by larger diameter pipes. The transmission line improvements can be classified in three categories:

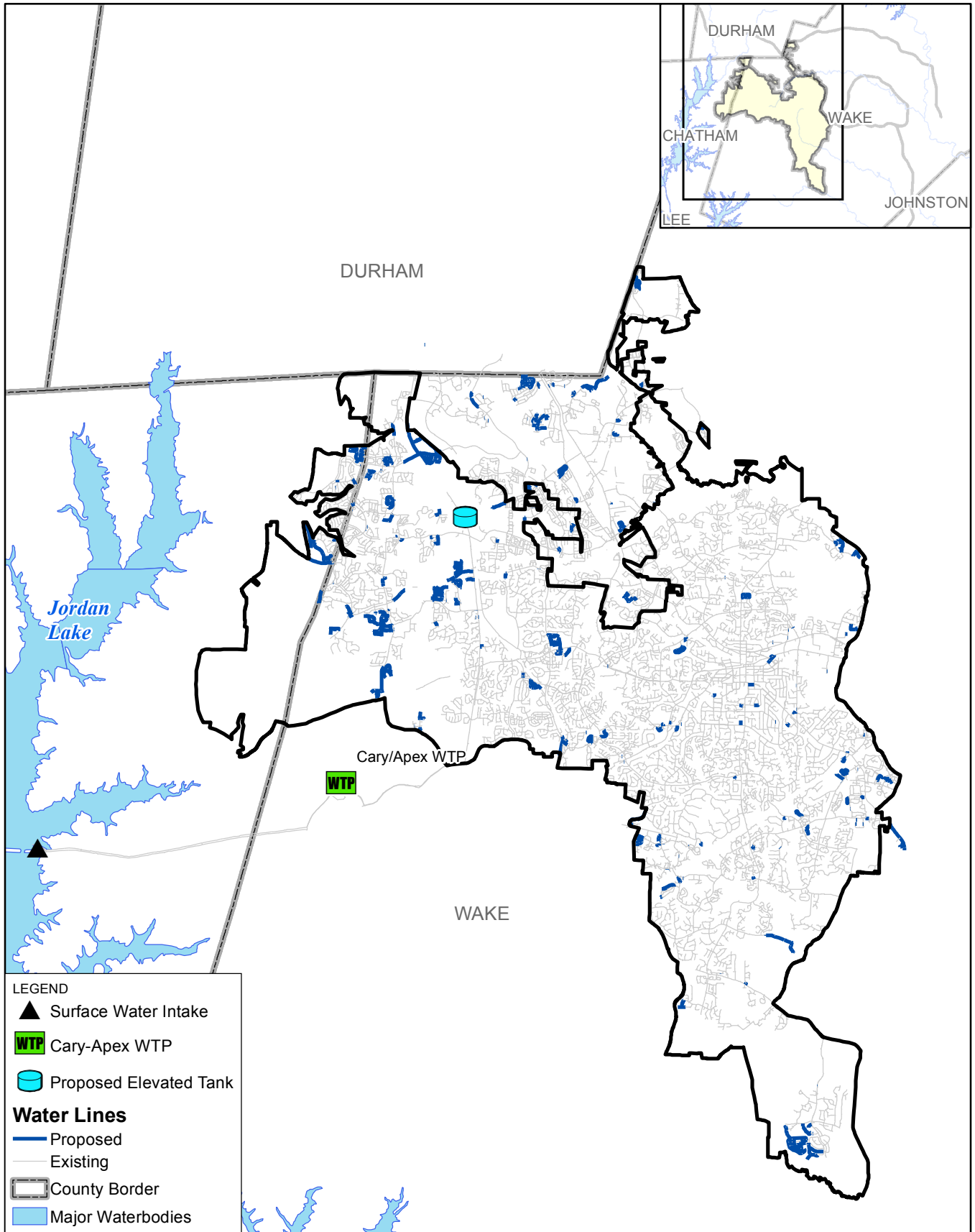
- Hydraulic (projects that are hydraulically necessary to maintain adequate flows and pressures in the system)
- Water Quality (projects that have anticipated water quality benefits, such as removal of dead-end piping by forming loops in the system)
- Planned or Anticipated Local Service (to meet the water needs of new service areas)

Future water lines are shown on Figure 2-3. A detailed explanation of proposed capital improvements is presented in Appendix C. Exact locations of the proposed infrastructure will be determined during development of the environmental documents that examine the direct impacts of the infrastructure. However, general locations are known and are supported by land use plans and population projections; thus, SCI are identifiable at this time.

In addition to the distribution system improvements outlined in the Water Plan, the Town is in the process of expanding the WTP capacity to 56 MGD. The upgrade will require the installation of a 48-inch raw water transmission pipeline. The increased capacity and transmission line, as well as improvements to the raw water pump station, are expected to provide sufficient raw water conveyance capacity through the utility system's build-out. The construction is expected to be complete in 2016 (Town of Cary, 2014b). These plans are included in the Town's CIP and are presented in Appendix C. The Town is also in the process of designing a reservoir aeration system to provide better water quality near its water supply intake in Jordan Lake.

The Town is planning to expand and improve storage capacity as identified in the Water Plan. Preliminary engineering work is underway for the construction of an approximately 2-million-gallon (MG) water storage tank, known as the West Cary Water Tank, near the intersection of NC 55 and Good Hope Church Road. When completed, the tank will provide additional storage for the water system, help maintain system pressure, reduce the demands on the transmission mains during peak flow conditions, and provide reserve capacity during fire fighting or system maintenance activities. Construction is expected to begin in the fall of 2015. The Town is also pursuing redundancy in its emergency interconnections, as well as modifications to pressure zone boundaries to improve operational efficiency.

In 2013, the Town completed a Long Range Water Resources Plan (LRWRP), which will guide the development of water supply and resource management solutions that are financially responsible and maintain a high quality of service for the Town's residents. The LRWRP takes a strategic long view, through 2060, to meet the Town's water resources challenges in a dynamic and holistic way, through development of a Water Resources Portfolio. The Portfolio provides a mix of practical strategies that the Town can apply to meet its water resources responsibilities by implementing the right actions at the right time (CH2M HILL and Brown and Caldwell, 2013). The LRWRP identifies water supply and resource management options for implementation.



0 1.25 2.5 5 Miles



FIGURE 2-3
Proposed Water Infrastructure
 2015 Secondary and Cumulative Impacts
 Master Management Plan - Town of Cary

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2.3 Transportation

The Town's Comprehensive Transportation Plan (Transportation Plan) was adopted in September 2008 (Kimley-Horn and Associates, 2008). The Plan seeks to create a safe, convenient, and efficient multi-modal transportation system. The Plan addresses potential solutions to improve pedestrian, bicycle, transit, and thoroughfare elements for the future. While the NCDOT is responsible for the major highway work that will be done in the Town, the Town's Transportation Plan includes specific recommendations for thoroughfare improvements. The purpose of the Transportation Plan is to update the official Thoroughfare Plan that is used by local, regional, state, and federal decision-makers. The plan reserves land for future transportation corridors and helps guide decisions on setbacks and roadway improvements as development occurs.

The Comprehensive Transportation Plan has four elements: Pedestrians, Bicycles, Transits, and Thoroughfares. The Pedestrians Element shows the network of walkways that will include sidewalks and greenways, forming an interconnected system. The Bicycle Element shows a network of on-street bikeways, including striped bike lanes, streets with wide outside lanes to accommodate bicycles, and connections to the Town's greenway system. The Transit Element shows how the Town can incorporate enhanced regional bus service and future local and feeder bus service. The Thoroughfares Element shows the network of major and minor roadways that will improve traffic flow over existing conditions and begin to meet some of the anticipated future travel demands (Kimley-Horn and Associates, 2008).

Figure 2-4 summarizes thoroughfares recommended in the Transportation Plan. Several roads are being widened, some with projects undertaken by the Town, to help accommodate the growth. Exact locations of the proposed infrastructure will be determined during the development of environmental documents that examine the direct impacts of infrastructure. However, general locations are known and are supported by the land use plan and population projections; thus SCI are identifiable at this time. More information on these plans can be found in the Town's CIP in Appendix C. Other major regional transportation efforts affecting the Towns of Cary, Apex and Holly Springs include the completion of NC 540, which currently ends at NC 55, but will eventually be extended to the U.S. 64/U.S. 264 Bypass in Knightdale. A portion of both the existing and future segments extends through the Town (NCDOT, 2013).

In September 2012, Wake County released an updated draft of the Wake County Transit Plan, which is pending action from the Wake County Board of Commissioners. The Plan was developed in cooperation with several partners, including the Capital Area Metropolitan Planning Organization (CAMPO), Triangle Transit, the Regional Transportation Alliance (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 rush-hour commuter rail service from Garner to Durham; and (2) an enhanced transit plan that includes a regional light rail service (Wake County, 2012). More information on regional transportation plans is found in Appendix B.

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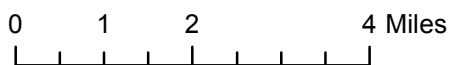
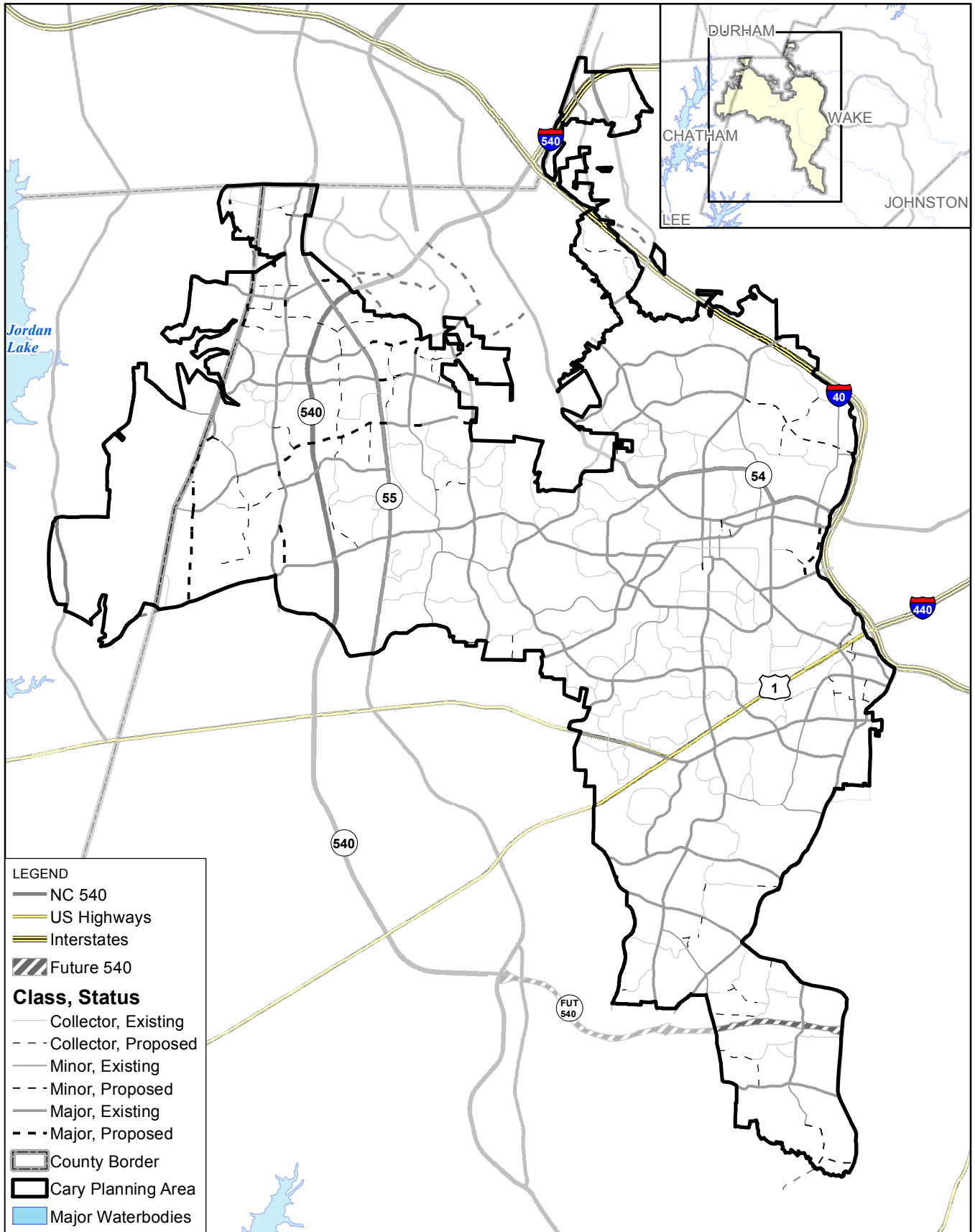


FIGURE 2-4
Proposed Transportation Infrastructure
 2015 Secondary and Cumulative Impacts
 Master Management Plan - Town of Cary

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