CERTIFICATE AUTHORIZING THE TOWNS OF CARY AND APEX TO TRANSFER WATER FROM THE HAW RIVER BASIN TO THE NEUSE AND CAPE FEAR RIVER BASINS UNDER THE PROVISIONS OF G.S. § 143-215.22L

On September 30, 2013, the Towns of Cary, Apex and Morrisville and Wake County (on behalf of the Wake County portion of Research Triangle Park) filed a notice of intent with the Environmental Management Commission (EMC) to request a modification to their jointly held interbasin transfer (IBT) certificate. The IBT certificate issued by the EMC on July 12, 2001 allows for the transfer of up to 24 million gallons per day (MGD) on a maximum day basis from the Haw River basin to the Neuse River basin.

The requested modification will address:

- Recently adopted changes to G.S. 143-215.22L;
- Inclusion of transfers to the Cape Fear River basin (consumptive uses in the southwestern portion of the Town of Apex service area), so that the modified certificate addresses transfers from the Haw River basin to both the Neuse River basin and Cape Fear River basin; and
- Extension of the certificate term to cover a 30-year planning period, ensuring the modified certificate addresses IBT through 2045 (previous certificate was based on 2030 planning). The permitted transfer amount shall not exceed a maximum of 31 million gallons per day from the Haw River Basin to the Neuse River Basin and 2 million gallons per day from the Haw River Basin to the Cape Fear River Basin, calculated as a daily average of a calendar month basis.

A public hearing on the Interbasin Transfer Certificate Modification for the Towns of Cary, Apex and Morrisville and Wake County was held on January, 7, 2015 in Apex pursuant to G.S 143-215.22L. In response to the public's requests for an additional comment opportunity, a second public hearing was held on January 22, 2015 in Fayetteville. Throughout the process, a total of 30 oral comments was received and 35 persons submitted written comments.

The EMC will consider the petitioners' request at its regular meeting on March 12, 2015. According to G.S. § 143-215.L(m), the EMC shall grant a certificate modification if the benefits of the proposed modification outweigh the detriments of the proposed modification, and the detriments have been or will be mitigated to a reasonable degree.

The EMC may grant the requested modification in whole or in part, or deny it, and may grant a modification with conditions, as provided in G.S. § 143-215.22L (k)-(m). In making this determination, the EMC shall specifically consider:

1. Necessity, reasonableness, and beneficial effects of the transfer
2. Detrimental effects on the source river basin
3. Cumulative effects on the source major river basins of any current or projected water transfer or consumptive water use
4. Detrimental effects on the receiving basin

5. Reasonable alternatives to the proposed transfer
6. Applicants' use of impounded storage capacity
7. Purposes of any US Army Corps of Engineers multi-purpose reservoir relevant to the certificate modification
8. Whether applicants' service area is located in both the source and receiving river basins
9. Any other facts or circumstances which are reasonably necessary to carry out the law

The Commission Finds:

The members of the EMC reviewed and considered the complete record, which included the Hearing Officer's Report, the applicants' notice of intent to modify the interbasin transfer certificate, and the Environmental Assessment (EA), including public comments on the EA. Based on the record, the Commission makes the following findings of fact.

Findings of Fact

(1) Necessity, Reasonableness, and Beneficial Effects of the Transfer

The applicants' current water supply is provided by the B. Everett Jordan Lake (Jordan Lake) in the Haw River basin of the Cape Fear River basin. The Towns of Apex and Cary jointly have a Jordan Lake water supply allocation issued by the Environmental Management Commission (EMC). The Town of Cary administers the individual Jordan Lake water supply allocations of the Town of Morrisville and Wake County. Additionally, the Town of Cary owns and operates the Town of Morrisville's water and sewer system, and operates and maintains the water utility infrastructure for Wake County (for RTP South), by agreement. Figure 1 is a site map with facility locations and Figure 2 summarizes the applicants' requested 2045 projected movement of water.

The proposed water transfer will provide water to the rapidly growing communities of Cary, Apex, and Morrisville, as well as the Research Triangle Park (RTP) within Wake County. The current population served in 2015 is about 215,800 and has an estimated current average day water demand (ADD) of 24.1 MGD. The 2045 projected service area population is 354,800, with an ADD of 45.1 MGD.

The Towns of Apex, Cary, Morrisville, and Wake County (for RTP South), are subject to an IBT certificate issued by the EMC in 2001. This certificate is required by North Carolina law, because wastewater discharges and consumptive uses of surface water occur in receiving basins that differ from the Towns' water supply source basin, the Haw River basin. The 2001 IBT Certificate limits transfers from the Towns' water supply source basin, the Haw River basin (Jordan Lake), to the Neuse River basin to 24 MGD on a maximum day basis.

When the 2001 IBT Certificate was issued, it was projected to be sufficient for transfers through 2030. However, based on more recent population growth projections and forecasts of future raw water supply needs, it is estimated that the 24 MGD (adjusted to 22 MGD representing the average day for a maximum month) IBT may be exceeded between 2020 and 2025 (Table 1).

More information about the future population growth and water demand projections may be found in section 2.2 of the Environmental Assessment (EA).

Table 1. Forecast of IBT from the Haw River Basin to the Neuse River Basin and Cape Fear River Basin, 2012–2045, Maximum Month Average Day

	2012[a]	2013[a]	2015	2020	2025	2030	2035	2040	2045
IBT (MGD)	17.1	16.1	19.8	22.8	26.1	28.7	31.1	32.4	33.0

[a] 2012 and 2013 IBT based on actual IBT monitoring data

The proposed certificate modification is to increase the allowable transfer to 33 MGD daily average for a calendar month, for the month in which IBT is expected to be the highest. This increase is needed in order to support the projected population growth and water supply needed for the economic growth of the Towns of Cary, Apex, and Morrisville and the Wake County portion of RTP over the next 30 years.

Based on the record, the Commission finds that current allowable water supply transfer rate is insufficient to supply the Towns of Cary, Apex and Morrisville and Wake County, and their related service areas for the reasonable 30-year planning horizon through the year 2045. Providing water for the anticipated growth of these communities will have a major beneficial effect on the region. The requested IBT certificate modification to increase the transfer to 33 MGD daily average for a calendar month is found to be a necessary and reasonable amount to support the growing residential and industrial needs of this area.

Figure 1. Site Map with Facility Locations

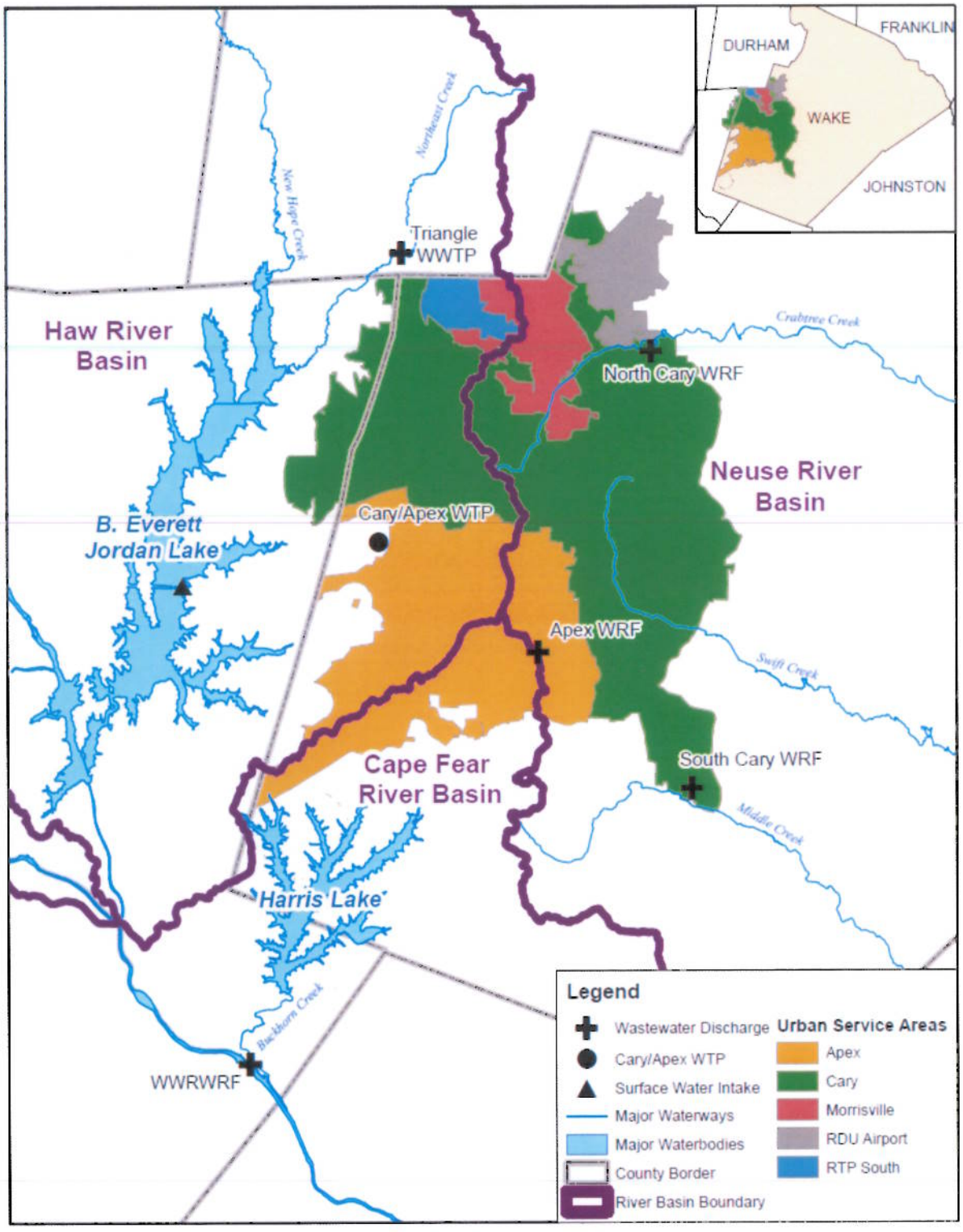
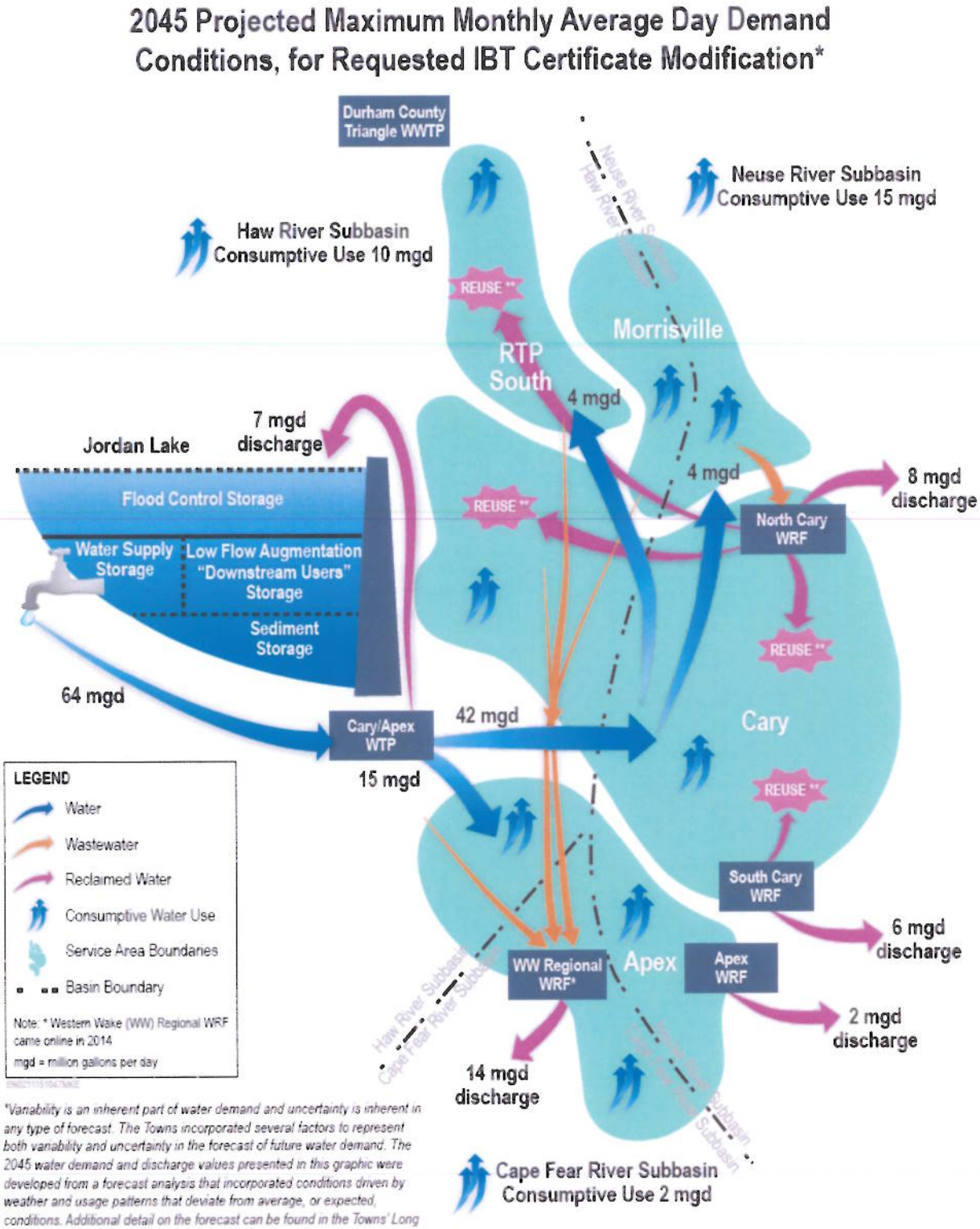


Figure 2. Jordan Lake and Regional Water Movement



Variability is an inherent part of water demand and uncertainty is inherent in any type of forecast. The Towns incorporated several factors to represent both variability and uncertainty in the forecast of future water demand. The 2045 water demand and discharge values presented in this graphic were developed from a forecast analysis that incorporated conditions driven by weather and usage patterns that deviate from average, or expected, conditions. Additional detail on the forecast can be found in the Towns' Long Range Water Resources Plan.

***2045 water demand on Jordan Lake and the resulting IBT accounts for the demand reductions attributed to existing reclaimed water system customers.*

(2) Detrimental Effects on the Source River Basin

To evaluate the direct impacts on the source basin resulting from the increased IBT, the primary tool used was the combined Cape Fear–Neuse River Basin Hydrologic Model, based on OASIS with OCL™. OASIS with OCL™ is a computer program designed to simulate the routing of water through the system described by a specific application. The Cape Fear – Neuse River Basin Hydrologic Model is a mathematical model that simulates surface water flows in the Cape Fear and Neuse river basins taking into consideration watershed inflows, withdrawals, wastewater discharges and water management protocols. The model is a tool to evaluate the impacts to water quantity with changes in water demands and water management protocols. The model considers all major water withdrawals and discharges within the Cape Fear River basin above Lock & Dam #1 in Bladen County, including those into and out of Jordan Lake. As required under G.S. 143-215.22L(k)(2), data from local water supply plans (LWSPs) were used in developing the model. In addition, industrial, recreation, energy production, mining, and agricultural withdrawals were factored into the model.

The initial set of conditions for the model represents demands, discharges and management protocols as they were in 2010. This model scenario provides a point of comparison to characterize the impacts of changes in demands and management scenarios by incorporating future demands to create several future scenarios. Estimates of future demands and discharges through the year 2045 were developed by DWR using data reported in LWSPs, information provided directly from municipalities, and input from Triangle J Council of Governments. The following four scenarios were developed to allow evaluation of the potential relative effects of the proposed increase in IBT and alternatives:

- 2010 Baseline – represents current conditions as defined by DWR
- 2045 Baseline – represents Alternative 1 (no action) and Alternatives 3a through 3e (avoid an increase in IBT)
- 2045 Expanded IBT – represents Alternative 2a (proposed increase in IBT, preferred alternative)
- 2045 Maximum IBT – represents Alternative 2b (increased discharge to the Neuse River basin)

To isolate the impact of the proposed increase in IBT from the effects of increased use of the Jordan Lake water supply pool, all of the 2045 scenarios assume full allocation and use of the Jordan Lake water supply pool's estimated yield of 100 MGD. Output variables related to Jordan Lake elevation, water quality and water supply pool levels, and flows at the Lillington United States Geological Survey (USGS) gage and the Fayetteville Public Works Commission (PWC) water supply intake were selected as key hydrologic indicators for use in evaluating the relative effects of the alternatives.

The source for all of the petitioners' water is the water supply pool of Jordan Lake. The water supply pool is operated entirely separate from the low-flow augmentation pool. The low-flow augmentation pool, not the water supply pool, is dedicated to maintaining flows in the Cape Fear River downstream of Jordan Lake dam. Therefore, the petitioners' water supply withdrawals will have no significant impact on the downstream flows as demonstrated by the model. Modeling results showed that the proposed transfer will not have any significant impact on Jordan Lake

surface water elevation, minimum releases from the dam, or low-flow augmentation pool levels compared to the other alternatives and to present conditions (see Tables 5, 6, 7, 8, and 9 in Appendix D of the Environmental Assessment (EA)).

Approximately two-thirds of Jordan Lake's conservation storage is dedicated to maintaining minimum flows in the Cape Fear River, compared with the one-third dedicated to water supply. Downstream users benefit from this low-flow augmentation pool without requiring a Jordan Lake allocation and at no cost. Upstream users do not benefit from the low flow augmentation pool. The historic low flow of the Cape Fear River at Lillington was 75 cubic feet per second (cfs) prior to regulation by Jordan Dam. The target flow at Lillington is now 600 cfs ± 50 cfs, supported by the low flow augmentation pool of Jordan Lake. This target flow is equivalent to 388 MGD. Even allowing for instream flow requirements at water supply intakes for aquatic wildlife habitat, an enormous amount of water is available to downstream users. Between Lillington and Lock & Dam #3, below Fayetteville, there are three public water systems that withdraw water from the Cape Fear River: Dunn, Harnett County Regional Water, and Fayetteville PWC. Based on data used to review basinwide water demands in the review of requests for water supply allocations from Jordan Lake, the estimated combined demands for these systems in 2045 is 99 MGD. These water systems return almost 80% of the cumulative withdrawals as treated wastewater resulting in an estimated cumulative net withdrawal of about 22 MGD. The target flow of 388 MGD is almost 4 times as great as the total projected municipal water supply demand downstream of the Lillington gage. Target flows at Lillington and Fayetteville for the various model scenarios are illustrated by flow duration curves in Figures 28 and 29 in Appendix D of the EA.

Table 2 presents results showing the frequency with which the key hydrologic indicators occur over the entire period of record (January 1930 through September 2011), for each model scenario.

Table 2.
Comparison of the Percentage of the Period of Record below the Key Hydrologic Indicators

Model Scenario	2010 Baseline	2045 Baseline	2045 Requested IBT	2045 Increased Neuse Discharge IBT
EA Alternative		**Alt. 1 (no action) and 3a though 3e**	**2a (preferred)**	**2b**
Jordan Lake Level < 210 feet msl[1]	0.0%	1.6%	2.0%	2.0%
Jordan Lake Level < 210 feet msl, Memorial Day to Labor Day[2]	0.0%	0.2%	0.3%	0.4%
Water Quality Pool <80%[3]	13.5%	15.8%	16.4%	16.9%
Water Quality Pool <60%[4]	5.6%	5.9%	6.4%	6.5%
Water Quality Pool <40%[5]	0.9%	0.5%	0.7%	0.8%
Water Quality Pool <20%[6]	0.0%	0.0%	0.0%	0.0%
Water Supply Pool <50%[7]	0.0%	1.6%	1.9%	1.9%
Flows downstream of Jordan Dam in the Cape Fear receiving basin				
Flow at Lillington < 550 cfs[8]	13.9%	15.6%	15.9%	16.4%
Flow at Fayetteville < 600 cfs[9]	5.9%	6.1%	6.3%	6.7%

1: Jordan Lake Levels less than 210 feet mean sea level (msl) (lower limit for boat ramp use)
2: Jordan Lake Levels less than 210 feet msl (lower limit for boat ramp use): between Memorial Day and Labor Day
3: Water Quality Pool less than 80 percent (Stage 1 Drought trigger, in accordance with the *Jordan Lake Drought Contingency Plan*)
4: Water Quality Pool less than 60 percent (Stage 2 Drought trigger, in accordance with the *Jordan Lake Drought Contingency Plan*)
5: Water Quality Pool less than 40 percent (Stage 3 Drought trigger, in accordance with the *Jordan Lake Drought Contingency Plan*)
6: Water Quality Pool less than 20 percent (Stage 4 Drought trigger, in accordance with the *Jordan Lake Drought Contingency Plan*)
7: Water Supply Pool less than 50 percent
8: Cape Fear River Flow at the Lillington USGS gage less than 550 cubic feet per second (cfs) (normal target flow is 600 ± 50 cfs)
9: Cape Fear River Flow at the Fayetteville Public Works Commission intake less than 600 cfs

The model results indicate the potential for a small decrease in lake level and Cape Fear River flow from the 2010 to 2045 Baseline scenario. This is attributed to the increased utilization of the Jordan Lake water supply pool and the expected increases in water withdrawals upstream of Jordan Lake – both of which are assumed to occur regardless of any increase in the applicants' IBT certificate.

For all scenarios, Jordan Lake's low-flow augmentation pool never goes below 20 percent of capacity. Under both the 2045 Requested IBT and 2045 Increased Neuse River discharge scenarios, there is a 0.4 percent increase in duration over the period of record when the lake level is below 210 feet mean sea level (msl), as compared to the 2045 baseline scenario. For the same model scenarios, there is a 0.6 percent increase in the duration of time over the period of record when the water supply and water quality pools operate below 80 percent capacity, when compared to the 2045 baseline scenario.

The Environmental Assessment (EA) concluded that the direct effects of the proposed IBT certificate modification on the source basin would be insignificant. The proposed IBT certificate modification will not significantly change Jordan Lake elevations, low-flow augmentation or water supply pool storage volumes, downstream flows, downstream users' water supply availability, or downstream water quality in the source or receiving basins. Based on the hydrologic modeling, there are noticeable changes in a number of the reviewed hydrologic indicators, but only as a result of future water withdrawals within the Cape Fear River basin and increased utilization of the Jordan Lake water supply pool, not due to the proposed IBT modification. No significant direct effects to environmental resources are expected.

Secondary effects from growth such as increased runoff, erosion, and loss of open space are expected to have negative impacts on water quality and fish and wildlife habitat. These impacts will be mitigated to a reasonable degree through existing regulations and programs (as outlined in Section 6 of the Environmental Assessment). Because wastewater assimilation is directly related to flows, no significant changes in wastewater assimilation are expected from the proposed action. Similarly, no impacts were identified for hydropower generation, navigation or recreation.

Based on the record, the Commission finds that the detrimental effects on the source basin described in G.S. § 143-215.22L(k)(2) will be insignificant. Additionally, the Commission finds that it is reasonable to minimize the impacts of secondary effects caused by growth in the Towns of Cary, Apex and Morrisville and Wake County through the implementation of local ordinances for parts of their jurisdictions that are within the Jordan Lake watershed for the protection of the lake.

(3) Cumulative Effects on the Source Major River Basin of Any Current or Projected Water Transfer or Consumptive Water Use

Local water supply plan data, including current and projected water use and water transfers, were used to develop the input data sets for the Cape Fear-Neuse River Basin Hydrologic Model scenarios. The model was used to evaluate current and future scenarios of basin water use.

A comparison of in-stream flows under the 2045 Baseline and 2045 Requested IBT scenario was performed at the Lillington USGS gage and at the Fayetteville PWC intake. It was determined that on average there is only a 10 cfs (0.3 percent) difference between the scenarios for the period of record. During drought periods the 2045 Requested IBT scenario had a 0.2 to 1.9 percent increase in time below specific low flow targets (550 cfs and 250 cfs for Lillington; 600 cfs for Fayetteville). These results indicate that the proposed increase in IBT will not affect the low-flow augmentation pool sufficiently to reduce releases from Jordan Lake required to maintain in-stream flows (as scheduled by U.S. Army Corps of Engineers operation guidelines), even during periods of drought. Downstream flow releases from Jordan Lake will remain subject to the USACE release regimes, and the target flows at the Lillington gage, intended to protect in-stream aquatic habitat and resources, will continue to be met.

In addition to the key hydrologic indicators reviewed, Jordan Lake Drought Stages, as defined by the *Jordan Lake Drought Contingency Plan* (USACE, 2008), and downstream water supply availability were also reviewed. The following bullets highlight the results:

- The model results show that all downstream demands (City of Sanford, Harnett County, Fayetteville PWC, City of Dunn, Smithfield Foods, Lower Cape Fear Water and Sewer Authority, and Cape Fear Public Utility Authority) are met 100 percent of the time for all model scenarios (see Table 3); no shortages result from the increase in future demands or from either of the scenarios with an increase in IBT. These results are based on water supply demand projections provided by these utilities and municipalities in their Local Water Supply Plans.
- For all scenarios, there is no occurrence of a Stage 4 Drought, as defined in the *Jordan Lake Drought Contingency Plan,* during the entire period of record (January 1930-September 2011).
- The frequencies and durations of Stage 1 and Stage 2 Droughts for all 2045 scenarios were greater than the 2010 Baseline scenario, as would be expected based on the increased withdrawals within the Cape Fear River basin and the assumed full utilization of the water supply pool.

Table 3. Comparison of the Downstream User Water Supply Availability

Percent of Time the Full Projected Water Supply Withdrawals are Met[1]
Demand values are presented in parentheses (MGD)

Water System/Withdrawer	2010 Baseline	2045 Baseline	2045 Requested IBT	2045 Increased Neuse Discharge IBT
		Alt. 1 (no action) and 3a though 3e	2a (preferred)	2b
City of Sanford	100% (6.54)	100% (17.83)	100% (17.83)	100% (17.83)
Harnett County	100% (16.28)	100% (50.36)	100% (50.36)	100% (50.36)
Fayetteville PWC	100% (29.38)	100% (69.04)	100% (69.04)	100% (69.04)
City of Dunn	100% (3.41)	100% (3.07)	100% (3.07)	100% (3.07)
Smithfield Foods	100% (2.25)	100% (2.25)	100% (2.25)	100% (2.25)
Lower Cape Fear Water and Sewer Authority	100% (25.16)	100% (20.79)	100% (20.79)	100% (20.79)
Cape Fear Public Utility Authority	100% (4.67)	100% (20.12)	100% (20.12)	100% (20.12)

1: The reliability for these systems is without the Water Shortage Response Plans being included in the model.

The increase in wastewater discharge to the Cape Fear River from the WWRWRF results in a reduced need for releases from Jordan Lake during drought periods; thereby resulting in a lower frequency of Stage 3 Droughts for the 2045 scenarios when compared to the 2010 Baseline scenario.

Under the 2045 Requested IBT scenario, there is a very small increase in the duration of time when the lake level is below 210 feet msl (0.4 percent increase in duration over the period of record) as compared to the 2045 baseline scenario. Both the water supply and low-flow augmentation pools operate at lower levels for a very small percentage of the period of record (example: 0.6 percent increase in duration below 80 percent full for the water quality pool, as compared to the 2045 baseline scenario). See Appendix D of the EA for more results and discussion, particularly Table 11.

The assessment of secondary and cumulative impacts (SCI) for both the source and receiving basins is presented in the Towns' Secondary and Cumulative Impact Master Management Plan (SCIMMP)(CH2M HILL, 2005a, 2005b, 2005c, 2014a, 2014b, and 2014c). The SCIMMPs include a comprehensive description of mitigation programs to avoid or minimize SCI to environmental resources that could occur with the Towns' land use plans and implementation of projects in the Towns' infrastructure master plans. The SCIMMPs discuss the federal, state, and

local programs that mitigate the potential SCI related to growth facilitated to some extent by infrastructure and public utility projects, including this proposed increase in IBT. The SCIMMPs discuss the potential for SCI to occur and the programs designed to mitigate SCI to a level that is not expected to be significant. The SCIMMPs are included in this section by reference, because no construction is proposed as part of this IBT certificate modification, the only potential for direct effects is related to water resources.

Based on the record, the Commission finds that the cumulative effects of this and other future water transfers and consumptive water uses as described in G.S. § 143-215.22L(k)(3)will be insignificant on the source basin.

(4) Detrimental Effects on the Receiving Basins

The receiving basins, to which water is transferred from Jordan Lake via both consumptive use and wastewater discharge, include primarily the Neuse River basin as well as the Cape Fear River basin.

Neuse River basin

Wastewater discharges are expected to increase in the Neuse River basin, but are planned to be within the limits of the current NPDES permitted flows. No additional water quantity or water quality impacts beyond those already accounted for in the NPDES permits are expected. Because stream flows in the Neuse River basin are not expected to change significantly due to the proposal, no impacts are likely to occur to navigation, recreation, or flooding.

Within the Neuse River basin, the proposed IBT will not have direct impacts to soils, wildlife resources, land cover, agricultural land and prime farmland, forested resources, public lands and scenic and natural areas, archaeological and historic resources, air quality, noise levels, and toxic substances/hazardous wastes. This is because there are no construction activities directly associated with the proposed increase in IBT.

The assessment of secondary and cumulative impacts (SCI) for both the source and receiving basins is presented in the Towns' Secondary and Cumulative Impact Master Management Plan (SCIMMP)(CH2M HILL, 2005a, 2005b, 2005c, 2014a, 2014b, and 2014c). The SCIMMPs include a comprehensive description of mitigation programs to avoid or minimize SCI to environmental resources that could occur with the Towns' land use plans and implementation of projects in the Towns' infrastructure master plans. The SCIMMPs discuss the federal, state, and local programs that mitigate the potential SCI related to growth facilitated to some extent by infrastructure and public utility projects, including this proposed increase in IBT. The SCIMMPs discuss the potential for SCI to occur and the programs designed to mitigate SCI to a level that is not expected to be significant. The SCIMMPs are included in this section by reference, because

no construction is proposed as part of this IBT certificate modification, the only potential for direct effects is related to water resources.

Any future facility construction needed to meet 2045 water demands will undergo a separate environmental permitting process and assessment of potential environmental impacts.

Cape Fear River basin

There have been no measurable impacts on the Jordan Lake water surface elevation or downstream flow patterns as a result of the applicants' current withdrawal and IBT. Refer to Table 2 in the discussion of Finding No. 2 for a presentation of the modeling results for key hydrologic indicators, including Jordan Lake levels and flow of the Cape Fear River at Lillington and Fayetteville. Aquatic resources in Jordan Lake, its tributaries, and in the downstream reaches of the Haw River and Cape Fear River are not expected to be directly impacted by the proposed increase in water withdrawal from Jordan Lake. Lake levels are not expected to be significantly altered, and downstream flow releases from Jordan Lake will remain subject to the USACE release regimes. In-stream flow patterns will not be impacted, and the target flows at the Lillington gage, which protect in-stream aquatic habitat, aquatic resources and water quality, will continue to be met.

The hydrologic modeling and impact analyses that were conducted for the Environmental Assessment have taken into account discharges to the Cape Fear River from the Western Wake Regional Water Reclamation Facility (WWRWRF). As required by §143-215.22L(k)(4), this modeling also used water demand projections supplied by Local Water Supply Plans. It is expected that these discharges from the WWRWRF will not only continue, but will increase in the future as withdrawals from Jordan Lake increase to support the expected growth, while more fully utilizing existing infrastructure. Modeling results project a lower frequency of Stage 3 droughts for the 2045 scenarios when compared to the 2010 baseline scenario. This is due to the increase in wastewater discharge to the Cape Fear River from the WWRWRF, which results in a reduced need for releases from Jordan Lake during drought. For the applicants to fully utilize their projected Jordan Lake water allocation, water will need to be returned to be in compliance with the requested transfer amount. It is expected that water quality will be protected from the expected increase in waste water discharge because the WWRWRF has more stringent nutrient removal criteria in its NPDES permit than any other facility in the Middle Cape Fear River basin.

Based on the record, the Commission finds that detrimental effects on the receiving basins as described in § 143-215.22L(k)(4) will be insignificant. The transfer will support continued population growth and the associated impacts of that growth. These impacts include effects on wastewater assimilation, fish and wildlife habitat, and water quality similar to the secondary growth effects described in Finding No. 2. However, these impacts will be minimal.

(5) Reasonable Alternatives to the Proposed Transfer

Several alternatives to the proposed project were defined and evaluated for their ability to meet the Towns' water supply needs through 2045, as described in Section 4.1 of the EA document. The following three categories of alternatives, with a total of eight water supply alternatives, were evaluated and summarized below:

1. No action (Updated 2001 IBT Certificate; 22 MGD total IBT):

   - **Alternative 1** - No action
     Under Alternative 1, no actions designed to meet projected demands through 2045 would be undertaken; the Towns would receive an Updated 2001 IBT Certificate limiting transfers from the Haw River basin to 22 MGD, reflecting the recent statutory change to a maximum month average day measurement. The Towns would limit future development and utility services so that no additional water would be transferred to the Neuse River basin above 20 MGD, essentially stopping all development and any increase in water use after 2016. Additional transfer to the Cape Fear River basin would remain less than 2 MGD. This alternative is not considered feasible because the applicant would be unable to meet projected water supply needs of their customers in the Neuse River basin.

2. Increase IBT:

   - **Alternative 2a** – Increase in IBT to meet 2045 demands (**Proposed IBT Certificate Modification**; 33 MGD total IBT)
     Under Alternative 2a, the Towns would increase their Jordan Lake withdrawal consistent with future water demand projections for 2045 (pending the separate Round 4 allocation process) and update the IBT certificate to address IBT through the 30-year planning period ending in 2045 (the previous IBT certificate was based on a 30-year planning period ending in 2030).

     Alternative 2a would meet the demands through 2045 by transferring up to 33 MGD from the Haw River basin (Jordan Lake); expanding the Cary/Apex Water Treatment Facility (CAWTF) to 72 MGD; using existing wastewater treatment facilities; and continuing water resources management measures to minimize IBT. The Towns intend to continue to use their existing Water Reclamation Facilities (North Cary, South Cary, Apex, and Western Wake Regional Water Reclamation Facility (WWRWRF)) to treat wastewater. The WWRWRF discharge returns treated wastewater effluent to the Cape Fear River basin; thereby, reducing IBTs. It is estimated that by 2045, the WWRWRF will discharge approximately 12 MGD on an annual average day basis to the Cape Fear River basin.

   - **Alternative 2b** – Increase in IBT to meet 2045 demands and use current permitted wastewater capacity (44 MGD total IBT)

Under Alternative 2b, the Towns would increase their Jordan Lake withdrawal consistent with future water demand projections for 2045. Alternative 2b would meet the 2045 demands by transferring up to 44 MGD from the Haw River basin (Jordan Lake); expanding the CAWTF to 72 MGD; and continuing water resources management measures to minimize IBT. In contrast to Alternative 2a, wastewater treatment would occur through expansion of the South Cary WRF (SCWRF) from 12.8 MGD to its permitted discharge capacity of 16 MGD, as well as continued use of existing facilities (North Cary, Apex and Western Wake WRFs). Under this alternative, the WWRWRF would discharge about 5 MGD on an average day basis to the Cape Fear River basin by 2045.

While this alternative fully utilizes existing treatment facilities and existing permitted discharges, it would require additional pipeline infrastructure to route a larger portion of the wastewater collection system to the South Cary WRF (SCWRF).

3. Avoid IBT increase (Updated 2001 IBT Certificate; 22 MGD total IBT):

- **Alternative 3a** – Transfer of untreated wastewater from the Neuse River basin to the WWRWRF, which discharges to the Cape Fear River basin.
  Under Alternative 3a, the Towns would increase their Jordan Lake withdrawal consistent with future water demand projections for 2045. Alternative 3a would meet the 2045 demands by transferring up to 22 MGD (no change from the Updated 2001 IBT Certificate) from the Haw River basin (Jordan Lake) and expanding the CAWTF to 72 MGD. In contrast to Alternatives 2a and 2b, wastewater treatment would occur through expansion of the WWRWRF, as well as use of existing facilities (North Cary, South Cary and Apex WRFs).

  Wastewater generated in both the Neuse River basin and in the Cape Fear River basin would be pumped to the new WWRWRF for treatment; the treated effluent would then be discharged into the Cape Fear River via the WWRWRF's outfall. Ultimately, an average of approximately 9 MGD of additional untreated wastewater (in addition to the future flows already within the areas defined for the WWRWRF service area) would need to be pumped from the North Cary WRF, South Cary WRF, and/or Apex WRF service areas into the WWRWRF influent collection infrastructure to avoid the need to increase IBT. By 2045, the additional inflows to the WWRWRF would result in treatment and discharge of about 24 MGD on an annual average day basis to the Cape Fear River basin from the WWRWRF.

  Alternative 3a would require the construction of major raw wastewater pumping facilities and wastewater conveyance infrastructure to transfer raw wastewater from the Neuse River basin into the Cape Fear basin. This alternative would require the expansion of the

WWRWRF to be online in approximately 2029, much earlier than currently projected, and would result in already-built capacity and investment at the Apex WRF and North Cary WRF being underutilized.

For a more thorough evaluation and discussion see the technical memorandum, "Comparisons for Environmental Assessment Alternatives 2a and 3a" (Appendix D). Because of the significant cost of Alternative 3a, the underutilization of existing facility capacity, and environmental impacts, this alternative is not considered fiscally responsible.

- **Alternative 3b** – Transfer of treated wastewater effluent from the Neuse River basin to the Cape Fear River basin
  Under Alternative 3b, the Towns would increase their Jordan Lake withdrawal consistent with future water demand projections for 2045. Alternative 3b would meet the 2045 demands by transferring up to 22 MGD (no change from the Updated 2001 IBT Certificate) from the Haw River basin (Jordan Lake) and expanding the CAWTF to 72 MGD.

  Wastewater produced in the Neuse River basin would be treated at the WRFs currently used for the Towns' wastewater service areas, and a portion of the effluent from the WRFs would be pumped into the Haw River or Cape Fear River basins for discharge. Ultimately, approximately 9 MGD of additional treated wastewater effluent (in addition to the WWRWRF effluent discharge defined for the WWRWRF service area) would need to be pumped from the North Cary WRF, South Cary WRF, and/or Apex WRF into the Haw River or Cape Fear River basins to avoid increasing IBT above the 2001 IBT Certificate.

  This alternative would require the construction of major pumping facilities to transfer treated effluent. A new discharge outfall would be constructed on the Cape Fear River, because of the longer distance to the WWRWRF effluent pumping facility and because the WWRWRF effluent pipeline capacity is not sufficient for both the current WWRWRF build-out capacity and the additional effluent flow. Alternative 3b could result in additional treatment requirements at the Apex WRF and South Cary WRF, because neither facility is designed to meet the effluent total phosphorus (TP) limits in the current WWRWRF NPDES permit.

  Because of the significant cost of Alternative 3b, this alternative is not considered fiscally responsible and will not be further evaluated.

- **Alternative 3c** – Use a water supply source in the Neuse River basin
  Under Alternative 3c, the Towns would use a water source in the Neuse River basin to meet future water demands and comply with the Updated 2001 IBT Certificate. The

current Jordan Lake Allocation would not be increased, and IBT would not be increased above the Updated 2001 IBT Certificate. This would be accomplished by (1) the Towns developing a new water supply source or (2) purchasing finished water and water supply capacity from another system in the Neuse River basin. To accomplish this, approximately 10 to 12 MGD of supply from the Neuse River basin is needed.

Because of the uncertain feasibility of developing a new water supply source in the Neuse River basin, this is an unreliable solution to meet the Towns' 2045 water demands. Similarly, purchasing finished water from within the Neuse River basin is not considered to be feasible due to the prohibitive cost involved with purchasing the water and constructing additional water transmission pumping and pipeline infrastructure, concerns about potential environmental impacts from construction activities, and the likelihood that increasing demands in the region would limit the potential for long-term capacity purchase agreements.

- **Alternative 3d** – Use groundwater as a water supply source
  Under Alternative 3d, new groundwater wells would be installed to supply the Towns with the additional water needed to meet 2045 demands. This alternative would require 45 to 65 new wells withdrawing at an average of 100 to 150 gallons per minute, and the wells would need to be placed at ¼- to ½-mile intervals. This "well-field" approach, with multiple wells on a single property, would be impractical because of the requirement for at least about 5 square miles of undeveloped property.

  Such a well system is expected to be cost prohibitive because of the area of land that would be required, the length of the raw water transmission line that would be needed, the operations and maintenance challenges associated with numerous wells, and water quality concerns due to expected iron and manganese concentrations. Also, there is no information to indicate whether the required yield could be sustained. New water treatment facilities for groundwater would be required; the current water treatment facilities at the CAWTF were designed for Jordan Lake's surface water quality. Alternative 3d is not considered feasible.

- **Alternative 3e** – Use additional water resources management tools
  The Towns have implemented proactive water resources management tools for more than 15 years to encourage conservation and wise water use practices. Alternative 3e would continue and expand the Towns' programs with the implementation of additional water resources management tools to reduce future water demands. These programs will increase the reliability with which the Towns can meet customer demands and comply with a modified IBT certificate. However, Alternative 3e is not considered feasible as a means to meet projected growth needs while reducing the Towns' long-term water demand and comply with the Updated 2001 IBT Certificate.

Based on the record, the Commission finds that reasonable alternatives to the proposed IBT were considered. Based on a review of the project information, the Commission finds the recommended alternative (Alternative 2a) to be the most feasible for meeting the petitioners' water supply needs while minimizing detrimental environmental impacts.

(6) Applicants' Use of Impoundment Storage Capacity

This criterion is not applicable, as the petitioners do not own, manage, or maintain a water supply impoundment.

(7) Purposes of Any US Army Corps of Engineers Multi-Purpose Reservoir Relevant to the Petition

Jordan Lake was constructed to provide flood control and water supply, but it must also meet multiple objectives including low-flow augmentation, fish propagation, and recreation. The lake is actively managed by the United States Army Corps of Engineers to meet these different objectives.

Water in Jordan Lake is considered to be in one of three storage pools: flood control storage, conservation storage, and sediment storage. The conservation storage pool is further split into a water supply pool and a low-flow augmentation, or water quality pool. To support aquatic life and other downstream uses, flows in the Cape Fear River are augmented by releases from the Jordan Lake Dam. These flows come from the water quality pool; when full, the water quality pool contains approximately 94,600 acre-feet of water.

Water supply withdrawals for permitted users come from the water supply pool. The water supply pool contains approximately 45,800 acre-feet of water and is estimated to yield approximately 100 MGD, of which 39 percent is allocated to the Towns of Apex, Cary, Morrisville and Wake County. However, a separate reallocation process is currently underway in order to meet anticipated future water supply needs through 2045 for all municipalities which rely on Jordan Lake for their water supply.

Table 2 depicts anticipated impacts to lake levels as a result of the proposed IBT, particularly the percentages of time levels are predicted to drop below 210 msl for boat access to the lake. These are presented during both year-round and during prime recreational boating season (Memorial Day to Labor Day). As Table 2 shows, the proposed IBT increase will result in a 0.4% increase in time year-round when the lake will drop below 210 msl, over the period of record (January 1930-September 2011). The proposed IBT increase will result in a 0.1% increase in time during the prime boating season when the lake will drop below 210 msl, over the period of record.

The Commission finds that the transfer and allocations are consistent with the federally authorized project purposes of Jordan Lake. Also, the Commission finds that to be consistent with the use of Jordan Lake as a regional water supply the Towns of Cary and Apex are required to provide access through their intake with other Jordan Lake Water Allocation Holders that

need access to their allocation. The cost associated with getting any necessary permits, engineering design, and associated construction costs are not the responsibility of the Towns of Cary and Apex.

(8) Whether applicants' service area is located in both the source and receiving river basins
The service areas for the Towns and the County are within the Haw River IBT basin (source), the Cape Fear River IBT basin (receiving), and the Neuse River IBT basin (receiving), as illustrated in Figure 1. The percentages of the Towns and County's service areas land area within each IBT basin are presented in Table 4:

Table 4. Percentage of Service Area in Individual River Basins

Municipality	River Basin		
	Neuse	Haw	Cape Fear
Town of Cary	71%	29%	-
Town of Apex	19%	59%	22%
Town of Morrisville	81%	19%	-
Wake County (RTP South)	-	100%	-

Therefore, the applicants' service area is located in both the source and receiving river basins.

The Commission finds that the Towns' service area population is within both the source and receiving basins, thereby avoiding the removal or receipt of water in a basin not contained within the existing service area.

(9) Any Other Facts or Circumstances that are Reasonably Necessary

The Commission finds that to protect the source basin during drought conditions, to mitigate the future need for allocations of the limited resources of this basin, and as authorized by G.S. § 143-215.22L(n), a drought management plan is appropriate. The plan should describe the actions that the Towns of Cary and Apex will take to protect the Cape Fear River Basin during drought conditions.

The Commission notes that future developments may prove the projections and predictions in the EA to be incorrect and new information may become available that shows that there are substantial environmental impacts associated with this transfer. Therefore, to protect water quality and availability and associated benefits, modification of the terms and conditions of the certificate may be necessary at a later date.

Decision

Based on the Findings of Fact stated above, the Commission has determined that (1) the benefits of the proposed certificate modification outweigh the detriments of the certificate modification, and (2) any detriments of the proposed certificate modification will be mitigated to a reasonable degree under the conditions of this Certificate. Therefore, and by duly made motions, the Commission grants the Towns of Cary's and Apex's request to transfer water from the Haw River basin to the Neuse River basin and Cape Fear River basin. The permitted transfer amount shall not exceed a maximum of 31 million gallons per day from the Haw River Basin to the Neuse River Basin and 2 million gallons per day from the Haw River Basin to the Cape Fear River Basin, calculated as a daily average of a calendar month basis.

The certificate is subject to the conditions below, which are imposed under the authority of G.S. § 143-215.22L. The Towns and County shall comply with any plan that is approved pursuant to this Certificate and any approved amendments to such plan. A violation of any plan approved pursuant to this Certificate will be considered a violation of the terms and conditions of this Certificate.

1. Within 90 days of receipt of the IBT certificate, the Towns of Cary and Apex shall update and submit a water conservation plan subject to approval by the Division of Water Resources (Division) that specifies the water conservation measures that will be implemented by the Towns to ensure the efficient use of the transferred water. Except in circumstances of technical or economic infeasibility or adverse environmental impact, the water conservation plan shall provide for the mandatory implementation of water conservation measures that equal or exceed the most stringent water conservation plan implemented by a public water system that withdraws water from the source river basin.
2. Within 90 days of receipt of the IBT certificate, the Towns of Cary and Apex shall update and submit a drought management plan subject to approval by the Division that specifies how the transfer shall be managed to protect the source river basin (Haw River basin) during drought conditions or other emergencies that occur within the source river basin. Except in circumstances of technical or economic infeasibility or adverse environmental impact, this drought management plan shall include mandatory reductions in the permitted amount of the transfer based on the severity and duration of a drought occurring within the source river basin and shall provide for the mandatory implementation of a drought management plan by the Towns of Cary and Apex that equals or exceeds the most stringent water conservation plan implemented by a public water system that withdraws water from the source river basin.
3. Within 90 days of receipt of the IBT certificate, the Towns of Cary and Apex shall update and submit a quarterly compliance and monitoring plan subject to approval by the Division. The plan shall include methodologies and reporting schedules for reporting the following information: daily transfer amount calculated as the average daily over the

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maximum month, compliance with permit conditions, progress on mitigation measures, drought management, and reporting. A copy of the approved plan shall be kept on file with the Division for public inspection. The Division shall have the authority to make modifications to the compliance and monitoring plan as necessary to assess compliance with the certificate. The quarterly compliance and monitoring report shall be submitted to the Commission no later than 30 days after the end of the quarter. The Towns of Cary and Apex shall employ any methods or install and operate any devices needed to measure the amount of water that is transferred during each calendar quarter, calculated as a daily average of a calendar month.

4. The Commission may amend the certificate to reduce the maximum amount of water authorized to be transferred whenever it appears that an alternative source of water is available to the certificate holder from within the receiving river basin, including, but not limited to, the purchase of water from another water supplier within the receiving basin or to the transfer of water from another sub-basin within the receiving major river basin.
5. The Commission shall amend the certificate to reduce the maximum amount of water authorized to be transferred if the applicant's actual future water needs are significantly less than the applicant's projected water needs at the time the certificate was granted.
6. The applicant shall not resell the water that would be transferred pursuant to the certificate to another public water system. This limitation shall not apply in the case of a proposed resale or transfer among public water systems within the receiving river basin as part of an inter-local agreement or other regional water supply arrangement, provided that each participant in the inter-local agreement or regional water supply arrangement is a co-applicant for the certificate and will be subject to all the terms, conditions, and limitations made applicable to any lead or primary applicant.
7. If the Commission determines that the record on which this Certificate is based is substantially in error or if new information becomes available that clearly demonstrates that any Finding of Fact (including those regarding environmental, hydrologic, or water use impacts) pursuant to G.S. § 143-215.22L(k) was not or is no longer supported or is materially incomplete, the Commission may reopen and modify this Certificate to ensure continued compliance with G.S. Chapter 143, Article 21, Part 2A.
8. The Towns of Cary and Apex shall be required to provide access at their existing intake site to other Jordan Lake water allocation holders that need access to utilize their allocation to the extent that this additional use is determined to be feasible by the Division of Water Resources. The cost associated with getting any necessary permits, engineering design, and associated construction costs are the responsibility of the allocation holder(s) requesting the access and not Cary and Apex.

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NOTICE: The holders of this certificate are jointly and severally responsible for compliance with the terms, conditions and requirements stated herein, and are therefore jointly and severally liable for all penalties assessed to enforce such terms, conditions and requirements as provided in G.S. §143-215.6A.

This is the 12th day of MARCH, 2015.

Gerard P. Carroll, Chairman