

SECTION 3.0 PURPOSE AND NEED

3.1 PROJECT PURPOSE AND NEED

The purpose of the proposed project is to provide the Partners with the necessary wastewater transmission and treatment facilities to address long-term wastewater capacity needs to the year 2030 while meeting regulatory requirements and recommendations. Specifically, the schedule for these improvements is driven by the EMC's requirement for the Towns of Cary, Apex, and Morrisville and Wake County to return wastewater to the Cape Fear River Basin by January 1, 2011 as a condition of their IBT certificate. In May 2002, Apex, Cary, Fuquay-Varina, Holly Springs, Morrisville, and Wake County formally agreed to jointly commission the Western Wake County Regional Wastewater Treatment Studies project. In general, the proposed project has been commissioned by each of the local governments to address one, or more of, the following issues:

- The need for additional capacity to serve growing areas in western Wake County;
- The required return of treated wastewater to the Cape Fear Basin by January 1, 2011 in accordance with the terms of the IBT Certificate issued to Apex, Cary, Morrisville, and Wake County (for RTP South);
- The recommendation by DWQ for Holly Springs to relocate its discharge from Utleigh Creek due to nutrient enrichment concerns;
- An expressed preference by State regulatory agencies for regional wastewater management planning; and
- The amount of time available for an optimistic permitting, design, and construction schedule and the time when most of the participating local governments will operate at capacity at their existing water reclamation facilities being approximately equal. In addition, some local governments will exceed the capacity of their existing wastewater treatment facilities before January 1, 2011.

The current and future situations that demonstrate the purpose and need for the proposed project are discussed in the following sections.

3.2 EXISTING COLLECTION SYSTEMS

3.2.1 Town of Apex

The Town of Apex currently owns, operates and maintains a wastewater collection system that serves residential, commercial, institutional, and industrial customers. The Town's industrial community includes the following major employers: Cooper Tools, Potters Industries, and Morton Meadowcraft. All of Apex's wastewater is treated at the Middle Creek Wastewater Treatment Plant (WWTP), which is also owned and operated by the Town. Figure 3-1 shows the Town of Apex's existing wastewater collection system, including pump stations and their associated force mains, and the location of the Middle Creek WWTP. Additional information on the Apex wastewater collection system is included in Appendix E.

3.2.2 Town of Cary

The Town of Cary provides wastewater collection and treatment for the Town of Cary, as well as for the Town of Morrisville, Raleigh-Durham (RDU) International Airport, and the Wake County portion of Research Triangle Park (RTP South). The Town of Cary wastewater system serves residential, commercial, institutional and industrial customers. The Town's industrial community includes the following major employers: IBM, SAS Institute, Caterpillar, John Deere, Lucent Technologies, Buehler Products, and Oxford University Press. The Town owns and operates two water reclamation facilities (WRFs), the North Cary WRF and the South Cary WRF. Figure 3-2 shows the Town of Cary's existing wastewater collection system, including pump stations and their associated force mains. The location of the two water reclamation facilities and RDU International Airport, RTP South and Town of Morrisville boundaries are also shown on Figure 3-2. Additional information on the Town of Cary wastewater collection system is included in Appendix E.

3.2.3 Town of Holly Springs

The Town of Holly Springs wastewater collection system serves residential, commercial, institutional, and industrial customers. All of the wastewater is treated at the Utley Creek WWTP, which is also owned and operated by the Town. Figure 3-3 shows the Town of Holly Springs existing wastewater collection system, including gravity lines, and pump stations and their associated force mains, and the location of the Utley Creek WWTP. Additional information on the Holly Springs wastewater collection system is included in Appendix E.

3.2.4 Town of Morrisville

The Town of Morrisville's wastewater collection system serves residential, commercial, institutional, and industrial customers. There are four developments in Morrisville that discharge wastewater directly to the Cary system. The remaining wastewater flow in Morrisville is collected and routed through a series of interceptors to the State Road (Aviation Parkway) Pump Station and the Perimeter Park Pump Station. From these pumping stations, the wastewater is pumped to interceptors owned by Cary that convey the wastewater to the North Cary WRF. Figure 3-4 shows the Town of Morrisville's existing wastewater collection system, including gravity lines, pump stations and their associated force mains. Additional information on the Morrisville wastewater collection system is included in Appendix E.

3.3 EXISTING TREATMENT SYSTEMS

3.3.1 Town of Apex

All of the Town of Apex's wastewater is treated at the Middle Creek WWTP. The design capacity of the facility is 3.6 mgd. For the period from July 1, 2002, to June 30, 2003, the average daily flow to the facility was 2.30 mgd. The Middle Creek WWTP is operated under NPDES Permit No. NC0064050. A copy of the permit limits page is provided in Appendix D. Apex also has an inter-municipal agreement with the City of Raleigh that allows the Town to discharge up to 1 mgd on average, and at a rate of not more than 1,800 gallons per minute (gpm), to the City of Raleigh's Neuse River WWTP.

The current NPDES permit effluent limits for the existing permitted capacity of 3.6 mgd are summarized in Table 3-1. Summer/winter limits are shown for BOD₅ and ammonia nitrogen. All permit limits are monthly averages except for total phosphorus, which is a quarterly average; dissolved oxygen, which is a daily average; and cyanide, which is a daily maximum. The current permit also requires effluent monitoring for chronic toxicity. In addition, the Middle Creek WWTP has an annual total nitrogen mass loading limit of 40,547 pounds/year and reports total nitrogen loading monthly. The Middle Creek WWTP is not operating under a Special Order by Consent (SOC) for permit noncompliance.

TABLE 3-1
Middle Creek WWTP Effluent Limits

Parameter	Effluent Limit
Permitted Flow, mgd	3.6
BOD ₅ , mg/L	5.0/10.0
Total Suspended Solids, mg/L	30
Ammonia Nitrogen, mg/L	1.0/2.0
Fecal Coliform, No./100 mL	200
pH	6-9
Total Phosphorus, mg/L	2.0
Dissolved Oxygen, mg/L	5.0
Cyanide, µg/L	22

The Middle Creek WWTP consists of the following unit processes: screenings removal with two mechanical bar screens; grit removal with two stirred vortex grit collectors; an influent pumping station with four submersible pumps; one anoxic oxidation ditch; two aerobic oxidation ditches; three mixed liquor recycle pumps for conveying nitrified mixed liquor to the anoxic oxidation ditch; four secondary clarifiers; two return activated sludge (RAS) pumping stations equipped with two RAS pumps in each station; four traveling bridge-type tertiary filters; one ultraviolet (UV) disinfection channel with medium pressure UV lamps; effluent flow measurement through an 18-inch Parshall flume; and post aeration using a cascade aerator. Effluent is conveyed by gravity to Middle Creek in the Neuse River Basin.

Waste activated sludge is pumped to two aerobic digester/holding tanks, and one new tank is currently under construction for additional sludge stabilization and storage prior to land application. The aeration system for the aerobic digesters is periodically stopped to promote sludge thickening through gravity settling. The supernatant is then pumped from the digesters to the head of the facility for treatment in the liquid process train. Once stabilized, thickened digested sludge (biosolids) is pumped to tanker trucks and land applied to privately-owned agricultural land by a biosolids management contractor.

Compliance with Class B requirements of the federal 40 CFR Part 503 sewage sludge regulations is monitored prior to land application by testing for fecal coliforms for pathogen reduction and specific oxygen uptake rate (SOUR) for stabilization (vector attraction reduction). The biosolids in the aerobic digesters/holding tanks is thickened to a solids concentration of approximately 2.5 percent before hauling.

A process flow schematic for the Middle Creek WWTP is shown on Figure 3-5. A summary of the Middle Creek WWTP design data is provided in Appendix E.

3.3.2 Town of Cary

The Town of Cary's wastewater system is separated into a North Cary System and a South Cary System. Wastewater flow from the North Cary System is treated at the North Cary WRF, and wastewater flow from the South Cary System is treated at the South Cary WRF.

The North Cary WRF is operated under NPDES Permit No. NC0048879, which expires on February 28, 2008. A copy of the permit limits pages is provided in Appendix D. The current NPDES permit effluent limits for the existing permitted capacity of 12 mgd are summarized in Table 3-2.

TABLE 3-2
North Cary WRF Effluent Limits

Parameter	Effluent Limits
Permitted Flow, mgd	12.0
CBOD ₅ , mg/L	4.1/8.2
Total Suspended Solids, mg/L	30
Ammonia Nitrogen, mg/L	0.5/1.0
Fecal Coliform, No./100 mL	200
pH	6-9
Total Phosphorus, mg/L	2.0
Dissolved Oxygen, mg/L	5.0

Summer/winter limits are shown for BOD₅ and ammonia nitrogen. All permit limits are monthly averages except for phosphorus, which is a quarterly average; and dissolved oxygen, which is a daily average. The current permit also requires effluent monitoring for temperature, total Kjeldahl nitrogen, nitrate and nitrite, total nitrogen, and chronic toxicity. The current NPDES permit for the North Cary WRF also includes a total nitrogen annual mass loading limit of 143,246 pounds per year (lb./yr.). The total nitrogen mass limit went into effect on January 1, 2003. The North Cary WRF is not operating under a Special Order by Consent (SOC) for permit noncompliance.

The South Cary WRF is operated under NPDES Permit No. NC0065102, which expires on April 30, 2008. A copy of the permit limits pages is provided in Appendix D. The current NPDES permit effluent limits for the existing permitted capacity of 12.8 mgd and for a future expanded capacity of 16 mgd are summarized in Table 3-3.

TABLE 3-3
South Cary WRF Effluent Limits

Parameter	Effluent Limits	
Permitted Flow, mgd	12.8	16.0
BOD ₅ , mg/L	5/10	5/10
Total Suspended Solids, mg/L	30	30
Ammonia Nitrogen, mg/L	1.0/2.0	1.0/2.0
Fecal Coliform, No./100 mL	200	200
pH	6-9	6-9
Total Phosphorus, mg/L	2.0	2.0
Dissolved Oxygen, mg/L	5.0	5.0

The effluent limits for 16 mgd are those that will take effect when the treatment plant is expanded to that capacity. Summer/winter limits are shown for BOD₅ and ammonia nitrogen. All permit limits are monthly averages except for phosphorus, which is a quarterly average; and dissolved oxygen, which is a daily average. The current permit also requires effluent monitoring for temperature, nitrate and nitrite, total Kjeldahl nitrogen, chronic toxicity, copper, and zinc. The current NPDES permit for the South Cary WRF also includes a total nitrogen annual mass loading limit of 180,210 pounds per year (lb./yr.). The total nitrogen mass limit went into effect on January 1, 2003. The South Cary WRF is not operating under a Special Order by Consent (SOC) for permit noncompliance.

Class B biosolids from the North and South Cary WRFs are beneficially used for land application under Permit No. WQ0000691. The permit allows operation of a water and wastewater residuals land application program on approximately 2,049 acres of land in Chatham, Cumberland, Harnett and Wake Counties. The permit includes approximately 2,400 dry tons per year of biosolids from the North and South Cary WRFs and 800 dry tons per year of alum residuals from the Cary/Apex Water Treatment Plant.

A summary of facility information for the North Cary and South Cary WRFs is provided in the following sections.

3.3.2.1 North Cary WRF

The North Cary WRF is located on Old Reedy Creek Road near I-40 and the William B. Umstead State Park. Its current treatment capacity is 10 mgd, and the facility is permitted to discharge up to 12.0 mgd to Crabtree Creek. An upgrade to 12.0 mgd is scheduled for completion by the end of 2005. For the period from July 1, 2002, to June 30, 2003, the average daily flow to the facility was 6.80 mgd. The facility also has a 4.28 mgd permit for reuse of wastewater effluent as reclaimed water for irrigation and

other nonpotable uses. The North Cary WRF discharges into Crabtree Creek, a tributary of the Neuse River. The Neuse River Basin is designated as nutrient sensitive waters; therefore, the NPDES permit has stringent nutrient discharge limits, as discussed above.

A plant layout and a process flow schematic for the North Cary WRF are shown on Figures 3-6 and 3-7, respectively. The current treatment processes at the North Cary WRF consist of the following: coarse bar screens; two influent pump stations; fine bar screens; grit removal facilities; two separate biological treatment trains, each consisting of a four-stage anaerobic selector, two oxidation ditches, a three-stage secondary anoxic zone and a reaeration zone; two secondary clarifiers; effluent filters; UV disinfection facilities; and a cascade aerator for reaeration prior to discharge.

Waste activated sludge at the North Cary WRF is pumped to two gravity belt thickeners for thickening before being pumped to three aerobic digesters for solids stabilization and storage. Digested biosolids from the digesters is hauled as a liquid and land applied to privately-owned agricultural land.

Compliance with the federal 40 CFR Part 503 sewage sludge regulations is monitored prior to land application by testing for fecal coliforms and 30-day laboratory bench-scale digestion testing for volatile suspended solids (VSS) reduction less than 15 percent. The Town of Cary contracts with a private biosolids management contractor for hauling and land application of biosolids from the North and South Cary WRFs. The Town of Cary also contracts with a private company for composting of dewatered biosolids from the North Cary WRF.

Under current operations, all sludge from the North Cary WRF is hauled as a liquid to the South Cary WRF for centrifuge dewatering followed by thermal drying.

Design data for the existing facilities at the North Cary WRF is summarized in Appendix E.

3.3.2.2 South Cary WRF

The South Cary WRF is located on West Lake Road, near Sunset Lake. Its current treatment capacity is 12.8 mgd. For the period from July 1, 2002, to June 30, 2003, the average daily flow to the facility was 5.49 mgd. The South Cary WRF is permitted to discharge up to 16 mgd under the terms of its NPDES permit (No. NC0065102). The facility also has a 0.86 mgd permit for reclaimed water. Similar to the North Cary WRF,

the South Cary WRF has stringent nutrient removal requirements because it discharges into Middle Creek, which is located in the Neuse River Basin.

A plant layout and a process flow schematic for the South Cary WRF are shown on Figures 3-8 and 3-9, respectively. The South Cary WRF has the following process units: screenings removal with two mechanically-cleaned bar screens; influent flow measurement using a Parshall flume; grit removal using two aerated grit chambers; three biological nutrient removal (BNR) aeration basins; magnesium hydroxide feed facilities for alkalinity addition; four secondary clarifiers; a RAS pumping station equipped with six variable speed pumps; seven deep bed effluent filters with denitrification capability (via methanol addition); one UV disinfection channel with medium pressure UV lamps; effluent flow measurement using a weir; and post aeration using a cascade aerator. The South Cary WRF discharges to Middle Creek in the Neuse River Basin.

Waste sludge at the South Cary WRF is pumped to two gravity belt thickeners before being pumped to three aerobic digesters for solids stabilization and storage before land application. Hauling and land application is by a private contractor. Compliance with the federal 40 CFR Part 503 sewage sludge regulations is monitored prior to land application by testing for fecal coliforms and 30-day laboratory bench-scale digestion testing for VSS reduction less than 15 percent.

A new biosolids dryer was placed into service at the South Cary WRF during the fourth quarter of calendar year 2005.

Design data for the existing facilities at the South Cary WRF is summarized in Appendix E.

3.3.3 Town of Holly Springs

Wastewater for the Town of Holly Springs is treated at the Utley Creek WWTP. The design flow rate for the Utley Creek WWTP is 1.5 mgd (Table 3-4). For the period from July 1, 2002, to June 30, 2003, the average daily flow to the facility was 0.90 mgd. Holly Springs presently has no inter-municipal agreement with any other entity for additional wastewater treatment capacity.

The Utley Creek WWTP is operated under NPDES Permit No. NC0063096, which expires on July 31, 2006. A copy of the permit limits page is provided in Appendix D. The current NPDES permit sets the following effluent limits for the existing permitted capacity of 1.5 mgd:

TABLE 3-4
Utlely Creek WWTP Effluent Limits

Parameter	Effluent Limit
Permitted Flow, mgd	1.5
BOD ₅ , mg/L	5.0/10.0
Total Suspended Solids, mg/L	30
Ammonia Nitrogen, mg/L	2.0/4.0
Fecal Coliform, No./100 mL	200
Total Residual Chlorine, µg/L	19.0
Dissolved Oxygen, mg/L	6.0
pH	6.0 – 9.0

Summer/winter limits are shown for BOD₅ and ammonia nitrogen. All permit limits are monthly averages except for total residual chlorine, which is a daily maximum, and dissolved oxygen, which is a daily average. Total residual chlorine is not required to be monitored when chlorine is not being added to the effluent. The current permit also requires effluent monitoring for chronic toxicity. The Utlely Creek WWTP is not operating under a Special Order by Consent (SOC) for permit noncompliance.

The Town of Holly Springs' original wastewater treatment plant was put into service in the mid-1980s. The treatment facility was a 0.25-mgd package treatment plant that provided secondary treatment for the Town's wastewater flow. The Town of Holly Springs' second wastewater treatment plant was put into service in January 1996. The second treatment facility was also a package treatment plant and had a capacity of 0.5 mgd. As part of the construction of the 0.5-mgd treatment facility, the original 0.25-mgd treatment plant was converted into a phosphorus removal/flow equalization tank, an influent pump station, and three aerobic digester/sludge holding tanks (Digesters 1, 2 and 3).

A third wastewater treatment train, consisting of an anoxic tank, an oxidation ditch aeration tank and a secondary clarifier, was put into service in 2000 and has a capacity of 1.0 mgd. Influent screening and grit removal were also added in 2000. The third treatment train is designed for parallel operation with the 0.5-mgd treatment facility to provide a total treatment capacity of 1.5 mgd.

A process flow diagram for the Utlely Creek WWTP is shown in Figure 3-10. The combined liquid treatment process train for the Utlely Creek WWTP is comprised of the following process units: influent flow measurement using a Parshall flume; screenings removal using one traveling bar screen; grit removal using an aerated grit chamber; a phosphorus removal/flow equalization tank; an influent pumping station with three submersible pumps; a flow splitter box; a 0.5-mgd package wastewater treatment

system consisting of a single circular steel tank which is partitioned to provide aeration basin volume, secondary clarifier volume, and aerobic digester/sludge holding tank volume; a parallel 1.0-mgd treatment train consisting of an anoxic tank, an oxidation ditch (Carrousel) aeration tank, and a secondary clarifier; two traveling bridge-type tertiary filters; a UV disinfection channel with low pressure UV lamps; effluent flow measurement using a weir; and post aeration using a cascade aerator. Effluent discharge is to Utlely Creek, which is a tributary of Harris Lake in the Cape Fear River Basin.

Waste activated sludge at the Utlely Creek WWTP is stabilized in five aerobic digesters/sludge holding tanks. The volume of the aerobic digester/sludge holding tanks is approximately 388,000 gallons. Sludge stabilization consists of aerobic digestion, followed by lime stabilization.

The Town of Holly Springs contracts with a private biosolids management contractor for biosolids disposal. The private contractor adds lime to the biosolids prior to land application to meet the 40 CFR Part 503 regulations. A solids concentration of approximately 3.5 to 4.0 percent is achieved by long-term storage and decanting prior to hauling and land application.

A summary of design data for the Utlely Creek WWTP is provided in Appendix E.

3.3.4 Town of Morrisville

Morrisville does not own or operate any wastewater treatment facilities. They have an agreement with the Town of Cary to treat 2.0 mgd of their wastewater and have explored utility merger opportunities with both Cary and Raleigh. The Town of Morrisville is currently planning to merge their wastewater collection system with the Town of Cary.

3.4 HISTORICAL WASTEWATER FLOWS AND I/I ANALYSIS

3.4.1 Town of Apex

The Town of Apex Middle Creek WWTP treats wastewater flows generated in the Apex service area. Existing wastewater flows in the Town of Apex service area for Fiscal Year 2003 are summarized in Table 3-5. The flows for the Town of Apex include infiltration and inflow, as well as residential, commercial and industrial flows. Expected residential, commercial, and industrial wastewater flows are based on water usage from water billing data times 0.9. The estimated infiltration and inflow rate is based on subtraction of the expected wastewater flows from the treatment plant flows. Plant

effluent flow records were used to determine the total treatment plant flow. The estimated infiltration/inflow (I/I) for the Apex service area shown in Table 3-5 is based on annual average conditions; however, I/I flows vary during the year and from year to year depending on rainfall and other conditions. An I/I analysis using State Revolving Fund criteria is included in Appendix E.

TABLE 3-5
Apex Wastewater Service Area Fiscal Year 2003 Wastewater Flows

Total Residential Served Population	26,844
Wastewater Flows, mgd*	
Residential	1.304
Commercial	0.401
Industrial	0.005
Subtotal	1.710
Annual Average Infiltration/Inflow	0.596
Annual Average WWTP Flow	2.306

* Wastewater flows estimated based on 0.9 times water consumption.

3.4.2 Town of Cary

Wastewater generated in Cary's service areas, including wastewater flows from Morrisville, RDU, and RTP South, are treated at the North Cary and South Cary WRFs. Existing wastewater flows in the Town of Cary service area for Fiscal Year 2003 are summarized in Table 3-6. The flows for the Town of Cary and its customers include infiltration and inflow, as well as residential and non-residential flows. Expected residential and non-residential wastewater flows for Cary are based on billed water usage times 0.9. The estimated infiltration and inflow rate is based on subtraction of the expected wastewater flows from the treatment plant flows. Plant effluent flow records for the North Cary WRF and South Cary WRF were used to determine the total treatment plant flow. The estimated I/I for the Cary service area shown in Table 3-6 is based on annual average conditions; however, I/I flows vary during the year and from year to year depending on rainfall and other conditions. An I/I analysis using State Revolving Fund criteria is included in Appendix E.

TABLE 3-6
Cary Fiscal Year 2003 Wastewater Flows

Total Residential Served Population	105,950
Wastewater Flows, mgd*	
Residential	4.901
Non-residential	3.216
Subtotal (Cary only)	8.117
Morrisville	1.019
RDU	0.148
RTP South	0.280
Total Wastewater Flow	9.563
Annual Average Infiltration/Inflow	2.731
Annual Average WRF Flow	12.294

*Wastewater flows estimated based on 0.9 times water consumption.

3.4.3 Town of Holly Springs

Wastewater flows generated in the Holly Springs service area are treated at the Utle Creek WWTP. Existing wastewater flows in the Town of Holly Springs service area for Fiscal Year 2003 are summarized in Table 3-7. The flows for the Town of Holly Springs include I/I, as well as residential, commercial and industrial flows. Expected residential, commercial, and industrial wastewater flows are based on water usage from water billing data times 0.9. The estimated I/I rate is based on subtraction of the expected wastewater flows from the treatment plant flows. Plant effluent flow records were used to determine the total treatment plant flow. The estimated I/I for the Holly Springs service area shown in Table 3-7 is based on annual average conditions; however, I/I flows vary during the year and from year to year depending on rainfall and other conditions. An I/I analysis using State Revolving Fund criteria is included in Appendix E.

TABLE 3-7
Holly Springs Fiscal Year 2003 Wastewater Flows

Total Residential Served Population	12,036
Wastewater Flows, mgd*	
Residential	0.630
Commercial	0.047
Industrial	0.007
Other	0.005
Subtotal	0.689
Annual Average Infiltration/Inflow	0.206
Annual Average WWTP Flow	0.896

* Wastewater flows estimated based on 0.9 times water consumption.

3.4.4 Town of Morrisville

All of Morrisville's wastewater flows are conveyed to the North Cary WRF for treatment and disposal. The I/I evaluation for the Morrisville collection system is included in the I/I evaluation for Cary in Section 3.4.2 and Section E.3.2 in Appendix E.

3.5 POPULATION PROJECTIONS

3.5.1 Town of Apex

The Town of Apex has experienced a very high rate of growth in the past decade. According to the U.S. Census, the Town's population increased over 300 percent from 1990 to 2000. Apex's growth is part of the growth of the entire Research Triangle Park area, which has experience steady growth since the mid 1960s. The communities closest to Research Triangle Park in western Wake County have been particularly influenced by this growth, and these communities are expected to continue to grow. Historical growth trends in Apex are shown in the following table. All data is from U.S. Census data, except for 2003 data which is based on estimated data from North Carolina State Demographics.

Year	Town of Apex Population
1960	1,368
1970	2,334
1980	2,847
1990	4,789
2000	20,212
2003	24,701

Population projections used to develop wastewater flow projections for this EIS are presented in Table 3-8, along with population projections from other sources. The population projections for the EIS are also based on the assumption that 50 percent of the unresolved area between Apex and Holly Springs will be served by each town.

TABLE 3-8
Town of Apex Population Projections

Year	Population Projections			
	1997 Local Water Supply Plan (water service area population)	Apex 2010 Land Use Plan Update	Round III Jordan Lake Water Supply Storage Allocation Application	EIS Projections
2000	21,500	21,500	22,453	20,212
2001		24,500		
2002		27,430		
2003		31,280		
2004		34,400		
2005		37,840	35,627	28,330
2006		41,600		
2007		45,700		
2008		50,330		
2010	58,398		48,800	34,000
2015			61,700	43,470
2020	98,000		74,600	60,820
2025			87,500	86,210
2030			100,400	100,400

Source: Various as indicated in the column headings

3.5.2 Towns of Cary and Morrisville

Population and wastewater flow projections for the Town of Cary service area were developed for 2003, 2008, 2013, 2018 and buildout in the Town of Cary Wastewater Collection System Master Plan (Hazen and Sawyer, 2003). The Cary wastewater service area includes the service area for the Town of Cary customers within the Town limits. In addition to its citizens and individual customers, the Town of Cary also provides wastewater treatment for the Town of Morrisville, RDU International Airport, and RTP South. These entities are either served through metered connections to the Cary wastewater collection system or convey their wastewater flows by pump station and force main to the Cary system.

Historical population data for the Towns of Cary and Morrisville are presented in Table 3-9. The Town provides wastewater service to all residents within the Town of Cary limits. According to the U.S. Census, the Town of Cary population in 2000 was 95,949. The Town of Cary Planning Department estimated the July 1, 2002 population as 103,260. The U.S. Census indicated a Town of Morrisville population in 2000 of 5,208, and the 2002 estimated population was 10,000.

For the purpose of wastewater flow projection, population projections used to estimate future service area populations for the Town of Cary were based on population data provided by the Capital Area Metropolitan Planning Organization (CAMPO) in the

“wakeforecasts.xls” file, and by the Durham/Chapel Hill/Carrboro Metropolitan Planning Organization (D/CH/C/MPO) in the “Chatham County Forecast.xls” file. The population projections were divided into Traffic Analysis Zones (TAZs), for which data were available for various parameters, including population and employment for 1995 through 2025. These data were based on the Town’s 1996 Land Use Plan.

TABLE 3-9
Historical Population Data

Year	Cary ⁽¹⁾	Morrisville ⁽²⁾
1960	3,356	
1970	7,640	
1980	21,763	
1990	44,397	1,489
1991	45,626	1,586
1992	53,437	1,756
1993	56,621	1,771
1994	62,193	1,914
1995	69,500	2,017
1996	76,800	2,165
1997	82,700	2,114
1998	85,232	2,808
1999	88,354	—
2000	95,949	5,208 (6,500)
2001	99,798	8,500
2002	103,260	10,000

(1)Town of Cary: 1960-1990, 1998, 2000: U.S. Census
 1991-1992: State Office of Management and Budget
 1993-1997, 1999, 2001, 2002: Town of Cary, Planning & Zoning Division

(2)Town of Morrisville: 1990, 2000: U.S. Census (Town of Morrisville in parentheses)
 1991-1996: State Office of Management and Budget
 1997-1998: Town of Cary
 2001, 2002: Town of Morrisville

Source: Town of Cary Wastewater Collection System Master Plan, Hazen and Sawyer, June 2003.

Adjustments to the population projections from the TAZ data were made for areas in the western and extreme southern portions of the Cary service area, for which more recent plans exist (since 1996). These plans include Planned Unit Developments (PUDs) and activity centers. Population projections for ultimate buildout of the PUDs were based on dwelling unit projections provided by the Town of Cary and an estimated 2.5 persons per dwelling unit.

Fifteen activity centers (ACs) are projected for the Cary service area, including 12 in the western service area and three in the southern service area. An activity center is a cluster of businesses and establishments, with an associated increased level of surrounding residential development. Three types of activity centers were projected: Regional Activity Centers (RACs), Community Activity Centers (CACs) and

Neighborhood Activity Centers (NACs). Potential AC locations and flows for the three types of ACs were provided by the Town of Cary.

In addition to the ultimate buildout for the PUDs and ACs, the Town of Cary provided projections of rates of development based on three growth scenarios, a fast growth scenario, an intermediate growth scenario and a slow growth scenario. The intermediate growth scenario provided by the Town was used to project PUD and AC populations and flows for the 2003, 2008, 2013 and 2018 planning periods. For additional information see Appendix F.

Projected wastewater service area populations for the Town of Cary were based on the overlay of the service area boundaries on the TAZ data, plus the above adjustments to the TAZ data. The projected service area population for 2030 was developed based on the 2025 population data. Population projections for the other planning years for this EIS, i.e., 2005, 2010, 2015, 2020, and 2025, were determined by interpolation. The projected wastewater service area populations for Cary are summarized in Table 3-10.

TABLE 3-10
Projected Wastewater Service Area Populations for Cary and Morrisville

Year	Cary ⁽¹⁾	Morrisville
2002-03	105,950	6,295
2005	113,460	7,920
2010	145,720	15,700
2015	178,380	21,880
2020	204,520	23,580
2025	223,730	25,290
2030	242,930	27,000

Notes:

- (1) The Town of Cary Planning Department has projected slightly slower population growth Townwide than is shown here. Since these projections are based on detailed land use plans, however, they are more suitable for wastewater flow projections.

Population projections for the Town of Morrisville were not included in the Town of Cary Wastewater Collection System Master Plan. However, population projections for the Town of Morrisville were presented in the Round III Jordan Lake Water Supply Storage Allocation Application submitted in May 2001. These projections were used for projecting the 2030 Morrisville population in Table 3-10. Population projections for earlier years were adjusted to reflect current growth estimates.

3.5.3 Town of Holly Springs

Population estimates and forecasts for the Town of Holly Springs from various sources are presented in Table 3-11. Final population projections for this EIS were developed for and are documented in the 201 Facility Plan Amendment for the Utley Creek WWTP (Davis-Martin-Powell, 2005). As noted for the Apex population projections, the population projections for the EIS are also based on the assumption that 50 percent of the unresolved area between Apex and Holly Springs will be served by each town.

TABLE 3-11
Town of Holly Springs Population Estimates and Projections

Year	Local Government (Economic Development Facts and Figures)	1997 Local Water Supply Plan (water service area population)	Round III Jordan Lake Water Supply Storage Allocation Application	EIS Projections ⁽¹⁾
2000	9,192	10,500	9,200	9,192
2001				
2005	15,652		21,500	15,090
2010	20,452	35,000	37,275	24,740
2015			54,235	40,570
2020		75,000	71,400	46,710
2025			87,210	53,780
2030			103,900	61,920

Data Sources: Various as indicated in the column headings.

(1) 201 Facility Plan Amendment for the Utley Creek WWTP, Davis-Martin-Powell, September 2005.

3.6 WASTEWATER FLOW PROJECTIONS

3.6.1 Town of Apex

Population and wastewater flow projections were developed separately for the Apex service areas in the Neuse River and Cape Fear River Basins. The portion of the Apex service area in the Neuse River Basin will predominantly be served by the existing Apex Middle Creek WWTP, while the portion of the Apex service area in the Cape Fear River Basin will predominantly be served by the Western Wake WRF. Wastewater flow projections for the portions of the Apex service areas in the Neuse River and Cape Fear River Basins are presented in Tables 3-12 and 3-13, respectively. A per capita flow of 48.6 gpcd was calculated based on historical wastewater flows and population data for 2002-03. This value was increased to 64.5 gpcd for future flows to more closely reflect typical per capita flows. Based on a comparison of maximum month average daily flows (MMFs) to annual average daily flows (ADFs) for 2002 and 2003, a peaking factor of 1.23 is used for projecting MMFs. Currently, all of Apex's flow is treated at the Middle Creek WWTP.

TABLE 3-12
Apex Middle Creek WWTP Wastewater Flow Projections

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Population	8,420	9,040	10,120	12,210	18,160	20,990
Residential ⁽¹⁾	0.409	0.58	0.65	0.79	1.17	1.35
Commercial ⁽²⁾	0.126	0.14	0.15	0.18	0.27	0.31
Industrial ⁽³⁾	0.002	0.07	0.08	0.10	0.14	0.17
Net Average Daily Flow	0.537	0.79	0.88	1.07	1.69	1.95
Estimated I/I ⁽⁴⁾	0.114	0.10	0.10	0.10	0.10	0.10
Total Average Daily Flow	0.650	0.89	0.98	1.17	1.69	1.95
Maximum Month Flow ⁽⁵⁾	0.800	1.10	1.21	1.44	2.08	2.38
Plus Maximum Month Flow from Western Apex Service Area	1.891	2.81	—	—	—	—
Minus Maximum Month Flow to Western Apex Service Area	—	—	—	0.60	0.60	0.60
Maximum Month Flow Treated at Middle Creek WWTP	2.691	3.91	1.21	0.84	1.48	1.78
Peak Flow ⁽⁶⁾	6.414	9.85	3.04	2.11	3.73	4.49

Notes:

(1) Estimated at 64.5 gpcd for 2010 through 2030.

(2) Estimated at 15 gpcd for 2010 through 2030.

(3) Estimated at 10 percent of total residential and commercial flow for 2010 through 2030.

(4) Estimated at 100,000 gallons per day total for 2010 through 2030.

(5) Average daily flow times 1.23 (Based on a review of DMR data).

(6) Average daily flow times 3.1 (Based on wastewater flow analysis for a portion of western Wake service area. This peaking factor is included in the wastewater services interlocal agreement executed by the Project Partners.).

TABLE 3-13
Western Apex Service Area Wastewater Flow Projections

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Population	19,910	24,960	33,350	48,610	68,050	79,410
Residential ⁽¹⁾	0.967	1.61	2.15	3.14	4.39	5.12
Commercial ⁽²⁾	0.298	0.37	0.50	0.73	1.02	1.19
Industrial ⁽³⁾	0.004	0.20	0.27	0.39	0.54	0.63
Net Average Daily Flow	1.269	2.18	2.92	4.25	5.95	6.94
Estimated I/I ⁽⁴⁾	0.269	0.10	0.10	0.10	0.10	0.10
Total Average Daily Flow	1.538	2.28	3.02	4.35	6.05	7.04
Maximum Month Flow ⁽⁵⁾	1.891	2.81	3.71	5.35	7.44	8.66
Plus Maximum Month Flow to Western Apex Service Area	—	—	—	0.60	0.60	0.60
Minus Maximum Month Flow from Western Apex Service Area	1.891	2.81	—	—	—	—
Maximum Month Flow Treated at Western Wake WRF	—	—	3.71	5.95	8.04	9.26
Peak Flow ⁽⁶⁾	—	—	9.36	15.00	20.26	23.34

Notes:

(1) Estimated at 64.5 gpcd for 2010 through 2030.

(2) Estimated at 15 gpcd for 2010 through 2030.

(3) Estimated at 10 percent of total residential and commercial flow for 2010 through 2030.

(4) Estimated at 100,000 gallons per day total for 2010 through 2030.

(5) Average daily flow times 1.23 (Based on a review of DMR data).

(6) Average daily flow times 3.1 (Based on wastewater flow analysis for a portion of western Wake service area. This peaking factor is included in the wastewater services interlocal agreement executed by the Project Partners.).

3.6.2 Town of Cary

Projected wastewater flows for the Town of Cary wastewater service area were developed based on flows presented in the Town of Cary Wastewater Collection System Master Plan. These projections were developed for residential, commercial, industrial and institutional categories and are presented as follows. Residential wastewater flows were projected based on the projected service area population and a projected residential per capita wastewater flow rate of 70 gpcd. This per capita flow rate was based on the 1998 residential per capita water consumption rate, including irrigation, of 76.8 gpcd times a water return rate to the wastewater collection system of 90 percent.

Commercial wastewater flow projections were developed using employment projections and a unit wastewater flow rate of 65 gpd/employee based on 1998 data (See Appendix F). Employment projections were based on the employment (TAZ) data provided by the Capital Area Metropolitan Planning Organization (CAMPO) and the Durham/Chapel Hill/Carrboro Metropolitan Planning Organization (D/CH/C/MPO). Adjustments to employment data provided by CAMPO were made for PUDs and ACs in the western and extreme southern portions of the Cary service area. For the PUDs and ACs, commercial and office flows were generally based on a flow rate of 0.09 to 0.12 gpd/sq. ft. (See Appendix F).

Industrial wastewater flow projections were developed using employment projections by TAZ areas by CAMPO and D/CH/C/MPO in a similar manner as for the commercial wastewater flow projections, and a unit wastewater flow rate of 12 gpd/employee, which was estimated based on 1988 data. Industrial employees from the CAMPO data for PUD and AC areas were subtracted from total industrial employees because no industrial flows are projected for PUDs and ACs. Institutional wastewater flow was projected to be approximately 2.5 percent of residential wastewater flow based on historical water demand data. Institutional flows for ACs were provided by the Town of Cary. Table 3-14 summarizes the wastewater flow projections for all Town of Cary customer categories.

Wastewater flow projections for the total Town of Cary service area, including the Town of Morrisville, RDU International Airport and RTP South, are presented in Table 3-15. The wastewater flow projections for the Town of Morrisville are discussed in Section 3.6.4 below.

TABLE 3-14
Town of Cary
Average Daily Wastewater Flow Projections

Customer Category	Average Daily Flow (mgd)						Notes
	2005	2010	2015	2020	2025	2030	
Population	113,460	145,720	178,380	204,520	223,730	242,930	
Residential	7.94	10.20	12.40	14.63	15.82	17.00	1
Commercial	2.61	3.66	4.80	5.90	6.43	6.95	2
Industrial	0.13	0.16	0.20	0.24	0.27	0.29	
Institutional	0.20	0.25	0.30	0.36	0.39	0.42	3
Total	10.87	14.27	17.70	21.13	22.90	24.66	

Notes:

1. Residential population times 70 gpcd.
2. Commercial employees times 65 gpcd (See Appendix F, Section F.3).
3. Based on 2.5 percent of residential wastewater flow.

TABLE 3-15
Total Cary System Wastewater Flow Projections

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Cary	10.87	14.27	17.70	21.13	22.90	24.66
Morrisville	1.16	1.92	2.67	2.88	3.09	3.29
RDU ⁽¹⁾	0.13	0.13	0.14	0.15	0.16	0.17
RTP South	0.50	1.01	1.38	1.75	2.12	2.49
Net Average Daily Flow	12.67	17.33	21.89	25.91	28.27	30.62
Estimated I/I ⁽²⁾	1.41	1.93	2.43	2.88	3.14	3.40
Total Average Daily WRF Flow	14.08	19.25	24.33	28.79	31.41	34.02
Maximum Month WRF Flow ⁽³⁾	16.62	22.72	28.71	33.97	37.06	40.15
Peak WRF Flow ⁽⁴⁾	43.65	59.68	75.42	89.25	97.37	105.47

Notes:

- (1) Based on estimates provided by the Town of Cary.
- (2) Estimated at 10 percent of average daily flow (See Appendix F, Section F.4).
- (3) Average daily flow times 1.18 (See Appendix B, TM 06, Appendix 6A).
- (4) Average daily flow times 3.1. Peak to average daily flow ratio based on 99th percentile value for historical flow data for North and South Cary WRFs for 1999 and 2000 (Town of Cary Wastewater Collection System Master Plan) (See Appendix B, TM 06, Appendix 6A).

Wastewater flow projections for RDU International Airport shown in Table 3-15 were provided by the Town of Cary, and were developed based on wastewater billing data from June 1998 through July 2004 and projected increases over the planning period.

The Research Triangle Park (RTP) is owned and developed by the private, not-for-profit Research Triangle Foundation (RTF). Water and sewer service for RTP South is provided by the Town of Cary in accordance with a three-party interlocal agreement involving RTF, the Town of Cary and Wake County. Wastewater flow forecasts for RTP South were developed by the Town of Cary in consultation with representatives from RTF, and those flow projections are presented in Table 3-15.

3.6.2.1 Wastewater Flow Projections for WRF Service Areas

Wastewater flow projections were prepared for the service areas for three proposed or existing WRFs within the total Town of Cary service area: the North Cary WRF, the South Cary WRF, and the Cary portion of the Western Wake WRF. These projections are summarized in Tables 3-16, 3-17, and 3-18, respectively. In general, all flows are apportioned to the WRF that they are tributary to by gravity. The flows tributary to the Walnut Creek and Swift Creek Pump Stations are included in the flows for the South Cary WRF, which are summarized in Table 3-17. The flows for the western Cary service area are currently being pumped to the North Cary WRF.

The existing North and South Cary WRFs currently discharge all of Cary's wastewater flow to the Neuse River Basin. However, the raw water for Cary's potable water treatment and distribution system comes from Jordan Lake in the Cape Fear River Basin. As a result, the Town has obtained an interbasin transfer (IBT) certificate from the N.C. Department of Environment and Natural Resources (DENR) for this interbasin transfer. The Town has recently obtained an increase in its allowable interbasin transfer from 16 mgd to 24 mgd. However, a condition of the IBT certificate is that the interbasin transfer cannot exceed a maximum day rate of 24 mgd, and that the Town must start returning wastewater to the Cape Fear River Basin by January 1, 2011.

TABLE 3-16
North Cary WRF Wastewater Flow Projections

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Cary	4.06	5.04	6.14	7.24	7.74	8.24
Morrisville	1.16	1.92	1.80	1.90	2.00	2.11
RDU ⁽¹⁾	0.13	0.13	0.14	0.15	0.16	0.17
Net Average Daily Flow	5.36	7.09	8.08	9.29	9.90	10.51
Estimated I/I ⁽²⁾	0.60	0.79	0.90	1.03	1.10	1.17
Total Average Daily Flow	5.96	7.88	8.98	10.32	11.00	11.68
Maximum Month Flow ⁽³⁾	7.03	9.30	10.59	12.18	12.98	13.79
Plus Maximum Month Flow from Western Cary Service Area	0.86 ⁽⁵⁾	0.89 ⁽⁵⁾	—	—	—	—
Minus Maximum Month Flow to Western Cary Service Area	—	—	—	0.18	0.98	1.79
Maximum Month Flow Treated at North Cary WRF	7.88	10.18	10.59	12.00	12.00	12.00
Peak Flow ⁽⁴⁾	20.71	26.75	27.83	31.53	31.53	31.53

Notes:

- (1) Based on estimates provided by the Town of Cary.
- (2) Estimated at 10 percent of average daily flow.
- (3) Average daily flow times 1.18.
- (4) Average daily flow times 3.1.
- (5) Only includes flows for White Oak and Fieldstone Pump Stations.

TABLE 3-17
South Cary WRF Wastewater Flow Projections

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Cary Net Average Daily Flow	5.38	6.21	7.03	7.85	8.27	8.68
Estimated I/I ⁽¹⁾	0.60	0.69	0.78	0.87	0.92	0.96
Total Average Daily Flow	5.98	6.90	7.81	8.72	9.19	9.64
Maximum Month Flow ⁽²⁾	7.05	8.14	9.22	10.29	10.84	11.38
Peak Flow ⁽³⁾	18.53	21.39	24.22	27.03	28.48	29.90

Notes:

- (1) Estimated at 10 percent of average daily flow.
- (2) Average daily flow times 1.18.
- (3) Average daily flow times 3.1.

TABLE 3-18
Cary Service Area Portion of the
Western Wake WRF Wastewater Flow Projections ⁽¹⁾

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Cary Net Average Daily Flow	1.43	3.02	4.53	6.05	6.89	7.74
Estimated I/I ⁽²⁾	0.16	0.34	0.50	0.67	0.77	0.86
Cary Total Average Daily Flow	1.59	3.36	5.03	6.72	7.66	8.60
Cary Maximum Month Flow ⁽³⁾	1.88	3.96	5.95	7.93	9.04	10.15
RTP South Maximum Month Flow ^{(2) (3)}	0.66	1.32	1.81	2.29	2.78	3.27
Total Maximum Month Flow	2.54	5.28	7.76	10.22	11.82	13.42
Minus Maximum Month Flow to North Cary WRF	0.86	0.89	—	—	—	—
Plus Maximum Month Flow From North Cary WRF Service Area	—	—	—	—	0.36	1.03
Maximum Month Flow Treated in Western Cary Service Area	1.68 ⁽⁵⁾	4.39 ⁽⁵⁾	7.76	10.22	12.18	14.45
Peak Flow ⁽⁴⁾	4.41	11.53	20.39	26.85	32.00	37.96

Notes:

- (1) Not including Morrisville flows.
- (2) Estimated at 10 percent of average daily flow.
- (3) Average daily flow times 1.18.
- (4) Average daily flow times 3.1.
- (5) Flows pumped to Durham County Triangle WWTP.

Another factor related to the Town of Cary wastewater discharge (NPDES) permits is that the Town of Cary does not currently plan to expand the North Cary WRF beyond 12 mgd. Therefore, flows in excess of a maximum month flow rate of 12 mgd are planned to be diverted to the Western Wake WRF.

Current plans to address the above two issues are (1) to pump wastewater flows from the western portion of the Cary service area to the Durham County Triangle WWTP for treatment, and (2) to pump a portion of the flow from the North Cary WRF service area to the Western Wake WRF. The Town has a contract with Durham County for treat-

ment of pumped flows from the Cary service area by the Triangle Plant beginning on or before September 1, 2004, and continuing through at least June 30, 2011. The amount of wastewater transferred to the Durham County Triangle WWTP is limited to a maximum month flow rate of 4.0 mgd. The Town of Cary anticipates pumping flows from the western service area for a period beginning in 2004 to around 2013, at which time the flow would be conveyed to the Western Wake WRF.

The Town also plans to construct a new pump station, the Upper Crabtree Pump Station, to pump flows from the upper portions of the basin flowing to the North Cary WRF to the western Cary service area to keep the maximum month flows to the North Cary WRF at or below 12 mgd. Based on the flow projections, this pump station is expected to be required to be in service around 2020, and to pump a maximum month flow of approximately 1.8 mgd in 2030. The flow projections shown in Tables 3-16 and 3-18 reflect the above flow transfers.

3.6.3 Town of Holly Springs

Wastewater flow projections for the Holly Springs service area have been developed cooperatively for the 201 Facility Plan Amendment for the Utley Creek WWTP (Davis-Martin-Powell, 2005), and this Environmental Impact Statement.

Wastewater flow projections have been developed using information and data from water and sewer billing records, daily monitoring report (DMR) data, future land use plans, and consideration of North Carolina Administrative Code (15A NCAC 02H.0219 – Minimum Design Requirements) requirements.

NCAC Minimum Design Requirements

The water and sewer customer base for the Town of Holly Springs is currently comprised of 97 percent residential accounts and 3 percent non-residential accounts. In accordance with 15A NCAC 02H.0219 (Minimum Design Requirements), when determining wastewater flow projections for residential dwelling units (RDU), the estimated flow rate shall be 120 gallons per day per bedroom, and the minimum wastewater flow estimate for an RDU shall be 240 gallons per day and each additional bedroom above two bedrooms will increase the estimate by 120 gallons per day. To address infiltration, 15A NCAC 02H.0219 also provides for an infiltration allowance of 100 gallons per day per inch of pipe diameter per mile of pipe.

Based on US Census Data for 2000, the average household size for the Town of Holly Springs is 2.77 persons per RDU. Based on NCAC minimum design requirements of

240 gallons per day per RDU (2 bedroom unit), the resulting per capita flow estimate is 86.6 gallons per capita per day for the Town of Holly Springs.

Wastewater Flow Projections

Based on the review and analysis of historical information and data, and giving consideration for 15A NCAC 02H.0219 (Minimum Design Requirements), the wastewater flow projection for the Town of Holly Springs has been estimated based on the following:

- Residential consumption rate of 80 gallons per capita per day (gpcd);
- 15 gpcd for commercial;
- 10% allowance for industrial; and
- An allowance for infiltration and inflow equal to 318,000 gallons per day.

The results of the flow projection analysis prepared for the Town of Holly Springs are presented in Table 3-19.

TABLE 3-19
Holly Springs Wastewater Flow Projections

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Population	15,090	24,740	40,570	46,710	53,780	61,920
Residential ⁽¹⁾	0.95	1.98	3.25	3.74	4.30	4.95
Commercial ⁽²⁾	0.07	0.37	0.61	0.70	0.81	0.93
Industrial	0.01	0.24	0.39	0.44	0.51	0.59
Net Average Daily Flow	1.03	2.59	4.24	4.88	5.62	6.47
Estimated I/I ⁽³⁾	0.32	0.32	0.32	0.32	0.32	0.32
Total Average Daily Flow	1.35	2.90	4.56	5.20	5.94	6.79
Maximum Month Flow ⁽⁴⁾	1.65	3.54	5.56	6.34	7.24	8.28
Peak Flow ⁽⁵⁾	4.12	9.00	14.13	16.12	18.41	21.04

Notes:

(1) Estimated at 80 gpcd.

(2) Estimated at 15 gpcd for 2010 through 2030.

(3) Estimated at a constant rate of 0.318 mgd.

(4) Average daily flow times 1.22 (Based on DMR data for Fiscal Year 2002-2003).

(5) Average daily flow times 3.1. (Based on wastewater flow analysis for a portion of western Wake service area. This peaking factor is included in the wastewater services interlocal agreement executed by the Project Partners.)

3.6.4 Town of Morrisville

Wastewater flow projections for the Town of Morrisville were based on the population projections in the Round III Jordan Lake Water Supply Storage Allocation Application, as discussed in Section 3.5.2, and were developed for the two Morrisville service areas in the Neuse River and Cape Fear (Haw) River Basins. The portion of the Morrisville

service area in the Neuse River Basin will predominantly be served by the North Cary WRF, while the portion of the Morrisville service area in the Haw River Basin will be served by the Western Wake WRF. Wastewater flow projections for the portions of the Morrisville service areas in the Neuse River and Haw River Basins are presented in Tables 3-20 and 3-21, respectively. The estimated wastewater flow rate of 97.6 gallons per capita per day (gpcd) was based on a review and evaluation of water billing data, wastewater flow records, and US Census population estimates, all for the period from FY 2000 to FY 2003. Currently, all of Morrisville’s flow is treated at the North Cary WRF.

TABLE 3-20
Morrisville Neuse Basin Wastewater Flow Projections

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Population	4,770	9,450	14,750	15,580	16,420	17,250
Residential ⁽¹⁾	0.560	0.92	1.44	1.52	1.60	1.68
Commercial ⁽²⁾	0.140	0.14	0.22	0.23	0.25	0.26
Industrial ⁽³⁾	—	0.11	0.17	0.18	0.18	0.19
Net Average Daily Flow	0.700	1.17	1.83	1.93	2.03	2.14
Estimated I/I ⁽⁴⁾	0.078	0.20	0.20	0.20	0.20	0.20
Total Average Daily Flow	0.777	1.37	2.03	2.13	2.23	2.34
Maximum Month Flow ⁽⁵⁾	0.917	1.62	2.39	2.51	2.64	2.76
Plus Maximum Month Flow from Haw Service Area	0.607	1.15	—	—	—	—
Minus Maximum Month Flow to Haw Service Area	—	—	—	0.18	0.63	0.76
Maximum Month Flow Treated at North Cary WRF	1.524	2.77	2.39	2.33	2.01	2.00
Peak Flow ⁽⁶⁾	4.004	7.28	6.28	6.12	5.28	5.25

Notes:

(1)Estimated at 97.6 gpcd for 2010 through 2030.

(2)Estimated at 15 gpcd for 2010 through 2030.

(3)Estimated at 10 percent of total residential and commercial flow for 2010 through 2030.

(4)Estimated at 200,000 gallons per day total for 2010 through 2030.

(5)Average daily flow times 1.18 (Based on a review of DMR data).

(6)Average daily flow times 3.1 (Based on wastewater flow analysis for a portion of western Wake service area. This peaking factor is included in the wastewater services interlocal agreement executed by the Project Partners.).

TABLE 3-21
Morrisville Haw Basin Wastewater Flow Projections

	Wastewater Flow (mgd)					
	2005	2010	2015	2020	2025	2030
Population	3,150	6,250	7,130	8,000	8,880	9,750
Residential ⁽¹⁾	0.370	0.61	0.70	0.78	0.87	0.95
Commercial ⁽²⁾	0.093	0.09	0.11	0.12	0.13	0.15
Industrial ⁽³⁾	—	0.07	0.08	0.09	0.10	0.11
Net Average Daily Flow	0.463	0.77	0.88	0.99	1.10	1.21
Estimated I/I ⁽⁴⁾	0.051	0.20	0.20	0.20	0.20	0.20
Total Average Daily Flow	0.514	0.97	1.08	1.19	1.30	1.41
Maximum Month Flow ⁽⁵⁾	0.607	1.15	1.28	1.41	1.53	1.66
Plus Maximum Month Flow from Neuse Service Area	—	—	—	0.18	0.63	0.76
Minus Maximum Month Flow to Neuse Service Area	0.607	1.15	—	—	—	—
Maximum Month Flow Treated at Western Wake WRF	—	—	1.28	1.59	2.16	2.42
Peak Flow ⁽⁶⁾	—	—	3.36	4.18	5.67	6.36

Notes:

(1)Estimated at 97.6 gpcd for 2010 through 2030.

(2)Estimated at 15 gpcd for 2010 through 2030.

(3)Estimated at 10 percent of total residential and commercial flow for 2010 through 2030.

(4)Estimated at 200,000 gallons per day total for 2010 through 2030.

(5)Average daily flow times 1.18 (Based on a review of DMR data).

(6)Average daily flow times 3.1 (Based on wastewater flow analysis for a portion of western Wake service area. This peaking factor is included in the wastewater services interlocal agreement executed by the Project Partners.).

3.6.5 Western Wake WRF

Wastewater flow projections for the proposed Western Wake WRF are shown in Table 3-22. The projected flows include all flows from the Project Partners that are treated at the Western Wake WRF. It should be noted that some flow in the North Cary WRF service area (including Morrisville in Neuse and RDU airport) will need to be returned to the Western Wake WRF at some point in the future since the North Cary WRF is designed to treat a maximum of 12 mgd and will not be expanded. Also shown in Table 3-22 are the projected flows from the Holly Springs Utley Creek WWTP that will be pumped to the Western Wake WRF for pumping to the Cape Fear River with the treated flows from the Western Wake WRF. The sum of these flows is the amount discharged to the Cape Fear River under the proposed project. Projected flows from water treatment residuals from the Cary/Apex Water Treatment Plant (WTP) are also shown in Table 3-22. These flows are currently being treated at the Cary/Apex WTP and discharged to surface waters. However, the capacity of the residuals treatment system is expected to be exceeded beginning around 2020. The residuals flows are expected to be conveyed to the proposed Western Wake WRF via the Beaver Creek Pump Station. Figure 3-11 shows the sources of the contributory 2030 wastewater flows (MMF) for the Western Wake WRF.

TABLE 3-22
Western Wake WRF Wastewater Flow Projections (Maximum Month Flows)

	Wastewater Flow (mgd)					Table No. Reference
	2011	2015	2020	2025	2030	
Western Cary Service Area	4.36	5.95	7.93	9.04	10.15	3-18
North Cary WRF Flow Diversions						
Cary	—	—	—	0.36	1.03	—
Morrisville	—	—	0.18	0.63	0.76	—
Total Flow Diversions	—	—	0.18	0.98	1.79	3-18
Morrisville - Haw	1.03	1.28	1.41	1.53	1.66	3-21
RTP South	1.42	1.81	2.29	2.78	3.27	3-18
Western Apex Service Area	3.12	3.71	5.35	7.44	8.66	3-13
Apex Middle Creek Flow Diversions	—	—	0.60	0.60	0.60	3-13
Cary/Apex WTP Residuals	—	—	0.40	1.40	2.40	—
Total Western Wake WRF Flow	9.92	12.75	18.16	23.77	28.53	—
Utle Creek WWTP Flow	3.96	4.86	6.00	7.14	8.28	3-19
Total Discharge to Cape Fear River	13.88	17.61	24.16	30.91	36.81	—

3.7 REFERENCES

Town of Apex. 1997 Local Water Supply Plan. Submitted to the NC Department of Environment and Natural Resources, Division of Water Resources.

Town of Apex. 2010 Land Use Plan Update.

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