Jordan Lake Water Supply Storage Allocation Application

Wake County/Research Triangle Park

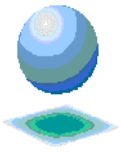
Prepared for

County of Wake

Post Office Box 550
Raleigh, North Carolina 27602

MAY 2001

Prepared By



CH2MHILL

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WAKE COUNTY
NORTH CAROLINA

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May 30, 2001

Mr. John Morris, Director
Division of Water Resources
North Carolina Department of Environment and Natural Resources
P.O. Box 27687
Raleigh, North Carolina 27611-7687

Dear Mr. Morris:

Attached is an application from Wake County for an allocation from Jordan Lake. The purpose of the allocation is to meet long-term water needs of the Wake County portion of Research Triangle Park, (RTP South). Wake County is prepared to enter a financial agreement with the State of North Carolina for reimbursement to the U.S. Army Corps of Engineers for construction, operation, and maintenance costs associated with the water supply pool of Jordan Lake.

With this application, Wake County requests the following allocations:

Level I: 3.5 mgd by year 2020 (includes 1.5 mgd request now being considered)
Level II: additional 2.0 mgd by year 2050.

With construction and expansion of regional wastewater treatment facilities that will have a Cape Fear discharge, our request will not involve interbasin transfer. We anticipate the current interbasin transfer request will meet long-term needs.

Wake County and Research Triangle Foundation have cooperated with Cary, Apex, and Morrisville in preparing allocation applications. While the Cary/Apex plant will provide water for those towns, we are requesting individual allocations for water supply. Because wastewater treatment for the towns is also accomplished through regional cooperation, we urge you to consider our regional approach when reviewing the allocation and wastewater discharge issues.

Thank you for assistance to our staff in preparing this application.

Sincerely,

David Cooke,
County Manager

Attachment

Introduction

Wake County is applying for a water supply allocation from Jordan Lake on behalf of the portion of the Research Triangle Park within Wake County (RTP South). The County itself is not a water supply provider. Generally, the County's municipalities provide water service to areas within their jurisdictions. However, Research Triangle Park (RTP) is an entity in itself, and legally cannot be annexed into a municipality. Since RTP does not have any water supply facilities of its own, it has contracted with the Town of Cary to serve the Wake County part of RTP with water supply and wastewater services.

An important element of water resource planning is identifying a dedicated water source for RTP South to meet forecasted demands. As a part of this process, Wake County is applying for a water supply allocation from Jordan Lake to meet its long-term needs. An allocation for 1.5 mgd was recommended by the Division of Water Resources (DWR) in the second round of the Jordan Lake water supply storage allocation process. RTP plans to continue its contract with Cary for treatment and transmission of its allocation from Jordan Lake.

To assist RTP South in meeting forecasted water use demands, Wake County is applying for a water supply allocation from Jordan Lake on behalf of RTP South. This application provides information substantiating the need for this allocation in the following sections:

Section 1 - Water Demand Forecast
Section 2 - Conservation and Demand Management
Section 3 - Current Water Supply
Section 4 - Future Water Supply Needs
Section 5 - Alternative Water Supplies
Section 6 - Plans to Use Jordan Lake
Attachment A - Local Water Supply Plan
Attachment B - Map of the RTP South service area
Attachment C – Alternative Cost Estimates
Attachment D - Draft Water Quality Monitoring Plan

1. Water Demand Forecast

1.1 Methodology

The forecasted water demand for the Research Triangle Park (RTP) South water service area is based on historic and anticipated development growth trends and historic water use patterns. Water demand forecasts for this area were developed solely for non-residential areas, as there are no residential areas in RTP South, and these were then subdivided into biotechnical companies versus non-biotechnical companies.

1.1.1 Biotechnical Use Sector

Biotechnical water demand forecasts were developed based on historical records of acreage sold, square footage, and employment for RTP. The total water usage for the sector is in million gallons (MG) and the usage per unit area is expressed in gallons per day (gpd) per square foot. Table 1-1 summarizes water use by the biotechnical sector in the RTP South area from 1998 and 1999.

TABLE 1-1
Historical Biotechnical Water Usage for RTP South
Jordan Lake Water Supply Storage Allocation Application

Year	Biotechnical Accounts	Biotechnical Water Use (MG)	Unit Usage Factor (gpd/ft^2)
1998	3	30.66	0.42
1999	3	33.92	0.44

Source: RTP

Wake County reviewed facility growth projections from the customers in the biotechnical use sector for its *Water and Sewer Facilities Plan (April 2001)*. Future water use in this sector is projected based on these specific forecasts. The biotechnical use sector plans extensive expansion of production, and water use, though expansion of facilities will fall behind projected growth in water demand. The quality and purity standards for their industry require biotechnical firms to use ultra-clean water for their manufacturing processes. This water is often treated through membrane processes where the recovery rate may be as low as 50 percent. As a result of the forecasts of facility square footage and water use, a unit usage rate of 1.07 gpd/ft^2 is used to project future biotechnical water demand.

1.1.2 Non-Biotechnical Use Sector

Non-Biotechnical water demand forecasts were also developed based on historical records of acreage sold, square footage, and employment for RTP. The total water usage for the sector is in million gallons (MG) and the usage per unit area is expressed in gpd per square

foot. Table 1-2 summarizes water use by the non-biotechnical sector in the RTP South area from 1998 through 1999.

TABLE 1-2
Historical Non-Biotechnical Water Usage for RTP South
Jordan Lake Water Supply Storage Allocation Application

Year	Non-Biotechnical Accounts	Non-Biotechnical Water Use (MG)	Unit Usage Factor(gpd/ft^2)
1998	14	13.79	0.058
1999	18	23.47	0.058

Source: Town of Cary

Table 1-2 summarizes water use for the Wake County/RTP South service area only. Water use data for Research Triangle Park as a whole in 1999 (the Wake County portion of RTP makes up only 20 percent of buildable land area and 24 percent of employment for RTP as a whole) was about 0.290 gpd/ft^2. This unit factor is believed to be more representative of future water use patterns as RTP South continues to develop and is used for water demand projections for the non-biotechnology firms.

1.1.3 Process Water and Unaccounted-For Water

RTP South does not supply water to any other entities in bulk water sales. In addition, RTP South does not have any water supply facilities, and therefore has no record of water lost through treatment systems processes. A process water loss of 9% of water demand is estimated for RTP South based on review of 1996 to 2000 data for the Cary/Apex WTP.

Since flow to the RTP South system is from the Town of Cary, unaccounted-for water for RTP South could not be determined separately for this system. Based on an evaluation of data from the Cary water system, an unaccounted-for water estimate of 6% of total finished water demand is used for RTP South.

1.2 Growth Projections

1.2.1 Historic Growth

Historic growth, by building square footage, for RTP South as far back as 1996 is summarized in Table 1-3. The historic data shows that RTP South has increased in building square footage from 645,500 in 1996 to a 1999 total square footage of 1,397,800. A primary driver for the growth of western Wake County has been the development linked to the Research Triangle Park, which brought an influx of technical and business professionals to the area. Employment in RTP South's service area for 1999 was 4,402 persons.

TABLE 1-3
Historic Building Square Footage Data for RTP South
Jordan Lake Water Supply Storage Allocation Application

Year	Biotechnical	Non-Biotechnical	Total
1996	199,000	446,500	645,500
1997	199,000	526,500	725,500
1998	199,000	652,500	851,500
1999	209,800	1,188,000	1,397,800

Sources: RTP

1.2.2 Future Growth

Water use in RTP South is driven by the needs of the companies within the park. There are no residential areas and the domestic water needs of the work-day population (offices) cannot be easily separated from the significant water requirement levels for the industrial processes. In order to project the rate of growth of RTP South, historical records of building square footage and employment for RTP were analyzed. Figures 1 and 2 show the projected growth in each for RTP and RTP South. Industrial water use varies widely depending upon the type of industry and the size of the facility. As a result of the variance, industrial water use is correlated with employment or building square footage.

Historical records for RTP and RTP South were evaluated for trends in growth and development. Figure 1 illustrates the employment projections in RTP and RTP South through 2050. There is strong linearity in the growth in employment in RTP since 1960. Employment in RTP is expected to increase from approximately 42,000 employees in 1999 to over 100,000 employees in 2050. In RTP South, employment is expected to increase from approximately 4,402 employees in 1999 to over 24,000 employees by 2050.

Annual building square footage was available for nearly all of the companies in RTP for the period 1996 through 1999. Both historical and projected building square footage for RTP and RTP South are shown in Figure 3. In RTP, building space is expected to increase from approximately 15.7 million square feet in 1999 to approximately 42.0 million square feet by 2050. Across RTP, the expected total maximum building area is about 45.5 million square ft. In RTP South, building space is projected to increase from approximately 1.4 million square feet in 1999 to approximately 10.1 million square feet by 2050.

Historical growth and development of building square footage was evaluated and found to have a strong correlation with employment, with a correlation factor of 0.98. Building square footage was determined to be the most appropriate parameter to develop unit water use factors for forecasting future water demands. For purposes of this study it is assumed that development will continue at the historical rate through the planning horizon.

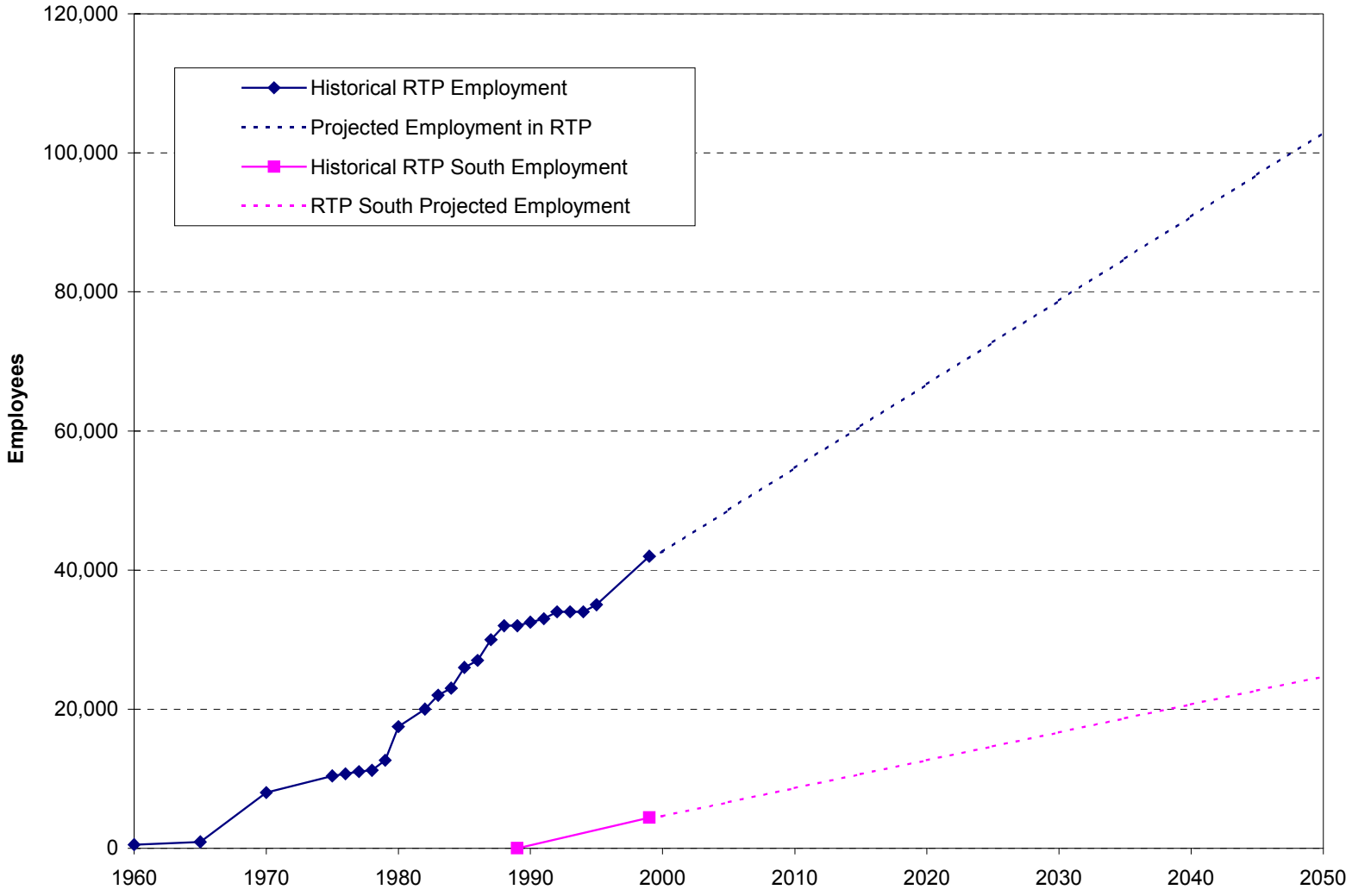

FIGURE 1.
Historical and Projected Employment in RTP

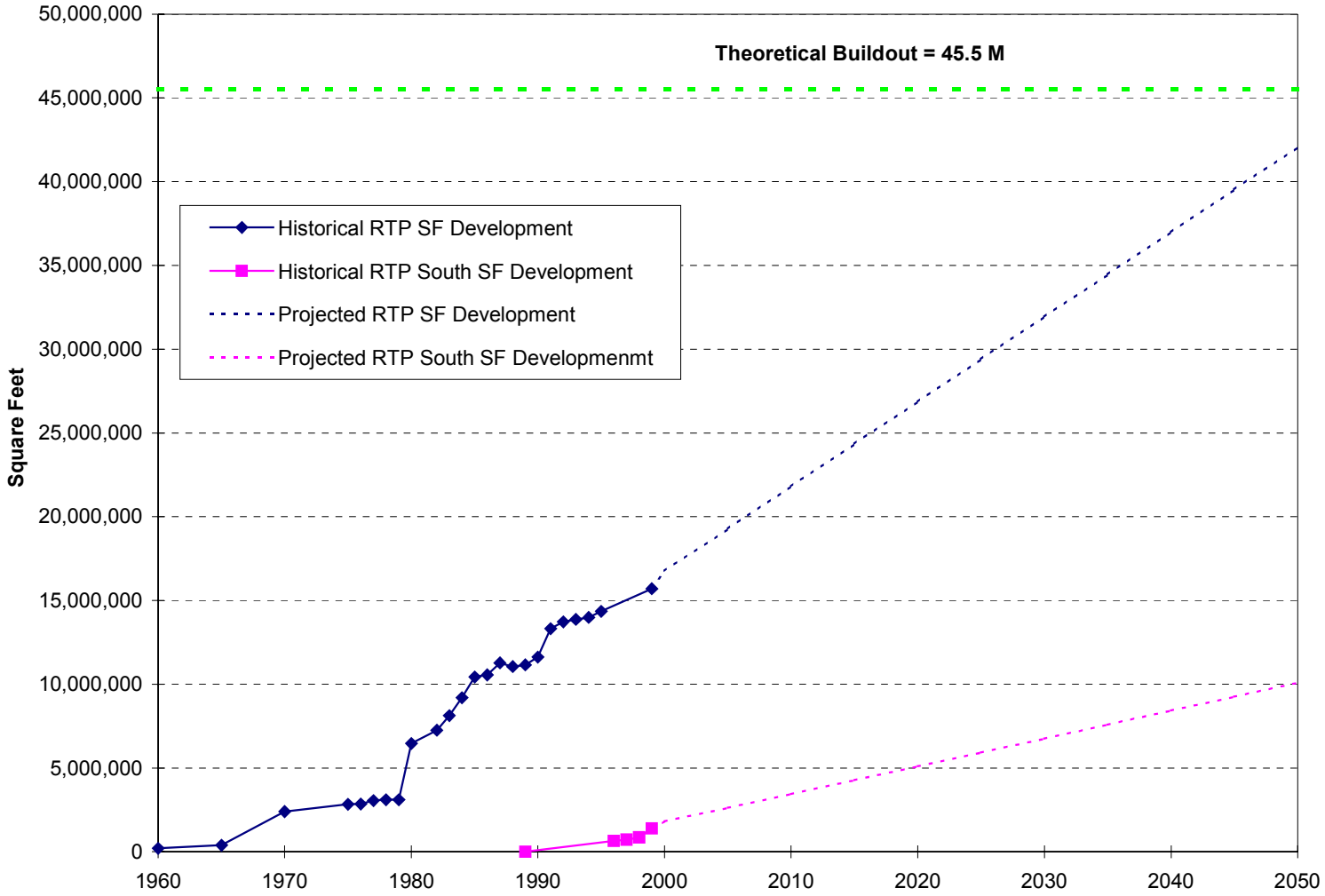

FIGURE 2
Historical and Projected Building Space in RTP and RTP South

For the period 1996-1999, non-biotechnical companies in RTP South accounted for most of the growth in building area terms. While future growth in this sector will continue to be strong, biotechnical companies in RTP South may, in percentage terms, grow at a quicker pace over the planning period. In terms of building area, biotechical sector customers will constitute about 12% of the total RTP South square footage in 2050, which is comparable to its percentage in 2000. Table 1-4 lists the projected growth and development for RTP and RTP South through 2050.

1.2.3 Water Demand Forecasts

Average day water demand forecasts are based upon the methods presented in Section 1.1 and are summarized in Table 1-5. Average day water demands for the RTP South service area are expected to increase from 0.27 mgd in 2000 to 4.5 mgd in 2050.

TABLE 1-4
Research Triangle Park Growth Projections

RTP Growth and Development				RTP South (Wake County) Projected Building Square Footage				
Year	**Acres**	**Square Feet**	**Employees**	**Acres**	**Biotechnical**	**Non-Biotechnical**	**Total**	**Employees**
2000	5,540	16,761,623	42,651	595	209,800	1,605,425	1,815,225	4,619
2005	6,085	19,291,174	48,674	1,015	415,840	2,210,560	2,626,400	6,627
2010	6,630	21,820,725	54,698	1,435	621,880	2,822,746	3,444,626	8,635
2015	6,968	24,350,276	60,721	1,546	827,920	3,439,883	4,267,803	10,642
2020	6,968	26,879,827	66,745	1,546	1,033,960	4,060,631	5,094,591	12,650
2025	6,968	29,409,378	72,768	1,546	1,240,000	4,684,093	5,924,093	14,658
2030	6,968	31,938,929	78,792	1,546	1,240,000	5,515,687	6,755,687	16,666
2035	6,968	34,468,480	84,816	1,546	1,240,000	6,348,928	7,588,928	18,674
2040	6,968	36,998,031	90,839	1,546	1,240,000	7,183,487	8,423,487	20,682
2045	6,968	39,527,582	96,863	1,546	1,240,000	8,019,119	9,259,119	22,690
2050	6,968	42,057,133	102,886	1,546	1,240,000	8,855,635	10,095,635	24,697

TABLE 1-5
Projected Average Daily Water Demand – RTP South Service Area[1]

	2000	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Residential	0	0	0	0	0	0	0	0	0	0	0
Non-Residential											
Biotechnical	0.1	0.5	0.7	0.9	1.1	1.3	1.3	1.3	1.3	1.3	1.3
Non-Biotechnical	0.2	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.1	2.3	2.6
Process Water (9%)	0.02	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4
Unaccounted-For Water (6%)	0.02	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Total Service Area Demand	0.3	1.3	1.7	2.2	2.6	3.1	3.4	3.6	3.9	4.2	4.5

1. All data in million gallons per day (mgd)

2. Conservation and Demand Management

RTP South has demonstrated its commitment to water conservation by implementing programs to reduce water demands and increase the efficient utilization and protection of existing natural resources. The anticipated increase in projected water demands for RTP South will exceed limits on the water purchase agreement with the Town of Cary, which is also experiencing rapid growth and water demands which exceed the existing capacity of the Cary/Apex WTP. To help in maintaining an adequate supply, both Cary and RTP South seek to manage water supply demand through proactive measures.

Conservation Education

RTP South's conservation education programs originate either with the Service Provider (the Town of Cary provided these services as of February 2001) or the Research Triangle Foundation (RTF), which manages the Park. Current and anticipated conservation education programs, which were summarized in RTP South's *Water Shortage Response Plan*, include:

- "Beat the Peak" program to reduce peak water usage rates
- Formation of a coalition of one designated contact from each RTP South water customer to solicit support for water conservation practices and coordinate notifications of conservation measures via email and postings at each business.
- Email distribution list during staged conservation, including the stage and required actions. The email distribution list would be initiated by the RTF to notify the designated contact from each company in RTP South, who will then send a broadcast email to their employees to raise awareness of the conservation action.
- Utilize RTP South companies to post notices of the conservation stage and the required actions at entrances to their buildings, in break rooms, etc.
- Newspaper advertisements in *News and Observer* and *Durham Herald* to raise conservation awareness and communicate conservation actions among RTP South employees.
- Information about stages and required actions/tips for RTP South companies in the *RTP Notes* and *RTP Viewpoints* newsletters. Educational information on water conservation at home could also be included. RTP South businesses are encouraged to get this information into their company's newsletter.
- Distribution of brochures with questions and answers from the Water Service Provider to RTP South managers and employees through billing stuffers, internet site and other means.

RTP South Permanent Conservation Measures

Permanent conservation measures have been instituted by RTF for companies located in RTP South. These measures are described below.

Landscaping and Irrigation

- More than 1/3 of the total acreage in RTP South is in a natural area preserve or a surface cover maintenance area where existing native vegetation will be retained, so there will be no need for water to irrigate these areas.
- Roadside landscaping is watered from the onsite lake, reducing the need for potable irrigation water.
- Companies such as Cisco Systems have made extensive use of native vegetation in their landscaping program because these species are hardy and resistant to drought. Compared with other industrial and office parks, relatively little landscaped area on the companies' sites is irrigated. Meters are typically installed on irrigation systems, which are monitored based on rain conditions.

Plumbing Fixtures

Recently, companies have used low-volume flush valves and flow regulators in showers. These are expected to be included in all future development.

Peak Demand Management

Biogen has a 50,000-gallon storage tank onsite, which enables them to reduce their demand for potable water during peak-use periods and during droughts.

Covance is considering the inclusion of on-site water storage in the company's long-range expansion plans.

Water Reuse/Recycling

Companies have expressed an interest in using recycled water for irrigation if a duplicate system became available.

Water recycling is also maximized in manufacturing-related processes where appropriate, to conserve water. For example, Covance currently recycles some of the reject water from their reverse osmosis system to the cooling towers.

Reducing Water Losses (Unaccounted for Water)

The Service Provider investigates potential leaks and meter accuracy issues upon notification by the RTP South water customer. RTP South businesses are encouraged to monitor their monthly account statements, as well as their site, for indications of leaks or inaccurate meters.

Service Provider Demand Management Programs

In addition to measures instituted by the RTF, RTP South businesses intend to work with the Water Service Provider to implement their demand management programs where applicable. Programs of the Town of Cary (the current Water Service Provider) are listed below.

Toilet Flapper Rebate Program

This program provides customers with the incentive to replace existing flappers with early closure models.

Conservation Rate Structure

A rate structure was designed by the Town of Cary to encourage more efficient use of water resources by charging higher unit rates to customers as their level of consumption increases. A two-tiered increasing block rate for commercial and industrial customers, including those in RTP South, becomes effective in March 2001. Irrigation meters for both residential and non-residential customers are billed at a two-tiered increasing block rate as well. The higher-rate tier for both regular and irrigation accounts is designed to encourage irrigation conservation, and is applied to water use in excess of a "landscape water budget" for each customer.

Landscape Water Budgets

A landscape water budget was prepared by Town of Cary staff for every irrigation account based on plant watering needs specific to the landscaped area served by each account. Billing notices will assist the customer in understanding the relationship between actual use and the water budget. Customers may contract with private water auditors as a means of reducing water use to budgeted amounts.

Rain Sensors

The Town of Cary requires customers with automatic irrigation systems to install a rain sensor that measures rainfall and overrides the irrigation cycle of the system.

Staged Conservation Measures

RTP South will rely on its Service Provider (currently the Town of Cary) to monitor the status of the Wake County/RTP South Jordan Lake water supply pool allocation. A Water Shortage Response Task Force, to be made up of the RTF Vice President for Planning and Development, the Service Provider's System Manager and Water Conservation Coordinator, and a representative appointed by Wake County, will be established in order to determine when conservation efforts should be enacted by RTP South. If the Jordan Lake water supply pool level falls below normal levels, the Service Provider will convene the Task Force to discuss appropriate water conservation measures. Once the Task Force has determined the appropriate level of conservation for RTP South, the Service Provider will declare and administer the conservation measures.

Summary

RTP South anticipates further reductions in water demand as its conservation programs yield changes in water use patterns and as water-conserving plumbing fixtures and irrigation systems increase. However, because the majority of water use for RTP South facilities is in water-intensive manufacturing processes, a numerical goal for water conservation has not been established. RTP South will continue to review the conservation savings potential of industrial processes, such as more efficient membrane treatment, with the goal of reducing overall water use.

Reuse of treated wastewater effluent is a desirable means for RTP South to reduce its water demand, but since its wastewater treatment operations and disposal are contracted with the Town of Cary, and Cary's recent *Water Reuse Plan* does not identify RTP South for reuse projects, RTP South is not presently in a position to commit to a reuse program. RTP South will continue to discuss reuse options with its water service provider, and will cooperate should extension of the reuse program into RTP South should this be proposed by Cary.

3. Current Water Supply

RTP South's current water source is Jordan Lake, through the treatment and distribution facilities of the Town of Cary. In November, 1989, the Town of Cary, Wake County, and the Research Triangle Foundation entered into an agreement with an initial 25-year term for water and wastewater services. The water contract provides for delivery of up to 1 mgd, in increments of 250,000 gpd, from Cary to RTP South. The water is treated at the Cary/Apex Water Treatment Plant (WTP) and is delivered to RTP South through the Town of Cary's transmission system.

The Town of Cary has agreed to plan for supplying RTP South with water, but advised RTP and Wake County that an allocation from Jordan Lake would be needed. Because RTP South could not be annexed into the Town of Cary, the town preferred for Wake County/RTP to hold the water allocation for meeting the water supply needs of RTP South.

Details of the current water supply source are shown in Table 3-1.

TABLE 3-1
Current Water Supply Sources
Research Triangle Park South

Source Name	Source Location		Source Type (surface, ground, purchase)	Estimated Yield	Water Quality (excellent, good, poor)
	County	River Basin			
Cary (Jordan Lake)	Chatham	Cape Fear (Haw River Sub-Basin)	purchase	1.0 mgd [a]	good

[a] Contracted amount.

4. Future Water Supply Needs

Based on the water demand forecasts presented in Section 1 and the water supply allocation of 1.5 mgd (upon completion of the pending Interbasin Transfer certificate process), the future water supply needs for the RTP South service areas are summarized in Table 4-1. RTP South will have a water supply deficit when average day demands exceed the allocation, beginning in 2010.

Due to continued growth within the service areas of RTP South, water demands are projected to increase to approximately 3.4 mgd by 2030 and to approximately 4.4 mgd by 2050. RTP South is pursuing several alternatives for expanding its water supply capacity, including water conservation efforts described in Section 2. The water supply deficit based on the projected 1.5 mgd Round 2 water supply allocation is estimated to be 1.9 mgd by 2030 and 3.0 mgd by 2050.

TABLE 4-1
Future Water Supply Needs
RTP South Jordan Lake Water Supply Storage Allocation Application - Round 3

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Available Supply											
(1) Existing Surface Water Supply	0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
(2) Existing Ground Water Supply	0	0	0	0	0	0	0	0	0	0	0
(3) Existing Purchase Contracts	1.0	0	0	0	0	0	0	0	0	0	0
(4) Future Supplies	0	0	0	0	0	0	0	0	0	0	0
(5) Total Available Supply	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Average Daily Demand											
(6) Service Area Demand	0.3	1.3	1.7	2.2	2.6	3.1	3.4	3.6	3.9	4.2	4.5
(7) Existing Sales Contracts	0	0	0	0	0	0	0	0	0	0	0
(8) Future Sales Contracts	0	0	0	0	0	0	0	0	0	0	0
(9) Total Average Daily Demand	0.3	1.3	1.7	2.2	2.6	3.1	3.4	3.6	3.9	4.2	4.5
(10) Demand as Percent of Supply	30%	87%	113%	147%	173%	207%	227%	240%	260%	280%	300%
(11) Supply Needed to Maintain 80%	0.4	1.6	2.1	2.8	3.3	3.9	4.2	4.5	4.9	5.2	5.5
Additional Information for Jordan Lake Allocation											
(12) Sales Under Existing Contracts	0	0	0	0	0	0	0	0	0	0	0
(13) Sales Under Future Contracts	0	0	0	0	0	0	0	0	0	0	0
(14) Demand in Each Planning Period	0.3	1.3	1.7	2.2	2.6	3.1	3.4	3.6	3.9	4.2	4.5
(15) Supply Minus Demand	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0

5. Alternative Water Supplies

RTP South has considered a number of alternatives to meet short-term and long-term water supply needs to the 2050 planning horizon. These water supply alternatives were evaluated in the *Town of Cary Long-Range Water Supply Plan* (CH2M HILL, 2000). RTP South would implement these alternatives in cooperation with Cary/Apex through pro-rated purchase of capacity in expanded treatment and transmission facilities. A summary of alternatives considered in this application is provided in Table 5-1. As noted in Section 4, successful completion of the ongoing interbasin transfer certification process is a basis of all water supply alternatives.

TABLE 5-1
Summary of Water Supply Alternatives
Cary/Apex Jordan Lake Water Supply Storage Allocation Application, Round 3

Water Supply Alternative	Description
1	Increase Jordan Lake Water Supply Allocation by 4.0 mgd
2	a) Obtain Water Supply from Cape Fear River b) Increase Jordan Lake Water Supply Allocation
3	Obtain additional Jordan Lake Water Supply Allocation of 4.0 mgd by Raising Lake Permanent Pool Elevation
4	a) Obtain additional Jordan Lake Water Supply Allocation by Converting a Portion of Lake Sediment Storage Pool to Water Supply Pool b) Increase Jordan Lake Water Supply Allocation so that total yield for this alternative is 4.0 mg
5	a) Utilize Kerr Lake as a Water Supply b) Increase Jordan Lake Water Supply Allocation
6	a) Utilize Harris Lake as a Water Supply b) Increase Jordan Lake Water Supply Allocation
7	a) New Reservoir on Middle Creek b) Increase Jordan Lake Water Supply Allocation
8	a) Raise Lake Michie Water Surface Elevation b) Interim Water Purchase from Durham c) Increase Jordan Lake Water Supply Allocation

Each water supply alternative was evaluated using the criteria contained in the *Jordan Lake Water Supply Storage Allocation Application Guidelines:*

- Environmental Impacts (compared to the Jordan Lake Alternative)
- Water quality classification
- Timeliness of implementation

- Interbasin transfers
- Potential for regional partnerships
- Technical complexity
- Institutional complexity
- Political complexity
- Public benefits
- Consistency with local plans
- Capital costs and operations/maintenance cost

A summary of the results of the evaluation of each water supply alternative is shown in Tables 5-2A and 5-2B. These costs also include the contractor's mobilization/demobilization, overhead and profit, a contingency, engineering design and administration, legal and administrative costs, and the cost of permitting and other regulatory issues. Note also that many of these alternatives are regional solutions, and that the costs may include RTP South's pro rata share of the costs of a larger, and more costly, project. Attachment C provides a more detailed estimate of costs for each of the alternatives.

TABLE 5-2A
Summary of Water Supply Alternative Evaluations (part 1 of 2)
RTP South Jordan Lake Water Supply Storage Allocation Application, Round 3

	Alternatives			
	1	**2**	**3**	**4**
Alternative Description	**Jordan Lake**	**Cape Fear River/Harnett**	**Change Jordan Lake Operating Rules**	**Convert Jordan Lake Sediment Storage**
Total Supply (MGD)	4.0	4.0	4.0	4.0
Environmental Impacts	Same	Same	Worse	Same
Water Quality Classification	WS IV B NSW CA	WS IV CA	WS IV B NSW CA	WS IV B NSW CA
Interbasin Transfer (MGD)	None	None	None	None
Regional Partnerships	Yes	Yes	Yes	Yes
Technical Complexity	Not Complex	Complex	Complex	Complex
Institutional Complexity	Not Complex	Complex	Complex	Complex
Political Complexity	Not Complex	Complex	Complex	Complex
Public Benefits	No	No	Few	No
Consistency with Local Plans	Yes	Yes	Yes	Yes
Total Cost ($ Millions)	$5.78	$23.84	$6.62	$6.62
Unit Cost ($/gpd)	$1.45	$5.96	$1.66	$1.66

TABLE 5-2B
Summary of Water Supply Alternative Evaluations (part 2 of 2)
RTP South Jordan Lake Water Supply Storage Allocation Application, Round 3

	Alternatives			
	5	**6**	**7**	**8**
Alternative Description	**Kerr Lake**	**Harris Lake**	**Middle Creek**	**Expand Lake Michie**
Total Supply (MGD)	4.0	4.0	4.0	4.0
Environmental Impacts	Worse	Worse	Worse	Worse
Water Quality Classification	WS III B	WS V	C NSW	WS III NSW
Interbasin Transfer (MGD)	(a) 2 mgd (b) 0 mgd	None	None	None
Regional Partnerships	Yes	No	Yes	Yes
Technical Complexity	Very Complex	Complex	Very Complex	Very Complex
Institutional Complexity	Very Complex	Very Complex	Very Complex	Very Complex
Political Complexity	Very Complex	Very Complex	Very Complex	Very Complex
Public Benefits	No	No	Many	few
Consistency with Local Plans	n/a	n/a	n/a	n/a
Total Cost ($ Millions)	(a) $12.08 (b) $20.50	$9.39	$20.26	$11.74
Unit Cost ($/gpd)	(a) $3.02 (b) $5.12	$2.35	$5.07	$2.93

1. Increase Jordan Lake Water Supply Allocation

This option increases the allocation for withdrawals through the Cary/Apex existing raw water intake on the east bank of Jordan Lake. To satisfy water demand for the RTP South service area in accordance with Table 4-1, the required average water allocation would be at least 5.5 mgd in 2050.

In the short term, all wastewater from RTP South will be discharged as wastewater to the Neuse River Basin, resulting in an interbasin transfer. The EMC will act in July 2001 on a request to increase the transfer amount. Construction of a new WWTP in the Cape Fear River basin, with an initial capacity of 9 mgd, is planned to limit interbasin transfer. Future water demands will be offset by increased discharges to the Cape Fear River basin in order to keep the interbasin transfer from exceeding the recommended 24-mgd maximum day amount.

The water intake screens and intake piping can handle a maximum flow of 50 mgd. Since the projected combined peak demands of Cary, Apex, Morrisville and RTP South (with reserve capacity) will exceed 50 mgd, this alternative requires replacement of the existing intake screens with larger screens and modification of the backwash air system. Also, the existing Cary/Apex WTP would be expanded incrementally to meet increased demands in the study period, and the distribution system would be upgraded to accommodate future demands.

Total Net Present Value of this alternative for RTP South is $5.78 million. The unit cost is $1.45 per gallon of additional water supply. Costs include capital and O&M costs for the construction of facilities.

	Comments
Available Supply	4.0 mgd
Environmental Impacts	No adverse impact on environment anticipated. New screens must adhere to 0.5 ft/sec velocity criteria.
Water Quality Classification	WS IV B NSW CA
Timeliness	WTP upgrade to 40 mgd by 2001, to 57 mgd by 2016. Cape Fear WWTP by 2010.
Interbasin Transfer	No increase in the currently requested maximum day IBT of 27 mgd
Regional Partnerships	Coordination with other utilities may be necessary to develop a regional water supply approach for Jordan Lake.
Technical Complexity	Screen modifications will require underwater installation. Removal of existing air lines from inside 54-inch intake pipelines presents greater challenge, and may require short pump station shutdown.
Institutional Complexity	Requires completion of DWR Jordan Lake Round 3 allocation process
Political Complexity	Complex
Public Benefit	None
Consistency w/ Local Plans	Yes
Cost	Capital expenditures for expansion of Cary/Apex WTP intake and treatment capacity, distribution system, construction of Cape Fear regional WWTP.

2. Construct Cape Fear River Supply, Increase Jordan Lake Allocation

Harnett County operates a water treatment plant in Lillington, with an intake on the Cape Fear River. This option expands the Harnett County water plant to 48 mgd, ultimately, at its present site. A maximum yield of 10 mgd is available to Cary/Apex/Morrisville/RTP South under this option. This option would be implemented as a form of indirect reuse, increasing the water available for withdrawal at the Harnett County WTP through an equivalent quantity of discharges to the Cape Fear River basin from a Cape Fear River regional WWTP. There is no net interbasin transfer for this arrangement. This option relies on a Cape Fear River regional WWTP.

This option utilizes the proposed finished water pipeline from the Harnett County WTP to Holly Springs as well as an existing interconnection with the Cary water distribution system, which could then provide the water to RTP South. To supplement this water supply so that the RTP South portion of the Cary/Apex demand is met throughout the planning period, an additional Jordan Lake allocation would be needed. The details of this additional project can be seen in the explanation of Alternative 1.

Total Net Present Value of this alternative for RTP South is $23.8 million. The unit cost is $5.96 per gallon of additional water supply. Costs include capital and O&M costs for the construction of facilities. The costs include capacity use payments to Harnett County of $1.10 per 1,000 gallons for water estimated to be used under this alternative.

	Comments
Available Supply	4.0 mgd
Environmental Impacts	No adverse impact on environment anticipated.
Water Quality Classification	WS IV CA
Timeliness	Harnett County WTP expansion online about 2005. West Cary WWTP completed in 2010.
Interbasin Transfer	No increase in the currently requested maximum day IBT of 27 mgd
Regional Partnerships	Requires establishment of a contractual relationship with Harnett County for Cary's participation in the Harnett County WTP. Also requires coordination with Holly Springs regarding the flow of Harnett County finished water through its system to Cary.
Technical Complexity	Option requires expansion of raw water intake facilities on Cape Fear River and expansion of Harnett County WTP treatment facilities. Potential for disinfection system incompatibility.
Institutional Complexity	Cape Fear WWTP subject to SEPA process. The EA may include evaluation of impacts on river quality and downstream assimilation of wastewater discharges as raw water withdrawals from Cape Fear River are increased.
Political Complexity	Complex
Public Benefit	None
Consistency with Local Plans	Yes
Cost	Share in capital expenditures for expansion of Harnett County WTP and intake, expansion of finished water pipelines to Holly Springs and Cary system, and internal distribution system expansions.

3. Increase Jordan Lake Reservoir Full Pool Elevation

This option increases the available water supply pool for Jordan Lake Reservoir by modifying the Army Corps of Engineers (USACE) operating rules to raise the top of the conservation pool elevation from its present 216 ft. By preliminary evaluation of stage-storage relations for Jordan Lake, an additional 4.50 billion gallons (bg) of water supply pool could be created by raising the permanent pool elevation by 1 ft. This quantity of additional water supply pool could increase the safe yield from the lake by as much as 30 mgd. In addition to potential environmental impacts that would be addressed by an EIS or EA, recreational facilities at the lake would be impacted by the change in top of pool elevation.

Scenarios to modify the lake's operating rules would require a USACE Section 216 Study process before the Corps would assent to the proposed change. Raising the permanent pool would also decrease available flood storage in the reservoir. According to DWR Staff, USACE approval to raise the permanent pool of Jordan Lake is not assured, and such an application could take ten years.

Total Net Present Value of this alternative for RTP South is $6.62 million. The unit cost is $1.66 per gallon of additional water supply. Costs include capital and O&M costs for the construction of facilities.

	Comments
Available Supply	4.0 mgd
Environmental Impacts	Potential impacts to existing wetlands and uplands from submergence.
Water Quality Classification	WS IV B NSW CA
Timeliness	Determination on agreement with DWR and USACE could be reached by 2002, though 216 study may take 5 years to complete and legal challenges may substantially delay implementation. WTP capacity upgrades by 2016.
Interbasin Transfer	No increase in the currently requested maximum day IBT of 27 mgd.
Regional Partnerships	A larger water supply pool is created, so other regional utilities may desire allocation increases. Coordination with other utilities is necessary to develop a regional water supply approach for Jordan Lake that results in sufficient increase for Cary.
Technical Complexity	This option would not alter the dam facilities but would require revision of dam safety documentation. Option may require relocation of some existing recreation facilities. This option incorporates improvements to the existing Cary/Apex raw water supply intake.
Institutional Complexity	Option is feasible for relatively minor adjustment of permanent pool. DWR allocation required to increase withdrawals. EIS/EA and USACE study required to address impacts from raising reservoir pool. Dam safety certification must also be revised, and concurrence from Corps for new operating rules.
Political Complexity	Very complex
Public Benefit	Few
Consistency with Local Plans	Yes
Cost	Capital expenditures for expansion of Cary/Apex WTP intake and treatment capacity, distribution system, construction of West Cary WWTP, as well as permitting costs.

4. Convert a Portion of Jordan Lake Sediment Storage to Water Supply Storage

This option increases the Jordan Lake water supply pool by reclassifying a portion of the 24.3 bg of existing lake volume allocated to sediments. If 10 percent of present sediment storage were converted to water supply pool, the estimated additional water supply storage volume which could be obtained in this manner is 2.43 bg, which may increase the safe yield of the reservoir by as much as 16 mgd.

This option will require USACE involvement and concurrence to change the reservoir's operating rules. This option may be linked to Section 216 Studies and to implementation of additional best management practices to reduce rate of sedimentation. The USACE might require these practices to be adopted by all local governments which discharge stormwater to Jordan Lake to justify reclassification of sediment storage pool to water supply pool.

Regulatory approval to convert a portion of the sediment storage of Jordan Lake to water supply pool is not assured, and such an application could take several years. To supplement this water supply so that the RTP South portion of the Cary/Apex demand is met throughout the planning period, an additional Jordan Lake allocation would be needed. The details of this additional project can be seen in the explanation of Alternative 1.

Total Net Present Value of this alternative for RTP South is $6.62 million. The unit cost is $1.66 per gallon of additional water supply. Costs include capital and O&M costs for the construction of facilities.

	Comments
Available Supply	4.0 mgd
Environmental Impacts	No adverse impact on environment anticipated.
Water Quality Classification	WS IV B NSW CA
Timeliness	Determination on agreement with USACE could be reached by 2002, though 216 study may take 5 years to complete and legal challenges may substantially delay implementation. WTP capacity upgrades by 2016.
Interbasin Transfer	No increase in the currently requested maximum day IBT of 27 mgd.
Regional Partnerships	Cooperation with other regional utilities may increase the likelihood of USACE approval for the change in operating rules and DWR increased allocation. Coordination with other utilities may be necessary to develop a regional water supply approach for Jordan Lake that results in sufficient increase for Cary.
Technical Complexity	Option may require implementation of local ordinances requiring additional best management practices to reduce sediment loading rates to Jordan Lake. Improvements to existing Cary/Apex raw water supply intake required.
Institutional Complexity	No significant DWR regulatory process anticipated for reclassification. USACE approval required, probably following a lengthy 216 Study. IBT and DWR allocation anticipated prior to increasing withdrawals.
Political Complexity	Very complex
Public Benefit	None
Consistency with Local Plans	Yes
Cost	Capital expenditures for expansion of Cary/Apex WTP intake and treatment capacity and distribution system.

5. Utililize Kerr Lake as Water Supply Reservoir, Increase Jordan Lake Allocation

This option draws water supply from the Kerr Lake reservoir. This option would construct a new WTP from a new intake structure. After treatment, the finished water would be provided to Cary, and then on to RTP South. Unless a corresponding quantity of treated effluent is returned to the Roanoke basin, this option includes an interbasin transfer.Obtaining a municipal water supply allocation from Kerr Lake would require a USACE study process. USACE approval to obtain the Kerr Lake allocation is not assured due to competing users and interbasin/interstate transfer issues, and such an application could take several years.

To supplement this water supply so that the RTP South Portion of the Cary/Apex demand is met throughout the planning period, particularly since a Kerr Lake supply would not be in place until 2022, an additional 2 mgd Jordan Lake allocation would be needed.

Total Net Present Value of the baseline alternative for RTP South is $12.1 million, with a unit cost of $3.02 per gallon of additional water supply. The version of this alternative that returns the interbasin transfer to the Roanoke Basin has a Net Present Value of $20.5 million and a unit cost of $5.12 per gallon of additional water supply. Costs include capital and O&M costs for the construction of facilities.

	Comments
Available Supply	4.0 mgd; 2 mgd from Kerr Lake and 2 mgd from Jordan Lake
Environmental Impacts	This option has impacts on environment anticipated as a result of new intake and pipeline. Island Creek, a potential intake site, is reported to have heavy metals contamination.
Water Quality Classification	WS III B
Timeliness	Determination with DWR on IBT and interstate issues could be reached by 2007, and WTP and pipeline improvements completed by 2022, though legal challenges may prevent implementation indefinitely.
Interbasin Transfer	Option requires IBT process for flows from Roanoke basin to Neuse basin, potential inter-state transfer issues.
Regional Partnerships	This option requires coordination with Durham and Raleigh as part of regional water supply approach. In addition, use of Kerr Lake will involve interstate coordination, as NC/VA municipalities rely on Kerr Lake as water source.
Technical Complexity	Option requires construction of raw water intake at Kerr Lake, new WTP, and finished water transmission pipeline, as well as upgrade of finished water pipelines within Cary/Apex system.
Institutional Complexity	USACE controls water supply allocations from Kerr Lake. Subject to SEPA process in NC, and depending on intake location, in VA. EIS would be required for the withdrawal facilities and new transmission line.
Political Complexity	Very complex – option has active opposition from citizens group.
Public Benefit	None
Consistency with Local Plans	N/A
Cost	Capital expenditures for construction of new Kerr Lake raw water intake, possible WTP and 45-50 mile water transmission pipeline with booster pumping from Kerr Lake, as well as permitting and IBT certification costs.

6. Utilize Harris Lake as Water Supply Reservoir, Increase Jordan Lake Allocation

Harris Lake was developed by Carolina Power and Light (CP&L) as a reservoir for the storage of cooling water for its Shearon Harris nuclear power plant. At present, it is used for this, as well as some recreational uses. Harris Lake is not presently classified as a water supply reservoir. According to permitting documents for the Shearon Harris plant, the storage volume between the normal and minimum lake levels contains approximately 15.4 bg and the safe yield of Harris Lake exceeds 11 mgd.

This option would classify Harris Lake as a water supply reservoir and utilize the lake as a Cary/Apex water source. Tritium is apparently present in Harris Lake, in quantities less than state water quality limits, so an evaluation of the lake prior to reclassification as a water supply will have to consider whether the quality of the Harris Lake water is safe.

This option includes construction of raw water intake facilities at Harris Lake and a new 10 to 15 mile raw water transmission main to the Cary/Apex WTP, depending on the intake location. To supplement this water supply so that the RTP South portion of the Cary/Apex demand is met throughout the planning period, particularly since this option could not be in effect until 2015, an additional Jordan Lake allocation of 2 mgd would be needed. The details of this additional project can be seen in the explanation of Alternative 1.

Total Net Present Value of this alternative for RTP South is $9.39 million. The unit cost is $2.35 per gallon of additional water supply. Costs include capital and O&M costs for the construction of facilities.

	Comments
Available Supply	4.0 mgd
Environmental Impacts	No adverse impact on environment anticipated.
Water Quality Classification	WS V
Timeliness	Unknown since CP&L does not at present appear willing to negotiate for availability of the lake for water supply. Capital facilities could be completed by 2015, pending regulatory approvals. It is likely the lake will not be available for water supply withdrawals until the power plant is off-line.
Interbasin Transfer	No increase in the currently requested maximum day IBT of 27 mgd
Regional Partnerships	CP&L as well as other regional utilities may desire an allocation from this new water supply pool.
Technical Complexity	This option would construct new raw water intake facilities for Cary/Apex and a raw water pipeline to the Cary/Apex WTP.
Institutional Complexity	Subject to SEPA process. EA required to address establishment of intake.
Political Complexity	Very Complex
Public Benefit	None
Consistency with Local Plans	N/A
Cost	Capital expenditures for construction of a new Harris Lake intake and raw water pipeline to the existing Cary/Apex WTP, expansion of Cary/Apex WTP treatment capacity, distribution system, as well as permitting costs.

7. Construct New Middle Creek Reservoir, Increase Jordan Lake Allocation

This option would develop a new Middle Creek reservoir as a joint venture with local governments in Wake County and Johnston County. RTP South could be provided with additional water supply from the yields of either Raleigh or Cary.

This option would include construction of several new facilities; relocation of existing roads and bridges; construction of a new raw water transmission pipeline from the intake to the Cary/Apex WTP and other regional partners; and expansion of the existing Cary/Apex WTP. To supplement this water supply so that the RTP South portion of the Cary/Apex demand is met throughout the planning period, particularly since this option could not be in effect until 2022, an additional Jordan Lake allocation of 2 mgd would be needed. The details of this additional project can be seen in the explanation of Alternative 1.

New or increased point source wastewater discharges by Cary and Fuquay-Varina to Middle Creek may affect the use of the creek for water supply as the creek has been given a biologic rating of "fair" to "poor" by DENR due to past nonpoint and point source wastewater discharges.

Total Net Present Value of this alternative for RTP South is $20.3 million. The unit cost is $5.07 per gallon of additional water supply. Costs include capital and O&M costs for the construction of facilities.

	Comments
Available Supply	4.0 mgd; 2 mgd from Middle Creek Reservoir, 2 mgd from increased Jordan Lake allocation.
Environmental Impacts	Potential impacts to existing wetlands and uplands from submergence. Water withdrawal from Neuse River may have impact on downstream water quality.
Water Quality Classification	C NSW
Timeliness	Uncertain; 20 years or more for new reservoir permitting and construction.
Interbasin Transfer	No increase in currently requested maximum day IBT of 27 mgd
Regional Partnerships	Increasing Cary's water supply from Neuse River basin may reduce the yield available to downstream regional utilities. Coordination with affected regional entities may be necessary to develop a regional water supply approach.
Technical Complexity	Construction of dam, reservoir, intake and transmission pipeline present significant engineering challenges; existing roads and bridges will have to be modified or relocated; Difference in Middle Creek water quality from existing Jordan Lake quality may require modification of treatment approach.
Institutional Complexity	Subject to SEPA process; EIS for new reservoir and intake facilities. The EIS would include an evaluation on river water quality.
Political Complexity	Very complex
Public Benefit	Many – Recreational use of new reservoir and surrounding park land
Consistency with Local Plans	N/A
Cost	Capital expenditures for land acquisition, construction of facilities listed above, as well as permitting and IBT costs.

8. Expand Durham's Lake Michie Reservoir and Increase Jordan Lake Allocation

Durham is considering raising the Lake Michie Dam to increase its water supplies. The study *Evaluation of Alternative Reservoirs on the Flat River and Little River* (Hazen and Sawyer, 1988), estimated that the 20-year safe yield of Lake Michie could be increased by 33 mgd if the dam is raised to elevation 380 ft. Durham has acquired approximately one-half of the 2,160 acres that would be submerged if Lake Michie were expanded to the 380 ft elevation.

This option would partner Cary/Apex and/or RTP South with Durham to raise the Lake Michie Dam to 380 ft, with the additional safe yield translating to an average treated water supply of about 11 mgd from Durham. Cary/Apex could contract with Durham to treat the water and provide the water to RTP South customers through upgraded interconnections with Durham; alternately, RTP South could become a Durham customer directly.

Since this option is located within the Neuse River basin, it has the potential to substantially reduce the quantity of interbasin transfer for Cary/Apex/RTP South water supply. To supplement this water supply so that the RTP South portion of the Cary/Apex demand is met throughout the planning period, an additional Jordan Lake allocation is required. This has no impact or cost related to it since the infrastructure needed is already in place.

Total Net Present Value of this alternative for RTP South is $11.79 million. The unit cost is $2.93 per gallon of additional water supply. Costs include capital and O&M costs for the construction of facilities.

	Comments
Available Supply	4.0 mgd; 2 mgd from Lake Michie, 2 mgd from Jordan Lake Allocation
Environmental Impacts	Potential impacts to existing wetlands and uplands from submergence. Water withdrawal may have impact upon downstream water quality and yield of Falls Lake reservoir, the primary Raleigh water source.
Water Quality Classification	WS III NSW
Timeliness	Uncertain; ~ 20 years for reservoir permitting and construction.
Interbasin Transfer	No increase in the currently requested maximum day IBT of 27 mgd
Regional Partnerships	May reduce the yield available to downstream regional utilities, such as Raleigh's Falls Lake. Coordination with affected regional entities may be necessary to develop regional water supply approach for Neuse River.
Technical Complexity	Significant but not unique challenges.
Institutional Complexity	Subject to SEPA process; EIS for new reservoir and intake facilities.
Political Complexity	Very complex
Public Benefit	Few
Consistency with Local Plans	N/A
Cost	Capital expenditures for land acquisition, land preparation and construction of a new dam, intake facilities, and raw water transmission main from intake to Durham's Brown WTP, as well as permitting costs. Treatment costs to be paid through contract with City of Durham.

6. Plans to Use Jordan Lake

RTP South is applying for a 3.5 mgd Level I and a 2.0 mgd Level II allocation from the Jordan Lake water supply pool to meet their long-term water demands. If a water supply allocation is granted, RTP South will work with Cary and Apex to expand existing facilities accordingly. The expanded facilities will also serve Morrisville and RTP South, although each community is pursuing its own allocation. Construction of capacity upgrades to the Cary/Apex WTP and its Jordan Lake intake structure and raw water transmission line is currently under way and will be completed in 2001.

The anticipated schedule for these and other relevant activities is shown below:

TABLE 6-1
Implementation Schedule - Water Supply Actions Relating to RTP South Jordan Lake Allocation

Activity	Expected Date
Complete Expansion of Cary/Apex WTP to 40 mgd	2001
Construct WWTP with discharge to Cape Fear Basin	2009
Complete Expansion of Cary/Apex WTP to 60 mgd	2015

Attachment A

Local Water Supply Plan

North Carolina Department of Environment and Natural Resources

Division of Water Resources

LOCAL WATER SUPPLY PLAN for JORDAN LAKE ALLOCATION APPLICATION 2000-2001
Part 1: Water Supply System Report for Calendar Year 2000

Completed By: CH2M HILL, Consultant to Wake County Date: 5/31/2001

SECTION 1: GENERAL INFORMATION

1-A. Water System: Wake County/RTP South 1-B. PWS Identification #:

1-C. River Sub-Basin(s): Neuse and Cape Fear

1-D. County(s): Wake

1-E. Contact Person: Brit Stoddard Title: Senior Planner

1-F. Mailing Address: PO Box 550; Planning Department CITY Raleigh ZIP 27502

1-G. Phone: 919.856-2641 1-H. Fax: 919.856.6184 1-I. E-mail: bstoddard@co.wake. nc.us

1-J. Type of Ownership (Check One): ☒ Municipality F County F Authority F District F Non-Profit Association F For-Profit Business
F State F Federal F Other_____

SECTION 2: WATER USE INFORMATION

2-A. Population Served in 2000 Year-Round 0

Seasonal (if applicable) N/A For Months of _____

2-B. Total Water Use for 2000 including all purchased water: 52.39 Million Gallons (MG)

2-C. Average Annual Daily Water Use in 2000: 0.258 Million Gallons per Day (MGD)

2-D. List 2000 Average Annual Daily Water Use by Type in Million Gallons per Day (MGD):

	Metered Connections		Non-Metered Connections		Total
Type of Use	Number	Average Use (MGD)	Number	Estimated Average Use (MGD)	Average Use (MGD)
(1) Residential					
(2) Commercial	21*	0.218			0.218
(3) Industrial					
(4) Institutional					
(5) Sales to other Systems					0
(6) System Processes					0.020
(7) Subtotal [sum (1) thru (6)]					0.238
(8) Average Annual Daily Water Use [Item 2-C]					0.258
(9) Unaccounted-for water [(8) - (7)]					0.020

2-E. List the Average Daily and Maximum Day Water Use by Month for 2000 in Million Gallons per Day (MGD):

	Average Daily Use	Maximum Day Use	Max/Ave Ratio		Average Daily Use	Maximum Day Use	Max/Ave Ratio		Average Daily Use	Maximum Day Use	Max/Ave Ratio
Jan	0.221	(1)		May	0.148	(1)		Sep	0.300	(1)	
Feb	0.146	(1)		Jun	0.239	(1)		Oct	0.250	(1)	
Mar	0.160	(1)		Jul	0.225	(1)		Nov	0.307	(1)	
Apr	0.245	(1)		Aug	0.118	(1)		Dec	0.264	(1)	

(1) No maximum day use calculated, as meters are not read on a daily basis. The usage numbers are based on month only.

2-F. List the system's 10 Largest Water Users and their Average Annual Daily Use in Million Gallons per Day (MGD) for 2000: (include sales to other systems)

Water User	Average Daily Use	Water User	Average Daily Use
Covance Biotechnologies	0.064	Bovis Construction	0.001
Cisco Systems	0.056		
Ericsson	0.033		
Biogen	0.033		
Delta Products	0.001		

2-G. WATER SALES TO OTHER WATER SYSTEMS IN 2000 List all systems that can be supplied water through existing interconnections (regular and emergency). Mark the locations of connections on the System Map.

1 Water supplied to:		2 Average Daily Amount		3 Contract Amount		4 Pipe Size(s)	5* R or E
Water System	PWSID	MGD	# of Days	MGD	Expiration Date	Inches	
N/A							

***NOTE** Column 5 **R=**Regular Use, **E=**Emergency Use

2-H. What is the Total Amount of Sales Contracts for Regular Use? ___0___MGD

SECTION 3: WATER SUPPLY SOURCES

3-A. SURFACE WATER List surface water source information. Mark and label locations of intakes on the System Map.

1 Name of Stream and/or Reservoir	2 Drainage Area Square Miles	3 Is Withdrawal Metered? Y / N	4 Sub-Basin	5 Average Daily Withdrawal for days used		6 Maximum Day Withdrawal	7* Available Supply		8* System Component Limiting Daily Output		9 Useable On-Stream Raw Water Supply Storage Million Gallons	10* R or E
				MGD	# of Days	MGD	MGD	Qualifier	Capacity MGD	System Component		
Jordan Lake (via Cary) refer to Cary LWSP												
								Totals				

***NOTES** Column 7 Supply Qualifiers: **C=**Contract amount, **SY20=2**0-year Safe Yield, **SY50=**50-year Safe Yield, **F=**20% of 7Q10 or other instream flow requirement, **T=**Treatment plant capacity, O=Other (specify) _____

Column 8 Component: **R=**Raw water pumps, **T=**Treatment facilities, **M=**Transmission main, **D=**Distribution system, **O=**Other (specify)_____

Column 10 **R=**Regular Use, **E=**Emergency Use

3-B. What is the Total Surface Water Supply available for Regular Use? _____ MGD

3-C. Does this system have off-stream raw water supply storage? F No F Yes Useable Capacity _____ Million Gallons

3-D. WATER PURCHASES FROM OTHER WATER SYSTEMS IN 2000

List all systems that can supply water to this system through existing interconnections (regular and emergency). Mark the locations of the connections on the System Map.

1 Water supplied by:		2 Average Daily Amount		3 Contract Amount		4 Pipe Size(s)	5* R or E
Water System	PWSID	MGD	# of Days	MGD	Expiration Date	Inches	
Cary	03-92-020	0.16	365	1.0	2014	16	R

***NOTE** Column 5 **R=**Regular Use, **E=**Emergency Use

3-E. What is the Total Amount of Purchase Contracts available for Regular Use? ____1.0_____MGD (Do not include emergency use connections in total)

SYSTEM NAME _____Wake County/RTP South_____ PWSID _____

3-F. GROUND WATER List well information. ***Mark and label the location of all wells on the System Map.***

1 Name or Number of Well	2 Well Depth Feet	3 Casing Depth Feet	4 Screen Depth Top Feet	4 Screen Depth Bottom Feet	5 Well Diameter Inches	6 Pump Intake Depth Feet	7 Is Well Metered? Y / N	8 Average Daily Withdrawal for Days Used MGD	8 Average Daily Withdrawal for Days Used # of Days	9 Maximum Day Withdrawal MGD	10 12-Hour Supply Million Gallons	11* System Component Limiting Daily Output Capacity MGD	11* System Component Limiting Daily Output System Component	12* R or E
N/A														

***NOTES** Column 11 Component: **R=**Raw water pumps, **T=**Treatment facilities, **M=**Transmission main, **D=**Distribution system, **O=**Other (specify)_____
Column 12 **R=**Regular Use, **E=**Emergency Use

3-G. What is the Total 12-Hour Supply of all wells available for Regular Use? N/A million gallons

3-H. Are ground water levels monitored? F No F Yes How often? _____

3-I. Does this system have a wellhead protection program F No F Yes F Under development

SYSTEM NAME Wake County/RTP South PWSID _____

3-J. WATER TREATMENT PLANTS List all WTPs, including any under construction, as of 12/31/2000. ***Mark and label locations on the System Map***.

Water Treatment Plant Name	Permitted Capacity MGD	Source(s)
Cary/Apex WTP	16	Jordan Lake
Cary/Apex WTP Capacity Expansion (complete 2001)	40	Jordan Lake

3-K. What is the system's finished water storage capacity? 0 Million Gallons

SECTION 4: WASTEWATER INFORMATION

4-A. List Average Daily Wastewater Discharges by Month for 2000 in Million Gallons per Day (MGD) *Separate Data for RTP South Not Available

	Average Daily Discharge		Average Daily Discharge		Average Daily Discharge		Average Daily Discharge
Jan	*	Apr	*	Jul	*	Oct	*
Feb	*	May	*	Aug	*	Nov	*
Mar	*	Jun	*	Sep	*	Dec	*

4-B. List all Wastewater Discharge and/or Land Application Permits held by the system***. Mark and label points of discharge and land application sites on the System Map***.

1 NPDES or Land Application Permit Number	2 Permitted Capacity Dec. 31,2000 MGD	3 Design Capacity MGD	4 Average Annual Daily Discharge MGD	5 Name of Receiving Stream	6 Sub-Basin	7 Maximum Daily Discharge MGD
Reference Cary LWSP						

4-C. List all Wastewater Discharge Connections with other systems. Mark and label the locations of connections on the System Map.

1 Wastewater Discharger		2 Wastewater Receiver		3 Average Daily Amount Discharged or Received		4 Contract Maximum
Name	PWSID	Name	PWSID	MGD	# of Days	MGD
RTP South		Town of Cary	03-92-020		365	0.25

4-D. Number of sewer service connections: 21

4-E. Number of water service connections with septic systems: 0 (Number in Sub-basin 1 ____ Number in Sub-basin 2 ____ Number in Sub-basin 3 ____)

4-F. Are there plans to build or expand wastewater treatment facilities in the next 10 years? F No ☒ Yes Please explain. Cary will construct; regional WW discharge to Cape Fear River by 2010.

SECTION 5: WATER CONSERVATION and DEMAND MANAGEMENT ACTIVITIES

5-A. What is the estimated total miles of distribution system lines? 7 miles

5-B. List the primary types and sizes of distribution lines:

	Asbestos Cement (AC)	Cast Iron (CI)	Ductile Iron (DI)	Galvanized Iron (GI)	Polyvinyl Chloride(PVC)	Other
Size Range			8”-12"			
Estimated % of lines			60%			

5-C. Were any lines replaced in 2000? ☒ No F Yes _____ linear feet

5-D. Were any new water mains added in 2000? ☒ No F Yes _____ linear feet

5-E. Does this system have a program to work or flush hydrants? F No ☒ Yes How often? Every 6 months (Cary performs)

5-F. Does this system have a valve exercise program? ☒ No F Yes How often? _____

5-G. Does this system have a cross-connection control program? ☒ No F Yes

5-H. Has water pressure been inadequate in any part of the system? ☒ No F Yes Please explain.

5-I. Does this system have a leak detection program? ☒ No F Yes What type of equipment or methods are used?

5-J. Has water use ever been restricted since 1992? ☒ No F Yes Please explain.

5-K. Does this system have a water conservation plan? ☒ No F Yes Please attach a copy. Cary Conservation Plan covers RTP South

5-L. Did this system distribute water conservation information in 2000? F No ☒ Yes

5-M. Are there any local requirements on plumbing fixture water use which are stricter than the NC State Building Code? ☒ No F Yes Please explain.

5-N. Does this system have a program to encourage replacement or retrofit of older, higher water-use plumbing fixtures? ☒ No F Yes

5-O. Does this system have a water shortage or drought response plan? ☒ No F Yes Please attach a copy.

5-P. Is raw water metered? F No F Yes ☒ N/A

5-Q. Is finished water output metered? F No F Yes ☒ N/A

5-R. Do you have a meter replacement program? F No ☒ Yes Cary

5-S. How many meters were replaced in 2000? ____0___ meters

5-T. How old are the oldest meters in the system? __20___ years

5-U. What type of rate structure is used? F Decreasing Block F Flat Rate ☒ Increasing Block F Seasonally Adjusted F Other_____

Attach a detailed description of the rate structure to this document.

5-V. Are there meters for outdoor water use, such as irrigation, which are not billed for sewer services? ☒ No F Yes # of meters _____

5-W. Does this system use reclaimed water or plan to use it within the next five years? ☒ No F Yes # of connections _____ ; _____ MGD

SECTION 6: SYSTEM MAP

Review, correct, and return the enclosed system map Check Plot to show the present boundaries of the water distribution system service area, points of intake and discharge, wells, water and wastewater treatment facilities, and water and wastewater interconnections with other systems. Also, show any proposed points of intake or discharge, wells, water and wastewater facilities, water and wastewater interconnections, and future service area extensions. Use symbols shown on the attached map.

LOCAL WATER SUPPLY PLAN for JORDAN LAKE ALLOCATION APPLICATION 2000-2001
Part 2: Water Supply Planning Report

Completed By: CH2M HILL, Consultant to Wake County Date: 5/31/01

WATER SYSTEM: Wake County/Research Triangle Park PWSID:

SECTION 7: WATER DEMAND PROJECTIONS

7-A. Population to be Served	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Year-Round	N/A										
Seasonal (if applicable)*											

*Please list the months of seasonal demand: _____N/A_____ Attach a detailed explanation of how projections were calculated.

Table 7-B. Projected Average Daily Service Area Demand in Million Gallons per Day (MGD). (Does not include sales to other systems)
Sub-divide each water use type as needed for projecting future water demands.

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Residential											
(2) Commercial											
(3) Industrial	0.3	1.1	1.5	1.9	2.3	2.7	2.9	3.1	3.4	3.7	3.9
(4) Institutional											
(5) System Processes	0.02	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4
(6) Unaccounted-for water	0.02	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
(7) Total Service Area Demand [sum (1) thru (6)]	0.3	1.3	1.7	2.2	2.6	3.1	3.4	3.6	3.9	4.2	4.5

7-C. Is non-residential water use expected to change significantly through 2050 from current levels of use? F No ☒ Yes
If yes, please explain; changes due to growth of population

Table 7-D. FUTURE SUPPLIES List all new sources or facilities which were under development as of December 31, 2000 and mark locations on the System Map.

Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply MGD	Development Time years	Year Online
N/A							

***NOTE** **R=**Regular Use, **E=**Emergency Use

7-E. What is the Total Amount of Future Supplies available for Regular Use? ____0____ MGD

Table 7-F. FUTURE SALES CONTRACTS that have been already agreed to. List new sales to be made to other systems.

1 Water supplied to:		2 Contract Amount and Duration			3 Pipe Size(s) Inches	4* R or E
System Name	PWSID	MGD	Year Begin	Year End		
N/A						

***NOTE** **R=**Regular Use, **E=**Emergency Use

7-G. What is the total amount of existing Future Sales Contracts for Regular Use? ____0_____ MGD

SECTION 8: FUTURE WATER SUPPLY NEEDS
***Completed jointly by Cary & Apex**

Local governments should maintain adequate water supplies to ensure that average daily water demands do not exceed 80% of the available supply. Completion of the following table will demonstrate whether existing supplies are adequate to satisfy this requirement and when additional water supply will be needed.

Table 8-A. AVERAGE DAILY DEMAND AS PERCENT OF SUPPLY Show all quantities in MGD.

Available Supply, MGD	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Existing Surface Water Supply (Item 3-B)	0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
(2) Existing Ground Water Supply (Item 3-G)	0	0	0	0	0	0	0	0	0	0	0
(3) Existing Purchase Contracts (Item 3-E)	1.0	0	0	0	0	0	0	0	0	0	0
(4) Future Supplies (Item 7-E)	0	0	0	0	0	0	0	0	0	0	0
(5) **Total Available Supply** [sum (1) thru (4)]	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Average Daily Demand, MGD											
(6) Service Area Demand (Item 7-B, Line 7)	0.3	1.3	1.7	2.2	2.6	3.1	3.4	3.6	3.9	4.2	4.5
(7) Existing Sales Contracts (Item 2-H)	0	0	0	0	0	0	0	0	0	0	0
(8) Future Sales Contracts (Item 7-G)	0	0	0	0	0	0	0	0	0	0	0
(9) **Total Average Daily Demand** [sum (6) thru (8)]	0.3	1.3	1.7	2.2	2.6	3.1	3.4	3.6	3.9	4.2	4.5
(10) Demand as Percent of Supply [(9) / (5)] x 100	30%	87%	113%	147%	173%	207%	227%	240%	260%	280%	300%
(11) **Supply Needed to maintain 80% [(9) / 0.8] - (5)**	0.4	1.6	2.1	2.8	3.3	3.9	4.2	4.5	4.9	5.2	5.5
Additional Information for Jordan Lake Allocation											
(12) Sales Under Existing Contracts	0	0	0	0	0	0	0	0	0	0	0
(13) Expected Sales Under Future Contracts	0	0	0	0	0	0	0	0	0	0	0
(14) Demand in each planning period [(6)+(12)+(13)]	0.3	1.3	1.7	2.2	2.6	3.1	3.4	3.6	3.9	4.2	4.5
(15) Supply minus Demand [(5) - (14)]	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0

8-B. Does Line 10 above indicate that demand will exceed 80% of available supply before the year 2030? F No ☒ Yes

If yes, your Jordan Lake Water Supply Storage Allocation Application should include the following items:

(1) Alternatives for obtaining additional water supply to meet future demands. Use the following tables to summarize the various future water supply alternatives available to your system. Attach a detailed description of each water supply project shown in each alternative. The sooner the additional supply will be needed, the more specific your plans need to be.

(2) A demand management program to ensure efficient use of your available water supply. A program should include: conducting water audits at least annually to closely monitor water use; targeting large water customers for increased efficiency; modifying water rate structures; identifying and reducing the amount of leaks and unaccounted-for water; and reusing reclaimed water for non-potable uses.

(3) Restrictive measures to control demand if the additional supply is not available when demand exceeds 80% of available supply, such as placing a moratorium on additional water connections until the additional supply is available or amending or developing your water shortage response ordinance to trigger mandatory water conservation as water demand approaches the available supply.

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#1)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply – Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (JL Allocation)		2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Available supply from Project 2 (describe)											
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	2.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin		0.7	1.4	1.8	2.1	2.5	2.8	2.9	3.2	3.4	3.6
(5) Consumptive Use in Source Basin	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
(6) Total discharge to Receiving Basin	0.2	0.4	0	0	0	0	0	0	0	0	0
(7) Consumptive Use in Receiving Basin	0	0	0	0	0	0	0	0	0	0	0
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.4	0	0	0	0	0	0	0	0	0

List details of the future supply options include in this alternative in the table below.

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Jordan Lake Allocation	03-92-020	Surface	Haw	WS IV B NSW CA	4	2	2003

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#2)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (Cape Fear R Supply)		2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Available supply from Project 2 (describe)											
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	2.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin		0.7	1.4	1.8	2.1	2.5	2.8	2.9	3.2	3.4	3.6
(5) Consumptive Use in Source Basin	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
(6) Total discharge to Receiving Basin	0.2	0.4	0	0	0	0	0	0	0	0	0
(7) Consumptive Use in Receiving Basin	0	0	0	0	0	0	0	0	0	0	0
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.4	0	0	0	0	0	0	0	0	0

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Cape Fear River	03-92-020	Surface	Haw	WS IV CA	4	6	2007

Attach additional pages as needed to summarize all alternatives.

8-C. Are peak day demands expected to exceed the water treatment plant capacity by 2010? ☒ No F Yes
If yes, what are your plans for increasing water treatment capacity?

Ongoing construction of upgrades at Cary/Apex WTP, when complete, should provide adequate peak day water supply thru about 2015.

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#3)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (Raise JL level)		2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Available supply from Project 2 (describe)											
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	2.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin		0.7	1.4	1.8	2.1	2.5	2.8	2.9	3.2	3.4	3.6
(5) Consumptive Use in Source Basin	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
(6) Total discharge to Receiving Basin	0.2	0.4	0	0	0	0	0	0	0	0	0
(7) Consumptive Use in Receiving Basin	0	0	0	0	0	0	0	0	0	0	0
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.4	0	0	0	0	0	0	0	0	0

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Jordan Lake Allocation	03-92-020	Surface	Haw	WS IV CA	4	6	2007

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#4)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (JL Sed Storage)		2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Available supply from Project 2 (describe)											
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	2.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin		0.7	1.4	1.8	2.1	2.5	2.8	2.9	3.2	3.4	3.6
(5) Consumptive Use in Source Basin	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
(6) Total discharge to Receiving Basin	0.2	0.4	0	0	0	0	0	0	0	0	0
(7) Consumptive Use in Receiving Basin	0	0	0	0	0	0	0	0	0	0	0
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.4	0	0	0	0	0	0	0	0	0

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Jordan Lake Allocation	03-92-020	Surface	Haw	WS IV CA	4	6	2007

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#5a)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (Kerr Lake)						2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 2 (JL Allocation)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	0.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin (Roanoke)						0	0	0	0	0	0
(5) Consumptive Use in Source Basin (Roanoke)											
Total discharge to Source Basin (Cape Fear)		0.7	1.4	1.8	2.1	2.5	2.8	2.9	3.2	3.4	3.6
Consumptive Use in Source Basin (Cape Fear)	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
(6) Total discharge to Receiving Basin (Neuse)	0.2	0.4	0	0	0	0	0	0	0	0	0
(7) Consumptive Use in Receiving Basin (Neuse)	0	0	0	0	0	0	0	0	0	0	0
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.4	0	0	0	0	0	0	0	0	0
Amount not returned to Roanoke Basin						2.0	2.0	2.0	2.0	2.0	2.0

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Kerr Lake Water Supply	03-92-020	Surface	Haw	WS IV CA	2	22	2022
Jordan Lake Allocation	03-92-020	Surface	Haw	WS IV CA	2	6	2003

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#5b)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (Kerr Lake)						2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 2 (JL Allocation)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	0.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin (Roanoke)						2.0	2.0	2.0	2.0	2.0	2.0
(5) Consumptive Use in Source Basin (Roanoke)						0	0	0	0	0	0
Total discharge to Source Basin (Cape Fear)		0.7	1.4	1.8	2.1	0.5	0.8	1.0	1.2	1.4	1.6
Consumptive Use in Source Basin (Cape Fear)	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
(6) Total discharge to Receiving Basin (Neuse)	0.2	0.4	0	0	0	0	0	0	0	0	0
(7) Consumptive Use in Receiving Basin (Neuse)	0	0	0	0	0	0	0	0	0	0	0
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.4	0	0	0	0	0	0	0	0	0
Amount not returned to Roanoke Basin						0	0	0	0	0	0

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Kerr Lake Water Supply	03-92-020	Surface	Haw	WS IV CA	2	22	2022
Jordan Lake Allocation	03-92-020	Surface	Haw	WS IV CA	2	2	2003

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#6)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (Harris Lake)					2.0	2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 2 (Jordan Lake)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	2.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin		0.7	1.5	1.9	2.3	2.7	2.9	3.2	3.4	3.7	3.9
(5) Consumptive Use in Source Basin	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.75	0.8	0.85
(6) Total discharge to Receiving Basin	0.2	0.4	0	0	0	0	0	0	0	0	0
(7) Consumptive Use in Receiving Basin	0	0	0	0	0	0	0	0	0	0	0
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.4	0	0	0	0	0	0	0	0	0

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Lake Harris Water Supply Intake	03-92-020	Surface	Haw	WS IV CA	2	20	2020
Jordan Lake Allocation	03-92-020	Surface	Haw	WS IV CA	2	6	2003

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#7)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (Middle Creek)						2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 2 (JL Allocation)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	0.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin (Neuse)	0	0.7	0	0	0	2.0	2.0	2.0	2.0	2.0	2.0
(5) Consumptive Use in Source Basin	0	0	0	0	0	0	0	0	0	0	0
(6) Total discharge to Receiving Basin (Cape Fear)	0.2	0.4	1.5	1.8	2.1	0.5	0.8	1.0	1.2	1.4	1.6
(7) Consumptive Use in Receiving Basin	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.7	0	0	0	0	0	0	0	0	0

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Middle Creek/Raleigh Water System	03-92-010	Surface	Neuse	WS III NSW	2	22	2022
Jordan Lake Allocation	03-92-020	Surface	Haw	WS IV CA	2	6	2003

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#8)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	0.7	0.2	-0.2	-0.7	-1.1	-1.6	-1.9	-2.1	-2.4	-2.7	-3.0
(2) Available supply from Project 1 (Lake Michie)						2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 2 (JL Allocation)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	0.7	2.2	1.8	1.3	0.9	2.4	2.1	1.9	1.6	1.3	1.0
(4) Total discharge to Source Basin	0	0.7	0	0	0	2.0	2.0	2.0	2.0	2.0	2.0
(5) Consumptive Use in Source Basin	0	0	0	0	0	0	0	0	0	0	0
(6) Total discharge to Receiving Basin	0.2	0.4	1.5	1.8	2.1	0.5	0.8	1.0	1.2	1.4	1.6
(7) Consumptive Use in Receiving Basin	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
(8) Amount not returned to Source Basin [(6) + (7)]	0.2	0.7	0	0	0	0	0	0	0	0	0

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
Expand Lake Michie	03-32-010	Surface	Haw	WS III NSW	2	22	2022
Jordan Lake Allocation	03-92-020	Surface	Haw	WS IV CA	2	6	2003

8-D. Does this system have an interconnection with another system capable of providing water in an emergency? F No ☒ Yes If not, what are your plans for interconnecting (or please explain why an interconnection is not feasible or not necessary).

8-E. Has this system participated in regional water supply or water use planning? F No ☒ Yes Please describe.

Wake County has participated in numberous regional water supply initiatives for both water supply, efficient use and wastewater treatment and disposal, including feasibility studies for water supply alternatives to Jordan Lake Allocations and regional WRF discharging to Cape Fear River

8-F. List the major water supply reports or studies used for planning.

Town of Long-Range Water Supply Plan (2000); Water Shortage Response Plan (2001); Reclaimed Water and Wastewater Reuse Program (1999); Interbasin Transfer Environmental Impact Statement (2000); Water System Master Plan (2000)

SECTION 9: TECHNICAL ASSISTANCE NEEDS

Is technical assistance needed:

9-A.	to develop a local water supply plan?	☒ No F Yes
9-B.	with a leak detection program?	☒ No F Yes
9-C.	with a demand management or water conservation program?	☒ No F Yes
9-D.	with a water shortage response plan?	☒ No F Yes
9-E.	to identify alternative or future water supply sources?	☒ No F Yes
9-F.	with a capacity development plan?	☒ No F Yes
9-G.	with a wellhead or source water protection plan?	☒ No F Yes
9-H.	with water system compliance or operational problems?	☒ No F Yes
9-I.	with Consumer Confidence Reports?	☒ No F Yes

9-J. Please describe any other needs or issues regarding your water supply sources, any water system deficiencies or needed improvements (storage, treatment, etc.), or your ability to meet present and future water needs. Include both quantity and quality considerations, as well as financial, technical, managerial, permitting, and compliance issues.

1. Increase Jordan Lake Water Supply Allocation

Project 1. Increase Jordan Lake Water Supply Allocation

This option increases the allocation for withdrawals through the Cary/Apex existing raw water intake on the east bank of Jordan Lake. To satisfy water demand for the RTP South service area and applying a 80 percent of available capacity threshold, the required average water allocation would be at least 5.5 mgd in 2030.

In the short term, water withdrawn by Cary from Jordan Lake is discharged as wastewater into the Neuse River basin, so the ongoing interbasin transfer (IBT) application to DENR supports the Jordan Lake allocation increase approach. Construction of a new West Cary WWTP in the Cape Fear River basin, with an initial capacity of 9 mgd, is planned to mitigate the IBT within 5 years.

The water intake screens and intake piping can handle a maximum flow of 50 mgd. Since the projected combined peak demands of Cary/Apex, Morrisville and RTP South (with reserve capacity) will exceed 50 mgd by about 2021, this alternative requires replacement of the existing intake screens with larger screens and modification of the backwash air system. Also, the existing Cary/Apex WTP would be expanded incrementally to meet increased demands in the study period, and the distribution system would be upgraded to accommodate future demands.

2. Cape Fear River Supply

Project 1. Cape Fear River Supply

Harnett County operates a water treatment plant in Lillington, with an intake on the Cape Fear River. The plant has a capacity of 12 mgd, and Harnett County has initiated a pilot-testing program to re-rate the plant's capacity to 18 mgd. This option expands the Harnett County water plant to 48 mgd, ultimately, at its present site. A maximum of 16 mgd is available under this option, subject to water availability. This option would be implemented as a form of indirect reuse, increasing the water available for withdrawal at the Harnett County WTP through an equivalent quantity of discharges to the Cape Fear River basin from a West Cary WWTP. There is no net interbasin transfer for this arrangement. This option relies on a West Cary WWTP.

This option utilizes the proposed finished water pipeline from the Harnett County WTP to Holly Springs as well as an existing interconnection with the Apex water distribution system. These existing interconnections would be upgraded as Cary's supply from the Harnett County WTP increases toward the maximum.

A variation of this option would involve RTP South's participation with Cary/Apex in construction of a new WTP on the Cape Fear River with other local governments. However, this WTP is not presently in place, and while that would provide more control over the facility's operation, the incremental cost of a Cary/regional utility WTP is likely to be higher.

3. Increase Jordan Lake Reservoir Full Pool Elevation

Project 1. Increase Jordan Lake Reservoir Full Pool Elevation

This option increases the available water supply pool for Jordan Lake Reservoir by modifying the Army Corps of Engineers (USACE) operating rules to raise the top of the conservation pool elevation from its present 216 ft. By preliminary evaluation of stage-storage relations for Jordan Lake, an additional 4.50 billion gallons (bg) of water supply pool could be created by raising the permanent pool elevation by 1 ft. This quantity of additional water supply pool could increase the safe yield from the lake by as much as 30 mgd. In addition to potential environmental impacts that would be addressed by an EIS or EA, recreational facilities at the lake would be impacted by the change in top of pool elevation.

Scenarios to modify the lake's operating rules would require a USACE Section 216 Study process before the Corps would assent to the proposed change. Raising the permanent pool would also decrease available flood storage in the reservoir. According to DWR staff, USACE approval to raise the permanent pool of Jordan Lake is not assured, and such an application could take several years.

4. Convert a Portion of Jordan Lake Sediment Storage to Water Supply Storage

Project 1. Convert a Portion of Jordan Lake Sediment Storage to Water Supply Storage

This option increases the Jordan Lake water supply pool by reclassifying a portion of the 24.3 bg of existing lake volume allocated to sediments. If 10 percent of present sediment storage were converted to water supply pool, the estimated additional water supply storage volume which could be obtained in this manner is 2.43 bg, which may increase the safe yield of the reservoir by as much as 16 mgd.

This option will require USACE involvement and concurrence to change the reservoir's operating rules. DWR owns the water supply pool and manages the water quality pool. This option may be linked to Section 216 Studies and to implementation of additional best management practices to reduce rate of sedimentation (sediment traps, buffer zones, local ordinances, etc.). The USACE would probably require these practices to be adopted by all local governments which discharge stormwater to Jordan Lake, in order to justify reclassification of sediment storage pool to water supply pool.

Regulatory approval to convert a portion of the sediment storage of Jordan Lake to water supply pool is not assured, and such an application could take several years.

5. Utilize Kerr Lake as Water Supply Resource

Project 1. Utilize Kerr Lake as Water Supply Resource

This option draws water supply from Kerr Lake reservoir on the North Carolina-Virginia line. This option would deliver raw water to either Raleigh or Durham via pipeline or construct a new WTP from a new intake structure. After treatment, the finished water would be provided to Cary, then on to RTP South, either through an interconnection with Raleigh or Durham or direct pipeline from the new WTP.

Obtaining a municipal water supply allocation from Kerr Lake would require a USACE study process. USACE approval to obtain the Kerr Lake allocation is not assured due to

competing users and interbasin/interstate transfer issues, and such an application could take several years.

Based on available information, the most favorable locations for new intake facilities are at Island Creek, just north of the NC-VA state line, and along the west bank of Nut Bush Creek north of Henderson. A pipeline could convey the raw water from the intake along highway right-of-way to Lake Michie, a Durham raw water supply reservoir.

Project 2. Due to the long lead time to implement a Kerr Lake water supply, a Jordan Lake water supply allocation is required to address demands through 2022.

6. Utilize Harris Lake as Water Supply Source

Project 1. Utilize Harris Lake as Water Supply Source

Harris Lake was developed by Carolina Power and Light (CP&L) as a reservoir for the storage of cooling water for its Shearon Harris nuclear power plant. At present, it is used for this, as well as some recreational uses. The reservoir's average annual flow yield is about 0.4 cfs/mi^2, measured downstream of the lake.

Harris Lake is not presently classified as a water supply reservoir. According to permitting documents for the Shearon Harris plant, the storage volume between the normal and minimum lake levels contains approximately 15.4 bg and the safe yield of Harris Lake exceeds 11 mgd.

This option would classify Harris Lake as a water supply reservoir and utilize the lake as a Cary/Apex water source. Tritium is apparently present in Harris Lake, in quantities less than state water quality limits. An evaluation of the lake prior to reclassification as a water supply will have to consider whether the quality of the Harris Lake water is compatible with that use.

This option includes construction of raw water intake facilities at Harris Lake and a new 10 to 15 mile raw water transmission main to the Cary/Apex WTP, depending on the intake location. Since Harris Lake is located in the Cape Fear River Basin, use of this reservoir for water supply will involve an interbasin transfer.

7. Purchase Finished Water from Raleigh

Project 1. Purchase Water From Raleigh

The City of Raleigh obtains its water primarily from Falls Lake in northern Wake County. Raleigh has indicated a willingness to provide water to RTP South on a contract basis through either existing interconnections or construction of a new metered interconnection. Raleigh would also contract for wastewater treatment and disposal through its Neuse WWTP.

This option would develop a new metered interconnection between Raleigh and RTP South with sufficient capacity to serve 2050 demands in RTP South. Existing interconnections between Raleigh, Cary and RTP South would be used to convey water until the direct interconnection could be constructed.

8. Purchase Finished Water from Durham

Project 1. Purchase Finished Water from Durham

The City of Durham obtains its water primarily from the Neuse River basin, though in the future it may also obtain water supply from Jordan Lake. Durham has indicated a willingness to provide water and sewer services to RTP South on a contract basis through either existing interconnections or construction of a new metered interconnection. Durham would also contract for wastewater treatment and disposal through its South Durham Water Reclamation Facility.

This option would develop a new metered interconnection between Durham and RTP South with sufficient capacity to serve 2050 demands in RTP South. The water would be provided from a new Durham WTP on Jordan Lake. Existing interconnections between Durham, Cary and RTP South would be used to convey water until the direct interconnection could be constructed.

Project 2. Due to the long lead time to implement modifications to Lake Michie dam, a Jordan Lake water supply allocation is required to address demands through 2022.

Attachment B

Map of Service Area and Facilities

Attachment C

Alternative Cost Estimates

Alternative 1
Increase Jordan Lake Water Supply Allocation
4.0 MGD Allocation

	Unit	Quantity	Unit Cost	Item Cost
Pipeline Construction				
Open-Cut Pipe	LF	31,000	$123	$3,804,000
Pump/Booster Station Pump Systems				
Raw Water Intake Structure Modification	EA	1	$1,534,030	$1,534,000
WTP Expansion (40 mgd to 57 mgd)	EA	1	$18,510,625	$18,511,000
RTP South's Percentage of the Above Costs		13%		$3,180,000
Mobilization/Demobilization		(7% of Construction Cost)		$223,000
Contingency		(10% of Construction Cost)		$318,000
Contractor's OH and Profit		(15% of Construction Cost)		$477,000
		Construction Costs (total)		$4,198,000
Engineering Design and Administration		(10% of Construction Cost)		$420,000
Legal and Administrative Costs		(5% of Construction Cost)		$210,000
Cost of Regulatory Requirements		(5% of Construction Cost)		$210,000
DWR Allocation Payment		13%	$600,000	$80,000
		Jordan Lake Capital Cost		$5,118,000
		Net Present Value of O&M Costs		$663,000
		Total Jordan Lake Costs		$5,781,000
		Incremental Supply (mgd)		4
		Unit cost ($/gpd)		$1.45

Alternative 2
A Cape Fear River Supply and Increase in Jordan Lake Water Supply Allocation
4.0 MGD Total Supply

	Unit	Quantity	Unit Cost	Item Cost
Cape Fear River Supply				
Pipeline Construction				
Open-Cut Pipe	LF	72,000	$147	$10,603,000
Pump/Booster Station Pump Systems				
Finished Water Booster Pump Station	/mgd	16	$71,588	$1,145,000
RTP South Portion of the Above Costs		13%		$1,566,000
Mobilization/Demobilization			(7% of Construction Cost)	$110,000
Contingency			(10% of Construction Cost)	$157,000
Contractor's OH and Profit			(15% of Construction Cost)	$235,000
			Construction Costs (total)	$2,068,000
Engineering Design and Administration			(10% of Construction Cost)	$207,000
Legal and Administrative Costs			(5% of Construction Cost)	$103,000
Cost of Regulatory Requirements			(5% of Construction Cost)	$103,000
Capacity Payment to Harnett County			(13% of 16 mgd Capacity Payment)	$1,920,000
			Cape Fear Capital Costs	$4,401,000
Net Present Value of O&M Costs (Includes Capacity Use Fees to Harnett County)				$13,659,000
			Total Cape Fear Costs	$18,060,000
Jordan Lake Water Supply				
WTP Expansion (40 mgd to 57 mgd)	EA	1	$18,510,625	$18,511,000
Raw Water Intake Structure Modification	EA	1	$1,534,030	$1,534,000
Raw Water Transmission Piping (add 24" line)	LF	31,000	$123	$3,804,000
RTP South Portion of the Above Costs		13%		$3,180,000
Mobilization/Demobilization			(7% of Construction Cost)	$223,000
Contingency			(10% of Construction Cost)	$318,000
Contractor's OH and Profit			(15% of Construction Cost)	$477,000
			Construction Costs (total)	$4,198,000
Engineering Design and Administration			(10% of Construction Cost)	$420,000
Legal and Administrative Costs			(5% of Construction Cost)	$210,000
Cost of Regulatory Requirements			(5% of Construction Cost)	$210,000
DWR Allocation Payment		13%	$600,000	$80,000
			Jordan Lake Capital Cost	$5,118,000
			Net Present Value of O&M Costs	$663,000
			Total Jordan Lake Costs	$5,781,000
			Total Net Present Value	$23,841,000
			Incremental Supply (mgd)	4
			Unit Cost ($/gpd)	$5.96

Alternative 3
Increase Jordan Lake Reservoir Full Pool Elevation
4.0 MGD Allocation

	Unit	Quantity	Unit Cost	Item Cost
Pipeline Construction				
Open-Cut Pipe	LF	31,000	$123	$3,804,000
Pump/Booster Station Pump Systems				
Raw Water Intake Structure Modification	EA	1	$1,534,030	$1,534,000
WTP Expansion (40 mgd to 57 mgd)	EA	1	$18,510,625	$ 18,511,000
RTP South Percentage of the Above Costs		13%		$3,180,000
Mobilization/Demobilization		(7% of Construction Cost)		$223,000
Contingency		(10% of Construction Cost)		$318,000
Contractor's OH and Profit		(15% of Construction Cost)		$477,000
		Construction Costs (total)		$4,198,000
Engineering Design and Administration		(20% of Construction Cost)		$839,600
Legal and Administrative Costs		(10% of Construction Cost)		$419,800
Cost of Regulatory Requirements		(10% of Construction Cost)		$419,800
DWR Allocation Payment		13%	$600,000	$80,000
			Jordan Lake Capital Cost	$5,957,200
			Net Present Value of O&M Costs	$663,000
			Total Jordan Lake Costs	$6,620,200
			Incremental Supply (mgd)	4
			Unit cost ($/gpd)	$1.66

Alternative 4
Convert a Portion of Jordan Lake Sediment Storage to Water Supply Storage and Increase in Jordan Lake Water Supply Allocation
4.0 MGD Total Supply

	Unit	Quantity	Unit Cost	Item Cost
Pipeline Construction				
Open-Cut Pipe	LF	31,000	$123	$3,804,000
Pump/Booster Station Pump Systems				
Raw Water Intake Structure Modification	EA	1	$1,534,030	$1,534,000
WTP Expansion (40 mgd to 57 mgd)	EA	1	$18,510,625	$ 18,511,000
RTP South Percentage of the Above Costs		13%		$3,180,000
Mobilization/Demobilization		(7% of Construction Cost)		$223,000
Contingency		(10% of Construction Cost)		$318,000
Contractor's OH and Profit		(15% of Construction Cost)		$477,000
		Construction Costs (total)		$4,198,000
Engineering Design and Administration		(20% of Construction Cost)		$840,000
Legal and Administrative Costs		(10% of Construction Cost)		$420,000
Cost of Regulatory Requirements		(10% of Construction Cost)		$420,000
DWR Allocation Payment		13%	$600,000	$80,000
			Jordan Lake Capital Cost	$5,958,000
			Net Present Value of O&M Costs	$663,000
			Total Jordan Lake Costs	$6,621,000
			Incremental Supply (mgd)	4
			Unit cost ($/gpd)	$1.66

Alternative 5
Utilize Kerr Lake as Water Supply Resource and Increase in Jordan Lake Water Supply Allocation
4.0 MGD Total Supply

	Unit	Quantity	Unit Cost	Item Cost
Kerr Lake Supply				
Pipeline Construction				
Open-Cut Pipe	LF	306,000	$172	$52,574,000
Open-Cut Pipe	LF	5,000	$172	$859,000
			Subtotal	$53,433,000
Pump/Booster Station Pump Systems				
Raw Water Intake and Pump Station	EA	1	$2,045,373	$2,045,000
Raw Water Booster Pump Station	/mgd	50	$71,588	$3,579,000
Finished Water Booster Pump Station	/mgd	3*50	$71,588	$10,738,000
			Subtotal:	$16,362,000
New Water Treatment Plant (50 mgd)	EA	1	$43,658,485	$ 43,658,000
RTP South Percentage of the Above Costs (13% of Cary's 25%)		3%		$3,782,000
Cary-Only Costs Related to Kerr Lake				
WTP Expansion (40 mgd to 48 mgd)	EA	1	$10,983,653	$10,984,000
Raw Water Transmission Piping (add 24" line)	LF	31,000	$98	$3,044,000
RTP South Percentage of the Above Costs		13%		$1,870,000
Mobilization/Demobilization			(7% of Construction Cost)	$396,000
Contingency			(10% of Construction Cost)	$565,000
Contractor's OH and Profit			(15% of Construction Cost)	$848,000
			Construction Costs (total)	$7,461,000
Engineering Design and Administration			(20% of Construction Cost)	$1,492,000
Legal and Administrative Costs			(10% of Construction Cost)	$746,000
Cost of Regulatory Requirements			(10% of Construction Cost)	$746,000
Land/Easement Acquisition			(3% share of 300 acres at $10,000/acre)	$100,000
			Kerr Lake Capital Costs	$10,545,000
			Net Present Value of O&M Costs	$1,036,000
			Total Kerr Lake Costs	$11,581,000
Jordan Lake Water Supply				
Raw Water Intake Modification	EA	1	$1,534,030	$1,534,000
RTP South Percentage of the Above Cost		13%		$205,000
Mobilization/Demobilization			(7% of Construction Cost)	$14,000
Contingency			(10% of Construction Cost)	$21,000
Contractor's OH and Profit			(15% of Construction Cost)	$31,000
			Construction Costs (total)	$271,000
Engineering Design and Administration			(10% of Construction Cost)	$27,000
Legal and Administrative Costs			(5% of Construction Cost)	$14,000
Cost of Regulatory Requirements			(5% of Construction Cost)	$14,000
DWR Allocation Payment		13%	$600,000	$80,000
			Jordan Lake Capital Cost	$406,000
			Net Present Value of O&M Costs	$97,000
			Total Jordan Lake Costs	$503,000
			Total Net Present Value	$12,084,000
			Incremental Supply (mgd)	4
			Unit Cost ($/gpd)	$3.02

Alternative 5
Utilize Kerr Lake as Water Supply Resource and Increase in Jordan Lake Water Supply Allocation
4.0 MGD Total Supply

Kerr Lake Supply	Unit	Quantity	Unit Cost	Item Cost
Pipeline Construction				
Open-Cut Pipe	LF	306,000	$172	$52,574,000
Open-Cut Pipe	LF	5,000	$172	$859,000
			Subtotal	$53,433,000
Pump/Booster Station Pump Systems				
Raw Water Intake and Pump Station	EA	1	$2,045,373	$2,045,000
Raw Water Booster Pump Station	/mgd	50	$71,588	$3,579,000
Finished Water Booster Pump Station	/mgd	3*50	$71,588	$10,738,000
			Subtotal:	$16,362,000
IBT Effluent Return Pipeline				
Effluent Transfer Pipeline (54-inch)	LF	274,560	$266	$73,005,000
Effluent Transfer Pipeline (42-inch)	LF	44,400	$192	$8,537,000
Effluent Transfer Pipeline (36-inch)	LF	69,700	$172	$11,975,000
Pump Station 1/Raleigh	mgd	13	$204,537	$2,659,000
Pump Station 2/Durham	mgd	17	$204,537	$3,477,000
Pump Station 3/Cary	mgd	10	$204,537	$2,045,000
Junction PS	mgd	40	$204,537	$8,181,000
Pipeline Clear and Grub (incl. easement preparation)	acres	10	$2,045	$20,000
Add for Rock Excavation (applied to 25% of total pipe length)	LF	97,165	$51	$4,968,000
Street/RR Crossings (Bore/Jack)	LF	2,000	$1,023	$2,045,000
Air Release Valves	EA	40	$39,885	$1,595,000
Street Repair (Asphalt Pavement Patch, 20% of total pipe length)	LF	77,732	$51	$3,975,000
Easement/Right of Way Restoration (80% of total pipe length)	LF	310,928	$6	$1,908,000
Traffic Control (applied to total project length in Street or adjacent ROW)	LF	77,732	$15	$1,192,000
			subtotal	$124,390,000
New Water Treatment Plant (50 mgd)	EA	1	$43,658,485	$ 43,658,000
RTP South Percentage of the Above Costs (13% of Cary's 25%)	3%			$7,928,000
Cary-Only Costs Related to Kerr Lake				
WTP Expansion (40 mgd to 48 mgd)	EA	1	$10,983,653	$10,984,000
Raw Water Transmission Piping (add 24" line)	LF	31,000	$98	$3,044,000
RTP South Percentage of the Above Costs		13%		$1,870,000
Mobilization/Demobilization			(7% of Construction Cost)	$686,000
Contingency			(10% of Construction Cost)	$980,000
Contractor's OH and Profit			(15% of Construction Cost)	$1,470,000
			Construction Costs (total)	$12,934,000
Engineering Design and Administration			(20% of Construction Cost)	$2,587,000
Legal and Administrative Costs			(10% of Construction Cost)	$1,293,000
Cost of Regulatory Requirements			(10% of Construction Cost)	$1,293,000
Land/Easement Acquisition		(3% share of 305 acres at $10,000/acre)		$102,000
Wetland Mitigation	acre	3% of 10 acres	$25,000	$8,000
			Kerr Lake Capital Costs	$18,217,000
			Net Present Value of O&M Costs	$1,777,000
			Total Kerr Lake Costs	$19,994,000
Jordan Lake Water Supply				
Raw Water Intake Modification	EA	1	$1,534,030	$1,534,000
RTP South Percentage of the Above Costs		13%		$205,000
Mobilization/Demobilization			(7% of Construction Cost)	$14,000
Contingency			(10% of Construction Cost)	$21,000
Contractor's OH and Profit			(15% of Construction Cost)	$31,000
			Construction Costs (total)	$271,000
Engineering Design and Administration			(10% of Construction Cost)	$27,000
Legal and Administrative Costs			(5% of Construction Cost)	$14,000
Cost of Regulatory Requirements			(5% of Construction Cost)	$14,000
DWR Allocation Payment		13%	$600,000	$80,000
			Jordan Lake Capital Cost	$406,000
			Net Present Value of O&M Costs	$97,000
			Total Jordan Lake Costs	$503,000
			Total Net Present Value	$20,497,000
			Incremental Supply (mgd)	4
			Unit Cost ($/gpd)	$5.12

Alternative 6
Utilize Harris Lake as Water Supply Reservoir and Increase in Jordan Lake Water Supply Allocation
4.0 MGD Total Supply

	Unit	Quantity	Unit Cost	Item Cost
Harris Lake Supply				
Pipeline Construction				
Open-Cut Pipe	LF	68,600	$123	$8,419,000
Pump/Booster Station Pump Systems				
Raw Water Intake and Pump Station	EA	1	$2,045,373	$2,045,000
WTP Expansion (40 mgd to 57 mgd)	EA	1	$18,510,625	$ 18,511,000
RTP South Percentage of the Above Costs		13%		$3,863,000
Mobilization/Demobilization			(7% of Construction Cost)	$270,000
Contingency			(10% of Construction Cost)	$386,000
Contractor's OH and Profit			(15% of Construction Cost)	$579,000
			Construction Costs (total)	$5,098,000
Engineering Design and Administration			(20% of Construction Cost)	$1,020,000
Legal and Administrative Costs			(10% of Construction Cost)	$510,000
Cost of Regulatory Requirements			(10% of Construction Cost)	$510,000
			Harris Lake Capital Costs	$7,138,000
			Net present Value of O&M Costs	$845,000
			Total Harris Lake Costs	$7,983,000
Jordan Lake Water Supply				
Raw Water Intake Structure Modification	EA	1	$1,534,030	$1,534,000
Raw Water Transmission Piping (add 24" line)	LF	31,000	$123	$3,804,000
RTP South Percentage of the Above Costs		13%		$712,000
Mobilization/Demobilization			(7% of Construction Cost)	$50,000
Contingency			(10% of Construction Cost)	$71,000
Contractor's OH and Profit			(15% of Construction Cost)	$107,000
			Construction Costs (total)	$940,000
Engineering Design and Administration			(10% of Construction Cost)	$94,000
Legal and Administrative Costs			(5% of Construction Cost)	$47,000
Cost of Regulatory Requirements			(5% of Construction Cost)	$47,000
DWR Allocation Payment		13%	$600,000	$80,000
			Jordan Lake Capital Cost	$1,208,000
			Net Present Value of O&M Costs	$194,000
			Total Jordan Lake Costs	$1,402,000
			Total Net Present Value	$9,385,000
			Incremental Supply (mgd)	4
			Unit Cost ($/gpd)	$2.35

Alternative 7
Construct New Middle Creek Reservoir and Increase in Jordan Lake Water Supply Allocation
4.0 MGD Total Supply

	Unit	Quantity	Unit Cost	Item Cost
Middle Creek Reservoir				
I. Dam and Reservoir Construction				
Reservoir Site Preparation/Clearing	Acres	1,600	$3,068	$4,909,000
New Dam	cubic yard	187,200	$128	$23,931,000
Electrical/I&C Allowance (8% of Dam cost)	EA	1	$1,914,480	$1,914,000
Water Quality/Sediment Control	EA	1	$1,000,000	$1,000,000
Access Roads	EA	1	$520,000	$520,000
Finishes (Site Work, Riprap, Piezometers, etc - 10% of Dam Cost)	EA	1	$2,340,000	$2,340,000
Road and Bridge Relocations/Replacement	EA	1	$7,000,000	$7,000,000
			Subtotal	$41,614,000
II. Finished Water Transmission				
FW Transmission Line (30 inch)	LF	33,900	$127	$4,299,000
FW Transmission Line (24 inch)	LF	119,612	$102	$12,233,000
FW Booster Pump Station 1 (Cary)	mgd	15	$204,537	$3,068,000
Pipeline Clear and Grub (incl. easement preparation)	Acres	10	$2,045	$20,000
Add for Rock Excavation (applied to 25% of total pipe length)	LF	38,378	$51	$1,962,000
Street/RR Crossings (Bore/Jack)	LF	600	$511	$307,000
Air Release Valves	EA	20	$2,045	$41,000
Street Repair (Asphalt Pavement Patch, 20% of total pipe length)	LF	30,702	$36	$1,099,000
Easement/Right of Way Restoration (80% of total pipe length)	LF	122,810	$5	$628,000
Traffic Control (applied to total project length in Street of adjacent ROW)	LF	153,512	$15	$2,355,000
			Subtotal	$26,012,000
III. Water Treatment Plant with Raw Water Intake and Conveyance				
New Middle Creek Regional WTP	EA	1	$53,339,236	$53,339,000
RW Intake Structure	EA	1	$3,857,751	$3,858,000
RW Transmission Piping (dual 54 inch lines)	LF	10,560	$221	$2,333,000
			Subtotal	$59,530,000
RTP South Percentage of the Above Costs (13% of Cary's 29%)		4%		$4,844,000
Mobilization/Demobilization			(7% of Construction Cost)	$339,000
Contingency			(10% of Construction Cost)	$484,000
Contractor's OH and Profit			(15% of Construction Cost)	$727,000
			Construction Costs (total)	$6,394,000
Engineering Design and Administration			(20% of Construction Cost)	$1,279,000
Legal and Administrative Costs			(10% of Construction Cost)	$639,000
Cost of Regulatory Requirements			(10% of Construction Cost)	$639,000
Land/Easement Acquisition	Acres	4% of 1,600 Acres	$10,000	$610,000
Wetland Mitigation	Acres	4$ of 2,280 Acres	$30,000	$2,606,000
			Middle Creek Capital Costs	$12,167,000
			Net Present Value of O&M Costs	$559,000
			Total Middle Creek Costs	$12,726,000
Jordan Lake Water Supply				
WTP Expansion (40 mgd to 49 mgd)	EA	1	$12,354,053	$12,354,000
Raw Water Intake Structure Modification	EA	1	$1,534,030	$1,534,000
Raw Water Transmission Piping (add 24" line)	LF	31,000	$98	$3,044,000
Expand Cary/Apex WTP (49 mgd to 56 mgd)	EA	1	$12,292,691	$12,293,000
RTP South Percentage of the Above Costs		13%		$3,897,000
Mobilization/Demobilization			(7% of Construction Cost)	$273,000
Contingency			(10% of Construction Cost)	$390,000
Contractor's OH and Profit			(15% of Construction Cost)	$585,000
			Construction Costs (total)	$5,145,000
Engineering Design and Administration			(10% of Construction Cost)	$515,000
Legal and Administrative Costs			(5% of Construction Cost)	$257,000
Cost of Regulatory Requirements			(5% of Construction Cost)	$811,000
DWR Allocation Payment		13%	$600,000	$80,000.00
			Jordan Lake Capital Cost	$6,808,000
			Net Present Value of O&M Costs	$730,000
			Total Jordan Lake Costs	$7,538,000
			Total Net Present Value	$20,264,000
			Incremental Supply (mgd)	4
			Unit Cost ($/gpd)	$5.07

Alternative 8

Expansion of Durham's Lake Michie Reservoir, Purchase from the City of Durham, and Increase in Jordan Lake Water Supply Allocation
4.0 MGD Total Supply

	Unit	Quantity	Unit Cost	Item Cost
Expansion of Lake Michie				
Dam Site Preparation	EA	1	$1,354,037	$1,354,000
Dam Embankment	EA	1	$5,583,868	$5,584,000
Principal Spillway	EA	1	$16,477,524	$16,478,000
Diversion Conduit	EA	1	$4,820,944	$4,821,000
Intake Tower	EA	1	$2,540,353	$2,540,000
Pumping Station	EA	1	$3,796,212	$3,796,000
Decommissioning of Existing Facility	EA	1	$281,239	$281,000
Access Roads	EA	1	$576,795	$577,000
Site Work	EA	1	$727,130	$727,000
Electrical	EA	1	$1,381,649	$1,382,000
Reservoir Clearing	EA	1	$661,678	$662,000
Road Relocations	EA	1	$5,829,313	$5,829,000
Modifications to Existing Utilities	EA	1	$607,476	$607,000
RTP South Percentage of the Above Costs (13% of Cary's 36%)		5%		$2,168,000
Mobilization/Demobilization		(7% of Construction Cost)		$152,000
Contingency		(10% of Construction Cost)		$217,000
Contractor's OH and Profit		(15% of Construction Cost)		$325,000
			Construction Costs (total)	$2,862,000
Engineering Design and Administration		(20% of Construction Cost)		$572,000
Legal and Administrative Costs		(10% of Construction Cost)		$286,000
Cost of Regulatory Requirements		(10% of Construction Cost)		$286,000
Land/Easement Acquisition	Acre	5% of 1,070 acres	$10,000	$520,000
			Lake Michie Capital Costs	$4,526,000
			Net Present Value of O&M Costs	$371,000
			Total Lake Michie Costs	$4,897,000
Purchase from the City of Durham				
*This project solely includes the cost of purchasing water; the infrastructure is already in place for this purchase.				
Net Present Value for Interim Water Purchases from Durham (13% of Cary's Cost)				$1,060,000
Jordan Lake Water Supply				
Pipeline Construction	LF	31,000	$123	$3,804,000
Raw Water Intake Structure Modification	EA	1	$1,534,030	$1,534,000
WTP Expansion (40 mgd to 57 mgd)	EA	1	$18,510,625	$18,511,000
RTP South Percentage of the Above Costs		13%		$3,180,000
Mobilization/Demobilization		(7% of Construction Cost)		$223,000
Contingency		(10% of Construction Cost)		$318,000
Contractor's OH and Profit		(15% of Construction Cost)		$477,000
			Construction Costs (total)	$4,198,000
Engineering Design and Administration		(10% of Construction Cost)		$420,000
Legal and Administrative Costs		(5% of Construction Cost)		$210,000
Cost of Regulatory Requirements		(5% of Construction Cost)		$210,000
DWR Allocation Payment		13%	$600,000	$80,000
			Jordan Lake Capital Cost	$5,118,000
			Net Present Value of O&M Costs	$663,000
			Total Jordan Lake Costs	$5,781,000
			Total Net Present Value	$11,738,000
			Incremental Supply (mgd)	$4
			Unit Cost ($/gpd)	$2.93

Attachment D

Draft Jordan Lake Water Quality Monitoring Plan