



Interbasin Transfer Petition: From Tar River to Contentnea and Neuse River Subbasins



Greenville Utilities Commission

April 2009



Environmental Management Commission Meeting May 2009

**Greenville Utilities Commission
Interbasin Transfer Petition**

Executive Summary

EXECUTIVE SUMMARY

The Town of Farmville, the Town of Winterville, and Greene County plan to purchase bulk finished water from the Greenville Utilities Commission (GUC) to comply with the Central Coastal Plain Capacity Use Area (CCPCUA) rules and continue to meet customer needs. GUC relies on the Tar River for its water supply, and the Town of Farmville and the majority of Greene County are located within the Neuse River Contentnea Creek subbasin. Farmville and Greene County discharge wastewater into the Contentnea Creek subbasin via centralized treatment or on-site septic systems. Therefore, sales of finished water to the Town of Farmville and Greene County will constitute an interbasin transfer from the Tar River subbasin to the Neuse River Contentnea Creek subbasin. The Town of Winterville water and wastewater systems and the southwestern portion of Greene County are located within the Neuse River subbasin. Therefore, sales of finished water to the Town of Winterville and Greene County will constitute an interbasin transfer from the Tar River subbasin to the Neuse River subbasin.

GUC is requesting an IBT Certificate for a water transfer from the Tar River subbasin to the Contentnea Creek subbasin to support the Town of Farmville and Greene County's compliance with CCPCUA rules. GUC is requesting an IBT Certificate in the amount of 8.3 mgd to meet Farmville and Greene County's maximum day demands through 2030. As part of the same Certificate, GUC requests the ability to transfer 9.3 mgd under emergency conditions to the Contentnea Creek subbasin.

GUC is also requesting an IBT Certificate for a water transfer from the Tar River subbasin to the Neuse River subbasin to support the Town of Winterville's compliance with CCPCUA rules, and to support water use in the portion of the GUC service area within the Neuse River Basin. GUC is requesting an IBT Certificate for 4.0 mgd to meet Winterville's maximum day demands through 2030. Additionally, GUC requests the ability to transfer 4.2 mgd under emergency conditions to the Neuse River subbasin.

The proposed IBT is the preferred alternative that was identified through the development and analysis of many alternatives. The GUC water treatment plant (WTP) has sufficient plant capacity to provide water to the City of Greenville, Farmville, Winterville, and Greene County until 2030. In 2030, the total maximum day water demand with minimum bulk purchase is projected to be 22.2 mgd and will not exceed the current WTP capacity of 22.5 mgd. No construction will occur as part of the proposed project.

A hydrologic analysis (ENTRIX, revised 2008) was performed for the Tar River to assess the hydrologic impact of the interbasin transfer of water from the Tar to the Neuse and Contentnea Creek subbasins. The model accounted for existing and expected future withdrawals from, and discharges to, the Tar River (greater than 100,000 gpd). Withdrawals and discharges were simulated over time to predict the effects on flow in the Tar River at Greenville. Model simulations included the current conditions in the Tar River, the 2030 average day IBT scenario, and the 2030 maximum withdrawal IBT scenario. The results of the hydrologic modeling indicate that the proposed interbasin transfer from the Tar River to the Neuse and Contentnea Creek subbasins will have minimal impact on stream flow at Greenville. The differences in the flow data below the 7Q10 are not significantly different between the no IBT, average, and maximum

**Greenville Utilities Commission
Interbasin Transfer Petition**

Executive Summary

withdrawal IBT scenarios for the current stream flow and the 2030 stream flow conditions. However, the existing periods of low flow, regardless of the significance of the resulting withdrawal scenario, may be ameliorated by the tidal influence. The tidal influence at Greenville is one factor that provides downstream aquatic habitat protection during low flow at Greenville. The influence of tides will naturally offset the low flow condition at the Greenville gage.

The proposed interbasin transfer will not result in significant indirect impacts. Significant growth in Farmville, Greene County, and Winterville is not a component of this project or a reason for developing the interbasin transfer request. Growth in the area is modest, at a rate of 1 to 3 percent for the larger communities (GUC, Greene County, and Farmville) and at slightly higher rates for smaller communities (Winterville).

This IBT petition provides supporting documentation as required by North Carolina General Statute 143-215.221; more detailed documentation of the environmental impacts of the requested action are contained in the Final Environmental Assessment (EA) for Greenville Utilities Commission Interbasin Transfer (ARCADIS, 2008) which was submitted to the State Clearinghouse October 2008. A Finding of No Significant Impact (FONSI) was issued in November 2008.

Greenville Utilities Commission Interbasin Transfer Petition

Table of Contents

| | |
|---|------------|
| Executive Summary | i |
| 1. Introduction | 1-1 |
| 1.1 Project Description | 1-1 |
| 1.2 Requested Action | 1-1 |
| 1.3 CCPCUA Regulations | 1-2 |
| 1.4 Existing Water and Wastewater Facilities | 1-3 |
| 1.5 Existing Conditions | 1-7 |
| 2. Necessity, Reasonableness, and Beneficial Effects of Transfer | 2-1 |
| 2.1 Growth Trends | 2-1 |
| 2.2 Water Demand Projections | 2-4 |
| 2.3 Need for Additional Water Supply | 2-4 |
| 2.4 Reasonableness of IBT Request | 2-6 |
| 2.5 Transfer from Tar River Basin to Contentnea Creek Subbasin | 2-11 |
| 2.6 IBT Management Strategy | 2-14 |
| 3. Effects on the Source Basin | 3-1 |
| 3.1 Water Supply Needs | 3-1 |
| 3.2 Wastewater Assimilation | 3-6 |
| 3.3 Water Quality | 3-6 |
| 3.4 Fish and Wildlife Habitat | 3-6 |
| 3.5 Hydroelectric Power Generation | 3-6 |
| 3.6 Navigation | 3-6 |
| 3.7 Recreation | 3-6 |
| 3.8 Cumulative Effect on Source Basin of any Transfers or Consumptive Water Use Projected in Local Water Supply Plans | 3-7 |
| 4. Detrimental Effects on the Receiving Basins | 4-1 |
| 4.1 Water Quality | 4-1 |
| 4.2 Wastewater Assimilation | 4-1 |

Greenville Utilities Commission Interbasin Transfer Petition

Table of Contents

| | | |
|--------------------|--|------------|
| 4.3 | Fish and Wildlife Habitat | 4-1 |
| 4.4 | Navigation | 4-2 |
| 4.5 | Recreation | 4-2 |
| 4.6 | Flooding | 4-2 |
| 5. | Alternatives to Proposed Transfer | 5-1 |
| 5.1 | No-Action Alternative | 5-1 |
| 5.2 | Independent Water Supply | 5-2 |
| 5.3 | Participate in Neuse Regional Water and Sewer Authority | 5-3 |
| 5.4 | Return of Water to Source Basin | 5-3 |
| 5.5 | Purchase Water from GUC – Selected Alternative | 5-5 |
| 6. | Impoundment Storage | 6-1 |
| 7. | Multipurpose Reservoir Constructed by the United States Army Corps of Engineers | 7-1 |
| 8. | Water Shortage Response and Conservation | 8-1 |
| 9. | Compliance and Monitoring Plan | 9-1 |
| 9.1 | Quarterly Reports | 9-1 |
| 9.2 | Annual Reports | 9-2 |
| 9.3 | Status Reports | 9-2 |
| 9.4 | Water Shortage Response and Conservation | 9-2 |
| Figures | | |
| | Figure 1-1: Interbasin Transfer Line, as Determined by the Environmental Management Commission | 1-5 |
| | Figure 1-2: Service Areas for the Town of Farmville, Town of Winterville, Greene County, and Greenville Utilities Commission | 1-6 |

Greenville Utilities Commission Interbasin Transfer Petition

Table of Contents

Tables

| | |
|--|------|
| Table 1-1: Bioclassification and Use Support Ratings for Streams within the Project Area | 1-9 |
| Table 1-2: Protected Species Listed for Pitt and Greene Counties | 1-16 |
| Table 2-1: Historical and Projected Population and Growth Rates | 2-3 |
| Table 2-2: Historical and Projected Water Demands | 2-5 |
| Table 2-3: Maximum Day GUC Demands with Minimum Bulk Purchases | 2-6 |
| Table 2-4: Water Balance Table for Maximum Day Condition from the Tar River to the Neuse River Subbasin (Town of Winterville and Greene County) | 2-9 |
| Table 2-5: Water Balance Table for Emergency Condition from the Tar River to the Neuse River Subbasin (Town of Winterville and Greene County) | 2-10 |
| Table 2-6: Water Balance Table for Maximum Day Condition from the Tar River to the Contentnea Creek Subbasin (Greene County and Town of Farmville) | 2-12 |
| Table 2-7: Water Balance Table for Emergency Condition from the Tar River to the Contentnea Creek Subbasin (Greene County and Town of Farmville) | 2-13 |
| Table 3-1: Explanation of Modeling Scenarios Used in the Tar River Water Balance | 3-2 |
| Table 3-2: Summary of Flow Statistics (Flow in cfs and Percentiles) for Greenville Gaging Station and Downstream of Greenville WWTP (ENTRIX, 2008) | 3-5 |
| Table 3-3: Summary of Flow Statistics (Annual Percent of Time and Average Number of Days) for Greenville Gaging Station and Downstream of Greenville WWTP (ENTRIX, 2008) | 3-5 |
| Table 5-1: Comparison of Allowable Pumping Rates with Average Day Demands | 5-1 |
| Table 5-2: Summary of Wastewater Treatment Facilities in Greene and Pitt Counties | 5-4 |
| Table 8-1: Greenville Utilities Commission Water Shortage Response Triggers | 8-1 |
| Table 9-1: Interbasin Transfer Calculation Table from the Tar River to the Neuse River and Contentnea Subbasins | 9-3 |

Appendices

| | |
|---|---|
| A | Finding of No Significant Impact (November 2008) |
| B | Interbasin Transfer Management Strategy for Greenville Utilities Commission (ARCADIS, 2008) |
| C | Greenville Utilities Commission Local Water Supply Plan |

Greenville Utilities Commission Interbasin Transfer Petition

Table of Contents

List of Acronyms

| | |
|-----------------|--|
| 7Q10 | 7-day duration, 10-year frequency low stream flow |
| ABR | Approved base rate |
| BMP | Best management practice |
| CAS | Cretaceous aquifer system |
| CCPCUA | Central coastal plain capacity use area |
| cfs | Cubic feet per second |
| CMSD | Contentnea Metropolitan Sewerage District |
| DEH | N.C. Department of Environmental Health |
| DENR | N.C. Department of Environment and Natural Resources |
| DWQ | N.C. Division of Water Quality |
| DWR | N.C. Division of Water Resources |
| E | Endangered |
| EA | Environmental Assessment |
| EMC | N.C. Environmental Management Commission |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| ETJ | Extraterritorial jurisdiction |
| FSC | Federal species of concern |
| FONSI | Finding of No Significant Impact |
| GMA | Groundwater Management Association, Inc. |
| gpd | Gallons per day |
| GUC | Greenville Utilities Commission |
| HQW | High quality water |
| IBT | Interbasin transfer |
| LWSP | Local water supply plan |
| MG | Million gallons |
| mgd | Million gallons per day |
| mgy | Million gallons per year |
| NCAC | N.C. Administrative Code |
| NHP | N.C. Natural Heritage Program |
| NO _x | Nitrogen oxides |
| NPDES | National Pollutant Discharge Elimination System |
| NRWASA | Neuse Regional Water and Sewer Authority |

**Greenville Utilities Commission
Interbasin Transfer Petition**

Table of Contents

List of Acronyms

| | |
|-------|------------------------------------|
| NSW | Nutrient sensitive waters |
| ORW | Outstanding resource water |
| ppm | Parts per million |
| RCW | Red Cockaded Woodpecker |
| SNHA | Significant Natural Heritage Area |
| SEPA | State Environmental Policy Act |
| T | Threatened |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| WRC | N.C. Wildlife Resources Commission |
| WS | Water supply |
| WTP | Water treatment plant |
| WWTP | Wastewater treatment plant |



1. Introduction

1.1 Project Description

The Town of Farmville, the Town of Winterville, and Greene County plan to purchase bulk finished water from the Greenville Utilities Commission (GUC) to comply with the Central Coastal Plain Capacity Use Area (CCPCUA) rules and continue to meet customer needs. GUC relies on the Tar River for its water supply, and the Town of Farmville and the majority of Greene County are located within the Neuse River Contentnea Creek subbasin. Farmville and Greene County discharge wastewater into the Contentnea Creek subbasin via centralized treatment or on-site septic systems. Therefore, sales of finished water to the Town of Farmville and Greene County will constitute an interbasin transfer from the Tar River subbasin to the Neuse River Contentnea Creek subbasin. The Town of Winterville water and wastewater systems and the southwestern portion of Greene County are located within the Neuse River subbasin. Therefore, sales of finished water to the Town of Winterville and Greene County will constitute an interbasin transfer from the Tar River subbasin to the Neuse River subbasin.

The interbasin transfer (IBT) line, as determined by the North Carolina Environmental Management Commission (EMC), is illustrated in Figure 1-1. The IBT line between the Tar River and Contentnea Creek and Neuse subbasins is located in Pitt County. The line extends through Pitt County around the perimeter of the western side of the GUC service area and around the eastern edge of the Town of Winterville. This IBT line crosses the southern end of the GUC service area. The IBT line between the Contentnea Creek subbasin and Neuse River subbasin is located approximately four miles west of Winterville and extends south on the western edge of the Towns of Ayden and Grifton to the Pitt County line.

The project encompasses the service areas for GUC, the Town of Farmville, the Town of Winterville, and Greene County, as provided in Figure 1-2. The service areas are entirely located in Pitt and Greene Counties. The Tar River runs on the northern edge of the City of Greenville. Upstream of the Tar River from the City of Greenville is the Town of Tarboro and the City of Rocky Mount. Downstream of the Tar River from Greenville is Beaufort County and the estuary. Contentnea Creek runs through the eastern edge of the Town of Farmville.

1.2 Requested Action

GUC is requesting an IBT certificate for a water transfer from the Tar River subbasin to the Contentnea Creek subbasin to support the Town of Farmville and Greene County's compliance with CCPCUA rules. GUC is requesting an IBT Certificate in the amount of 8.3 million gallons per day (mgd) to meet Farmville and Greene County's maximum day demands through 2030. As part of the same Certificate, GUC requests the ability to transfer 9.3 mgd under emergency conditions to the Contentnea Creek subbasin.

GUC is also requesting an IBT Certificate for a water transfer from the Tar River subbasin to the Neuse River subbasin to support the Town of Winterville's compliance with CCPCUA rules, and to support water

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

use in the portion of the GUC service area within the Neuse River Basin. GUC is requesting an IBT Certificate for 4.0 mgd to meet Winterville's maximum day demands through 2030. Additionally, GUC requests the ability to transfer 4.2 mgd under emergency conditions to the Neuse River subbasin.

The proposed IBT is the preferred alternative that was identified through the development and analysis of many alternatives. The GUC water treatment plant (WTP) has sufficient plant capacity to provide water to the City of Greenville, Farmville, Winterville, and Greene County until 2030. In 2030, the total maximum day water demand with minimum bulk purchase is projected to be 22.2 mgd and will not exceed the current WTP capacity of 22.5 mgd. No construction will occur as part of the proposed project.

The IBT petition provides supporting documentation as required by North Carolina General Statute 143-215.22I; more detailed documentation of the environmental impacts of the requested action are contained in the Final Environmental Assessment (EA) for Greenville Utilities Commission Interbasin Transfer (ARCADIS, 2008) which was submitted to the State Clearinghouse October 2008. The Finding of No Significant Impact (FONSI) is provided in Appendix A.

1.3 CCPCUA Regulations

The EMC enacted the CCPCUA rules on August 1, 2002. The CCPCUA rules were developed as a control measure for groundwater use in the Cretaceous aquifer in response to decreasing groundwater level and saltwater intrusion. The rules will be implemented over a ten-year period. The goal of the rules is to allow the Cretaceous aquifer to recharge and provide sustainable groundwater supply yields.

The CCPCUA rules require groundwater users located in the impacted areas to reduce withdrawals in three phases between 2008 and 2018. The required reduction amounts are based on the location of the water use, either in a dewatering zone or in a saltwater intrusion zone. The rules specify a percentage reduction in groundwater use from the Cretaceous aquifer from an approved base rate (ABR). The ABR for each groundwater user was determined by the North Carolina Division of Water Resources (DWR) based on historical annual water use from the Cretaceous aquifer system. GUC, Greene County, the Town of Farmville, and the Town of Winterville are located in the "dewatering zone." The reductions required by the CCPCUA rules for water users in the dewatering zone are as follows:

- Phase I (2008) – Permittees in the dewatering zone will be required to reduce annual water use by 25 percent from their ABR.
- Phase II (2013) – Permittees in the dewatering zone will be required to reduce annual water use by 50 percent from their ABR.
- Phase III (2018) – Permittees in the dewatering zone will be required to reduce annual water use by 75 percent from their ABR.

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

The Town of Farmville (Pitt County), the Town of Winterville (Pitt County), and Greene County currently rely on the Cretaceous aquifer for their sole water supply, and therefore are significantly affected by the CCPCUA rules.

1.4 Existing Water and Wastewater Facilities

1.4.1 Greenville Utilities Commission

GUC is located in Pitt County, and the majority of the GUC customer base resides in the Tar River subbasin. GUC relies on the Tar River for its water supply. The GUC WTP has a permitted capacity of 22.5 mgd. The WTP treats raw water withdrawn from the Tar River and pumped to a 63-million gallon pre-settling impoundment. The WTP utilizes conventional coagulation/sedimentation process, intermediate ozonation (for disinfection), and high-rate, dual-media filters. In 2002, the GUC converted from free chlorine to chloramines for disinfection. The WTP includes an alum residuals lagoon. The National Pollutant Discharge Elimination System (NPDES) discharge permit (NC0082139) is unlimited in flow and discharges to the Tar River.

GUC also operates eight groundwater wells, which are all subject to CCPCUA regulations. GUC has used the wells on an emergency only basis since December 2002 when the disinfectant at the WTP was switched from free chlorine to chloramines. These wells were only operated for sixteen days during 2006, as reported by DWR CCPCUA permit data.

Wastewater for the GUC service area is treated at the GUC wastewater treatment plant (WWTP). This facility is permitted for a NPDES discharge of 17.5 mgd (NC0023931) to the Tar River. The average flow rate through the WWTP was 10.3 mgd for the period from June 2006 through June 2007.

1.4.2 The Town of Farmville

The Town of Farmville operates eleven groundwater wells that withdraw water from the Cretaceous aquifer. All eleven wells are subject to the CCPCUA rules. Wastewater for the Town of Farmville is treated at the Farmville WWTP. This facility is permitted for a NPDES discharge of 3.5 mgd (NC0029572) to the Little Contentnea Creek in the Neuse River basin. The average flow rate through the WWTP was 1.96 mgd for the period from June 2006 through June 2007.

1.4.3 The Town of Winterville

The Town of Winterville operates three groundwater wells that are all subject to CCPCUA rules. Wastewater for the Town of Winterville is treated by the Contentnea Metropolitan Sewer District in Grifton. This facility is permitted for an NPDES discharge of 2.85 mgd to Contentnea Creek (NC0032077) in the Neuse River basin. The average daily wastewater flow rate for the Town was reported to be approximately 0.58 mgd in the 2002 LWSP. The average flow rate through the WWTP was 1.87 mgd for the period from

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

June 2006 through June 2007. Winterville currently purchases finished water from GUC (under the grandfathered IBT amount).

1.4.4 Greene County

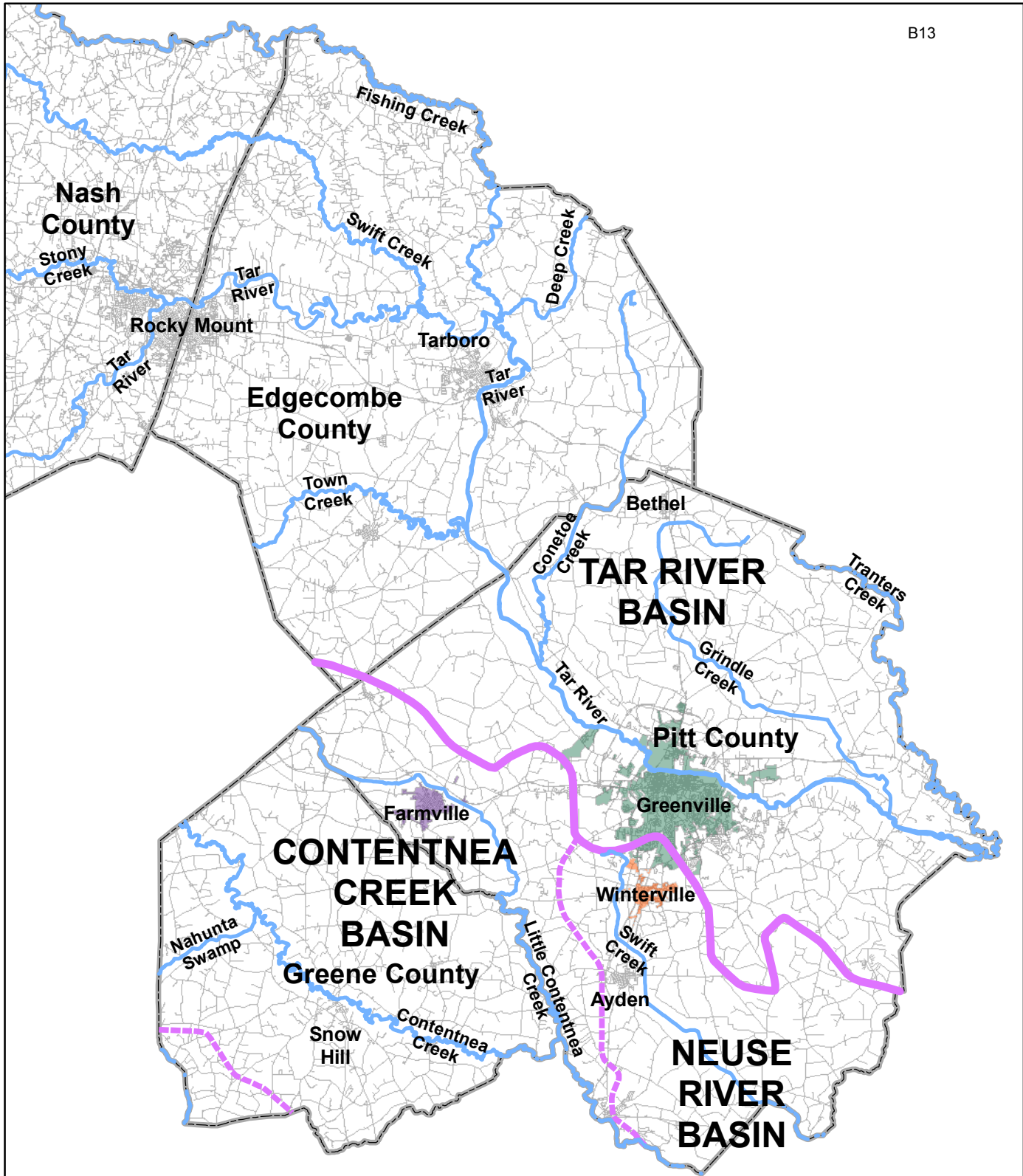
Greene County is currently served by ten different water systems. Greene County is acting as the lead agency on behalf of these water systems for the purposes of entering into bulk sales agreements with GUC. The water systems in Greene County are as follows:

- Greene County Regional Water System
- Town of Snow Hill
- Town of Hookerton
- Town of Walstonburg
- South Greene Water Corporation
- Maury Sanitary District
- Ormondsville Water Corporation
- Arba Water Corporation
- Lizzie Water Corporation
- Jason-Shine Water Corporation

The Town of Snow Hill has four groundwater wells that are used on a regular basis, and one for emergency use. Snow Hill operates its own WWTP, which is permitted for an NPDES discharge of 0.5 mgd to Contentnea Creek in the Neuse River basin (NC0020842). The Town provides utilities to the South Greene Water Corporation.

The Greene County Regional Water System operates ten groundwater wells. The Town of Walstonburg purchases water from the Greene County Regional Water System. Wastewater for the Town of Walstonburg is treated by the Farmville WWTP. The average daily wastewater flow rate for the Town is approximately 35,000 gpd.

Septic systems comprise the majority of wastewater treatment in Greene County. The Town of Hookerton WWTP and the Maury Sanitary Land District WWTP operate 0.06 mgd and 0.225 mgd treatment facilities, respectively. Both of these facilities discharge to Contentnea Creek.



LEGEND





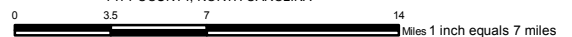
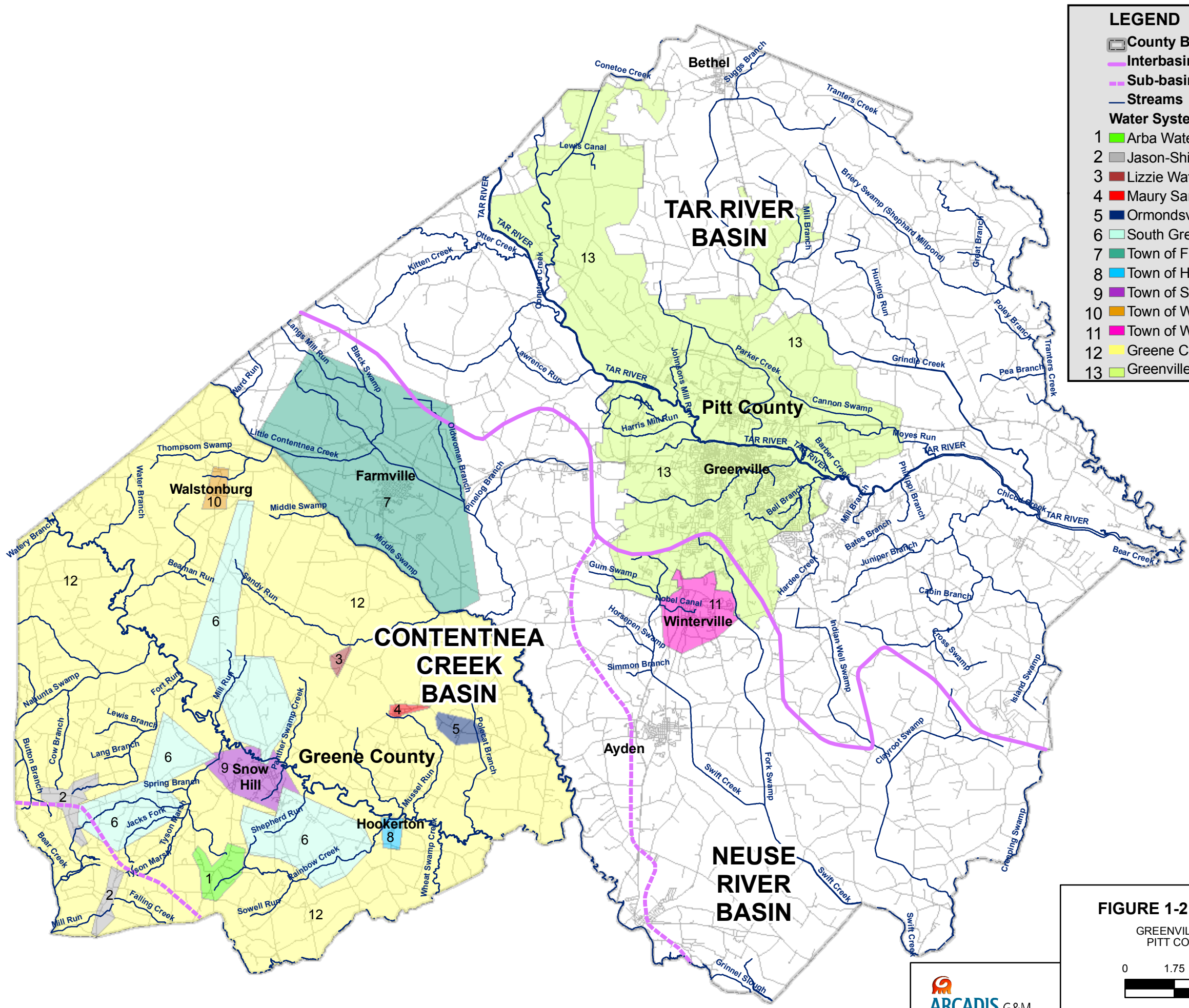
-  Interbasin Boundary
-  Sub-basin Boundary
-  County Boundary
-  Major Rivers

FIGURE 1-1: INTERBASIN TRANSFER LINE, AS DETERMINED BY THE ENVIRONMENTAL MANAGEMENT COMMISSION

GREENVILLE UTILITIES COMMISSION
PITT COUNTY, NORTH CAROLINA





LEGEND

- County Boundary
- Interbasin Boundary
- Sub-basin Boundary
- Streams

Water System Service Areas

- 1 Arba Water Corp.
- 2 Jason-Shine Water Corp.
- 3 Lizzie Water Corp.
- 4 Maury Sanitation District
- 5 Ormondsville Water Corp.
- 6 South Greene Water Corp.
- 7 Town of Farmville
- 8 Town of Hookerton
- 9 Town of Snow Hill
- 10 Town of Walstonburg
- 11 Town of Winterville
- 12 Greene Co. Regional Water System
- 13 Greenville Utilities

FIGURE 1-2: SERVICE AREA MAP
GREENVILLE UTILITIES COMMISSION
PITT COUNTY, NORTH CAROLINA

0 1.75 3.5 7 Miles

1 inch equals 3.5 miles



Greenville Utilities Commission Interbasin Transfer Petition



Introduction

1.5 Existing Conditions

1.5.1 Water Resources

1.5.1.1 Drainage Basins and Surface Water Supplies

The service areas are located within the Tar-Pamlico and Neuse River basins. The northern and northeastern portions of Pitt County are located within the Tar-Pamlico basin. The southern and western portions of Pitt County and all of Greene County are located within the Neuse River basin.

The Tar-Pamlico basin service area is located in USGS Hydrological Unit 03020103 and three North Carolina Division of Water Quality (DWQ) subbasins (03-03-03, 03-03-05, and 03-03-06). The central and northern portions of Pitt County, located in the Tar-Pamlico basin, are within USGS Hydrological Unit 03020103 and DWQ subbasins 03-03-03 and 03-03-05.

The southern and western portion of Pitt County and all of Greene County is located in the Neuse River basin. The southern portion of Pitt County and the westernmost portion of Greene County are located in USGS Hydrological Unit 03020202 and DWQ subbasins 03-04-05, 03-04-08, and 03-04-09. The western portion of Pitt County and all but the westernmost portion of Greene County are located within USGS Hydrological Unit 03020203 and DWQ subbasins 03-04-07.

GUC's surface water intake is located on the Tar River in the northern portion of Greenville in the central portion of Pitt County. The area designated as a water supply watershed (in association with the surface water intake) is located north of the intake and encompasses a portion of the northern portion of Pitt County and the northern portion of the service area.

1.5.1.2 Surface Water Use Classifications

The Tar River traverses Pitt County and the service area from northwest to southeast. The northern portion of Pitt County is designated as a water supply watershed due to GUC's water supply intake. The Tar River north of Greenville is designated as Class WS-IV NSW. The Nutrient Sensitive Waters (NSW) classification is a supplemental classification that has been assigned to waters that need additional nutrient management due to these waters being subject to excessive growth of microscopic or macroscopic vegetation. From the water supply intake to a point 1.2 miles downstream of the confluence with Broad Run, the Tar River is designated as Class C NSW. From a point 1.2 miles downstream of the confluence with Broad Run to Tranters Creek, which forms the eastern boundary of Pitt County, the Tar River is designated as Class B NSW. Within Pitt County, Tranters Creek and its tributaries are designated by DWQ as Class C Sw NSW. The Sw classification denotes Swamp Waters.

Within Pitt County downstream of the raw water intake site, tributaries to the Tar River are designated by DWQ as Class C NSW. Tributaries to the Tar River upstream of the raw water intake site within the water

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

supply watershed area are designated by DWQ as Class WS-IV NSW. A portion of the Tar River that extends from the raw water intake site upstream for 0.5 miles is designated by DWQ as Class WS-IV NSW CA. The classification CA denotes Critical Areas, which are areas that extend one half mile upstream from normal pool elevation of reservoirs or water intakes.

Within the portions of Pitt County located within the Neuse River basin, streams are designated by DWQ as Class C Sw NSW. The southern and northern portion of the boundary between Pitt and Greene Counties is formed by Little Contentnea Creek. Middle Swamp forms the boundary between Pitt and Greene Counties in the central portion of the county boundary. Contentnea Creek traverses the central portion of Greene County. Streams within Greene County are designated by DWQ as Class C Sw NSW.

Streams within the water supply watershed area are classified as WS-IV NSW. The streams within the service area that are located within the Tar-Pamlico basin are designated by DWQ as Class C NSW. Streams within the service area that are located within the Neuse basin are classified as Class C Sw NSW. No streams designated as Outstanding Resource Waters (ORW) Waters or High Quality Waters (HW) are present within the project area.

1.5.1.3 Existing Surface Water Quality

DWQ monitoring sites for benthic macroinvertebrates and fish communities are located throughout the project area. Table 1-1 provides bioclassifications and use support ratings for streams within the project area per the 2004 Tar-Pamlico River Basinwide Water Quality Plan and the 2008 Draft Neuse River Basinwide Water Quality Plan.

Water quality issues associated with the subbasins within the service area are reported by DWQ to include non-point source discharges, elevated levels of mercury, channelization, agriculture, and concentrated animal feeding operations. According to the North Carolina 303(d) Draft Impaired Waters List dated January 10, 2008, several streams within the Neuse River basin and the Tar-Pamlico River basin in Pitt and Greene Counties are listed as impaired. These streams are as follows:

- Conetoe Creek – from Crisp Creek to Pitt County SR 1404
- Tar River – from Greenville raw water supply intake to a point 1.2 miles downstream of the mouth of Broad Run
- Chicod Creek – from source to Tar River
- Creeping Swamp – from source to Clayroot Swamp
- Contentnea Creek – from 0.7 mile upstream of Toisnot Swamp to Nahunta Swamp
- Little Contentnea Creek – from source to Contentnea Creek
- Swift Creek – from source to Clayroot Swamp

**Greenville Utilities Commission
Interbasin Transfer Petition**



Introduction

- Clayroot Swamp – from source to SR 1925
- Hominy Swamp – from source to Contentnea Creek

Table 1-1: Bioclassification and Use Support Ratings for Streams within the Project Area

| Waterbody | Data Type | DWQ Subbasin | Bioclassification | Use Support Rating |
|---|---------------------------------|---------------------|--------------------------|---------------------------|
| Conetoe Creek | Special Benthic Community Study | 03-03-03 | Poor | Impaired |
| Grindle Creek | Benthic Community Survey | 03-03-05 | Good-Fair | Supporting |
| | Fish Community Survey | 03-03-05 | Not Rated | |
| Hardee Creek | Benthic Community Survey | 03-03-05 | Natural | Supporting |
| | Fish Community Survey | 03-03-05 | Not Rated | |
| Tar River | Benthic Community Survey | 03-03-05 | Not Rated | Not Rated |
| Chicod Creek | Benthic Community Survey | 03-03-05 | Severe Stress | Impaired |
| | Fish Community Survey | 03-03-05 | Not Rated | |
| Flat Swamp | Benthic Community Survey | 03-03-06 | Moderate Stress | Supporting |
| Tranters Creek | Benthic Community Survey | 03-03-06 | Moderate Stress | Supporting |
| Contentnea Creek (from 0.7 mile upstream of Toisnot Swamp to Nahunta Swamp) | Benthic Community Survey | 03-04-07 | Fair | Impaired |
| Contentnea Creek (from Nahunta Swamp to Neuse River) | Benthic Community Survey | 03-04-07 | Not Rated | --- |
| Nahunta Swamp | Benthic Community Study | 03-04-07 | Good-Fair | Supporting |
| Little Contentnea Creek | Benthic Community Survey | 03-04-07 | Fair | Impaired |
| Clayroot Swamp (from source to SR 1925) | Benthic Community Survey | 03-04-09 | Fair | Impaired |
| Clayroot Swamp (from SR 1925 to Swift Creek) | Benthic Community Survey | 03-04-09 | Good-Fair | Supporting |
| Creeping Swamp | Benthic Community Survey | 03-04-09 | Moderate | Supporting |

**Greenville Utilities Commission
Interbasin Transfer Petition**

Introduction

1.5.1.4 Groundwater

The project area is located within the Coastal Plain physiographic province in the central eastern portion of North Carolina. The aquifers underlying the area consist of a post-Miocene age surficial aquifer and a series of Cretaceous-aged aquifers that include the Lower Cape Fear, the Upper Cape Fear, the Black Creek, and the Pee Dee aquifers, collectively referred to as the Cretaceous Aquifer System (CAS). The surficial aquifer is the shallowest aquifer and is widely used for individual residential wells throughout the state.

The aforementioned aquifers are used by numerous municipalities, private water supply sources, and individual businesses and residences for drinking water. According to a Pitt County Comprehensive Water Resources Management Plan prepared by Groundwater Management Associates, Inc. (GMA), the primary source of water supply for ten public water systems in Pitt County is groundwater. GMA concluded that 98 percent of the groundwater withdrawal in Pitt County for public water supply systems is from the Black Creek and Upper Cape Fear aquifers.

A hydrologic study was performed by GMA utilizing the data from more than 100 wells located within Pitt County. The safe yield of each aquifer was compared to current withdrawals from the aquifers. It was determined that over-development of the Black Creek and Upper Cape Fear aquifers has occurred. GMA also reported that water quality problems associated with elevated levels of fluoride and chloride are present within the Black Creek and Upper Cape Fear aquifers in the eastern portion of the county. Additionally, GMA reports that the Lower Cape Fear aquifer below Pitt County contains elevated salt concentrations that must be treated prior to public consumption. Based on GMA's study, future development of the Pee Dee and Castle Hayne aquifers within Pitt County was found to be a viable option. However, GMA determined that groundwater resources within Pitt County are limited and that they will not meet the County's future water supply needs.

1.5.2 Land Use

Land use within the service area consists of single and multi-family residential, commercial, and undeveloped open space of varying uses including farmland, pastureland, and forested areas.

Land use within the northern portion of the Pitt County service area consists of low-density single and multi-family residential, commercial/industrial, and undeveloped open space. This area has seen considerable growth in the past decade (Northwest Planning Area Land Use Plan for Pitt County, North Carolina, The Wooten Company, 2001). However, the residential, industrial, and commercial development only comprises a small fraction of this northern portion. A majority of the land use within this area consists of wooded, undeveloped land including land used for forestry purposes, and agricultural land. Public water and soils suitable for septic systems makes the northern portion of the service area attractive for low to medium-density residential growth. (DWQ prefers regional wastewater treatment systems in lieu of

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

individual package plants). Residential growth in the northern portion of the service area mainly consists of manufactured housing in subdivisions and parks. Some industrial and commercial land use is also present.

Land use within the City of Greenville and its incorporated areas consist mainly of residential, commercial, and industrial development with some undeveloped areas present. East Carolina University is also located within the City of Greenville. The City of Greenville also has several parks and open spaces. A majority of the areas abutting the City of Greenville and the incorporated areas within the southern portion of the service area consist of wooded, undeveloped land, land used for forestry purposes, and land used for agricultural purposes.

Land use in Greene County is approximately 50 percent cultivated farmland and 50 percent wooded area. The largest jurisdiction in Greene County is Snow Hill, which is located in the south central area of the County along Contentnea Creek.

1.5.2.1 Forest Resources

Natural forested communities are scattered throughout the undeveloped and developed portions of the service area. The forested areas include mixed upland hardwoods, bottomland forest/hardwood swamps, needleleaf deciduous, southern yellow pine, and oak/gum/cypress forests. Approximately 32 percent of the service area consists of undeveloped, wooded land.

1.5.2.2 Prime and Unique Farmlands

Within North Carolina, three categories of important farmlands are recognized. These consist of prime farmland, unique farmland, and farmland of statewide importance. Approximately 38 percent of the service area consists of cultivated land. Within the service area, fifteen mapped soils are listed by the U.S. Natural Resource Conservation Service (NRCS) as prime farmland and six of the mapped soils are listed as prime farmland if drained. One of the soils mapped within the service area is listed by the NRCS as prime farmland if drained and either protected from flooding or not frequently flooded during the growing season. Six of the soils mapped within the service area are listed by the NRCS as farmland of statewide importance. None of the soils mapped within the service area are listed by the NRCS as unique farmland soils. Developed land no longer qualifies as prime or unique farmland, regardless of soil type.

1.5.2.3 Public, Scenic, and Recreational Areas

No state or federal parks are located within the service area, although two areas that are owned by the federal government are located within Pitt County. The North Carolina Wildlife Resources Commission (WRC) does not list any game lands within the service area.

Nine public municipal and county parks are located within the service area. Eight of the public municipal parks are located within Pitt County and one is located within Greene County.

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

1.5.2.4 Significant Natural Areas

Natural Heritage Protection (NHP) designates significant natural areas if those areas contain rare or protected species, high quality examples of relatively undisturbed natural communities, or unusual geological features. They may be on public or private land and their designation as a natural area by NHP does not confer protection. No significant natural heritage areas (SNHAs) are listed by NHP within Greene County. Several sites are listed as significant natural areas within Pitt County. The following sites are listed as nationally significant natural areas that contain examples of natural communities, rare plant or animal populations, or geologic features that have the highest quality or are the best of their kind in the nation: Tar River Basin Megasite, Lower Tar River/Swift Creek Macrosite, Lower Tar River Aquatic Habitat, and Bethel/Grindle Hardwood Flats. Two sites, the Neuse River Floodplain and Bluffs and Voice of America Site B, are listed as being statewide significant natural areas that contain similar ecological resources, which are among the highest quality occurrences in North Carolina. Eight sites are listed as regionally significant natural areas that contain natural elements that may be represented elsewhere in the state by better quality examples.

1.5.3 Wildlife Habitat and Resources

The service area contains a variety of different vegetative communities based on topography, soils, hydrology, and disturbance. Terrestrial communities within the service area vary from undeveloped wooded areas to cultivated farm fields to disturbed lands. The numerous natural communities and disturbed habitats have been grouped into the following categories: (1) bottomland hardwood forest, (2) upland hardwood forest, (3) pine forest, and (4) disturbed land. The bottomland hardwood forest category is found predominantly on stream floodplains and may include some mesic low-slope woodland. The upland hardwood forest category includes mesic mixed hardwood forest and dry-mesic oak/hickory forest. Forests with greater than 50 percent of the canopy dominated by pines in either uplands or floodplains were designated as pine forest. Disturbed lands include lawns, agricultural fields, un-vegetated land, and infrequently mowed utility rights-of-way. These communities provide suitable habitat for numerous species of terrestrial species and vascular plants.

1.5.3.1 Bottomland Hardwood Forest

The bottomland hardwood community occurs in the upper portion of the floodplain, generally flat areas that are saturated for part of the year. The canopy of the bottomland hardwood community is dominated by red maple (*Acer rubrum*), loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), and oaks (*Quercus* spp.). The understory layer includes American holly (*Ilex opaca*), red maple, red bay (*Persea palustris*), and sweetbay magnolia (*Magnolia virginiana*). The well-developed and sometimes dense shrub layer includes blueberry (*Vaccinium elliotii*), sweet pepperbush (*Clethra alnifolia*), Virginia willow (*Itea virginica*), and giant cane (*Arundinaria gigantea*). The vine layer can be dense and typically includes poison ivy (*Toxicodendron radicans*), common greenbrier (*Smilax rotundifolia*), and muscadine grape (*Vitis rotundifolia*). Usually, the herbaceous layer of bottomland hardwood communities is poorly developed.

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

Wildlife commonly found within bottomland hardwood communities includes several reptiles including the ground skink (*Scincella lateralis*), scarlet snake (*Cemophora coccinea*), corn snake (*Elaphe guttata*), and southern hognose snake (*Heterodon simus*). These snakes forage on small mammals, birds, frogs, lizards, and toads. Birds include Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), pine warbler (*Dendroica pinus*), and brown-headed nuthatch (*Sitta pusilla*). These birds generally feed on seeds and insects. Small mammals such as the nocturnal fox squirrel (*Sciurus niger*) and the larger, more visible southern flying squirrel (*Glaucomys volans*) may also be present. Larger mammals such as the eastern cottontail (*Sylvilagus floridanus*), Virginia opossum (*Didelphis virginiana*), and white-tailed deer (*Odocoileus virginianus*) are common within bottomland hardwood communities.

1.5.3.2 Upland Hardwood Forest

The canopy of the upland hardwood community is dominated by tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), white oak (*Q. alba*), red oak (*Q. rubra*), and sweetgum. The understory of the Upland Hardwood community includes flowering dogwood (*Cornus florida*), American holly, ironwood (*Carpinus caroliniana*), red maple, red bay, sourwood (*Oxydendrum arboreum*), and eastern hop-hornbeam (*Ostrya virginiana*). The shrub layer varies from sparse to dense and includes giant cane, blueberry, sweet pepperbush, and American witch hazel (*Hamamelis virginiana*). The herb layer is likely to contain Christmas fern (*Polystichum acrostichoides*), partridgeberry (*Mitchella repens*), sedges (*Carex* spp.), and slender spikegrass (*Chasmanthium laxum*).

The upland hardwood vegetative community is often found adjacent to bottomland hardwood and riverine swamp forest communities; therefore, they have similar wildlife and may also include the following species. The spotted (*Ambystoma maculatum*), slimy (*Plethodon glutinosus*), and many-lined (*Stereochilus marginatus*) salamanders may be found within the service area. The five-lined skink (*Eumeces fasciatus*) and worm snake (*Carphophis amoenus*) are found in hardwood forests. These reptiles feed on mainly arthropods and earthworms, respectively. The multi-layered structure characteristic of mature mixed hardwood communities supports high densities and diversities of neotropical migratory birds such as wood thrush (*Hylocichla mustelina*), ovenbird (*Seiurus aurocapillus*), Swainson's warbler (*Limnothlypis swainsonii*), worm-eating warbler (*Helmitheros vermivorus*), prothonotary warbler (*Protonotaria citrea*), hooded warbler (*Wilsonia citrina*), and white-breasted nuthatch (*Sitta carolinensis*). Small mammals such as the gray squirrel (*Sciurus carolinensis*) and golden mouse (*Ochrotomys nuttalli*) are found in the hardwood forests of the service area.

1.5.3.3 Pine Forest

Pine forests are mesic sites, located either on flat or rolling Coastal Plain sediments, that are neither excessively drained nor with a significant seasonal high water table. Pine forests commonly occur on broad flats along interstream divides. This community often consists of large contiguous tracts of land that are leased for hunting. Many of these tracts of land are owned by timber companies and routinely logged and replanted.

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

The pine forest community is underlain by loamy or fine-textured soils, sometimes on sands, and is characterized as having a closed to open canopy mainly consisting of longleaf pine (*Pinus palustris*) or loblolly pine. The understory is commonly sparse and contains species such as Southern red oak, water oak, post oak, mockernut hickory and sweet gum. The shrub layer will have varying densities and is similar to wet pine flatwoods. The herbaceous layer is generally dominated by pineland three-awn grass (*Aristida stricta*), bracken fern (*Pteridium aquilinum*), old switch panic grass (*Panicum virgatum*), little bluestem (*Andropogon scoparium*), and roundhead bushclover (*Lespedeza capitata*).

Several reptiles are found in pine forest habitats including the ground skink (*Scincella lateralis*), scarlet snake (*Cemophora coccinea*), corn snake (*Elaphe guttata*), and southern hognose snake (*Heterodon simus*). These snakes forage on small mammals, birds, frogs, lizards, and toads. The red-cockaded woodpecker (*Picoides borealis*), a federally endangered species, is found in pine forest communities. Other birds include Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), pine warbler (*Dendroica pinus*), and brown-headed nuthatches (*Sitta pusilla*). These birds generally feed on seeds and insects. Small mammals such as the nocturnal fox squirrel (*Sciurus niger*) and the larger, more visible southern flying squirrel (*Glaucomys volans*) may also be found within the service area.

1.5.3.4 Disturbed Land

Three main types of disturbed land are found in the service area: cutover, farm field, and maintained areas. Cutover areas are generally dominated by immature loblolly pine, sweetgum, red maple, and tulip poplar with blueberry, American holly, and flowering dogwood being present within the shrub layer. The vine layer of the cutover area is dominated by common greenbrier. Vegetation within the maintained areas includes Bermuda grass (*Cynodon dactylon*), crabgrass (*Digitaria* sp.), clover (*Trifolium* spp.), dandelion (*Taraxacum officinale*), foxtail grass (*Sertaria italica*), bead grass (*Paspalum* sp.), as well as other forbs commonly found in maintained/disturbed areas.

Disturbed lands such as those within the service area are typically drier than wooded land and do not support a wide variety of amphibian species. The reptiles are limited to snakes, lizards and skinks such as those inhabiting the pine-dominated woodlands. Other reptiles found may include the southern cricket frog (*Acris gryllus*), squirrel treefrog (*Hyla squirella*), Carolina anole (*Anolis carolinensis*), and eastern fence lizard (*Sceloporus undulatus*). Common birds of pasture, fallow fields, and hedgerows include eastern bluebirds (*Sialia sialis*), eastern meadowlark (*Sturnella magna*), Northern bobwhite quail, American goldfinch (*Carduelis tristis*), towhee (*Pipilio erythrophthalmus*), field sparrow (*Spizella pusilla*), barn swallow (*Hirundo rustica*), American robin (*Turdus migratorius*), and red-tailed hawk (*Buteo jamaicensis*). Typical mammals include the eastern mole (*Scalopus aquaticus*), eastern cottontail, raccoon (*Procyon lotor*), opossum, least shrew (*Cryptotis parva*), and white-tailed deer.

Greenville Utilities Commission Interbasin Transfer Petition



Introduction

1.5.4 Aquatic Habitat and Resources

Aquatic habitats are present within the project area. These aquatic habitats range from small headwater streams and wetlands to large third and fourth order streams and floodplain communities. The diversity of aquatic habitat available supports a variety of aquatic fauna within the service area.

The most important physical factors that affect freshwater organisms are temperature, light, water current, and substrate (Voshell, 2002). As stream order increases, these factors change and have an effect on the type of organisms present within each aquatic community. Benthic species typically found dominating the smaller headwater and second order streams include various shredders such as mayflies (Ephemeroptera), stoneflies (Plecoptera), craneflies (Nematocera), and case maker caddisflies (Trichoptera). Shredders are most abundant in first and second order streams because these streams usually have an abundance of coarse particulate organic material entering the stream, which provides a food source for these organisms. Filter feeders and collector-gatherers are most abundant in higher order streams due to the abundance of fine particular organic matter and may include species such as common net spinner caddisflies (Trichoptera), true flies (Diptera), and water boatmen (Heteroptera). Predator species in streams of all orders within the service area include damselflies (Zygoptera), dragonflies (Anisoptera), hellgrammites (Megaloptera), and water striders (Heteroptera). Bivalves are most abundant in medium to large rivers and prefer a stable substrate consisting of gravel or a combination of gravel and sand. Crayfish (Decapoda) habitat is also present within the service area.

In general, streams in the project area provide suitable habitat for fish such as bluegill (*Lepomis macrochirus*), tessellated darter (*Etheostoma olmstedii*), redbfin pickerel (*Esox americanus*), dusky shiner (*Notropis cummingsae*), redbreast sunfish (*L. auritus*), warmouth (*L. gulosus*), largemouth bass (*Micropterus salmoides*), pirate perch (*Aphredoderus sayanus*), and American eel (*Anguilla rostrata*). Many benthic macroinvertebrates are expected to inhabit the streams. Benthic invertebrates common in swamp streams are the caddisflies (*Nyctiophlax moestus*) and (*Pycnopsyche* sp.) and the mayflies (*Stenonema modestum*), (*Leptophlebia* sp.), (*Caenis* sp.), and (*Eurylophella doris*) (DENR, 2004).

The streams within the project area support anadromous fish such as hickory shad (*Alosa mediocris*), American shad (*A. sapidissima*), alewife (*A. pseudoharengus*), blueback herring (*A. aestivalis*), striped bass (*Morone saxatilis*), and American eel (*Anguilla rostrata*). Within the Tar-Pamlico River basin, the Tar River and several of its tributaries are listed as anadromous fish spawning areas. The tributaries to the Tar River within Pitt and Greene Counties that are listed as supporting anadromous fish include portions of Otter Creek, Kitten Creek, Conetoe Creek, Tyson Creek (King Creek), Meeting House Branch, Hardee Creek, Chicod Creek, Grindle Creek, and Tranters Creek. Within the Neuse River basin, Contentnea Creek and several of its tributaries are listed as anadromous fish spawning areas. The tributaries to Contentnea Creek within Pitt and Greene Counties listed as supporting anadromous fish include portions of Rainbow Creek, Wheat Swamp Creek, Beaverdam Run, Panther Swamp Creek, Polecat Branch, and Little Contentnea Creek.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Introduction

1.5.5 Rare and Protected Aquatic Species or Habitats

Some populations of fauna and flora have been, or are, in the process of decline due to either natural forces or their inability to coexist with humans. Federal law (under the provisions of Section 7 of the Endangered Species Act (ESA) of 1973, as amended) requires that any action likely to adversely affect a species classified as federally protected be subject to review by the U.S. Fish and Wildlife Service (USFWS). Other species may receive additional protection under separate state laws. As of January 2008, the USFWS identified three species as federally Endangered (E) and ten species as Federal Species of Concern (FSC) potentially occurring in Pitt and Greene Counties. The NHP list of May 2008 included the aforementioned species and identified an additional 14 species receiving protection under state laws. The full list of protected species listed for Pitt and Greene Counties are provided in the Final Environmental Assessment (ARCADIS 2008). Table 1-2 provides a list of the protected aquatic species for the purposes of this Petition.

Table 1-2: Protected Species Listed for Pitt and Greene Counties

| Scientific Name | Common Name | State Status | Federal Status | County |
|-----------------------------------|-------------------------------|--------------|----------------|--------|
| Vertebrates | | | | |
| <i>Acipenser brevirostrum</i> | Shortnose sturgeon | E | - | P |
| <i>Alligator mississippiensis</i> | American alligator | T | - | P |
| <i>Ambloplites cavifrons</i> | Roanoke bass | SR | FSC | P |
| <i>Anguilla rostrata</i> | American eel | - | FSC | G, P |
| <i>Lampetra aepyptera</i> | Least brook lamprey | T | - | P |
| <i>Lythrurus matutinus</i> | Pinewoods shiner | - | FSC | G, P |
| <i>Necturus lewisi</i> | Neuse River waterdog | SC | - | G, P |
| <i>Noturus furiosus</i> | Carolina madtom | SC (PT) | FSC | G, P |
| <i>Trichechus manatus</i> | West Indian manatee | E | E | P |
| Invertebrates | | | | |
| <i>Alasmidonta undulata</i> | Triangle floater | T | - | P |
| <i>Elliptio roanokensis</i> | Roanoke slabshell | T | - | P |
| <i>Elliptio steinstansana</i> | Tar River spiny mussel | E | E | P |
| <i>Fusconaia masoni</i> | Atlantic pigtoe | E | FSC | P |
| <i>Lampsilis cariosa</i> | Yellow lamp mussel | E | FSC | P |
| <i>Lasmigona subviridis</i> | Green floater | E | FSC | P |
| <i>Leptodea ochracea</i> | Tidewater mucket | T | - | P |
| <i>Ligumia nasuta</i> | Eastern pond mussel | T | - | P |
| <i>Orconectes carolinensis</i> | North Carolina spiny crayfish | SC | - | G, P |
| <i>Strophitus undulatus</i> | Creeper | T | - | P |

**Greenville Utilities Commission
Interbasin Transfer Petition**



Introduction

Table 1-2: Protected Species Listed for Pitt and Greene Counties

| Scientific Name | Common Name | State Status | Federal Status | County |
|--|--------------------|---------------------|-----------------------|---------------|
| P = Pitt County | | | | |
| G = Greene County | | | | |
| <u>Key to Federal Status:</u> | | | | |
| E – Endangered. A taxon “in danger of extinction throughout all or a significant portion of its range.” | | | | |
| T – Threatened. A taxon “likely to become endangered within the foreseeable future throughout all or a significant portion of its range.” | | | | |
| FSC – Federal species of concern. A species under consideration for listing, for which there is insufficient information to support listing at this time. | | | | |
| BGPA – Bald and Golden Eagle Protection Act. The bald eagle was de-listed from the Federal List of Threatened and Endangered wildlife and the primary law protecting the bald eagle became the BGPA. | | | | |
| <u>Key to State Status:</u> | | | | |
| E – Endangered: “Any species or higher taxon of plant whose continued existence as a viable component of the State’s flora is determined to be in jeopardy” (GS 19B 106:202.12). | | | | |
| T – Threatened: “Any resident species of plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range” (GS 19B 106:202.12). | | | | |
| SC – Special Concern. Any species of plant in North Carolina which required monitoring but which may be collected and sold under regulations adopted under the provisions of the Plant Protection and conservation Act (GS 19B 106:202.12). | | | | |
| SR – Significantly Rare (only an NHP designation): Species which are very rare in North Carolina, generally with 1-20 populations in the state, generally substantially reduced in numbers by habitat destruction. These species are generally more common somewhere else in their ranges. | | | | |
| P – Proposed. A species that has been formally proposed for listing as endangered, Threatened, or Special Concern, but has not yet completed the legally mandated listing process. | | | | |
| -T – Throughout. These species are rare throughout their ranges (fewer than 100 populations total). | | | | |

**Greenville Utilities Commission
Interbasin Transfer Petition**

Necessity, Reasonableness, and
Beneficial Effects of Transfer

2. Necessity, Reasonableness, and Beneficial Effects of Transfer

2.1 Growth Trends

2.1.1 Greene County

Since 1990, Greene County's population has grown by over 5,000 individuals to 20,466 residents, which is approximately a 25 percent increase according to 2006 statistics. Though largely agricultural, Greene County has a growing industrial community, which will continue to expand as the Global Transpark, a local business park, begins to take shape. According to the North Carolina State Demographics Unit, an annual growth rate of approximately 1 percent is expected to occur in Greene County between 2010 and 2030, a slightly lower growth rate than experienced before 2006. Assuming that the estimated growth rate is accurate, the County's population is projected to exceed 27,000 residents by the year 2030.

2.1.2 Town of Farmville

The Town of Farmville has experienced limited growth in the last fifteen years, with 180 additional residents added between 1990 and 2004. Farmville does not consistently record yearly census data, nor have they conducted population projections. The available population estimates are from the Local Water Supply Plan. Based on the observed historical growth percentage (0.28 percent annually between 1990 and 2004), the Town of Farmville may expect to support a population of approximately 5,000 residents by the year 2030.

2.1.3 Town of Winterville

The Town of Winterville, located south of Greenville, has experienced increased growth and development in the past fifteen years. Winterville's population more than doubled between 1990 and 2006, and grew by as much as 21.25 percent between 2000 and 2001 with the addition of 940 people. Between 2000 and 2006, Winterville's population increased at an average annual rate of 11 percent but it reached 17.1 percent between 2004 and 2005. The Town completed a water system master plan in Spring 2008. Population projections for Winterville were provided by the Town's master planning consultant. Growth in Winterville is expected to remain consistent over the next several years due to Winterville's close proximity to the City of Greenville. At an annual growth rate between 4.5 percent and 5.8 percent, Winterville's population in 2025 is expected to reach approximately 21,700 residents.

2.1.4 City of Greenville

Greenville is the largest municipality in Pitt County, making up 48 percent of the total population in July 2005, according to the North Carolina State Demographics Unit. East Carolina University, Pitt Memorial Hospital, and other businesses have attracted many residents to the area, bringing Greenville's population to 68,852 in 2005. The North Carolina State Demographics Unit has predicted that Pitt County



Greenville Utilities Commission Interbasin Transfer Petition

Necessity, Reasonableness, and
Beneficial Effects of Transfer

will grow to 153,411 by 2010, and 192,493 by the year 2030. Assuming that Greenville continues to make up almost half of the County's population, the City will host approximately 100,000 residents by 2030.

GUC provides utility services to customers in the City of Greenville and some of the surrounding areas. According to 2005 census data from North Carolina State Demographics and projected values from the GUC Water System Master Plan, approximately 10 percent of the customers served by GUC live outside the City limits. GUC's service population has grown by an average annual rate of 1.91 percent between 2000 and 2005. Assuming an average annual growth rate of approximately 1.8 percent, population for the GUC service area is predicted to increase by approximately 25,000 persons between 2005 and 2020. By 2030, GUC may serve more than 110,000 customers.

Historical growth trends and growth projections for Greene County, the Towns of Farmville and Winterville, and the City of Greenville are provided in Table 2-1.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Necessity, Reasonableness, and
Beneficial Effects of Transfer

Table 2-1: Historical and Projected Population and Growth Rates

| Year | Greenville Utilities Commission | | Farmville | | Greene County | | Winterville | |
|------|---------------------------------|-----------------------|--------------------|-----------------------|-------------------------|-----------------------|---------------------|-----------------------|
| | Population ¹ | Annual Growth Rate, % | Population | Annual Growth Rate, % | Population ⁴ | Annual Growth Rate, % | Population | Annual Growth Rate, % |
| 1990 | NA | NA | 4,446 ² | NA | 15,384 | NA | 3,053 ⁵ | NA |
| 2000 | 69,507 | NA | 4,302 ² | - 0.33 | 18,974 | 2.10 | 3,979 ⁵ | 2.65 |
| 2001 | NA | NA | NA | NA | 19,050 | 0.40 | 4,921 ⁵ | 21.25 |
| 2002 | NA | NA | 4,325 ³ | 0.27 | 19,488 | 2.27 | 5,101 ⁵ | 3.59 |
| 2003 | NA | NA | NA | NA | 19,860 | 1.89 | 5,402 ⁵ | 5.73 |
| 2004 | NA | NA | 4,626 ² | 3.36 | 19,998 | 0.69 | 5,850 ⁵ | 7.97 |
| 2005 | 76,478 | 1.91 ⁶ | NA | NA | 20,167 | 0.84 | 6,942 ⁵ | 17.11 |
| 2006 | 79,025 | 3.28 | NA | NA | 20,466 | 1.47 | 8,500 ⁷ | 10.34 |
| 2010 | 85,067 | 1.84 | NA | NA | 21,567 | 1.31 | NA | NA |
| 2015 | NA | NA | NA | NA | 22,976 | 1.27 | 13,800 ⁷ | 5.8 |
| 2020 | 101,932 | 1.81 | NA | NA | 24,485 | 1.27 | NA | NA |
| 2025 | NA | NA | NA | NA | 25,883 | 1.11 | 21,700 ⁷ | 4.5 |
| 2030 | NA | NA | NA | NA | 27,378 | 1.12 | NA | NA |

¹. From Greenville Utilities Commission Water System Master Plan (Black and Veatch, not yet published).

². From Town of Farmville.

³. From 2002 Town of Farmville Local Water Supply Plan.

⁴. From N.C. Demographics Unit.

⁵. From N.C. Division of Water Resources.

⁶. Average Annual Historical Growth Rate (2000 – 2005).

⁷. Town of Winterville Water and Wastewater System Master Plan (Black & Veatch, not yet published).

NA = Data Not Available

Greenville Utilities Commission Interbasin Transfer Petition

Necessity, Reasonableness, and
Beneficial Effects of Transfer



2.2 Water Demand Projections

Historical water use data and water demand projections were collected for GUC, Greene County, the Town of Farmville, and the Town of Winterville and summarized in Table 2-2. Water demand projections provided by Greene County, the Town of Farmville, and the Town of Winterville were based on average day demands (ADD). Maximum day demand (MDD) projections were developed using historical MDD and ADD peaking factors.

The projected water demands for Farmville, Winterville, and Greene County were used in combination with the Approved Base Rate (ABR) of each municipality to determine estimated bulk purchases from GUC needed in 2008 and beyond in order for these water systems to comply with the CCPCUA rules. This Estimated Minimum Purchase is equal to the required reduction in well pumping to meet CCPCUA rules and is stated in the bulk sales contracts between GUC and its wholesale customers: Farmville, Greene County, and Winterville.

2.3 Need for Additional Water Supply

In order to comply with CCPCUA rules for the Cretaceous aquifer and continue to meet customer demands, the Town of Farmville, Town of Winterville, and Greene County plan to purchase bulk finished water from GUC. GUC relies on the Tar River for its water supply, and the Town of Farmville and the majority of Greene County are located within the Neuse River Contentnea Creek subbasin. Farmville and Greene County discharge wastewater into the Contentnea Creek subbasin via centralized treatment or on-site septic systems. Therefore, sales of finished water to the Town of Farmville and Greene County will constitute an interbasin transfer from the Tar River subbasin to the Neuse River Contentnea Creek subbasin. The Town of Winterville water and wastewater systems and the southwestern portion of Greene County are located within the Neuse River subbasin. Therefore, sales of finished water to the Town of Winterville and Greene County will constitute an interbasin transfer from the Tar River subbasin to the Neuse River subbasin.

GUC has signed bulk sales agreements with Farmville, Greene County, and Winterville (wholesale customers). The bulk sales agreements stipulate an Estimated Minimum Purchase, which is equal to the required reduction in well pumping to meet CCPCUA rules. Table 2-3 provides a summary of maximum day demands for GUC, the Estimated Minimum Purchases from each wholesale customer, and the resulting maximum day water demand for all four systems. In 2030, the total maximum day water demand is projected to be 22.2 mgd, not to exceed the current WTP capacity of 22.5 mgd. Therefore, a plant capacity expansion for GUC is not requested as part of this project. The bulk sales contracts also stipulate that GUC may limit distribution to Winterville, Farmville, and Greene County when GUC experiences peak demands. GUC's wholesale customers will rely on well pumping to meet demands during peak periods, and GUC will provide sufficient water during the remainder of the year to allow its customers to meet CCPCUA rules.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Necessity, Reasonableness, and
Beneficial Effects of Transfer

Table 2-2: Historical and Projected Water Demands

| Year | Greenville Utilities Commission ⁷ | | Farmville ⁸ | | Greene County ⁹ | | Winterville ¹⁰ | |
|------|--|--------------------------|--------------------------|--------------------------|----------------------------|--------------------------|---------------------------|--------------------------|
| | Average Day Demand (mgd) | Maximum Day Demand (mgd) | Average Day Demand (mgd) | Maximum Day Demand (mgd) | Average Day Demand (mgd) | Maximum Day Demand (mgd) | Average Day Demand (mgd) | Maximum Day Demand (mgd) |
| 1990 | 8.94 ¹ | NA | 2.17 ³ | 3.20 ³ | NA | NA | NA | NA |
| 1995 | 9.67 ¹ | NA | 1.60 ³ | 2.38 ³ | NA | NA | NA | NA |
| 2000 | 10.06 ¹ | 14.17 ¹ | 1.57 ³ | 2.43 ³ | 1.12 ⁵ | 1.83 ⁵ | 0.463 ⁵ | 0.667 ⁵ |
| 2005 | 10.03 ¹ | 14.71 ¹ | 1.66 ³ | 2.74 ³ | 1.19 ⁵ | 2.22 ⁵ | 0.706 ⁵ | 1.32 ⁵ |
| 2006 | 10.19 ¹ | 15.28 ¹ | NA | NA | NA | NA | NA | NA |
| 2007 | 10.34 ² | 15.51 | NA | NA | NA | NA | 0.80 ⁶ | 1.44 |
| 2008 | 10.50 ² | 15.75 | 1.87 ⁴ | 3.18 | 2.31 ⁴ | 4.04 | 0.85 | 1.53 |
| 2009 | 10.65 ² | 15.98 | 1.89 ⁴ | 3.22 | 2.35 ⁴ | 4.11 | 0.90 | 1.62 |
| 2010 | 10.81 ² | 16.21 | 1.91 ⁴ | 3.25 | 2.39 ⁴ | 4.18 | 0.95 | 1.71 |
| 2015 | 11.19 ² | 16.78 | 2.01 ⁴ | 3.41 | 2.60 ⁴ | 4.54 | 1.20 | 2.16 |
| 2020 | 11.57 ² | 17.35 | 2.11 ⁴ | 3.59 | 2.80 ⁴ | 4.90 | 1.55 | 2.79 |
| 2025 | 11.95 ² | 17.92 | 2.22 ⁴ | 3.77 | 3.01 ⁴ | 5.27 | 1.93 | 3.47 |
| 2030 | 12.33 ² | 18.49 | 2.33 ⁴ | 3.96 | 3.22 ⁴ | 5.64 | 2.00 | 3.60 |

¹ Historical data from Greenville Utilities Commission.

² ADD demands based on a linear projection of historical demands (1990 – 2005).

³ Town of Farmville Water production data.

⁴ Water Supply Agreement with Greenville Utilities Commission.

⁵ Data from Division of Water Resources.

⁶ Data from the Town of Winterville.

⁷ Per capita water use (residential, commercial, and institutional) for GUC is approximately 120 gpcd.

⁸ Per capita water use for Farmville (residential) is estimated between 90 and 120 gpcd. Farmville has a large industrial percentage of water use (39%). The large industrial water use in addition to the scarcity of population data has resulted in inaccurate per capita use values.

⁹ Per capita water use (residential, commercial, and institutional) for Greene County is approximately 115 gpcd.

¹⁰ Per capita water use (residential, commercial, and institutional) for Winterville is approximately 90 gpcd.

NA = Data Not Available

**Greenville Utilities Commission
Interbasin Transfer Petition**



Necessity, Reasonableness, and
Beneficial Effects of Transfer

Table 2-3: Maximum Day GUC Demands with Minimum Bulk Purchases

| Year | GUC Demands (mgd) ¹ | Estimated Minimum Purchase (mgd) | | | Total (mgd) |
|------|-----------------------------------|----------------------------------|---------------|-----------|----------------|
| | | Winterville | Greene County | Farmville | |
| 2008 | 15.83 | 0.12 | 0.74 | 0.39 | 17.09 |
| 2013 | 16.71 | 0.25 | 1.48 | 0.79 | 19.22 |
| 2018 | 17.28 | 0.37 | 2.22 | 1.18 | 21.05 |
| 2020 | 17.51 | 0.37 | 2.22 | 1.18 | 21.27 |
| 2025 | 18.08 | 0.37 | 2.22 | 1.18 | 21.84 |
| 2030 | 18.65 | 0.37 | 2.22 | 1.18 | 22.41 |
| 2035 | 19.22 | 0.37 | 2.22 | 1.18 | 22.98 |
| 2040 | 19.79 | 0.37 | 2.22 | 1.18 | 23.55 |

¹ Demands include minimum bulk sales to Stokes and Bethel.

2.4 Reasonableness of IBT Request

To support the Town of Farmville and Greene County's compliance with CCPCUA rules, GUC is requesting an IBT Certificate for the transfer from the Tar River subbasin to the Contentnea Creek subbasin. GUC is requesting an IBT Certificate for 8.3 mgd to meet Farmville and Greene County's maximum day demands through 2030. As part of the same Certificate, GUC requests the ability to transfer 9.3 mgd under emergency conditions to the Contentnea Creek subbasin.

GUC is also requesting an IBT Certificate for the transfer from the Tar River subbasin to the Neuse River subbasin to support the Town of Winterville's compliance with CCPCUA rules, and to support water use in the portion of the GUC service area within the Neuse River Basin. GUC is requesting an IBT Certificate for 4.0 mgd to meet Winterville's maximum day demands 2030. As part of the same Certificate, GUC requests the ability to transfer 4.2 mgd under emergency conditions to the Neuse River subbasin.

Detailed explanations of the IBT calculations are provided in Attachment B (IBT Management Strategy). The following sections provide a summary of these calculations.

2.4.1 Transfer from Tar River Basin to Neuse River Subbasin

IBT calculations for the transfer from the Tar River subbasin (Basin ID 15-1) to the Neuse River subbasin (Basin ID 10-1) are shown in the water balance Tables 2-4 and 2-5. Transfers to the Neuse River subbasin are a result of bulk sales to the Town of Winterville and the southwestern portion of Greene County as well as water use by GUC customers located in the Neuse River subbasin. IBT calculations are based on the following:

Greenville Utilities Commission Interbasin Transfer Petition



Necessity, Reasonableness, and
Beneficial Effects of Transfer

- Peak day demands for GUC are calculated based on a MDD:ADD peaking factor of 1.50, based on historical demand trends.
- Peak day demands for the Town of Winterville are calculated based on a MDD:ADD peaking factor of 1.80, based on historical demand trends.
- Peak day demands for Greene County are calculated based on a MDD:ADD peaking factor of 1.75, based on historical demand trends.
- Consumptive water use for GUC is 20 percent based on historical operating records.
- Consumptive water use for Winterville and Greene County is assumed to be 30 percent.
- Process water use at the GUC WTP is 8 percent of raw water withdrawal based on operating records.
- The service area for the Town of Winterville is entirely within the Neuse River subbasin.
- The portion of Greene County in the Neuse River subbasin is estimated at 5 percent.
- The portion of GUC's service area in the Neuse River subbasin is estimated at 8 percent based on current water distribution system maps and the number of service connections located in the Neuse River subbasin.
- All wastewater produced in the GUC service area is returned to the Tar River Basin, with the exception of a limited number of septic tanks in the Neuse River Basin.
- All wastewater produced in the Winterville service area is discharged into the Neuse River subbasin.
- All wastewater produced in Greene County is disposed of by on-site septic systems.

In Table 2-4, the maximum day bulk sales projected for the Town of Winterville and portion of Greene County are used to determine the maximum day IBT amounts. The maximum day bulk sale represents the total peak day demands for the Winterville and Greene County service area less the average annual allowable well pumping rate.

In Table 2-5, the emergency bulk sales projected for the Town of Winterville and portion of Greene County are used to determine the emergency condition for the IBT. The emergency condition represents the total peak day demand for the Winterville and Greene County service area. This strategy will allow GUC to provide water to Winterville and Greene County in the event a catastrophic event was to occur, e.g. aquifer



**Greenville Utilities Commission
Interbasin Transfer Petition**

Necessity, Reasonableness, and
Beneficial Effects of Transfer

contamination, drought, or major mechanical or electrical failure. GUC requests that the IBT certificate be written such that notification would be required to DWR to trigger the emergency request.



**Greenville Utilities Commission
Interbasin Transfer Petition**

Necessity, Reasonableness, and
Beneficial Effects of Transfer

Table 2-4: Water Balance Table for Maximum Day Condition from the Tar River to the Neuse River Subbasin (Town of Winterville and Greene County)

| Year | GUC Water Demand | Winterville Water Demand | Greene County Water Demand | Withdrawal from Tar River | Consumptive Use | | | | | | | | | Wastewater Discharge | | WTP Dis-charge | Total Return to Tar River Basin | Inter-basin Transfer |
|------|------------------|--------------------------|----------------------------|---------------------------|-----------------|-----------------|-------------------|-------------|-----------------|-------------------|-------------|-----------------|-------------------|----------------------|-------------------|-----------------|---------------------------------|----------------------|
| | | | | | GUC | | Winterville | | | Greene County | | | Tar River Basin | | Neuse River Basin | Tar River Basin | | |
| | | | | | % Tar River | Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | Tar River Basin | Neuse River Basin | Tar River Basin | | |
| 2005 | 14.71 | 1.32 | 0.11 | 17.43 | 92 | 2.71 | 0.24 | 0 | 0.0 | 0.40 | 0 | 0.0 | 0.11 | 11.8 | 0.9 | 1.3 | 15.8 | 1.7 |
| 2010 | 16.22 | 1.34 | 0.10 | 19.07 | 92 | 2.98 | 0.26 | 0 | 0.0 | 0.40 | 0 | 0.0 | 0.10 | 13.0 | 0.9 | 1.4 | 17.4 | 1.7 |
| 2015 | 16.79 | 1.91 | 0.16 | 20.36 | 92 | 3.09 | 0.27 | 0 | 0.0 | 0.57 | 0 | 0.0 | 0.16 | 13.4 | 1.3 | 1.5 | 18.0 | 2.3 |
| 2020 | 17.36 | 2.67 | 0.21 | 21.85 | 92 | 3.19 | 0.28 | 0 | 0.0 | 0.80 | 0 | 0.0 | 0.21 | 13.9 | 1.9 | 1.6 | 18.7 | 3.2 |
| 2025 | 17.93 | 3.34 | 0.23 | 23.21 | 92 | 3.30 | 0.29 | 0 | 0.0 | 1.00 | 0 | 0.0 | 0.23 | 14.3 | 2.3 | 1.7 | 19.3 | 3.9 |
| 2030 | 18.50 | 3.48 | 0.25 | 24.00 | 92 | 3.40 | 0.30 | 0 | 0.0 | 1.04 | 0 | 0.0 | 0.25 | 14.8 | 2.4 | 1.8 | 20.0 | 4.0 |
| 2035 | 19.07 | 3.48 | 0.26 | 24.63 | 92 | 3.51 | 0.31 | 0 | 0.0 | 1.04 | 0 | 0.0 | 0.26 | 15.3 | 2.4 | 1.8 | 20.6 | 4.0 |
| 2040 | 19.64 | 3.48 | 0.28 | 25.27 | 92 | 3.61 | 0.31 | 0 | 0.0 | 1.04 | 0 | 0.0 | 0.28 | 15.7 | 2.4 | 1.8 | 21.2 | 4.1 |



**Greenville Utilities Commission
Interbasin Transfer Petition**

Necessity, Reasonableness, and
Beneficial Effects of Transfer

Table 2-5: Water Balance Table for Emergency Condition from the Tar River to the Neuse River Subbasin (Town of Winterville and Greene County)

| Year | GUC Water Demand | Winterville Water Demand | Greene County Water Demand | Withdrawal from Tar River | Consumptive Use | | | | | | | | | Wastewater Discharge | | WTP Discharge | | Total Return to Tar River Basin | Inter-basin Transfer |
|------|------------------|--------------------------|----------------------------|---------------------------|-----------------|-----------------|-------------------|-------------|-----------------|-------------------|---------------|-----------------|-------------------|----------------------|-------------------|-----------------|-------------------|---------------------------------|----------------------|
| | | | | | GUC | | | Winterville | | | Greene County | | | Tar River Basin | Neuse River Basin | Tar River Basin | Neuse River Basin | | |
| | | | | | % Tar River | Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | Tar River Basin | Neuse River Basin | Tar River Basin | Neuse River Basin | | |
| 2005 | 14.71 | 1.32 | 0.11 | 17.43 | 92 | 2.71 | 0.24 | 0 | 0.0 | 0.40 | 0 | 0.0 | 0.11 | 11.8 | 0.9 | 1.3 | | 15.8 | 1.7 |
| 2010 | 16.22 | 1.71 | 0.21 | 19.58 | 92 | 2.98 | 0.26 | 0 | 0.0 | 0.51 | 0 | 0.0 | 0.21 | 13.0 | 1.2 | 1.4 | | 17.4 | 2.2 |
| 2015 | 16.79 | 2.16 | 0.23 | 20.71 | 92 | 3.09 | 0.27 | 0 | 0.0 | 0.65 | 0 | 0.0 | 0.23 | 13.4 | 1.5 | 1.5 | | 18.1 | 2.7 |
| 2020 | 17.36 | 2.79 | 0.25 | 22.02 | 92 | 3.19 | 0.28 | 0 | 0.0 | 0.84 | 0 | 0.0 | 0.25 | 13.9 | 2.0 | 1.6 | | 18.7 | 3.3 |
| 2025 | 17.93 | 3.47 | 0.26 | 23.39 | 92 | 3.30 | 0.29 | 0 | 0.0 | 1.04 | 0 | 0.0 | 0.26 | 14.3 | 2.4 | 1.7 | | 19.4 | 4.0 |
| 2030 | 18.50 | 3.60 | 0.28 | 24.17 | 92 | 3.40 | 0.30 | 0 | 0.0 | 1.08 | 0 | 0.0 | 0.28 | 14.8 | 2.5 | 1.8 | | 20.0 | 4.2 |
| 2035 | 19.07 | 3.60 | 0.30 | 24.80 | 92 | 3.51 | 0.31 | 0 | 0.0 | 1.08 | 0 | 0.0 | 0.30 | 15.3 | 2.5 | 1.8 | | 20.6 | 4.2 |
| 2040 | 19.64 | 3.60 | 0.32 | 25.44 | 92 | 3.61 | 0.31 | 0 | 0.0 | 1.08 | 0 | 0.0 | 0.32 | 15.7 | 2.5 | 1.9 | | 21.2 | 4.2 |

**Greenville Utilities Commission
Interbasin Transfer Petition**



Necessity, Reasonableness, and
Beneficial Effects of Transfer

2.5 Transfer from Tar River Basin to Contentnea Creek Subbasin

IBT calculations for the transfer from the Tar River subbasin (Basin ID 15-1) to the Contentnea Creek subbasin (Basin ID 10-2) are shown in water balance Tables 2-6 and 2-7. Transfers to the Contentnea Creek subbasin are a result of bulk sales to the Town of Farmville and Greene County.

- Peak day demands for the Town of Farmville are calculated based on a MDD:ADD peaking factor of 1.70, based on historical demand trends.
- Peak day demands for Greene County are calculated based on a MDD:ADD peaking factor of 1.75, based on historical demand trends.
- Consumptive water use for Farmville and Greene County is assumed to be 30 percent.
- Process water use at the GUC WTP is 8 percent of raw water withdrawal based on operating records.
- The service area for the Town of Farmville is entirely within the Contentnea Creek subbasin.
- The portion of Greene County in the Contentnea Creek subbasin is estimated at 95 percent.
- No wastewater produced in the Town of Farmville and Greene County service areas is returned to the Tar River subbasin.

In Table 2-6, the maximum day IBT amount was determined using the maximum day bulk sales projected for Greene County and the Town of Farmville. The maximum day bulk sales represents the total peak day demands for Greene County and Farmville less the average annual allowable well pumping rate.

In Table 2-7, the emergency bulk sales projected for Greene County and Farmville are used to determine the emergency condition for the IBT. The emergency condition represents the total peak day demand. This strategy will allow GUC to provide water to Greene County and Farmville in the event a catastrophic event was to occur, e.g. aquifer contamination, drought, or major mechanical or electrical failure. GUC requests that the IBT certificate be written such that notification would be required to DWR to trigger the emergency request.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Necessity, Reasonableness, and
Beneficial Effects of Transfer

**Table 2-6: Water Balance Table for Maximum Day Condition from the Tar River to the Contentnea Creek Subbasin
(Greene County and Town of Farmville)**

| Year | Farmville Water Demand | Greene County Water Demand | Total Bulk Sales to Contentnea Basin | Withdrawal from Tar Basin (associated with bulk sales only) | Consumptive Use | | | Wastewater Discharge | | WTP Discharge | Total Return to Tar River Basin | Interbasin Transfer |
|------|------------------------|----------------------------|--------------------------------------|---|-----------------|-----------------|------------------------|----------------------|------------------------|-----------------|---------------------------------|---------------------|
| | | | | | % Tar River | Tar River Basin | Contentnea Creek Basin | Tar River Basin | Contentnea Creek Basin | Tar River Basin | | |
| 2005 | 1.66 | 2.08 | 3.74 | 4.04 | 0 | 0.0 | 1.1 | 0.0 | 2.6 | 0.3 | 0.3 | 3.7 |
| 2010 | 2.07 | 1.87 | 3.93 | 4.25 | 0 | 0.0 | 1.2 | 0.0 | 2.8 | 0.3 | 0.3 | 3.9 |
| 2015 | 2.63 | 2.91 | 5.54 | 5.99 | 0 | 0.0 | 1.7 | 0.0 | 3.9 | 0.4 | 0.4 | 5.5 |
| 2020 | 3.19 | 3.95 | 7.15 | 7.72 | 0 | 0.0 | 2.1 | 0.0 | 5.0 | 0.6 | 0.6 | 7.1 |
| 2025 | 3.38 | 4.30 | 7.68 | 8.29 | 0 | 0.0 | 2.3 | 0.0 | 5.4 | 0.6 | 0.6 | 7.7 |
| 2030 | 3.57 | 4.65 | 8.22 | 8.88 | 0 | 0.0 | 2.5 | 0.0 | 5.8 | 0.7 | 0.7 | 8.3 |
| 2035 | 3.77 | 5.00 | 8.77 | 9.47 | 0 | 0.0 | 2.6 | 0.0 | 6.1 | 0.7 | 0.7 | 8.8 |
| 2040 | 3.98 | 5.35 | 9.33 | 10.08 | 0 | 0.0 | 2.8 | 0.0 | 6.5 | 0.7 | 0.7 | 9.3 |



**Greenville Utilities Commission
Interbasin Transfer Petition**

Necessity, Reasonableness, and
Beneficial Effects of Transfer

**Table 2-7: Water Balance Table for Emergency Condition from the Tar River to the Contentnea Creek Subbasin
(Greene County and Town of Farmville)**

| Year | Farmville Water Demand | Greene County Water Demand | Total Bulk Sales to Contentnea Basin | Withdrawal from Tar Basin (associated with bulk sales only) | Consumptive Use | | | Wastewater Discharge | | WTP Dis-charge | Total Return to Tar River Basin | Interbasin Transfer |
|------|------------------------|----------------------------|--------------------------------------|---|-----------------|-----------------|------------------------|----------------------|------------------------|-----------------|---------------------------------|---------------------|
| | | | | | % Tar River | Tar River Basin | Contentnea Creek Basin | Tar River Basin | Contentnea Creek Basin | Tar River Basin | | |
| 2005 | 1.66 | 3.64 | 5.30 | 5.73 | 0 | 0.0 | 1.6 | 0.0 | 3.7 | 0.4 | 0.4 | 5.3 |
| 2010 | 3.25 | 3.98 | 7.22 | 7.80 | 0 | 0.0 | 2.2 | 0.0 | 5.1 | 0.6 | 0.6 | 7.2 |
| 2015 | 3.41 | 4.32 | 7.73 | 8.35 | 0 | 0.0 | 2.3 | 0.0 | 5.4 | 0.6 | 0.6 | 7.7 |
| 2020 | 3.59 | 4.66 | 8.24 | 8.90 | 0 | 0.0 | 2.5 | 0.0 | 5.8 | 0.7 | 0.7 | 8.2 |
| 2025 | 3.77 | 5.01 | 8.78 | 9.48 | 0 | 0.0 | 2.6 | 0.0 | 6.1 | 0.7 | 0.7 | 8.8 |
| 2030 | 3.96 | 5.35 | 9.32 | 10.06 | 0 | 0.0 | 2.8 | 0.0 | 6.5 | 0.7 | 0.7 | 9.3 |
| 2035 | 4.17 | 5.70 | 9.87 | 10.66 | 0 | 0.0 | 3.0 | 0.0 | 6.9 | 0.8 | 0.8 | 9.9 |
| 2040 | 4.38 | 6.05 | 10.43 | 11.27 | 0 | 0.0 | 3.1 | 0.0 | 7.3 | 0.8 | 0.8 | 10.4 |

Greenville Utilities Commission Interbasin Transfer Petition

Necessity, Reasonableness, and
Beneficial Effects of Transfer



2.6 IBT Management Strategy

Greene County, the Town of Farmville, and the Town of Winterville have each entered into Water Purchase Agreements with GUC in response to the CCPCUA rules. Key provisions that are similar for each contract are as follows:

- Contract terms are valid for 40 years, beginning August 1, 2008.
- The minimum daily amount that GUC is committed to provide is equal to water supply reductions required by CCPCUA rules for each customer.
- Interruption or curtailment of water supply will occur no more than 10 percent of the time (36 days per year). GUC will provide at least a 24-hour notice prior to interruption or curtailment of water service.

GUC currently has system interconnections with the Town of Winterville. GUC has constructed a 24-inch transmission main to the end of its water system for the purposes of interconnecting to the Farmville and Greene County water systems. A Final Environmental Assessment for ten miles of finished water line and a booster pump station to support the IBT (2006, McDavid and Associates) has been approved with a FONSI for Greene County and Farmville.

The intent of the IBT Certificate to have an emergency condition as well as a maximum day demand condition is to allow flexibility for GUC to meet the needs of its wholesale customers during an emergency even if it occurs during a peak demand period. GUC also intends to help its wholesale customers meet peak demands if supply is available.

When GUC experiences peak demands, GUC may limit distribution to the wholesale customers as necessary. However, GUC will supply the wholesale customers with the Estimated Minimum Purchase. Wholesale customers will rely on well pumping to meet their customer's demands during those periods, and GUC will provide sufficient water during the remainder of the year to allow its customers to meet CCPCUA rules. In the event that GUC experiences a mechanical failure, pipeline break, an unusually high demand or other situation in its water system, the Water Purchase Agreements include a provision that allows GUC to curtail or interrupt service.

GUC and its wholesale customers will be required to balance requirements of two regulations: CCPCUA rules and requirements of the IBT Certificate. CCPCUA rules limit the amount of well pumping from the Cretaceous aquifer system over an annual period (i.e. total annual volume). The IBT Certificate will limit the transfer amount on a maximum day basis. The IBT management strategy was developed to meet the requirements of two sets of rules with different criteria.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Effects on the Source Basin

3. Effects on the Source Basin

This section summarizes the findings of the EA regarding the present and reasonably foreseeable future detrimental effects on the source river basin concerning:

- Water Supply Needs
- Wastewater Assimilation
- Water Quality
- Fish and Wildlife Habitat
- Hydroelectric Power Generation
- Navigation
- Recreation

3.1 Water Supply Needs

A hydrologic analysis was performed to assess the impact of the proposed interbasin transfer of water from the Tar to the Neuse and Contentnea Creek subbasins on flows in the Tar River (ENTRIX 2008). The hydrologic analysis included:

- Development of a long-term flow record at Greenville from existing USGS flow records.
- Generation of flow duration and other flow statistics to characterize the Tar River discharge at Greenville under existing conditions and 2030 future water use scenarios.
- A hydrologic accounting model using the long-term flow record, projected water usage, and wastewater discharge for multiple municipalities within the lower Tar River basin to determine future flow conditions with and without the GUC IBT.

ENTRIX (2008) developed a spreadsheet-based hydrologic model to account for all existing and projected future withdrawals from, and discharges to, the Tar River (greater than 100,000 gpd). Withdrawals and discharges were simulated over time to predict the effects on flow in the Tar River at Greenville. The model accounted for all withdrawals and discharges from the Rocky Mount dam downstream to the GUC WWTP discharge. The flow record developed for the Greenville gage was used as the base flow record for the simulations. Model simulations included the following scenarios:

1. Current flows with no IBT.
2. Current flows with 2030 average day IBT.
3. Current flows with 2030 Maximum Withdrawal IBT.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Effects on the Source Basin

4. Predicted 2030 flows with no IBT.
5. Predicted 2030 flows with 2030 average day IBT.
6. Predicted 2030 flows with 2030 Maximum Withdrawal IBT.

In March 2008, DWR requested that additional conservatism be built into the hydrologic analysis for the proposed IBT via two specific changes to the model input data. The first change requested by DWR was to subtract the 2002 GUC water withdrawals from the Tar River at the Greenville flow record for current conditions and 2030 conditions. This exercise double counts GUC water withdrawals for a number of years. The second change was to set up the model with the GUC wastewater discharge reduced by the amount of the maximum IBT. The results of these scenarios will be particularly conservative because the total volume of the GUC wastewater discharge will be removed from the Tar River in the 2002 scenario and for most months in the 2030 scenario. In reality, GUC would continue to treat and discharge wastewater effluent from its service area to the Tar River. Table 3-1 provides an explanation of the modeling scenarios.

Table 3-1: Explanation of Modeling Scenarios Used in the Tar River Water Balance

| | GUC Water Demand (mgd) | Neuse River Subbasin IBT (mgd) | Contentnea Subbasin IBT (mgd) | Total Water Use (mgd)² | WTP Capacity (mgd)³ | Comment |
|--|-------------------------------|---------------------------------------|--------------------------------------|--|---------------------------------------|--------------------------|
| <u>Current Conditions</u>¹ | | | | | | |
| No IBT | 10.91 | 0 | 0 | <u>10.91</u> | 23.76 | <u>modeling scenario</u> |
| Average Day IBT | 12.83 | 2.0 | 3.9 | <u>18.73</u> | 23.76 | <u>modeling scenario</u> |
| Maximum Withdrawal IBT | 18.65 | 3.9 | 9.6 | 32.15 | <u>23.76</u> | <u>modeling scenario</u> |
| <u>2030 Conditions</u>¹ | | | | | | |
| No IBT | 12.83 | 0 | 0 | <u>12.83</u> | 23.76 | <u>modeling scenario</u> |
| Average Day IBT | 12.83 | 2.0 | 3.9 | <u>18.73</u> | 23.76 | <u>modeling scenario</u> |
| Max Day IBT | 18.65 | 3.8 | 8.5 | 30.95 | 23.76 | ⁴ |
| Maximum Withdrawal IBT | 18.65 | 3.9 | 9.6 | 32.15 | <u>23.76</u> | <u>modeling scenario</u> |

¹ The daily water withdrawal data used for each model scenario have been underlined. The model runs evaluated the influence of 2030 average day IBT and 2030 maximum withdrawal IBT on both current flow and projected 2030 flow.

² The total withdrawal indicated in this column represents a yearly average. Total withdrawals were modeled by month using a composite monthly factor. The composite monthly factor was determined using six years of daily water withdrawal data from GUC.

³ The water treatment plant capacity of 22 mgd plus 8 percent process water.

⁴ The maximum day IBT scenario was not modeled in the water balance. In the 2030 condition, both the maximum day IBT and maximum withdrawal IBT scenarios exceed the water treatment plant capacity. Therefore, the water treatment plant capacity (plus process water) was used as the worst-case (maximum withdrawal) condition. There are three reasons to support this assumption: 1) the maximum day for the Neuse River subbasin, the Contentnea subbasin, and GUC are not expected to occur on the same day, 2) GUC's water purchase agreement contracts stipulate that GUC reserves the right to curtail water to Farmville, Winterville, and Greene County given the appropriate notice, and 3) Farmville, Winterville, and Greene County expect to use their banked water during periods of high water demand.

Greenville Utilities Commission Interbasin Transfer Petition



Effects on the Source Basin

ENTRIX tabulated and graphed the model results for each scenario in order to quantify and demonstrate the influence of the proposed IBT withdrawal on current and future flow conditions. The model results summarize the following statistics:

- Minimum, maximum, mean, the 95th, 50th, and 5th percentiles for flow.
- Flow that is equaled or exceeded for a specific percent of time (0 percent through 100 percent).
- Low flow details (25 to 16,000 cubic feet per second [cfs]): percent of time and average number of days flow is below a specific range.
- Percent of time on an annual basis that daily flows go below the 7Q10 flow and below 80 percent of the 7Q10 flow for the period of record.
- Average number of days per year that daily flows go below the 7Q10 flow and below 80 percent of the 7Q10 flow.

For ease of reference, the summary of the statistical results from the hydrologic analysis (ENTRIX, 2008) are presented in Tables 3-2 and 3-3. The lowest Tar River flow conditions are observed at the Greenville gage, the location downstream of the GUC water intake but upstream of the WWTP discharge. The effects of the proposed IBT appear to be negligible for both locations at average flow levels and higher. However, the effect of the proposed IBT appears to be slightly greater at the minimum-recorded flow of record where the stream flow becomes negative under the maximum IBT scenarios for 2030 conditions.

Tables 3-2 and 3-3 summarize the percent of time and the number of days (annually) that flows would be below the summer 7Q10 and below 80 percent of the 7Q10. At the Greenville gaging station, flows would be expected to drop below the 7Q10 1.3 percent of the time (4.7 days) each year for current conditions and 1.4 percent of the time (5.0 days) for 2030 conditions. With an average IBT withdrawal, flows are predicted to be below the 7Q10 1.6 percent of the time (5.8 and 5.9 days, respectively) for current and 2030 conditions. This percentage increases to 1.8 percent of the time (6.5 days) for the maximum expect IBT withdrawal.

At the location downstream of the WWTP, flows are predicted to drop below the 7Q10 1.0 percent of the time (3.7 days) for current conditions and are predicted to drop below 1.3 percent of the time (4.7 days) for 2030 conditions. For the average IBT withdrawal, flow would be expected to drop below the 7Q10 1.3 percent of the time (4.6 days) for the current conditions and 1.6 percent of the time (5.7 days) for 2030 conditions. The percentages increase to 1.5 percent and 1.7 percent of the time (5.4 and 6.3 days, respectively) for the current maximum IBT and 2030 maximum IBT, respectively. At the downstream location under the most conservative scenario where wastewater withdrawals are reduced by the amount of the IBT, the current flows are predicted to be below the 7Q10 1.8 percent of the time (6.4 days) and 2.1 percent of the time (7.7 days) in 2030.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Effects on the Source Basin

The results of the hydrologic modeling indicate that the proposed interbasin transfer from the Tar River to the Neuse and Contentnea Creek subbasins will have minimal impact on the existing stream flow at Greenville. The similarity in percentages and total number of days predicted below the 7Q10 between the No IBT, Average, Maximum, and two times the Maximum IBT scenarios indicate that the projected IBT quantities appear to have very little impact on flows in the Tar River at Greenville.

The estimated effects on Tar River flows associated with GUC's proposed IBT are based on projected flows estimated from the best available USGS hydrologic data for the lower Tar River. The flow data from the USGS gage at Tarboro were used to develop the long-term flow record for the Tar River at Greenville. Since the synthesized long-term flow record developed for Greenville (based on a 77 year flow record) was based on regression analyses, the predicted flows are more accurate on a weekly, monthly, or annual basis than individual days. The model is likely to accurately predict flow conditions over time and the distribution of flows over time. The estimated flow provided throughout the hydrologic analysis (ENTRIX 2008) should be interpreted as net freshwater flows delivered by the Tar River to the tidally-influenced section of the lower Tar River near Greenville.

It is challenging to fully understand and quantify the flow characteristics for the Tar River at Greenville. Current USGS techniques for low-flow analyses do not provide a means of accounting for tidal effect. The lower Tar River is influenced by tides to a point just upstream of the USGS gage at Greenville. The amount of tidal influence is variable and depends on weather, tidal phase, and river flow. The presence of tides in the Tar River at Greenville is more pronounced during low-flow periods. Monitoring conducted by GUC in 2002 and 2007 has demonstrated that the salt wedge moves further upstream during low flow conditions than during high flow conditions.

Under the model conditions where withdrawals and interbasin transfers have a small effect on net downstream river flow, tidal influences may be greater than the net amount of flow being delivered from upstream. The tidal influence from critically low periods may substantially ameliorate the impacts of IBT withdrawals. The tidal influence at Greenville was cited by GMA (2003) as one factor that provides downstream aquatic habitat protection during low flow at Greenville.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Effects on the Source Basin

Table 3-2: Summary of Flow Statistics (Flow in cfs and Percentiles) for Greenville Gaging Station and Downstream of Greenville WWTP (ENTRIX, 2008)

| Flow Statistics (cfs) ¹ | Greenville Gaging Station ² | | | | | | Downstream of Greenville WWTP ³ | | | | | | | |
|------------------------------------|--|---------|---------|-----------------------|---------|---------|--|---------|---------|-------------|-----------------------|---------|---------|-------------|
| | Current Scenarios | | | Future 2030 Scenarios | | | Current Scenarios | | | | Future 2030 Scenarios | | | |
| | No IBT | Avg IBT | Max IBT | No IBT | Avg IBT | Max IBT | No IBT | Avg IBT | Max IBT | 2xMax IBT * | No IBT | Avg IBT | Max IBT | 2xMax IBT * |
| Maximum | 31,866 | 31,855 | 31,849 | 31,872 | 31,860 | 31,854 | 31,878 | 31,866 | 31,860 | 31,849 | 31,875 | 31,863 | 31,858 | 31,840 |
| Minimum | 24 | 11 | 4 | 20 | 7 | -1 | 38 | 25 | 17 | 4 | 17 | 5 | -3 | -15 |
| Average | 2,524 | 2,513 | 2,505 | 2,525 | 2,513 | 2,505 | 2,537 | 2,526 | 2,518 | 2,506 | 2,529 | 2,518 | 2,509 | 2,492 |
| <u>Percentiles</u> | | | | | | | | | | | | | | |
| 95 th | 9,033 | 9,023 | 9,014 | 9,035 | 9,025 | 9,016 | 9,046 | 9,036 | 9,027 | 9,014 | 9,038 | 9,028 | 9,018 | 9,001 |
| 50 th (Mean) | 1,398 | 1,387 | 1,381 | 1,397 | 1,384 | 1,375 | 1,410 | 1,398 | 1,393 | 1,381 | 1,403 | 1,390 | 1,380 | 1,365 |
| 5 th | 229 | 216 | 210 | 228 | 215 | 208 | 242 | 229 | 222 | 210 | 231 | 219 | 211 | 194 |

¹ Based on long-term flow record of the Tar River at Tarboro extrapolated downstream.

² Flow at Greenville, NC, downstream of GUC water supply intake and upstream of Greenville wastewater discharge.

³ Flow at Greenville, NC, downstream of Greenville wastewater discharge

* This scenario increases the Greenville withdrawal by the Max IBT amount and decreases the Greenville WWTP discharge (not adjusted for the other IBT scenarios) by the Max IBT amount (effectively removing 2x the Max IBT amount from the Tar River flow). If the calculated discharge was below zero, the amount was entered as zero.

Table 3-3: Summary of Flow Statistics (Annual Percent of Time and Average Number of Days) for Greenville Gaging Station and Downstream of Greenville WWTP (ENTRIX, 2008)

| Flow Statistics (cfs) ¹ | Greenville Gaging Station ² | | | | | | Downstream of Greenville WWTP ³ | | | | | | | |
|--|--|---------|---------|-----------------------|---------|---------|--|---------|---------|-------------|-----------------------|---------|---------|-------------|
| | Current Scenarios | | | Future 2030 Scenarios | | | Current Scenarios | | | | Future 2030 Scenarios | | | |
| | No IBT | Avg IBT | Max IBT | No IBT | Avg IBT | Max IBT | No IBT | Avg IBT | Max IBT | 2xMax IBT * | No IBT | Avg IBT | Max IBT | 2xMax IBT * |
| <u>Percent of Time (per Year)</u> | | | | | | | | | | | | | | |
| 7Q10 (109 cfs) | 1.3% | 1.6% | 1.8% | 1.4% | 1.6% | 1.8% | 1.0% | 1.3% | 1.5% | 1.8% | 1.3% | 1.6% | 1.7% | 2.1% |
| 7Q10 x 80% (87.2 cfs) | 0.9% | 1.1% | 1.2% | 0.9% | 1.1% | 1.3% | 0.7% | 0.9% | 1.0% | 1.2% | 0.8% | 1.1% | 1.3% | 1.6% |
| <u>Average Number of Days (per Year)</u> | | | | | | | | | | | | | | |
| 7Q10 (109 cfs) | 4.7 | 5.8 | 6.4 | 5.0 | 5.9 | 6.5 | 3.7 | 4.6 | 5.4 | 6.4 | 4.7 | 5.7 | 6.3 | 7.7 |
| 7Q10 x 80% (87.2 cfs) | 3.3 | 3.9 | 4.5 | 3.3 | 4.1 | 4.9 | 2.5 | 3.2 | 3.6 | 4.5 | 3.1 | 3.8 | 4.6 | 5.8 |

¹ Based on long-term flow record of the Tar River at Tarboro extrapolated downstream.

² Flow at Greenville, NC, downstream of GUC water supply intake and upstream of Greenville wastewater discharge.

³ Flow at Greenville, NC, downstream of Greenville wastewater discharge

* This scenario increases the Greenville withdrawal by the Max IBT amount and decreases the Greenville WWTP discharge (not adjusted for the other IBT scenarios) by the Max IBT amount (effectively removing 2x the Max IBT amount from the Tar River flow). If the calculated discharge was below zero, the amount was entered as zero.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Effects on the Source Basin

3.2 Wastewater Assimilation

The results of the hydrologic modeling indicate that the proposed IBT will have minimal impact on the existing stream flow. Therefore, there are no expected impacts to the wastewater assimilation capacity of the Tar River subbasin.

3.3 Water Quality

Impacts to water quality within the source basin as a result of the proposed project are not anticipated. The NPDES permit for the GUC WWTP is not being modified as a result of the proposed IBT. Additionally, the results of the hydrologic modeling indicate that the proposed interbasin transfer from the Tar River to the Neuse and Contentnea Creek subbasins will have minimal impact on the existing stream flow at Greenville. It follows that water quality will not be significantly impacted.

3.4 Fish and Wildlife Habitat

Construction activities are not proposed in association with this project, and significant growth in these areas is not a component of this project or a reason for developing the interbasin transfer request. Therefore, no direct or indirect impacts to aquatic or terrestrial habitats within the source basin will occur from the proposed interbasin transfer. Indirect impacts to state and federally protected species are expected to be insignificant.

3.5 Hydroelectric Power Generation

No direct or indirect impacts to hydroelectric power generation within the Tar River subbasin will occur as a result of the proposed IBT.

3.6 Navigation

No direct or indirect impacts to navigation within the source basin will occur as a result of the proposed IBT.

3.7 Recreation

The proposed IBT will not have any direct or indirect impacts on recreation within the Tar River subbasin. The project will have minimal impact on the existing stream flow.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Effects on the Source Basin

3.8 Cumulative Effect on Source Basin of any Transfers or Consumptive Water Use Projected in Local Water Supply Plans

Cumulative impacts are impacts that result from the proposed project when added to other past, present, and reasonably foreseeable future activities. Cumulative impacts related to growth are expected to be essentially the same as those identified as secondary impacts. This proposed interbasin transfer project will not induce growth as this project is not being pursued for the management of growth. Rather, this project is requested to allow existing communities with groundwater systems to continue to serve their existing customers and future customers until 2030. Growth in the area is modest, at a rate of 1 to 3 percent for the larger communities (GUC, Greene County, and Farmville) and at slightly higher rates for smaller communities (Winterville). The issuance of an IBT certificate will not directly affect growth rate, final land use patterns, or development densities in the service area, as these have been determined by separate planning and political processes.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Detrimental Effects on the Receiving
Basins



4. Detrimental Effects on the Receiving Basins

This section summarizes the findings of the EA regarding the present and reasonably foreseeable future detrimental effects on the receiving river basins concerning:

- Water Quality
- Wastewater Assimilation
- Fish and Wildlife Habitat
- Navigation
- Recreation
- Flooding

4.1 Water Quality

The proposed IBT will not result in an increase in permitted wastewater flows being discharged into the receiving basins. No increase in WWTP capacity will be requested as a result of the proposed IBT. Primary impacts due to flows from these WWTPs have been addressed through NPDES permitting.

There may be indirect impacts to water quality as a result of growth in the receiving basins. However, this interbasin transfer project is primarily a replacement water supply project to allow the Town of Farmville, Greene County, and the Town of Winterville to comply with the CCPCUA rules. Significant growth in these areas is not a component of this project or a reason for developing the interbasin transfer request.

4.2 Wastewater Assimilation

No wastewater treatment facilities within the Contentnea Creek or Neuse River subbasins will be constructed or expanded as a result of the proposed IBT. Existing WWTPs in the receiving basins have already been permitted. Therefore, no direct impacts to wastewater assimilation will occur.

4.3 Fish and Wildlife Habitat

Construction activities are not proposed in association with this project, and significant growth in these areas is not a component of this project or a reason for developing the interbasin transfer request. Therefore, no direct or indirect impacts to aquatic or terrestrial habitats within the source basin will occur from the proposed interbasin transfer. Indirect impacts to state and federally protected species are expected to be insignificant.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Detrimental Effects on the Receiving
Basins

4.4 Navigation

No direct or indirect impacts to navigation within the receiving basins will occur as a result of the proposed IBT since stream flows are not expected to change. No expansions to existing WWTPs are proposed.

4.5 Recreation

No direct or indirect impacts to recreation within the receiving basins will occur as a result of the proposed IBT since streamflows are not expected to change. No expansions to existing WWTPs are proposed. Increased WWTP discharges as a result of the IBT will be within existing permit limits.

4.6 Flooding

Direct impacts to flooding as a result of increased stream flow are not expected to be significant. Increased WWTP discharges will be within permitted NPDES amounts. Impacts due to growth and development will not occur as a result of the proposed project.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Alternatives to Proposed Transfer

5. Alternatives to Proposed Transfer

5.1 No-Action Alternative

Under the no-action alternative, GUC would not sell finished water to the Town of Farmville, Town of Winterville, or Greene County. These communities would continue to rely on their existing groundwater systems to meet the needs of their service areas. The Town of Farmville, Town of Winterville, and Greene County are all required to comply with the CCPCUA rules. These communities must reduce their annual water use from the Cretaceous aquifer 25 percent by 2008, 50 percent by 2013, and 75 percent by 2018.

Average day demands will exceed the allowable groundwater well pumping rate in 2008 for Farmville, Winterville, and Greene County. The ADD for the Town of Farmville is 1.87 mgd for 2008 and is projected to be 2.33 mgd in 2030. The ADD in 2008 is greater than the 2008 allowable pumping rate of 1.13 mgd. The ADD for the Town of Winterville is 0.85 mgd in 2008 and is projected to be 2.0 mgd in 2030. The 2008 ADD is greater than the 2008 allowable pumping rate, indicating that there will be a capacity deficit within the service area for the first 25 percent reduction. In Greene County, the 2008 ADD is 2.31 mgd and is projected to increase to 3.2 mgd in 2030. The allowable withdrawal will reduce to 2.14 mgd in 2008 and to 0.715 mgd by 2030. Thus, in 2008 the Greene County ADD will be greater than the allowable withdrawal for the first 25 percent reduction. Table 5-1 summarizes the allowable pumping rates and average day demands for Farmville, Winterville, and Greene County. Maximum day demand projections are not provided in Table 5-1 since the average day demands exceed the capacity of these groundwater systems.

Table 5-1: Comparison of Allowable Pumping Rates with Average Day Demands

| Year | Farmville | | Winterville | | Greene County | |
|------|------------------------------|--------------------------|------------------------------|--------------------------|------------------------------|--------------------------|
| | Allowable pumping rate (mgd) | Average Day Demand (mgd) | Allowable pumping rate (mgd) | Average Day Demand (mgd) | Allowable pumping rate (mgd) | Average Day Demand (mgd) |
| 2008 | 1.13 | 1.87 | 0.37 | 0.85 | 2.14 | 2.31 |
| 2015 | 0.76 | 2.01 | 0.25 | 1.2 | 1.43 | 2.60 |
| 2020 | 0.38 | 2.11 | 0.12 | 1.55 | 0.71 | 2.80 |
| 2030 | 0.38 | 2.33 | 0.12 | 2.00 | 0.71 | 3.22 |

The no-action alternative is not a viable option for Farmville, Winterville, or Greene County. The average day water demands will exceed the allowable withdrawal rates set by the CCPCUA rules for all three service areas in 2008. Without provisions for an additional water supply, the Town of Farmville, Town of Winterville, and Greene County will not be able to meet the needs of their existing service areas. Additionally, these communities will be unable to compensate for the reduced groundwater withdrawals for predicted growth to 2030.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Alternatives to Proposed Transfer

5.2 Independent Water Supply

As an alternative to purchasing finished water from another utility, the Town of Farmville, the Town of Winterville, and Greene County could pursue the construction of an independent water supply and water treatment facility. A groundwater source from a different aquifer or surface water source are the two independent water supply alternatives. A 13.5 mgd water treatment facility would be required to meet the maximum day demand until 2030 (3.96 mgd for Farmville, 5.64 mgd for Greene County, and 3.6 mgd for Winterville).

Alternate aquifers to the Cretaceous aquifer are the principal aquifers Castle Hayne, Pee Dee, and Yorktown. The Castle Hayne aquifer is one of the most productive aquifers in North Carolina. The typical well yield from the Castle Hayne ranges from 200 to 500 gallons per minute (gpm). The Castle Hayne is a relatively shallow aquifer and would require a water treatment plant, most likely nanofiltration, to treat to drinking water standards. The Pee Dee aquifer is less shallow than the Castle Hayne, and well yields are typically around 200 gpm. A nanofiltration plant would also be required to treat to drinking water standards. The Yorktown aquifer is the most surficial aquifer of the three and has typical well yields of 90 gpm. A WTP and new well field were estimated to cost approximately \$70 million. However, capacity use rules are already in place for the Cretaceous aquifer, and DENR is currently investigating the possibility of capacity use regulations for other aquifers. Thus, a new groundwater source may not be a viable long-term water supply alternative.

The Tar River is a surface water supply source being used by Rocky Mount, Tarboro, and GUC. However, a Tar River water supply source for Greene County, Farmville and Winterville will require an interbasin transfer and possibly an instream flow study for a new withdrawal. The second potential water supply source in Greene County is Contentnea Creek. The 7Q10 at Contentnea Creek at U.S. 258 at Snow Hill (USGS gaging station 02091241) is 11 cfs. It is most likely that this water supply source would only be able to supply these communities with a maximum day demand until 2015. The construction of major water supply infrastructure to serve less than a ten-year period is not economical and does not adhere to sound engineering or management practices. A new reservoir on Contentnea Creek would increase the feasibility of this water supply alternative to meet maximum day demands until 2030 instead of 2015. However, the challenges associated with permitting, design, and construction of a new reservoir will significantly impact the near-term need for water due to the CCPCUA rules. In addition, the construction of the infrastructure to support a new water supply reservoir and WTP was estimated to cost over \$100 million.

An independent water supply alternative has been removed from consideration for several reasons. The construction of infrastructure to support a surface water supply will be cost prohibitive to these small communities. Furthermore, the first reduction in the current groundwater withdrawal will occur in 2008, leaving these communities in a water supply deficit in 2008 for the current average day demand.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Alternatives to Proposed Transfer

5.3 Participate in Neuse Regional Water and Sewer Authority

The Town of Farmville, Town of Winterville, and Greene County have all considered membership in the Neuse Regional Water and Sewer Authority (NRWASA). The NRWASA was formed in 2000 in order to develop regional solutions for water and wastewater. Current members include the Town of Ayden, Bell Arthur Water Corporation, Deep Run Water Corporation, Eastern Pines Water Corporation, Town of Grifton, City of Kinston, North Lenoir Water Corporation, and the Town of Pink Hill.

A regional water supply study was commissioned in 2000. The study recommended that a new 15 mgd WTP with a withdrawal from the Neuse River be constructed by the NRWASA. The project is currently under construction with a planned completion date in late 2008. The plant will be located in Lenoir County west of the City of Kinston. Bids were taken for the construction of the WTP and water transmission mains. The current construction cost is over \$115 million.

Raw water will be withdrawn from the Neuse River for the proposed NRWASA WTP. Therefore, an IBT Certificate would be required for the Town of Farmville and Greene County in the Contentnea Creek subbasin. This water supply alternative will not eliminate the need for an interbasin transfer. Additionally, the high cost of this capital improvements project was also cost prohibitive to these small communities. Therefore, this alternative was removed from consideration in the analysis.

5.4 Return of Water to Source Basin

Wastewater service in the area is not as widespread as water service. In Greene County, wastewater is treated at the Snow Hill WWTP, the Hookerton WWTP, and the Maury Sanitary Land District WWTP. In Pitt County, wastewater is treated at the Farmville WWTP, the Contentnea Creek WWTP, and the GUC WWTP. Wastewater from the Town of Winterville is currently treated at the Contentnea Creek WWTP. County residents within the unincorporated areas rely primarily on septic systems.

Table 5-2 provides a summary of the Greene and Pitt County WWTPs. A 2030 flow was projected for each community based on a linear extrapolation of discharge monitoring report (DMR) data from January 2002 until June 2007 or community population projections. The total wastewater plant capacity in Greene County is 0.785 mgd, of which 47 percent of this capacity is currently used. The total wastewater capacity in Pitt County is 6.35 mgd (not including GUC), of which 60 percent is currently used.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Alternatives to Proposed Transfer

Table 5-2: Summary of Wastewater Treatment Facilities in Greene and Pitt Counties

| | Snow Hill WWTP | Hookerton WWTP | Maury Sanitary Land District WWTP | Farmville WWTP | Contentnea Creek WWTP |
|-----------------------|---------------------------|--|--|---------------------------|---|
| Permit No. | NC0020842 | NC0025712 | NC0061492 | NC0029572 | NC0032077 |
| Receiving Stream | Contentnea Creek | Contentnea Creek | Contentnea Creek | Little Contentnea Creek | Unnamed Tributary to Contentnea Creek |
| River Basin | Neuse | Neuse | Neuse | Neuse | Neuse |
| County | Greene | Greene | Greene | Pitt | Pitt |
| Permitted Flow | 0.5 mgd | 0.06 mgd | 0.225 mgd | 3.5 mgd | 2.85 mgd |
| 12-month Average Flow | 0.195 mgd | 0.027 mgd | 0.144 mgd | 1.96 mgd | 1.87 mgd |
| Plant Capacity in Use | 39% | 45% | 64% | 56% | 65% |
| Projected 2030 Flow | 0.45 mgd ¹ | 0.10 mgd ¹ | 0.14 mgd ² | ~ 2.5 mgd ² | < 4 mgd ¹ |
| Comments | | Currently under an SOC for effluent BOD, TSS, and fecal coliform | | | Currently under an SOC for BOD and fecal coliform |

¹ Flow projections based on growth rate per Traffic Analysis Zone (TAZ) data.

² Flow projections based on linear extrapolation of DMR data.

Most of Greene County's population is on septic systems. Centralized wastewater treatment in Greene County is not present except for a few small wastewater treatment plants. A countywide sewer system would be required to send wastewater from Greene County back to the Tar River basin. If it is assumed that wastewater demand is 70 percent of the total water demand (less consumptive use), the current wastewater demand in Greene County is approximately 0.87 mgd. The closest existing WWTP that could treat this volume of wastewater is the GUC WWTP, which is located well over 20 miles from Snow Hill, a central location within the County. However, a centralized collection system would be required prior to pumping to the GUC facility. The second option is the construction of a new WWTP and collection system that would serve the entire county. However, effluent from a new wastewater treatment facility would also need to be pumped over 20 miles back to the Tar River basin. The construction of a countywide collection and/or treatment system, over \$150 million, will be cost prohibitive to these small communities.

Greenville Utilities Commission Interbasin Transfer Petition



Alternatives to Proposed Transfer

The Town of Farmville has a 3.5 mgd WWTP discharging to Little Contentnea Creek in the Contentnea Creek subbasin. The plant is operating between 50 and 60 percent of total capacity, and is not expected to require an expansion for the next 15 years. In order to transfer effluent back to the Tar River basin, the discharge would need to be moved approximately 8 miles to the Tar River. This infrastructure project has been estimated to cost \$20 million. This alternative will also be cost prohibitive for the Town of Farmville.

Wastewater from the Town of Winterville is currently treated at the Contentnea Creek WWTP. The Contentnea Creek WWTP discharges to an unnamed tributary to Contentnea Creek in the Neuse River basin. The Town of Winterville has had discussions with GUC concerning future wastewater service, but there are currently no immediate plans to proceed with this option due to the high capital costs.

5.5 Purchase Water from GUC – Selected Alternative

The selected alternative consists of the Town of Farmville, Town of Winterville, and Greene County purchasing finished water from GUC. GUC primarily serves the City of Greenville in the Tar River basin with the Tar River as the water supply source. The Town of Farmville and Greene County are located within the Contentnea Creek subbasin. Sale of finished water from GUC to the Town of Farmville and Greene County will constitute an IBT from the Tar River subbasin to the Contentnea Creek subbasin. The Town of Winterville is located within the Neuse River subbasin. Sale of finished water from GUC to the Town of Winterville will constitute an IBT from the Tar River subbasin to the Neuse River subbasin.

Purchasing water from GUC will allow the Town of Farmville, Town of Winterville, and Greene County to meet the water demands of their service areas while still complying with CCPCUA rules. By the year 2008, the average day demand for Farmville, Winterville, and Greene County will exceed the allowable groundwater well pumping rates. The year 2008 is the first 25 percent reduction in the ABR for each community.

The GUC WTP has sufficient plant capacity to provide water to the City of Greenville, Farmville, Winterville, and Greene County until 2030. In 2030, the total maximum day water demand with minimum bulk purchase is projected to be 22.2 mgd and will not exceed the current WTP capacity of 22.5 mgd. The signed bulk sales agreements with each community stipulate that GUC may limit distribution to Winterville, Farmville, and Greene County when GUC experiences peak demands. Farmville, Winterville, and Greene County will then rely on their groundwater systems and any banked water to meet peak demand for short periods.

The GUC water distribution system is also the closest in proximity to these communities. According to the Administrative Code, GUC is allowed to transfer up to 2 mgd without an IBT certificate. The proposed construction for the interconnection between GUC and the Town of Farmville and Greene County will occur in three phases. Phase 1A is 10 miles of waterline from the Frog Level area to Lang's Crossroads in Pitt County. Phase 1A also includes two new elevated storage tanks and two booster pump stations. This project has been recently bid for \$17,195,417.00. Phase 1B of the project is the Town of Farmville's water distribution system tie in at Lang's Crossroads. This project has not yet been bid; however, the engineer's

**Greenville Utilities Commission
Interbasin Transfer Petition**

Alternatives to Proposed Transfer

estimate for this phase is \$4.9 million. Phase 1C of the project is Greene County's water distribution system tie in at Lang's Crossroads. Approximately 12 miles of 16-inch pipe will tie in the Phase 1A project at Lang's Crossroad to Greene County's water distribution system in Murray via an existing elevated water storage tank. This project has not been bid; however, the engineer's estimate for this phase is \$8.6 million. The total cost of the proposed IBT project is \$30.7 million. The construction cost for this alternative is at least one-quarter or less than the infrastructure cost for the other water supply alternatives.

The selected alternative is the most cost effective and environmentally sound alternative to providing water to Farmville, Winterville, and Greene County. These three communities have been restricted on the use of their current groundwater source due to the CCPCUA rules. Other than the no-action alternative, any other water supply alternative will require the construction of a new water treatment plant and possibly a reservoir to meet the long-term water supply needs of these communities. Existing water treatment capacity will be used to serve these communities, thereby limiting the environmental impact of construction and the economic impact of funding a large-scale infrastructure project.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Impoundment Storage

6. Impoundment Storage

This criterion is not applicable to the proposed IBT.



**Greenville Utilities Commission
Interbasin Transfer Petition**

Multipurpose Reservoirs Constructed
by the United States Army Corps of
Engineers

**7. Multipurpose Reservoir Constructed by the United States Army Corps of
Engineers**

The water to be withdrawn or transferred will not be stored in a multipurpose reservoir constructed by the United States Army Corps of Engineers. Therefore, this criterion is not applicable to the proposed IBT.

**Greenville Utilities Commission
Interbasin Transfer Petition**



Water Shortage Response
and Conservation

8. Water Shortage Response and Conservation

GUC has implemented a Water Emergency Management Plan in their Utilities Ordinance. The Water Emergency Management Plan was revised to include triggers for implementation of the Stage 1, 2, and 3 conservation measures, effective July 29, 2008. In lieu of river flow, the implementation triggers are based on river level at the raw water intake or the salt wedge location from the raw water intake. Due to the tidal influence, river flow is not an appropriate trigger, since there have been many instances of net negative flow recorded but adequate water over the intake screens (indicating tidally influenced flow). Table 8-1 provides the implementation triggers for water restrictions.

**Table 8-1: Greenville Utilities Commission Water Shortage
Response Triggers**

| Stage | River Level at WTP Intake ¹ | | Salt Wedge Location from WTP Intake |
|-------|---|----|--|
| 1 | – 1.0 feet MSL | Or | 10 miles |
| 2 | – 1.5 feet MSL | Or | 7 miles |
| 3 | – 2.0 feet MSL | Or | 4 miles |

¹ The top elevation of the raw water intake screens are at – 2.5 feet mean sea level (MSL) and the mid-point of the screens are at elevation – 3.4 feet MSL. Therefore, when the river level is 1.5 feet above the top of the intake screen, Stage 1 restrictions are applied.

GUC Water Purchase Agreements with Farmville, Winterville, and Greene County stipulate that these systems implement the same water shortage response measures that GUC enacts. All of these communities have adopted GUC's water shortage response measures.

The stages of water conservation are described as follows:

1. Stage 1 – Water Conservation Alert: A Stage 1 water emergency may be declared in the event of an immediate water shortage or when there are three consecutive days when water demand exceeds 80 percent of water production capacity. During a declared Stage 1 water emergency, the following voluntary water conservation practices are encouraged:
 - a. Inspect and repair all faulty and defective parts of faucets and toilets.
 - b. Use shower for bathing rather than bathtub and limit shower to no more than 5 minutes.
 - c. Do not leave faucets running while shaving, brushing teeth, rinsing or preparing food.
 - d. Limit the use of clothes washers and dishwashers and when used, operate fully loaded.

**Greenville Utilities Commission
Interbasin Transfer Petition****Water Shortage Response
and Conservation**

- e. Limiting lawn watering to that necessary for plant survival. Water lawns before the peak demand hours of 6 to 10 p.m.
 - f. Limit vehicle washing.
 - g. Do not wash down outside areas such as sidewalks, driveways, patios, etc.
 - h. Installing water-saving showerheads and other devices.
 - i. Use disposable and biodegradable dishes where possible.
 - j. Install water-saving devices in toilets such as early closing flappers.
 - k. Limit hours of water-cooled air conditioners.
 - l. Do not fill swimming or wading pools.
2. Stage 2 – Water Shortage Warning: A Stage 2 water emergency may be declared in the event of an immediate water shortage or when there are two consecutive days when water demand exceeds 90 percent of the water production capacity. During a declared Stage 2 water emergency, the following activities are prohibited:
- a. Watering lawns, grass, shrubbery, trees, flowers, and vegetable gardens except by hand-held hose, container, or drip irrigation system. A person who regularly sells plants will be permitted to use water on their commercial stock. A golf course may water their greens. State, County and Town licensed landscape contractors may water by hand-held hose or drip irrigation any plants under a written warranty.
 - b. Filling swimming or wading pools, either newly constructed or previously drained. Make-up water for pools in operation will be allowed.
 - c. Using water-cooled air conditioners or other equipment, in which cooling water is not recycled, unless there are health and safety concerns.
 - d. Washing any type of mobile equipment including cars, trucks, trailers, boats, or airplanes. Any persons involved in a business of washing motor vehicles may continue to operate.
 - e. Washing outside surfaces such as streets, driveways, service station aprons, parking lots, or patios.
 - f. Washing the exterior of office buildings, homes, or apartments.
 - g. Using water for any ornamental fountain, pool, pond, etc.
 - h. Serving drinking water in food establishments, such as restaurants or cafeterias, unless requested to do so by a customer.

**Greenville Utilities Commission
Interbasin Transfer Petition**Water Shortage Response
and Conservation

- i. Using water from a public or private fire hydrant for any reason other than to suppress a fire or other public emergency or as authorized by the Town Manager or his authorized representative.
 - j. Using water to control or compact dust.
 - k. Intentionally wasting water.
 - l. Commercial and industrial water customers must achieve mandatory reductions in water usage through whatever means are available. A minimum reduction of 20 percent shall be the target; however, a greater target reduction percentage may be required depending on the severity of the water emergency. Compliance with the reduction target shall be determined by the General Manager or his authorized representative. Variances to the target reduction may be granted by the Town Manager or his authorized representative to designated public health facilities.
3. Stage 3 – Water Shortage Danger: A Stage 3 water emergency may be declared in the event of an immediate water shortage or when there is one day when water demand exceeds 100 percent of the water production capacity. During a declared Stage 3 water emergency the following activities are prohibited, in addition to activities prohibited under Stage 2:
 - a. Watering lawns, grass, shrubbery, trees, and flowers.
 - b. Washing motor vehicles at commercial car wash establishments.
 - c. Watering any vegetable garden except by hand-held hose, container, or drip irrigation.
 - d. Commercial and industrial water customers must achieve mandatory reductions in water usage through whatever means are available. A minimum reduction of 50 percent shall be the target; however, a greater target reduction percentage may be required depending on the severity of the water emergency. Compliance with the reduction target shall be determined by the General Manager or his authorized representative. Variances to the target reduction may be granted by the General Manager or his authorized representative to designated public health facilities.
 - e. In the event that the prohibition of the activities listed above is not sufficient to maintain an adequate supply of water for fire protection, all use of water for purposes other than maintenance of public health and safety is prohibited. Residential water use is limited to the amount necessary to sustain life through drinking, food preparation, and personal hygiene.

**Greenville Utilities Commission
Interbasin Transfer Petition****Water Shortage Response
and Conservation**

The General Manager or authorized representative can require that commercial and industrial water customers prepare plans detailing measures to be taken by them to achieve mandatory reductions in daily water usage during Stage 2 and Stage 3 emergencies. Such plans shall be completed within 60 calendar days after receipt of notice to prepare them.

Public or private water systems purchasing water from GUC were required to adopt and enforce this entire article as a condition of water service. These systems are required to enforce the water use restriction for the level of emergency.

Additionally, GUC and its wholesale customers strongly encourage the use of water saving devices. GUC is a licensed member of the national "Water Use it Wisely" campaign. The Energy Services and Public Information Offices incorporate water conservation messages into all communications. This includes preparation of fact sheets, television and radio advertisements, print ads, and billboards to provide local citizens with water conservation tips.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Compliance and Monitoring Plan

**9. Compliance and Monitoring Plan**

The proposed compliance and monitoring plan for the requested interbasin transfer certificate includes the following four elements, which are described in the sections below:

1. Quarterly Reports
2. Annual Reports
3. Status Reports
4. Water Shortage Response and Conservation

The details of monitoring and compliance will be specified in a Compliance and Monitoring Plan approved by DWR.

9.1 Quarterly Reports

At the end of each quarter, GUC will calculate the daily IBT amounts for that quarter and provide this information to DWR in a quarterly report. The quarterly reports will be submitted to DWR 45 days after the end of the quarter to allow for the staggered billing cycle to be included in the report.

The IBT calculations will be similar to those shown in the Water Balance Tables 2-4 through 2-7. GUC will maintain records of the following:

- Monthly metered water use by GUC during a billing cycle, with Tar and Neuse Subbasin customers delineated.
- Daily water purchased (metered) by the Town of Farmville.
- Daily water purchased (metered) by the Town of Winterville.
- Daily water purchased (metered) by Greene County.
- Monthly average day wastewater effluent discharge from the GUC WWTP.

GUC will geocode (via the GUC GIS database) those water customers located in the Neuse River subbasin so that the consumptive use for the GUC customers can be calculated. The consumptive use for Winterville, Farmville, and Greene County is not calculated. The entire metered water use to these communities is the transfer to each of the respective subbasins.

Table 9-1 provides a sample calculation for the IBT certificate. The IBT calculation would be determined on a monthly basis, but would be reported quarterly.

**Greenville Utilities Commission
Interbasin Transfer Petition**

Compliance and Monitoring Plan

**9.2 Annual Reports**

At the end of each calendar year, the quarterly IBT reports will be summarized in an annual report to DWR. The annual report will document the maximum day IBT amount for that year. The annual report will also document compliance with conditions, if any, that the EMC includes in the certificate.

Once an annual report indicates that a daily maximum IBT has exceeded 80 percent of the IBT specified on the certificate, GUC will begin monthly monitoring to DWR during the next calendar year. At the end of 45 days after each month, GUC will report IBT calculations and document the maximum IBT that occurred that month. GUC will also continue to submit annual reports and document compliance with any conditions the EMC includes in the IBT certificate.

9.3 Status Reports

At the end of each calendar year, if requested by DWR, GUC will provide status reports on specific measures or other activities discussed in the IBT petition. DWR will identify the specific measures/activities to be addressed.

9.4 Water Shortage Response and Conservation

At the end of each calendar year, if requested by DWR, GUC will provide a summary of any water shortage response and conservation measures discussed in the IBT petition. DWR will identify the specific measures/activities to be addressed.

Table 9-1: Interbasin Transfer Calculation Table from the Tar River to the Neuse River and Contentnea Subbasins

| Date | Tar | | Neuse | | Contentnea | | Neuse | | Contentnea | | Consumptive Use | | | | | | | | | Wastewater Discharge in Tar River Basin ¹¹ | Interbasin Transfer to Neuse River Subbasin ¹² | Interbasin Transfer to Contentnea Subbasin ¹³ |
|-----------|--|---|---|--|---|---|---|--|---|-------------|-----------------|-------------------|-------------|-----------------|-------------------|---------------------------|--------|---------|---------|---|---|--|
| | Total GUC Metered Water Use ¹ | GUC Metered Water Use for Customers in Tar River Basin ² | GUC Metered Water Use for Customers in Neuse River Basin ² | Winterville Metered Water Use ³ | Farmville Metered Water Use (Total Bulk Sales) ⁴ | Greene County Metered Water Use (Total Bulk Sales) ⁵ | Greene County Water Use in Neuse ⁶ | Water Use in Neuse River Subbasin (GUC, Winterville, Greene County) ⁷ | Water Use in Contentnea Subbasin (Farmville and Greene County) ⁸ | GUC | | | Winterville | | | Greene County / Farmville | | | | | | |
| | % Tar River | Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | Note 9 | Note 9 | Note 9 | Note 10 | | | |
| 1/1/2010 | 7.17 | 6.65 | 0.52 | 0.71 | 1.11 | 0.50 | 0.03 | 1.25 | 1.59 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.59 | |
| 1/2/2010 | 7.17 | 6.65 | 0.52 | 0.58 | 1.21 | 0.60 | 0.03 | 1.13 | 1.81 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.7 | 1.81 | |
| 1/3/2010 | 7.17 | 6.65 | 0.52 | 0.62 | 0.95 | 0.80 | 0.04 | 1.18 | 1.75 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.8 | 1.75 | |
| 1/4/2010 | 7.17 | 6.65 | 0.52 | 0.88 | 1.08 | 0.40 | 0.02 | 1.42 | 1.48 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.0 | 1.48 | |
| 1/5/2010 | 7.17 | 6.65 | 0.52 | 0.89 | 1.12 | 0.30 | 0.02 | 1.43 | 1.42 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.0 | 1.42 | |
| 1/6/2010 | 7.17 | 6.65 | 0.52 | 0.72 | 1.40 | 0.50 | 0.03 | 1.27 | 1.90 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.90 | |
| 1/7/2010 | 7.17 | 6.65 | 0.52 | 0.76 | 1.33 | 0.30 | 0.02 | 1.30 | 1.63 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.63 | |
| 1/8/2010 | 7.17 | 6.65 | 0.52 | 0.61 | 1.08 | 0.20 | 0.01 | 1.14 | 1.28 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.7 | 1.28 | |
| 1/9/2010 | 7.17 | 6.65 | 0.52 | 0.66 | 1.30 | 0.50 | 0.03 | 1.21 | 1.80 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.8 | 1.80 | |
| 1/10/2010 | 7.17 | 6.65 | 0.52 | 0.59 | 1.41 | 0.50 | 0.03 | 1.14 | 1.91 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.7 | 1.91 | |
| 1/11/2010 | 7.17 | 6.65 | 0.52 | 0.72 | 1.11 | 0.60 | 0.03 | 1.27 | 1.71 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.71 | |
| 1/12/2010 | 7.17 | 6.65 | 0.52 | 0.71 | 1.12 | 0.70 | 0.04 | 1.27 | 1.82 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.82 | |
| 1/13/2010 | 7.17 | 6.65 | 0.52 | 0.70 | 1.21 | 0.55 | 0.03 | 1.25 | 1.76 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.8 | 1.76 | |
| 1/14/2010 | 7.17 | 6.65 | 0.52 | 0.80 | 2.07 | 0.65 | 0.03 | 1.35 | 2.72 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.0 | 2.72 | |
| 1/15/2010 | 7.17 | 6.65 | 0.52 | 0.79 | 1.06 | 0.45 | 0.02 | 1.33 | 1.51 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.51 | |
| 1/16/2010 | 7.17 | 6.65 | 0.52 | 1.25 | 1.05 | 0.20 | 0.01 | 1.78 | 1.25 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.4 | 1.25 | |
| 1/17/2010 | 7.17 | 6.65 | 0.52 | 1.19 | 1.50 | 0.35 | 0.02 | 1.73 | 1.85 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.3 | 1.85 | |
| 1/18/2010 | 7.17 | 6.65 | 0.52 | 0.95 | 1.40 | 0.20 | 0.01 | 1.48 | 1.60 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.1 | 1.60 | |
| 1/19/2010 | 7.17 | 6.65 | 0.52 | 0.76 | 1.30 | 0.50 | 0.03 | 1.31 | 1.80 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.80 | |
| 1/20/2010 | 7.17 | 6.65 | 0.52 | 0.76 | 1.22 | 0.65 | 0.03 | 1.32 | 1.87 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.87 | |
| 1/21/2010 | 7.17 | 6.65 | 0.52 | 0.72 | 1.12 | 0.75 | 0.04 | 1.28 | 1.87 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.87 | |
| 1/22/2010 | 7.17 | 6.65 | 0.52 | 0.66 | 1.21 | 0.80 | 0.04 | 1.22 | 2.01 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.8 | 2.01 | |
| 1/23/2010 | 7.17 | 6.65 | 0.52 | 0.69 | 1.10 | 0.50 | 0.03 | 1.24 | 1.60 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.8 | 1.60 | |
| 1/24/2010 | 7.17 | 6.65 | 0.52 | 0.74 | 1.21 | 0.55 | 0.03 | 1.29 | 1.76 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.76 | |
| 1/25/2010 | 7.17 | 6.65 | 0.52 | 0.78 | 1.06 | 0.65 | 0.03 | 1.33 | 1.71 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.71 | |
| 1/26/2010 | 7.17 | 6.65 | 0.52 | 0.82 | 1.32 | 0.45 | 0.02 | 1.36 | 1.77 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.0 | 1.77 | |
| 1/27/2010 | 7.17 | 6.65 | 0.52 | 0.87 | 1.25 | 0.40 | 0.02 | 1.41 | 1.65 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.0 | 1.65 | |
| 1/28/2010 | 7.17 | 6.65 | 0.52 | 1.00 | 1.20 | 0.30 | 0.02 | 1.54 | 1.50 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.1 | 1.50 | |
| 1/29/2010 | 7.17 | 6.65 | 0.52 | 0.94 | 1.21 | 0.25 | 0.01 | 1.47 | 1.46 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 1.1 | 1.46 | |
| 1/30/2010 | 7.17 | 6.65 | 0.52 | 0.76 | 1.26 | 0.50 | 0.03 | 1.31 | 1.76 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.9 | 1.76 | |
| 1/31/2010 | 7.17 | 6.65 | 0.52 | 0.70 | 1.18 | 0.55 | 0.03 | 1.25 | 1.73 | 93% | 1.55 | 0.12 | 0% | 0.00 | Note 9 | 0% | 0.00 | Note 10 | 5.5 | 0.8 | 1.73 | |

¹ Data from GUC Utility Billing System, monthly average divided by the number of days in the billing cycle.
² Data from GUC Utility Billing System, Tar and Neuse Subbasins Geocoded by Subbasin. Monthly average divided by the number of days in the billing cycle.
³ Data from GUC Metering System for Winterville, collected and reported on a daily basis.
⁴ Data from GUC Metering System for Farmville/Greene County, collected and reported on a daily basis.
⁵ Data from Farmville/Greene County Metering System, collected and reported to GUC on a daily basis.
⁶ Data calculated as 5% of metered water use for the Neuse Subbasin in Greene County.
⁷ GUC metered water use in Neuse River Subbasin + Winterville metered water use + Greene County water use in Neuse Subbasin.
⁸ Farmville metered water use + Greene County metered water use - Greene County water use in Neuse Subbasin.
⁹ Consumptive use in Winterville is not calculated. The entire metered water use to Winterville is the Interbasin Transfer.
¹⁰ Consumptive use in Greene County and Farmville is not calculated. The entire metered water use to Farmville and Greene County is the Interbasin Transfer.
¹¹ Data reported as the monthly average WWTP discharge.
¹² Interbasin Transfer = Winterville metered water use + Greene County water use in Neuse River Subbasin + GUC consumptive use in Neuse River Subbasin.
¹³ Interbasin Transfer = Water use for Farmville and Greene County in the Contentnea Subbasin.
¹⁴ The total Interbasin Transfer is the sum of the Neuse River Subbasin and the Contentnea Subbasins, both located in the Neuse River Watershed.

**Greenville Utilities Commission
Interbasin Transfer Petition**

ARCADIS

Appendix A

Finding of No Significant Impact
(November 2008)



RECEIVED

B65

NOV 26 2008

ARCADIS G & M
of North Carolina, Inc.

North Carolina
Department of Administration

Michael F. Easley, Governor

Britt Cobb, Secretary

November 25, 2008

Ms. Mary Sadler
Greenville Utilities Commission
c/o ARCADIS G&M of NC, Inc.
801 Corporate Drive, Ste. 300
Raleigh, NC 27607

Re: SCH File # 09-E-4300-0104; EA/FONSI; Provide finished water by Interbasin Transfer from the Tar River subbasin to the Contentnea Creek subbasin (to Town of Farmville and Greene County) and to the Neuse River subbasin (to Town of Winterville), Pitt and Greene Counties

Dear Ms. Sadler:

The above referenced environmental impact information has been reviewed through the State Clearinghouse under the provisions of the North Carolina Environmental Policy Act.

Attached to this letter are comments made in the review of this document. Because of the nature of the comments, it has been determined that no further State Clearinghouse review action on your part is needed for compliance with the North Carolina Environmental Policy Act. The attached comments should be taken into consideration in project development.

Best regards.

Sincerely,

Valerie McMillan (576)

Valerie W. McMillan, Director
State Environmental Policy Act

Attachments

cc: Region Q
Region P

Mailing Address:
1301 Mail Service Center
Raleigh, NC 27699-1301

Telephone: (919)807-2425
Fax (919)733-9571
State Courier #51-01-00
e-mail valerie.w.mcmillan@doa.nc.gov

Location Address:
116 West Jones Street
Raleigh, North Carolina

NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

B66

STATE NUMBER: 09-E-4300-0104 H01
DATE RECEIVED: 10/17/2008
AGENCY RESPONSE: 11/19/2008
REVIEW CLOSED: 11/24/2008

MS MELBA MCGEE
CLEARINGHOUSE COORD
DENR LEGISLATIVE AFFAIRS
ARCHDALE BLDG - MSC # 1601
RALEIGH NC

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DENR - COASTAL MGT
DENR LEGISLATIVE AFFAIRS
DEPT OF CUL RESOURCES
DEPT OF TRANSPORTATION
EASTERN CAROLINA COUNCIL
MID EAST COMMISSION



PROJECT INFORMATION

APPLICANT: Greenville Utilities Commission

TYPE: State Environmental Policy Act

ERD: Environmental Assessment/Finding of No Significant Impact

DESC: Provide finished water by Interbasin Transfer from the Tar River subbasin to the Contentnea Creek subbasin (to Town of Farmville and Greene County) and to the Neuse River subbasin (to Town of Winterville), Pitt and Greene Counties

The attached project has been submitted to the N. C. State Clearinghouse for intergovernmental review. Please review and submit your response by the above indicated date to 1301 Mail Service Center, Raleigh NC 27699-1301. If additional review time is needed, please contact this office at (919)807-2425.

AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED:

NO COMMENT

COMMENTS ATTACHED

SIGNED BY: _____

DATE: _____

[Handwritten signature]
10/24/08

NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

Elena Talarca B67

STATE NUMBER: 09-E-4300-0104 H01
DATE RECEIVED: 10/17/2008
AGENCY RESPONSE: 11/19/2008
REVIEW CLOSED: 11/24/2008

MS SHIRLEY FOYE
CLEARINGHOUSE COORD
DEPT OF TRANSPORTATION
STATEWIDE PLANNING - MSC #1554
RALEIGH NC

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DENR - COASTAL MGT
DENR LEGISLATIVE AFFAIRS
DEPT OF CUL RESOURCES
DEPT OF TRANSPORTATION
EASTERN CAROLINA COUNCIL
MID EAST COMMISSION



PROJECT INFORMATION

APPLICANT: Greenville Utilities Commission
TYPE: State Environmental Policy Act
ERD: Environmental Assessment/Finding of No Significant Impact
DESC: Provide finished water by Interbasin Transfer from the Tar River subbasin to the Contentnea Creek subbasin (to Town of Farmville and Greene County) and to the Neuse River subbasin (to Town of Winterville), **Pitt and Greene Counties**

The attached project has been submitted to the N. C. State Clearinghouse for intergovernmental review. Please review and submit your response by the above indicated date to 1301 Mail Service Center, Raleigh NC 27699-1301. If additional review time is needed, please contact this office at (919)807-2425.

AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED:

- NO COMMENT
 COMMENTS ATTACHED

SIGNED BY: *Talarca*

DATE: 10/31/08



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

October 31, 2008

MEMORANDUM

TO: North Carolina State Clearinghouse

FROM: Elena Talanker, NCDOT Transportation Planning Branch

SUBJECT: Review of 09-E-4300-0104, Environmental; Assessment for Greenville Utilities Commission Interbasin Transfer in Pitt and Green Counties, NC.



It is recommended that work associated with the subject project be coordinated with the NCDOT Division 2 Engineer, Mr. C.E. (Neil) Lassiter, P.E. (252) 830-3490, to insure that there are no potential conflicts with NCDOT projects in the general area of the subject project.

I can be reached at (919)733-4705 and would be happy to discuss any related concerns you may have about the project.

ET

cc: Mr. C.E. (Neil) Lassiter, P.E., Division 2 Engineer

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
TRANSPORTATION PLANNING BRANCH
1554 MAIL SERVICE CENTER
RALEIGH NC 27699-1554



www.NCDOT.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH, NC 27601
Phone: 919-733-4705
Fax: 919-733-4705

NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

RECEIVED B69
OCT 20 2008

STATE NUMBER: 09-E-4300-0104 H01
DATE RECEIVED: 10/17/2008 RESERVATION OFFICE
AGENCY RESPONSE: 11/19/2008
REVIEW CLOSED: 11/24/2008

MS RENEE GLEDHILL-EARLEY
CLEARINGHOUSE COORD
DEPT OF CUL RESOURCES
ARCHIVES-HISTORY BLDG - MSC 4617
RALEIGH NC

CH 08 2170

REVIEW DISTRIBUTION
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DEPT OF CUL RESOURCES
DEPT OF TRANSPORTATION
EASTERN CAROLINA COUNCIL
MID EAST COMMISSION



OSA-

(110) Jesu
10/27/08

11/13/08

PROJECT INFORMATION

APPLICANT: Greenville Utilities Commission

TYPE: State Environmental Policy Act

ERD: Environmental Assessment/Finding of No Significant Impact

DESC: Provide finished water by Interbasin Transfer from the Tar River subbasin to the Contentnea Creek subbasin (to Town of Farmville and Greene County) and to the Neuse River subbasin (to Town of Winterville), **Pitt and Greene Counties**

The attached project has been submitted to the N. C. State Clearinghouse for intergovernmental review. Please review and submit your response by the above indicated date to 1301 Mail Service Center, Raleigh NC 27699-1301. If additional review time is needed, please contact this office at (919)807-2425.

AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED:

NO COMMENT

COMMENTS ATTACHED

SIGNED BY: Renee Gledhill-Earley by mpm

DATE: 11/4/2008

FINDING OF NO SIGNIFICANT IMPACT

ENVIRONMENTAL ASSESSMENT FOR THE GREENVILLE UTILITIES COMMISSION INTERBASIN TRANSFER

Pursuant to the requirements of the State Environmental Policy Act (G.S. 113A), an environmental assessment (EA) has been prepared to allow the Greenville Utilities Commission (GUC) to apply for two interbasin transfer (IBT) Certificates to provide finished water to the Town of Farmville (Pitt County), the Town of Winterville (Pitt County), and Greene County. The North Carolina Environmental Management Commission (EMC) enacted the Central Coastal Plain Capacity Use Area (CCPCUA) rules on August 1, 2002. The CCPCUA rules require groundwater users to reduce withdrawals from the Cretaceous aquifer in three phases between 2008 and 2018. Farmville, Winterville, and Greene County currently rely on the Cretaceous aquifer for their sole water supply, and therefore are significantly affected by the CCPCUA rules. These communities plan to purchase bulk finished water from GUC to comply with CCPCUA rules and continue to meet customer needs. However, the purchase of bulk finished water from GUC to the Town of Farmville and Greene County constitutes an IBT from the Tar River subbasin to the Contentnea Creek subbasin. Sale of finished water to the Town of Winterville constitutes an IBT from the Tar River subbasin to the Neuse River subbasin.

GUC is requesting an IBT Certificate for a water transfer from the Tar River subbasin to the Contentnea Creek subbasin to support the Town of Farmville and Greene County's compliance with CCPCUA rules. GUC is requesting an IBT Certificate in the amount of 8.3 mgd to meet Farmville and Greene County's maximum day demands through 2030. As part of the same Certificate, GUC requests the ability to transfer 9.3 mgd under emergency conditions to the Contentnea Creek subbasin.

GUC is also requesting an IBT Certificate for a water transfer from the Tar River subbasin to the Neuse River subbasin to support the Town of Winterville's compliance with CCPCUA rules, and to support water use in the portion of the GUC service area within the Neuse River Basin. GUC is requesting an IBT Certificate for 4.0 mgd to meet Winterville's maximum day demands through 2030. Additionally, GUC requests the ability to transfer 4.2 mgd under emergency conditions to the Neuse River subbasin.

A hydrologic analysis was performed for the Tar River to assess the hydrologic impact of the interbasin transfer of water from the Tar to the Neuse and Contentnea Creek subbasins. Results indicate that the proposed interbasin transfer from the Tar River to the Neuse and Contentnea Creek subbasins will have minimal impact on stream flow at Greenville. The differences in the flow data below the 7Q10 are not significantly different between the no IBT, average, and maximum withdrawal IBT scenarios for the current stream flow and the 2030 stream flow conditions. However, the existing periods of low flow, regardless of the significance of the resulting withdrawal scenario, may be ameliorated by the tidal influence.

No construction is proposed in conjunction with this interbasin transfer. Therefore, direct impacts to soils, topography, wetlands, protected species, or land use as a result of this proposed project are expected to be insignificant. Additionally, the proposed interbasin transfer will not result in significant indirect impacts. Significant growth in Farmville, Greene County, and Winterville is not a component of this project or a reason for developing the interbasin transfer request.

Based on the findings of the EA, the Division of Water Resources (DWR) has concluded that the proposed project will not result in significant impacts to the environment. This EA and Finding of No Significant Impact (FONSI) are prerequisites for the issuance of the requested IBT Certificates. An Environmental Impact Statement (EIS) will not be prepared for this project. This FONSI completes the environmental review record. The FONSI and EA will be available for inspection and comment for 30 days at the State Clearinghouse.



**Greenville Utilities Commission
Interbasin Transfer Petition**

Appendix B

Interbasin Transfer Management
Strategy for Greenville Utilities
Commission (ARCADIS 2008)

**MEMO**

To:
Greenville Utilities Commission
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Barrett Lasater
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From:
David S. Briley
Hunter Carson

Date:
January 15, 2008
Revised per DWR Comment September 2008

ARCADIS Project No.:
NC706015.0010

Subject:
Interbasin Transfer Management Strategy
Greenville Utilities Commission

1. Background

1.1 Central Capacity Use Regulations

In 2001, the North Carolina Environmental Management Commission (EMC) enacted the Central Coastal Plain Capacity Use Area (CCPCUA) rules. These regulations were developed as a control measure for groundwater use in the Cretaceous aquifers in response to decreasing groundwater levels and saltwater intrusion. The rules will be implemented over a ten year period with a goal to allow the Cretaceous aquifers to recharge and provide sustainable groundwater supply yields. The CCPCUA Cretaceous aquifer zones are illustrated in Figure 1.

The CCPCUA rules will require groundwater users located in the impacted areas to reduce their consumption in three phases between 2008 and 2018. The required reduction amounts are based on the location of the water use; in the dewatering zone or in the saltwater intrusion zone. The rules specify a percentage reduction in groundwater use from the Cretaceous aquifers from an approved base rate (ABR). The ABR for each groundwater user was determined by the North Carolina Division of Water Resources (DWR) based on historical annual water use from the Cretaceous aquifer system. GUC, Greene County, the Town of Farmville, and the Town of Winterville are located in the “dewatering zone.” The reductions required by the CCPCUA rules for water users in the “dewatering zone” are as follows:

- Phase I (2008) – Permittees in the dewatering zone will be required to reduce annual water use from Cretaceous aquifers by 25 percent from their ABR.

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- Phase II (2013) – Permittees in the dewatering zone will be required to reduce annual water use from Cretaceous aquifers by 50 percent from their ABR.
- Phase III (2018) – Permittees in the dewatering zone will be required to reduce annual water use from Cretaceous aquifers by 75 percent from their ABR.

At the end of each phase, the CCPCUA will be monitored to determine aquifer water level responses to the phased withdrawal reductions.

1.2 Purpose of IBT

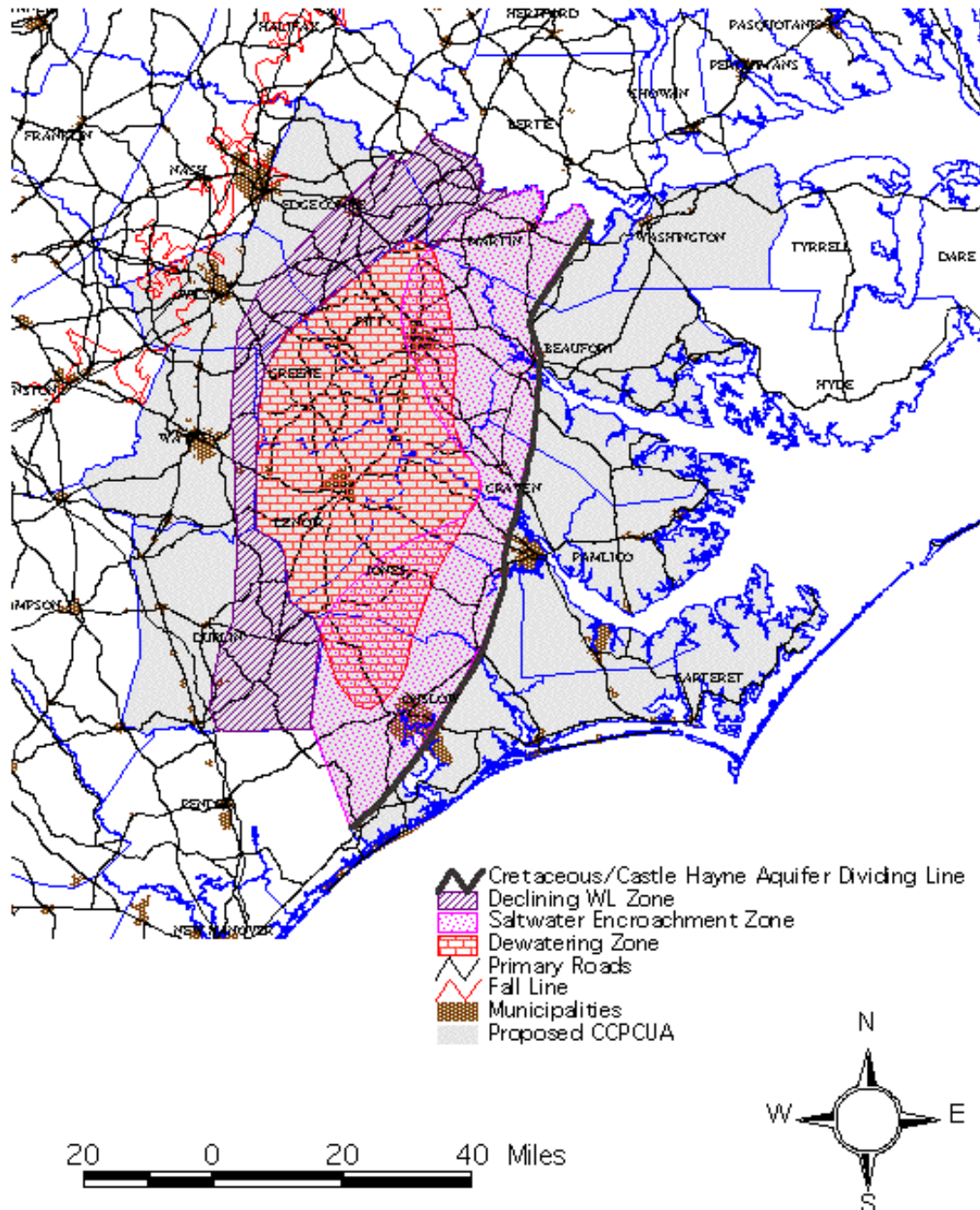
The Town of Farmville, Town of Winterville, and Greene County rely on the Cretaceous aquifers for water supply and are affected by the CCPCUA rules. To comply with CCPCUA reductions and meet customer demands, the Town of Farmville, Town of Winterville, and Greene County plan to purchase bulk finished water from GUC. However, GUC relies on the Tar River for its water supply, and the Town of Farmville and the majority of Greene County are located within the Contentnea Creek subbasin. Farmville and Greene County discharge wastewater into the Contentnea Creek subbasin via centralized treatment or on-site septic systems. Therefore, sales of finished water to the Town of Farmville and Greene County constitute an interbasin transfer from the Tar River subbasin to the Contentnea Creek subbasin (Figure 2). The Town of Winterville water system and the southwestern portion of Greene County are located within the Neuse River subbasin. Therefore, sales of finished water to the Town of Winterville and Greene County constitute an interbasin transfer from the Tar River subbasin to the Neuse River subbasin (Figure 2).

To support the Town of Farmville and Greene County's compliance with CCPCUA rules, GUC is requesting an IBT Certificate for the transfer from the Tar River subbasin to the Contentnea Creek subbasin. GUC is requesting an IBT Certificate for the maximum day amount of 8.3 million gallons per day (mgd) to meet customer needs through 2030. GUC also requests an emergency condition IBT of 9.3 mgd.





GUC is also requesting an IBT Certificate for the transfer from the Tar River subbasin to the Neuse River subbasin to support the Town of Winterville's compliance with CCPCUA rules, and to support water use in the portion of the GUC service area within the Neuse River Basin. GUC is requesting an IBT Certificate in the amount of 4.0 mgd to meet Winterville's needs and meet GUC customer demands through 2030. GUC also requests an emergency condition IBT of 4.2 mgd.

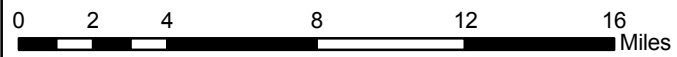
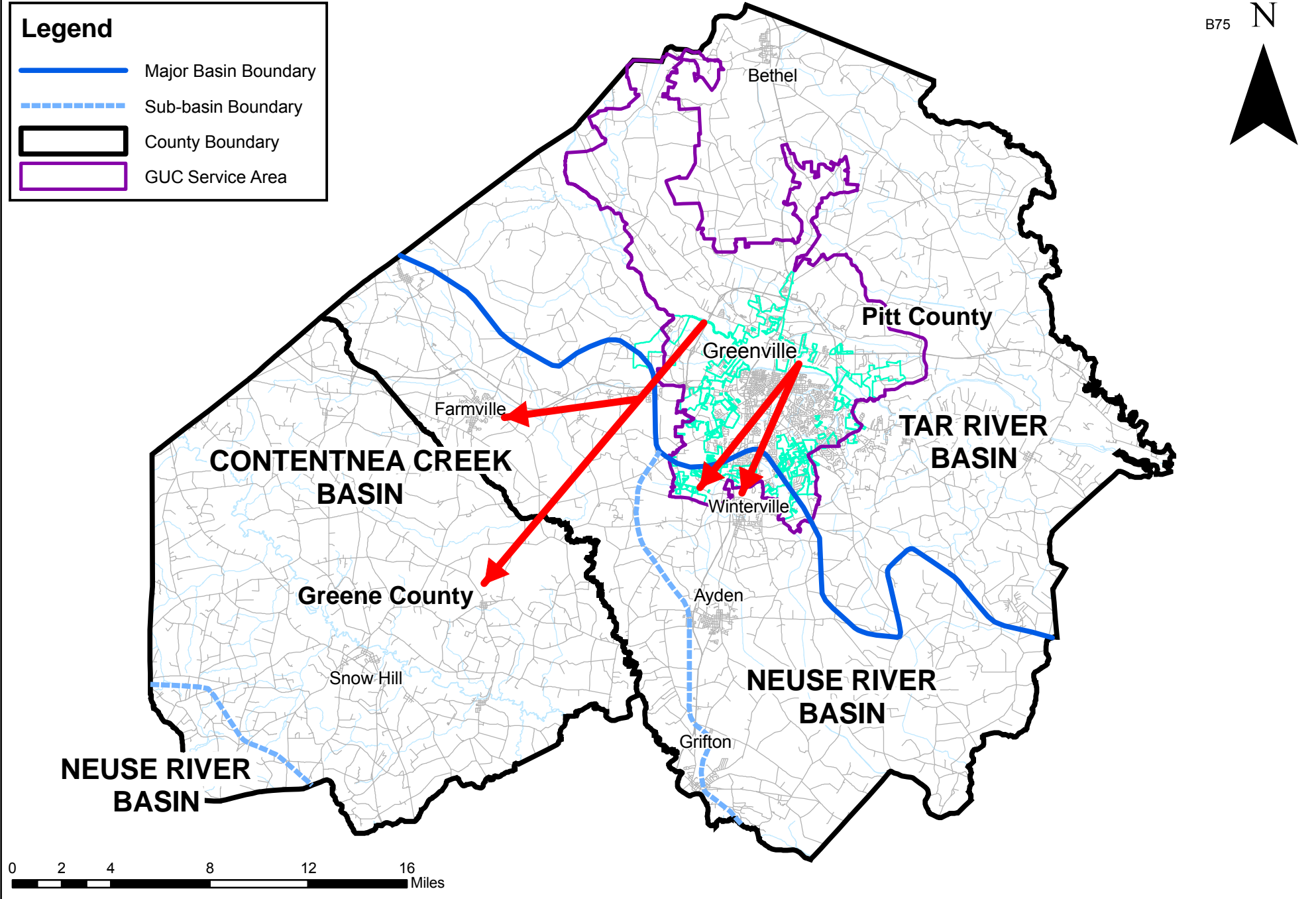
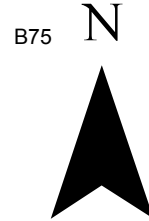
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Figure 1: CCPCUA Cretaceous Aquifer



Legend

-  Major Basin Boundary
-  Sub-basin Boundary
-  County Boundary
-  GUC Service Area



INTERBASIN TRANSFER (IBT) CERTIFICATION SCHEMATIC

Greenville Utilities Commission

9 March 2007

FIGURE 2



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2. Growth and Development

2.1 Population Projections

2.1.1 Greene County

Since 1990, Greene County's population has grown by over 5,000 individuals to 20,466 residents, which is almost a 25 percent increase according to 2006 statistics. Though largely agricultural, the County has a growing industrial community, which will continue to expand as the Global Transpark, a local business park, begins to take shape. According to the North Carolina State Demographics Unit, an annual growth rate of approximately 1 percent is expected in Greene County between 2010 and 2030. This is slightly lower than growth experienced during and in years before 2006. Assuming the estimated growth rate is accurate, the County's population is projected to exceed 27,000 residents by the year 2030 (Table 1).

2.1.2 Town of Farmville

The Town of Farmville has experienced limited growth in the last 15 years: 180 additional residents between 1990 and 2004. The Town does not consistently record yearly census data, nor have they conducted population projections for the near future. The population estimates available are from the Town of Farmville and from the Local Water Supply Plan, published by DWR (Table 1). Based on the observed historical growth percentage (0.28 percent annually between 1990 and 2004), the Town may expect to support a population of approximately 5,000 residents by the year 2030.

2.1.3 Town of Winterville

The Town of Winterville, located to the south of Greenville, has experienced increased growth and development in the past 15 years. The Town's population has more than doubled between 1990 and 2006, and grew by as much as 21.25 percent between 2000 and 2001. Between 2000 and 2006, Winterville's population increased at an average annual rate of 11 percent but it reached 17.1 percent between 2004 and 2005 (Table 1). The Town has commissioned a water system master plan but it has not yet been published. Population projections for Winterville were provided by the Town's master planning consultant. Based on its close proximity to the City of Greenville, growth in Winterville is expected to remain strong in the near future. At an annual growth rate between 4.5 percent and 5.8 percent, Winterville's population in 2025 is expected to reach approximately 21,700 residents (Table 1).

2.1.4 Greenville Utilities Commission

Greenville is the largest municipality in Pitt County, making up 48 percent of the total population in July 2005, according to the N.C. State Demographics Unit. East Carolina University, Pitt Memorial Hospital, and other businesses have attracted many residents to the area, bringing Greenville's population to 68,852 in 2005. The N.C. State Demographics Unit has predicted that Pitt County will grow to 153,411

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by 2010, and 192,493 by the year 2030. Assuming that Greenville continues to make up almost half of the County's population, the City will host approximately 100,000 residents by 2030.

GUC provides utility services to customers in the City of Greenville and some of the surrounding areas. According to 2005 census data from the N.C. State Demographics and projected values from the 2001 GUC Water System Master Plan, approximately 10 percent of the customers served by GUC live outside the City limits. GUC's service population has grown by an average annual rate of 1.91 percent between 2000 and 2005. Assuming an average annual growth rate of approximately 1.8 percent, population for the GUC service area is predicted to increase by approximately 25,000 persons between 2005 and 2020 (Table 1). By 2030, GUC may serve more than 110,000 customers.

Table 1: Historical and Projected Populations and Growth Rates

| Year | Greenville Utilities Commission | | Farmville | | Greene County | | Winterville | |
|------|---------------------------------|-----------------------|--------------------|-----------------------|-------------------------|-----------------------|---------------------|-----------------------|
| | Population ¹ | Annual Growth Rate, % | Population | Annual Growth Rate, % | Population ⁴ | Annual Growth Rate, % | Population | Annual Growth Rate, % |
| 1990 | NA | NA | 4,446 ² | NA | 15,384 | NA | 3,053 ⁵ | NA |
| 2000 | 69,507 | NA | 4,302 ² | - 0.33 | 18,974 | 2.10 | 3,979 ⁵ | 2.65 |
| 2001 | NA | NA | NA | NA | 19,050 | 0.40 | 4,921 ⁵ | 21.25 |
| 2002 | NA | NA | 4,325 ³ | 0.27 | 19,488 | 2.27 | 5,101 ⁵ | 3.59 |
| 2003 | NA | NA | NA | NA | 19,860 | 1.89 | 5,402 ⁵ | 5.73 |
| 2004 | NA | NA | 4,626 ² | 3.36 | 19,998 | 0.69 | 5,850 ⁵ | 7.97 |
| 2005 | 76,478 | 1.91 ⁶ | NA | NA | 20,167 | 0.84 | 6,942 ⁵ | 17.11 |
| 2006 | 79,025 | 3.28 | NA | NA | 20,466 | 1.47 | 8,500 ⁷ | 10.34 |
| 2010 | 85,067 | 1.84 | NA | NA | 21,567 | 1.31 | NA | NA |
| 2015 | NA | NA | NA | NA | 22,976 | 1.27 | 13,800 ⁷ | 5.8 |
| 2020 | 101,932 | 1.81 | NA | NA | 24,485 | 1.27 | NA | NA |
| 2025 | NA | NA | NA | NA | 25,883 | 1.11 | 21,700 ⁷ | 4.5 |
| 2030 | NA | NA | NA | NA | 27,378 | 1.12 | NA | NA |

¹. From Greenville Utilities Commission Water System Master Plan (Black and Veatch, not yet published).

². From Town of Farmville.

³. From 2002 Town of Farmville Local Water Supply Plan.

⁴. From N.C. Demographics Unit.

⁵. From N.C. Division of Water Resources.

⁶. Average Annual Historical Growth Rate (2000 – 2005).

⁷. Town of Winterville Water and Wastewater System Master Plan (Black & Veatch, not yet published).

NA = Data Not Available

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2.2 Water Demand Projections

Historical water use data and water demand projections were collected for GUC, Greene County, the Town of Farmville, and the Town of Winterville. These sources have been identified in Table 2. Water demand projections provided by Greene County, the Town of Farmville, and the Town of Winterville were based on average day demands (ADD). Maximum day demand (MDD) projections were developed using historical MDD and ADD peaking factors (Table 3). Water demand projections for each water system are presented in Section 2.2.1 through 2.2.4.

Projected water demands were used in combination with the ABR of each municipality to determine estimated bulk purchases from GUC needed in 2008 and beyond in order for these water systems to comply with the CCPCUA rules.

Greene County, Farmville, and Winterville have each expressed interest in the concept of “water banking” or “banking”. The concept of banking is based on a water system pumping less groundwater than allowed by the CCPCUA rules and off-sets reductions using a supplemental surface water supplier such as GUC. Banking reduces groundwater withdrawals faster than the CCPCUA rules mandate, but allows the water systems to use this banked water at a later time. This approach meets the average reduction requirement over the first two reduction phases, and still maintains a high level of protection for the Cretaceous aquifer system.

DWR has approved the concept of banking, but required that a letter of intent be submitted by each water system interested in pursuing a “Cretaceous water bank account”. Farmville, Winterville and Greene County have all been approved for banking. The letter of approval for Farmville and Greene County is attached to this memorandum. Along with the state’s approval, a set of guidelines were introduced to clarify the banking system. Guidelines that were included in the approval letter received by Farmville and Greene County dated July 6, 2004, included the following provisions:

- Present day through July 31, 2008 – The bank may be credited with the positive volume of water calculated by subtracting the actual annual use from the ABR.
- August 1, 2008 through July 31, 2013 – The bank may be credited with the positive volume of water calculated by subtracting the actual annual use from the ABR less Phase I reduction.
- August 1, 2013 through July 31, 2018 – The bank may be credited with the positive volume of water calculated by subtracting the actual annual use from the ABR less Phase II reduction.

Graphs depicting how the banking concept may be utilized by Farmville, Greene County, and Winterville are included in the following sections.

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Table 2: Water Demand Projections

| Year | Greenville Utilities Commission | | Farmville | | Greene County | | Winterville | |
|------|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | Average Day Demand (mgd) | Maximum Day Demand (mgd) | Average Day Demand (mgd) | Maximum Day Demand (mgd) | Average Day Demand (mgd) | Maximum Day Demand (mgd) | Average Day Demand (mgd) | Maximum Day Demand (mgd) |
| 1990 | 8.94 ¹ | NA | 2.17 ³ | 3.20 ³ | NA | NA | NA | NA |
| 1995 | 9.67 ¹ | NA | 1.60 ³ | 2.38 ³ | NA | NA | NA | NA |
| 2000 | 10.06 ¹ | 14.17 ¹ | 1.57 ³ | 2.43 ³ | 1.12 ⁵ | 1.83 ⁵ | 0.463 ⁵ | 0.667 ⁵ |
| 2005 | 10.03 ¹ | 14.71 ¹ | 1.66 ³ | 2.74 ³ | 1.19 ⁵ | 2.22 ⁵ | 0.706 ⁵ | 1.32 ⁵ |
| 2006 | 10.19 | 15.28 | NA | NA | NA | NA | NA | NA |
| 2007 | 10.34 | 15.51 | NA | NA | NA | NA | 0.80 ⁶ | 1.44 |
| 2008 | 10.50 | 15.75 | 1.87 ⁴ | 3.18 | 2.31 ⁴ | 4.04 | 0.85 | 1.53 |
| 2009 | 10.65 | 15.98 | 1.89 ⁴ | 3.22 | 2.35 ⁴ | 4.11 | 0.90 | 1.62 |
| 2010 | 10.81 ² | 16.21 | 1.91 ⁴ | 3.25 | 2.39 ⁴ | 4.18 | 0.95 | 1.71 |
| 2015 | 11.19 ² | 16.78 | 2.01 ⁴ | 3.41 | 2.60 ⁴ | 4.54 | 1.20 | 2.16 |
| 2020 | 11.57 ² | 17.35 | 2.11 ⁴ | 3.59 | 2.80 ⁴ | 4.90 | 1.55 | 2.79 |
| 2025 | 11.95 ² | 17.92 | 2.22 ⁴ | 3.77 | 3.01 ⁴ | 5.27 | 1.93 | 3.47 |
| 2030 | 12.33 ² | 18.49 | 2.33 ⁴ | 3.96 | 3.22 ⁴ | 5.64 | 2.00 | 3.60 |

¹ Historical data from Greenville Utilities Commission.

² ADD demands based on a linear projection of historical demands (1990 – 2005).

³ Town of Farmville Water production data.

⁴ Water Supply Agreement with Greenville Utilities Commission.

⁵ Data from Division of Water Resources.

⁶ Data from the Town of Winterville.

NA = Data Not Available


Table 3: Historical Peaking Factors

| Year | Greenville Utilities Commission | | | Farmville | | | Greene County | | | Winterville | | |
|------|---------------------------------|------------------|--------------------------|--------------------|------------------|--------------------------|--------------------|------------------|--------------------------|--------------------|------------------|--------------------------|
| | ADD ¹ | MDD ¹ | Peaking Factor (MDD:ADD) | ADD ² | MDD ² | Peaking Factor (MDD:ADD) | ADD ³ | MDD ³ | Peaking Factor (MDD:ADD) | ADD ³ | MDD ³ | Peaking Factor (MDD:ADD) |
| 1999 | 10.65 | 16.24 | 1.52 | 1.48 | 2.58 | 1.74 | 1.15 | 1.97 | 1.71 | 0.54 | 1.04 | 1.93 |
| 2000 | 10.06 | 14.17 | 1.41 | 1.57 | 2.43 | 1.55 | 1.12 | 1.83 | 1.63 | 0.46 | 0.67 | 1.44 |
| 2001 | 10.27 | 13.55 | 1.32 | 1.6 | 2.55 | 1.59 | NA | NA | NA | 0.48 | 0.75 | 1.58 |
| 2002 | 10.47 | 15.56 | 1.49 | 1.76 | 3.36 | 1.91 | 1.17 | 2.12 | 1.81 | 0.53 | 0.97 | 1.83 |
| 2003 | 9.21 | 12.83 | 1.39 | 1.71 | 2.74 | 1.60 | 1.89 | 2.68 | 1.42 | 0.53 | 1.20 | 2.25 |
| 2004 | 9.92 | 16.31 | 1.64 | 1.66 | 2.66 | 1.60 | 1.22 | 2.42 | 1.98 | 0.60 | 0.91 | 1.51 |
| 2005 | 10.03 | 14.71 | 1.47 | 1.66 | 2.74 | 1.65 | 1.19 | 2.22 | 1.87 | 0.71 | 1.32 | 1.87 |
| | MDD:ADD ratio | | 1.46 | MDD:ADD ratio | | 1.72 | MDD:ADD ratio | | 1.74 | MDD:ADD ratio | | 1.77 |
| | Peaking Ratio Used | | 1.50 | Peaking Ratio Used | | 1.70 | Peaking Ratio Used | | 1.75 | Peaking Ratio Used | | 1.80 |

¹ From Greenville Utilities Commission

² From Town of Farmville Water Production Data;

³ From N.C. Division of Water Resources;

NA = Data Not Available

ADD = Average Daily Demand

MDD = Maximum Daily Demand

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2.2.1 Greene County

Greene County is served by ten water systems. Greene County is serving as the lead agency on behalf of these water systems for the purposes of entering into bulk sales agreements with GUC. The water systems in Greene County are:

- Greene County Regional Water System
- Town of Snow Hill
- Town of Hookerton
- Town of Walstonburg
- South Greene Water Corporation
- Maury Sanitary District
- Ormondsville Water Corporation
- Arba Water Corporation
- Lizzie Water Corporation
- Jason-Shine Water Corporation

In 2005, Greene County had an average day demand of 1.19 mgd and a maximum day demand of 2.22 mgd (Table 2). By the year 2030, the County's water demands are projected to increase to 3.22 mgd on an average daily basis and to 5.64 mgd during peak day demands. Peak day demands were projected using a historical peaking factor of 1.75 (Table 3).

The ABR approved for Greene County is 1,079.8 million gallons per year (MGY), which translates to an average annual pumping rate of 2.96 mgd. Greene County will be required to reduce annual withdrawals as required by the CCPCUA rules (Table 4).

Table 4: Annual Withdrawal Rates Required by CCPCUA Rules for Greene County

| Year | Total Annual Withdrawal (MGY) | Average Annual Withdrawal (mgd) |
|------|-------------------------------|---------------------------------|
| ABR | 1079.8 | 2.96 |
| 2008 | 810 | 2.22 |
| 2013 | 540 | 1.48 |
| 2018 | 270 | 0.74 |

The County intends to bank water by pumping 50 percent of its allowed pumping rate during Phase 1 (2008 through 2013), and 75 percent of its allowed pumping rate during Phase II (2013 through 2018). Proposed banking amounts are included in Table 5 and a graphical interpretation is shown in Figure 3. Water banking will serve as a buffer for the County's water supply during peak demand periods or drought conditions, and will provide flexibility in its well pumping. Between 2008 and 2018, the County will bank approximately 2,700 MG, or 7.4 mgd of pumping capacity, and intends to distribute the capacity equally over the following 20 years (2018 through 2037).


Table 5: Water Demand Projections and Summary of Greene County Water Operations

| Year | Projected System Demand (mgd) ¹ | Allowable Well Pumping Rate (mgd) ² | Supplemental Water | | Estimated Minimum Purchase (mgd) ⁴ | Water to be Banked (mgd) ^{5,6} |
|------|--|--|---|------------------------------|---|---|
| | | | Average Day Bulk Sales (mgd) ³ | Maximum Day Bulk Sales (mgd) | | |
| 2008 | 2.31 | 2.22 | 1.20 | 1.82 | 0.74 | 1.11 |
| 2009 | 2.35 | 2.22 | 1.24 | 1.89 | 0.74 | 1.11 |
| 2010 | 2.39 | 2.22 | 1.28 | 1.96 | 0.74 | 1.11 |
| 2011 | 2.43 | 2.22 | 1.32 | 2.04 | 0.74 | 1.11 |
| 2012 | 2.47 | 2.22 | 1.36 | 2.11 | 0.74 | 1.11 |
| 2013 | 2.51 | 1.48 | 1.77 | 2.92 | 1.48 | 0.37 |
| 2014 | 2.56 | 1.48 | 1.82 | 2.99 | 1.48 | 0.37 |
| 2015 | 2.60 | 1.48 | 1.86 | 3.06 | 1.48 | 0.37 |
| 2016 | 2.64 | 1.48 | 1.90 | 3.13 | 1.48 | 0.37 |
| 2017 | 2.68 | 1.48 | 1.94 | 3.21 | 1.48 | 0.37 |
| 2018 | 2.72 | 0.74 | 2.35 | 4.02 | 2.22 | 0.37 |
| 2020 | 2.80 | 0.74 | 2.43 | 4.16 | 2.22 | - 0.37 |
| 2025 | 3.01 | 0.74 | 2.64 | 4.53 | 2.22 | - 0.37 |
| 2030 | 3.22 | 0.74 | 2.85 | 4.90 | 2.22 | - 0.37 |
| 2035 | 3.43 | 0.74 | 3.06 | 5.26 | 2.22 | - 0.37 |
| 2040 | 3.64 | 0.74 | 3.27 | 5.63 | 2.22 | NA |
| 2045 | 3.85 | 0.74 | 3.48 | 6.00 | 2.22 | NA |
| 2048 | 3.98 | 0.74 | 3.61 | 6.22 | 2.22 | NA |

¹ Projected system demands provided by McDavid Associates, Inc.

² The allowable well pumping rate is based on an approved ABR of 1,079,800,000 gallons or 2,960,000gpd.

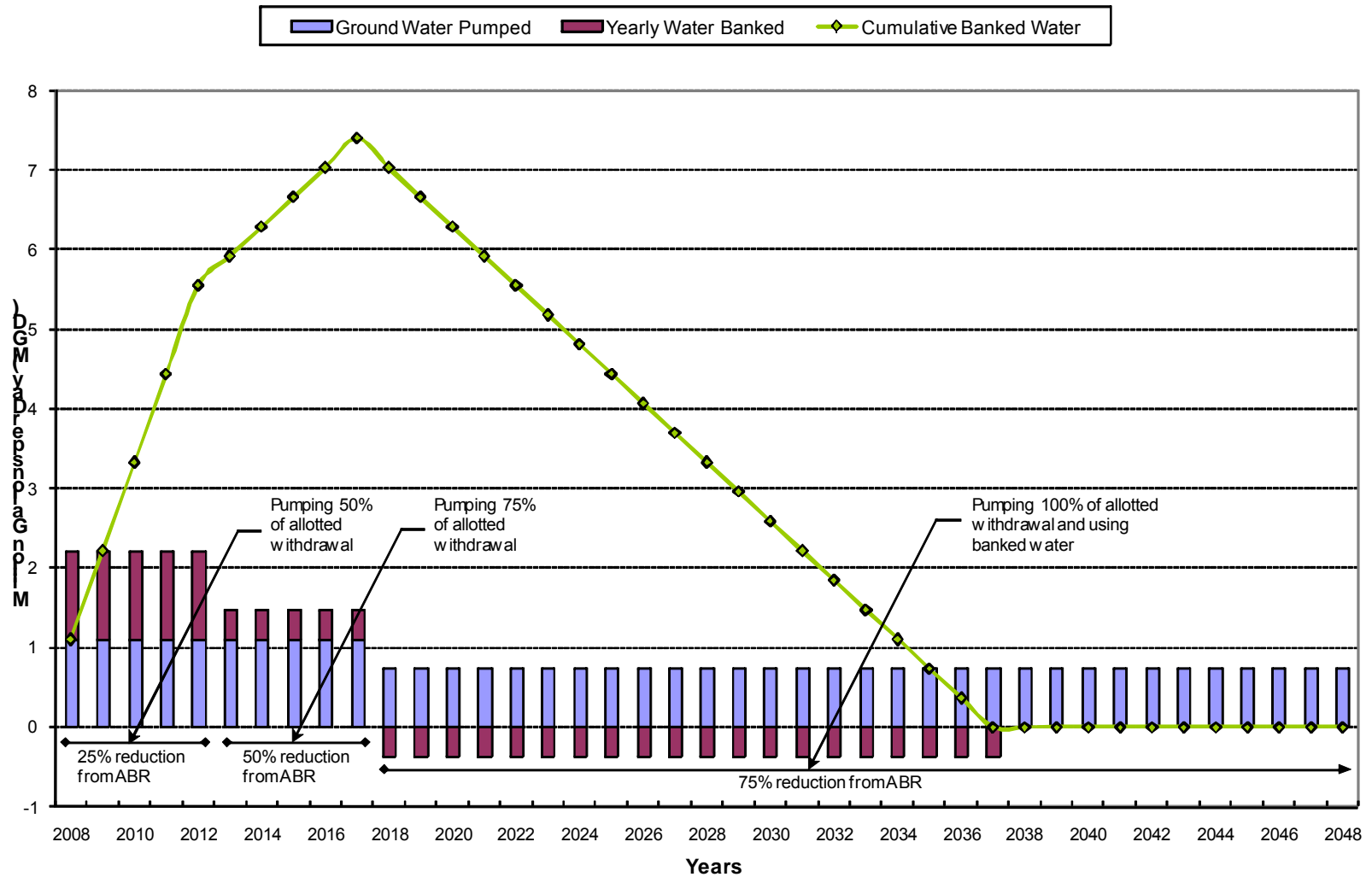
³ Average day bulk sales include water to be "banked."

⁴ Estimated minimum purchase amounts are contractual limits and are equal to the amount of reduction required by CCPCUA rules from the ABR. In the event of curtailment, average daily volume may be adjusted.

⁵ Distribution of banked water is proposed for 2018 – 2037.

⁶ Negative banking denotes usage of banked water.

Figure 3: Greene County Banked Water



2.2.2 Town of Farmville

The Town of Farmville's average day water demand is expected to increase by 25 percent between 2008 and 2030. According to the Water Purchase Agreement with GUC, average daily demands in 2030 will be approximately 2.33 mgd. Based on a peaking factor of 1.70, maximum day demands are projected to be 3.96 mgd in 2030 (Table 3).

The ABR approved for Farmville is 574 MGY, which translates to an average annual pumping rate of 1.572 mgd. Farmville will be required to reduce annual withdrawals as shown in Table 6.

Table 6: Annual Withdrawal Rates Required by CCPCUA Rules for Farmville

| Year | Total Annual Withdrawal (MGY) | Average Annual Withdrawal (mgd) |
|------|-------------------------------|---------------------------------|
| ABR | 574 | 1.572 |
| 2008 | 431 | 1.179 |
| 2013 | 287 | 0.786 |
| 2018 | 144 | 0.393 |

The Town of Farmville also intends to bank water throughout Phases I and II of the CCPCUA rule, pumping only half of what is permitted during Phase I, and 75 percent of their allotted withdrawal during Phase II. Farmville will bank a total of 1,434 MG between 2008 and 2018. Proposed banking amounts are included in Table 7 and a graphical interpretation is shown in Figure 4. It is unclear at this time whether Farmville intends to utilize its banked water over an extended period similar to Greene County, or maintain its "banked" status for periods of high demand.

Table 7: Water Demand Projections and Summary of Farmville Water Operations

| Year | Projected System Demand (mgd) ¹ | Allowable Well Pumping Rate (mgd) ² | Supplemental Water ³ | | | Water to be Banked (mgd) ^{5,7} |
|------|--|--|---|------------------------------|---|---|
| | | | Average Day Bulk Sales (mgd) ⁴ | Maximum Day Bulk Sales (mgd) | Estimated Minimum Purchase (mgd) ⁶ | |
| 2008 | 1.87 | 1.18 | 1.28 | 2.00 | 0.39 | 0.59 |
| 2009 | 1.89 | 1.18 | 1.30 | 2.04 | 0.39 | 0.59 |
| 2010 | 1.91 | 1.18 | 1.32 | 2.07 | 0.39 | 0.59 |
| 2011 | 1.93 | 1.18 | 1.34 | 2.10 | 0.39 | 0.59 |
| 2012 | 1.95 | 1.18 | 1.36 | 2.13 | 0.39 | 0.59 |
| 2013 | 1.97 | 0.78 | 1.38 | 2.57 | 0.79 | 0.20 |
| 2014 | 1.99 | 0.78 | 1.40 | 2.60 | 0.79 | 0.20 |
| 2015 | 2.01 | 0.78 | 1.42 | 2.63 | 0.79 | 0.20 |
| 2016 | 2.03 | 0.78 | 1.44 | 2.67 | 0.79 | 0.20 |
| 2017 | 2.05 | 0.78 | 1.46 | 2.70 | 0.79 | 0.20 |
| 2018 | 2.07 | 0.39 | 1.48 | 3.12 | 1.18 | - 0.20 |
| 2020 | 2.11 | 0.39 | 1.52 | 3.19 | 1.18 | - 0.20 |
| 2025 | 2.22 | 0.39 | 1.63 | 3.38 | 1.18 | - 0.20 |
| 2030 | 2.33 | 0.39 | 1.74 | 3.57 | 1.18 | - 0.20 |
| 2035 | 2.45 | 0.39 | 1.86 | 3.77 | 1.18 | - 0.20 |
| 2040 | 2.58 | 0.39 | 1.99 | 3.98 | 1.18 | NA |
| 2045 | 2.71 | 0.39 | 2.12 | 4.21 | 1.18 | NA |
| 2048 | 2.79 | 0.39 | 2.20 | 4.35 | 1.18 | NA |

¹ Projected system demands based on 2002 actual usage and a 1% annual growth rate.

² Pumped water volumes based on an ABR of 1,572,000 gpd.

³ Supplemental water volumes rounded to nearest thousand gallons.

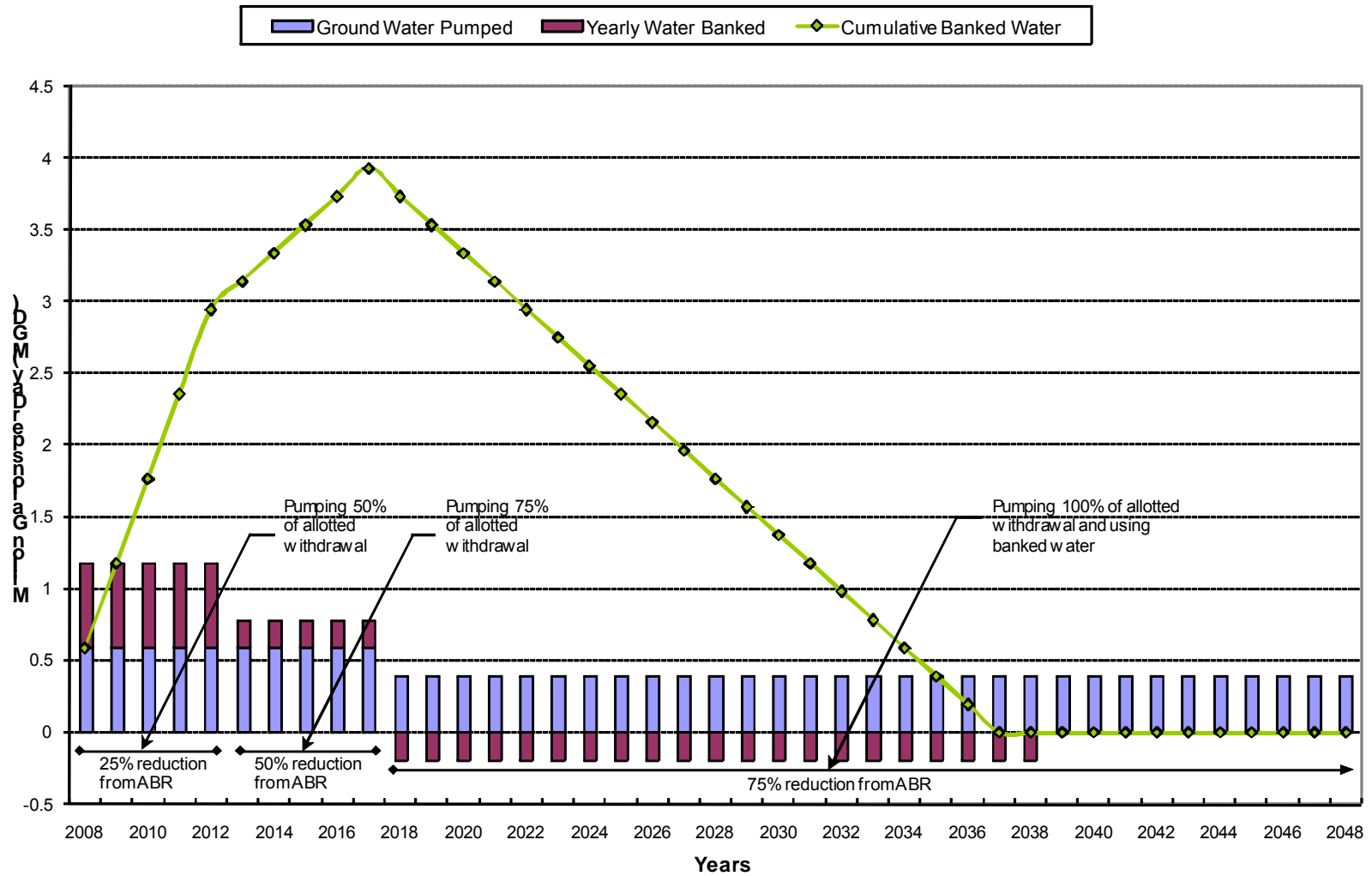
⁴ Average day bulk sales include water to be "banked".

⁵ Distribution of banked water is proposed for 2018 – 2037.

⁶ Estimated Minimum Purchase amount is equal to required reduction in well pumping to meet CCPCUA rules.

⁷ Negative banking denotes usage of banked water.

Figure 4: Town of Farmville Banked Water



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2.2.3 Town of Winterville

As Winterville's population increases rapidly, its water demand will grow concurrently. Current water usage is approximately 0.80 mgd. By 2026, it is expected to increase by 135 percent to a build-out capacity of 2.0 mgd for areas not served by Bell Arthur or Eastern Pines Water Corporations. The MDD was projected using a peaking factor of 1.80, and was calculated to approach 3.6 mgd by 2026 (Table 2).

The ABR approved for Winterville is 181 MGY, which translates to an average annual pumping rate of 0.496 mgd. Winterville will be required to reduce annual withdrawals as shown in Table 8.

Table 8: Annual Withdrawal Rates Required by CCPCUA Rules for Winterville

| Year | Total Annual Withdrawal (MGY) | Average Annual Withdrawal (mgd) |
|------|-------------------------------|---------------------------------|
| ABR | 181 | 0.496 |
| 2008 | 136 | 0.372 |
| 2013 | 91 | 0.249 |
| 2018 | 45 | 0.123 |

Similar to Greene County and the Town of Farmville, Winterville intends to bank water in the same manner throughout Phases I and II of the CCPCUA rule. Winterville submitted a letter of intent to DWR to bank water on August 12, 2008. Winterville has an approved ABR of 0.496 mgd and plans to pump approximately 0.185 mgd, thereby banking up to 449 MG of capacity prior to 2018 (Table 9). Winterville has not expressed how it intends to utilize its banked water. However, Figure 5 depicts a banking strategy where the banked water is used equally over a 20-year period, similar to Greene County and Farmville.

2.2.4 Greenville Utilities Commission

Between 1990 and 2005, GUC water demand increased 1.1 mgd according to historical water use data (Table 2). Based on the GUC Water System Master Plan (Black & Veatch, 2001), the service area will expand to over 100,000 customers by 2020. The projected ADD in 2020 will be approximately 11.6 mgd (Table 2). Peak-day demands were estimated to reach 17.4 mgd in 2020 and 18.5 mgd in 2030.



Table 9: Water Demand Projections and Summary of Winterville's Water Operations

| Year | Projected System Demand (mgd) ¹ | Allowable Well Pumping Rate (mgd) ² | Average Day Bulk Sales (mgd) ⁴ | Supplemental Water ³ | | Water to be Banked (mgd) ^{5,7} |
|------|--|--|---|---------------------------------|---|---|
| | | | | Maximum Day Bulk Sales (mgd) | Estimated Minimum Purchase (mgd) ⁶ | |
| 2008 | 0.85 | 0.37 | 0.66 | 1.16 | 0.12 | 0.185 |
| 2009 | 0.90 | 0.37 | 0.71 | 1.25 | 0.12 | 0.185 |
| 2010 | 0.95 | 0.37 | 0.76 | 1.34 | 0.12 | 0.185 |
| 2011 | 1.00 | 0.37 | 0.81 | 1.43 | 0.12 | 0.185 |
| 2012 | 1.05 | 0.37 | 0.86 | 1.52 | 0.12 | 0.185 |
| 2013 | 1.10 | 0.25 | 0.91 | 1.73 | 0.25 | 0.062 |
| 2014 | 1.15 | 0.25 | 0.96 | 1.82 | 0.25 | 0.062 |
| 2015 | 1.20 | 0.25 | 1.01 | 1.91 | 0.25 | 0.062 |
| 2016 | 1.25 | 0.25 | 1.06 | 2.00 | 0.25 | 0.062 |
| 2017 | 1.33 | 0.25 | 1.14 | 2.14 | 0.25 | 0.062 |
| 2018 | 1.40 | 0.12 | 1.21 | 2.40 | 0.37 | - 0.062 |
| 2020 | 1.55 | 0.12 | 1.36 | 2.67 | 0.37 | - 0.062 |
| 2025 | 1.93 | 0.12 | 1.74 | 3.34 | 0.37 | - 0.062 |
| 2030 | 2.00 | 0.12 | 1.81 | 3.48 | 0.37 | - 0.062 |
| 2035 | 2.00 | 0.12 | 1.81 | 3.48 | 0.37 | - 0.062 |
| 2040 | 2.00 | 0.12 | 1.88 | 3.48 | 0.37 | NA |
| 2045 | 2.00 | 0.12 | 1.88 | 3.48 | 0.37 | NA |
| 2048 | 2.00 | 0.12 | 1.88 | 3.48 | 0.37 | NA |

¹ Projected system demand was linearly interpolated by ARCADIS. The Town of Winterville provided projection values for 2016 and 2026.

² Pumped water volumes based on an ABR of 180,709,104 gallons.

³ Supplemental water volumes rounded to nearest thousand gallons.

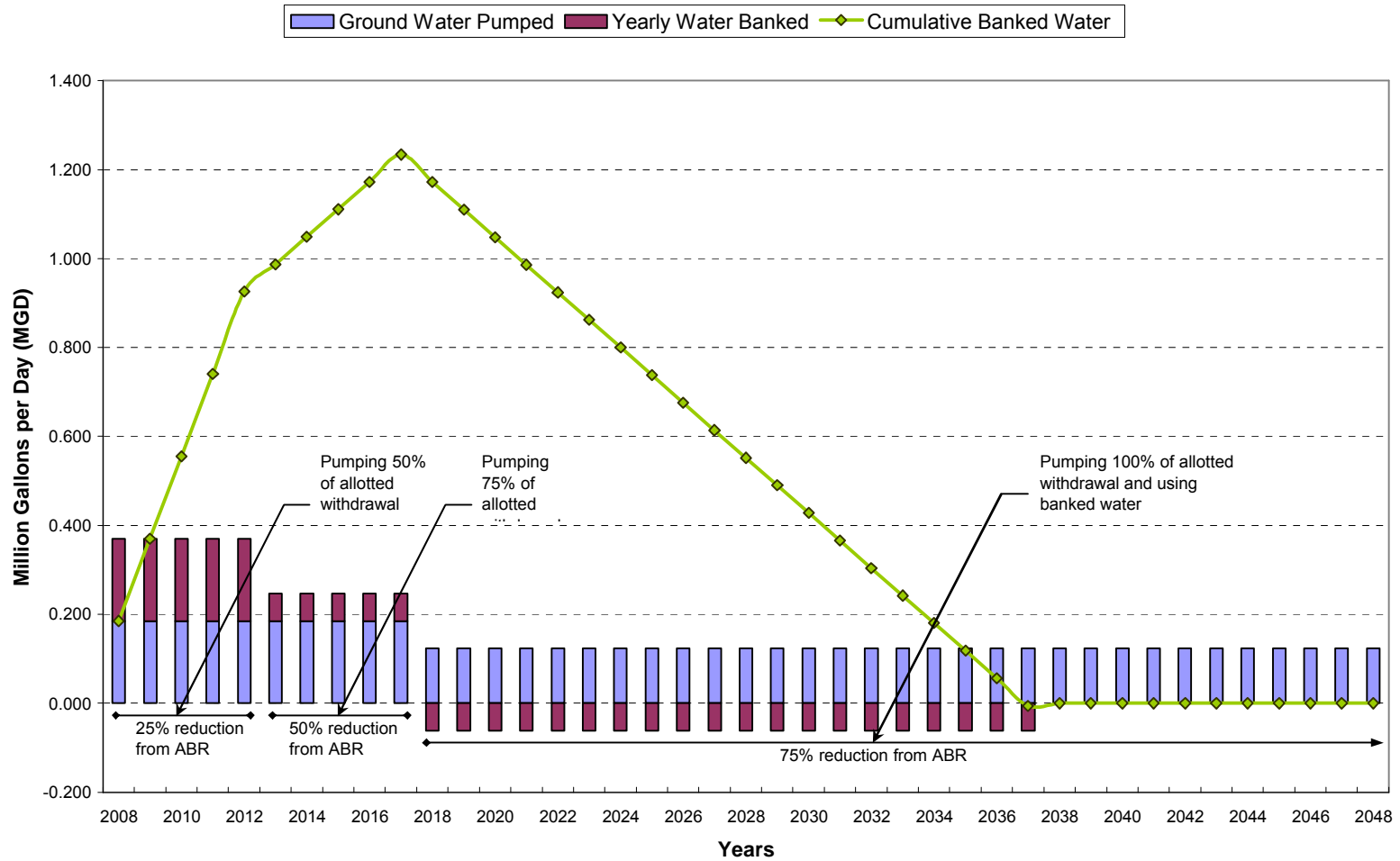
⁴ Average day bulk sales include a percentage for banked water.

⁵ Distribution of banked water is proposed for 2018 – 2037.

⁶ Estimated Minimum Purchase amount is equal to required reduction in well pumping to meet CCPCUA rules.

⁷ Negative banking denotes usage of banked water.

Figure 5: Town of Winterville Banked Water



3. Water Treatment Plant Capacity

GUC's water treatment plant (WTP) has a permitted capacity of 22.5 mgd. The WTP treats raw water withdrawn from the Tar River and pumped to a 63-million gallon pre-settling impoundment. The WTP utilizes conventional coagulation/sedimentation process, intermediate ozonation (for disinfection), and high-rate, dual-media filters. In 2002, the WTP converted from free chlorine to chloramines for disinfection.

Bulk sales contracts between GUC and its wholesale customers (Farmville, Greene County, and Winterville) stipulate an Estimated Minimum Purchase, which is equal to the required reduction in well pumping to meet CCPCUA rules. Based on the peak demands for the GUC service area and the Estimated Minimum Purchase that GUC is obligated to provide to Farmville, Greene County, and Winterville, the WTP has the capacity to meet the projected needs through 2030 (Table 10). The Estimated Minimum Purchase amount was used since GUC may limit distribution to the wholesale customers when GUC experiences peak demands. Wholesale customers will rely on well pumping to meet demands during those periods, and GUC will provide sufficient water during the remainder of the year to allow its customers meet CCPCUA rules.

Table 11 shows the average annual demands for GUC as well as the projected annual average bulk sales amounts for Farmville, Winterville, and Greene County. This also demonstrates that GUC's existing WTP has sufficient capacity to meet its retail customer's demands as well as the wholesale customers.

Table 10: Maximum Day GUC Demands with Minimum Bulk Purchases

| Year | GUC Demands (mgd) ¹ | Estimated Minimum Purchase (mgd) | | | Total (mgd) |
|------|--------------------------------|----------------------------------|---------------|-----------|-------------|
| | | Winterville | Greene County | Farmville | |
| 2008 | 15.83 | 0.12 | 0.74 | 0.39 | 17.09 |
| 2013 | 16.71 | 0.25 | 1.48 | 0.79 | 19.22 |
| 2018 | 17.28 | 0.37 | 2.22 | 1.18 | 21.05 |
| 2020 | 17.51 | 0.37 | 2.22 | 1.18 | 21.27 |
| 2025 | 18.08 | 0.37 | 2.22 | 1.18 | 21.84 |
| 2030 | 18.65 | 0.37 | 2.22 | 1.18 | 22.41 |
| 2035 | 19.22 | 0.37 | 2.22 | 1.18 | 22.98 |
| 2040 | 19.79 | 0.37 | 2.22 | 1.18 | 23.55 |

¹ Demands include minimum bulk sales to Stokes and Bethel.

Table 11: Average Day GUC Demands with Average Day Bulk Purchases

| Year | GUC Demands (mgd) ¹ | Estimated Average Day Bulk Sales (mgd) | | | Total (mgd) |
|------|--------------------------------|--|---------------|-----------|-------------|
| | | Winterville | Greene County | Farmville | |
| 2008 | 10.91 | 0.66 | 1.14 | 1.28 | 13.99 |
| 2013 | 11.37 | 0.91 | 1.69 | 1.38 | 15.36 |
| 2018 | 11.80 | 1.21 | 2.23 | 1.48 | 16.72 |
| 2020 | 11.98 | 1.36 | 2.31 | 1.52 | 17.17 |
| 2025 | 12.40 | 1.74 | 2.51 | 1.63 | 18.28 |
| 2030 | 12.83 | 1.81 | 2.71 | 1.74 | 19.10 |
| 2035 | 13.27 | 1.81 | 2.91 | 1.86 | 19.85 |
| 2040 | 13.70 | 1.88 | 3.11 | 1.99 | 20.67 |

¹ Demands include annual average bulk sales to Stokes and Bethel.

4. IBT Calculations

4.1 Transfer from Tar River Basin to Neuse River Subbasin

IBT calculations for the transfer from the Tar River subbasin (Basin ID 15-1) to the Neuse River subbasin (Basin ID 10-1) are shown in the Water Balance Tables (Tables 12, 13, and 14). Transfers to the Neuse River subbasin are a result of bulk sales to the Town of Winterville and Greene County as well as water use by GUC customers located in the Neuse River Subbasin. IBT calculations are based on the following:

- Peak day demands for GUC are calculated based on a MDD:ADD peaking factor of 1.50, based on historical demand trends.
- Peak day demands for the Town of Winterville are calculated based on a MDD:ADD peaking factor of 1.80, based on historical demand trends.
- Consumptive water use for GUC is 20 percent based on historical operating records.
- Consumptive water use for Winterville and Greene County is assumed to be 30 percent.
- Process water use at the GUC WTP is 8 percent of raw water withdrawal based on operating records.
- The service area for the Town of Winterville is entirely within the Neuse River subbasin.
- The portion of Greene County in the Neuse River subbasin is estimated at 5 percent.
- The portion of GUC's service area in the Neuse River subbasin is estimated at 8 percent based on current water distribution system maps and the number of service connections located in the Neuse River Subbasin.
- All wastewater produced in the GUC service area is returned to the Tar River Basin, with the exception of a limited number of septic tanks in the Neuse River Basin.
- All wastewater produced in the Winterville service area is discharged into the Neuse River subbasin.
- All wastewater produced in Greene County is disposed of by on-site septic systems.

In Table 12, water demands for the Town of Winterville are based on Average Day Bulk Sales as shown in Table 9. This demonstrates the average day IBT amounts that are expected on an annual basis. These demands account for bulk purchases from GUC required for Winterville to meet customer demands, to comply with CCPCUA regulations, and to allow for "banking" of groundwater.

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In Table 13, the Maximum Day Bulk Sales projected for the Town of Winterville are used to determine maximum day IBT amounts. The Maximum Day Bulk Sales represents the total peak day demands for the Winterville service area less the average annual allowable well pumping rate.

In Table 14, the Emergency Bulk Sales projected for the Town of Winterville are used to determine the emergency condition for the IBT. The emergency condition represents the total peak day demand for the Winterville service area. This strategy will allow GUC to provide water to Winterville in the event a catastrophic event was to occur, e.g. aquifer contamination, drought, or major mechanical or electrical failure. GUC requests that the IBT certificate be written such that notification would be required to DWR to trigger the emergency request.



Table 12: Water Balance Table – Tar River to Neuse River (Average Day)

| Year | Consumptive Use | | | | | | | | | | Wastewater Discharge | | WTP Discharge | | Total Return to Tar River Basin | Interbasin Transfer | | |
|------|------------------|-------------------------------------|---------------------------------------|---------------------------|-------------|---------------------|-------------------|-------------|-----------------------------|-------------------|----------------------|-----------------|-------------------|-----------------|---------------------------------|---------------------|-------------------|-----------------|
| | GUC Water Demand | Winterville Estimated Bulk Purchase | Greene County Estimated Bulk Purchase | Withdrawal from Tar River | % Tar River | GUC Tar River Basin | Neuse River Basin | % Tar River | Winterville Tar River Basin | Neuse River Basin | % Tar River | Tar River Basin | Neuse River Basin | Tar River Basin | | | Neuse River Basin | Tar River Basin |
| 2005 | 10.03 | 0.71 | 0.06 | 11.66 | 92 | 1.85 | 0.16 | 0 | 0.0 | 0.21 | 0 | 0.0 | 0.06 | 8.0 | 0.5 | 0.9 | 10.7 | 0.9 |
| 2010 | 10.81 | 0.76 | 0.06 | 12.57 | 92 | 1.99 | 0.17 | 0 | 0.0 | 0.23 | 0 | 0.0 | 0.06 | 8.6 | 0.5 | 0.9 | 11.6 | 1.0 |
| 2015 | 11.19 | 1.01 | 0.09 | 13.28 | 92 | 2.06 | 0.18 | 0 | 0.0 | 0.30 | 0 | 0.0 | 0.09 | 9.0 | 0.7 | 1.0 | 12.0 | 1.3 |
| 2020 | 11.57 | 1.36 | 0.12 | 14.10 | 92 | 2.13 | 0.19 | 0 | 0.0 | 0.41 | 0 | 0.0 | 0.12 | 9.3 | 1.0 | 1.0 | 12.4 | 1.7 |
| 2025 | 11.95 | 1.74 | 0.13 | 14.93 | 92 | 2.20 | 0.19 | 0 | 0.0 | 0.52 | 0 | 0.0 | 0.13 | 9.6 | 1.2 | 1.1 | 12.9 | 2.1 |
| 2030 | 12.33 | 1.81 | 0.14 | 15.43 | 92 | 2.27 | 0.20 | 0 | 0.0 | 0.54 | 0 | 0.0 | 0.14 | 9.9 | 1.3 | 1.1 | 13.3 | 2.2 |
| 2035 | 12.71 | 1.81 | 0.15 | 15.85 | 92 | 2.34 | 0.20 | 0 | 0.0 | 0.54 | 0 | 0.0 | 0.15 | 10.2 | 1.3 | 1.2 | 13.7 | 2.2 |
| 2040 | 13.09 | 1.88 | 0.16 | 16.34 | 92 | 2.41 | 0.21 | 0 | 0.0 | 0.56 | 0 | 0.0 | 0.16 | 10.5 | 1.3 | 1.2 | 14.1 | 2.3 |



Table 13: Water Balance Table – Tar River to Neuse River (Maximum Day)

| Year | Consumptive Use | | | | | | | | | | Wastewater Discharge | | WTP Discharge | | Total Return to Tar River Basin | Interbasin Transfer | | |
|------|------------------|-------------------------------------|--------------------------------|---------------------------|-------------|---------------------|-------------------|-------------|-----------------------------|-------------------|----------------------|-------------------------------|-------------------|-----------------|---------------------------------|---------------------|-------------------|-----------------|
| | GUC Water Demand | Winterville Estimated Bulk Purchase | Greene Estimated Bulk Purchase | Withdrawal from Tar River | % Tar River | GUC Tar River Basin | Neuse River Basin | % Tar River | Winterville Tar River Basin | Neuse River Basin | % Tar River | Greene County Tar River Basin | Neuse River Basin | Tar River Basin | | | Neuse River Basin | Tar River Basin |
| 2005 | 14.71 | 1.32 | 0.11 | 17.43 | 92 | 2.71 | 0.24 | 0 | 0.0 | 0.40 | 0 | 0.0 | 0.11 | 11.8 | 0.9 | 1.3 | 15.8 | 1.7 |
| 2010 | 16.22 | 1.34 | 0.10 | 19.07 | 92 | 2.98 | 0.26 | 0 | 0.0 | 0.40 | 0 | 0.0 | 0.10 | 13.0 | 0.9 | 1.4 | 17.4 | 1.7 |
| 2015 | 16.79 | 1.91 | 0.16 | 20.36 | 92 | 3.09 | 0.27 | 0 | 0.0 | 0.57 | 0 | 0.0 | 0.16 | 13.4 | 1.3 | 1.5 | 18.0 | 2.3 |
| 2020 | 17.36 | 2.67 | 0.21 | 21.85 | 92 | 3.19 | 0.28 | 0 | 0.0 | 0.80 | 0 | 0.0 | 0.21 | 13.9 | 1.9 | 1.6 | 18.7 | 3.2 |
| 2025 | 17.93 | 3.34 | 0.23 | 23.21 | 92 | 3.30 | 0.29 | 0 | 0.0 | 1.00 | 0 | 0.0 | 0.23 | 14.3 | 2.3 | 1.7 | 19.3 | 3.9 |
| 2030 | 18.50 | 3.48 | 0.25 | 24.00 | 92 | 3.40 | 0.30 | 0 | 0.0 | 1.04 | 0 | 0.0 | 0.25 | 14.8 | 2.4 | 1.8 | 20.0 | 4.0 |
| 2035 | 19.07 | 3.48 | 0.26 | 24.63 | 92 | 3.51 | 0.31 | 0 | 0.0 | 1.04 | 0 | 0.0 | 0.26 | 15.3 | 2.4 | 1.8 | 20.6 | 4.0 |
| 2040 | 19.64 | 3.48 | 0.28 | 25.27 | 92 | 3.61 | 0.31 | 0 | 0.0 | 1.04 | 0 | 0.0 | 0.28 | 15.7 | 2.4 | 1.8 | 21.2 | 4.1 |



Table 14: Water Balance Table – Tar River to Neuse River (Emergency Condition)

| Year | GUC Water Demand | Winterville Estimated Bulk Purchase | Greene County Estimated Bulk Purchase | Withdrawal from Tar River | % Tar River | Consumptive Use | | | | | | Wastewater Discharge | | WTP Discharge | | Total Return to Tar River Basin | Interbasin Transfer | |
|------|------------------|-------------------------------------|---------------------------------------|---------------------------|-------------|---------------------|-------------------|-------------|-----------------------------|-------------------|-------------|-------------------------------|-------------------|-----------------|-------------------|---------------------------------|---------------------|-----------------|
| | | | | | | GUC Tar River Basin | Neuse River Basin | % Tar River | Winterville Tar River Basin | Neuse River Basin | % Tar River | Greene County Tar River Basin | Neuse River Basin | Tar River Basin | Neuse River Basin | | | Tar River Basin |
| 2005 | 14.71 | 1.32 | 0.11 | 17.43 | 92 | 2.71 | 0.24 | 0 | 0.0 | 0.40 | 0 | 0.0 | 0.11 | 11.8 | 0.9 | 1.3 | 15.8 | 1.7 |
| 2010 | 16.22 | 1.71 | 0.21 | 19.58 | 92 | 2.98 | 0.26 | 0 | 0.0 | 0.51 | 0 | 0.0 | 0.21 | 13.0 | 1.2 | 1.4 | 17.4 | 2.2 |
| 2015 | 16.79 | 2.16 | 0.23 | 20.71 | 92 | 3.09 | 0.27 | 0 | 0.0 | 0.65 | 0 | 0.0 | 0.23 | 13.4 | 1.5 | 1.5 | 18.1 | 2.7 |
| 2020 | 17.36 | 2.79 | 0.25 | 22.02 | 92 | 3.19 | 0.28 | 0 | 0.0 | 0.84 | 0 | 0.0 | 0.25 | 13.9 | 2.0 | 1.6 | 18.7 | 3.3 |
| 2025 | 17.93 | 3.47 | 0.26 | 23.39 | 92 | 3.30 | 0.29 | 0 | 0.0 | 1.04 | 0 | 0.0 | 0.26 | 14.3 | 2.4 | 1.7 | 19.4 | 4.0 |
| 2030 | 18.50 | 3.60 | 0.28 | 24.17 | 92 | 3.40 | 0.30 | 0 | 0.0 | 1.08 | 0 | 0.0 | 0.28 | 14.8 | 2.5 | 1.8 | 20.0 | 4.2 |
| 2035 | 19.07 | 3.60 | 0.30 | 24.80 | 92 | 3.51 | 0.31 | 0 | 0.0 | 1.08 | 0 | 0.0 | 0.30 | 15.3 | 2.5 | 1.8 | 20.6 | 4.2 |
| 2040 | 19.64 | 3.60 | 0.32 | 25.44 | 92 | 3.61 | 0.31 | 0 | 0.0 | 1.08 | 0 | 0.0 | 0.32 | 15.7 | 2.5 | 1.9 | 21.2 | 4.2 |

4.2 Transfer from Tar River Basin to Contentnea Creek Subbasin

IBT calculations for the transfer from the Tar River subbasin (Basin ID 15-1) to the Contentnea Creek subbasin (Basin ID 10-2) are shown in the Water Balance Tables (Tables 15, 16, and 17). Transfers to the Contentnea Creek subbasin are a result of bulk sales to the Town of Farmville and Greene County.

- Peak day demands for the Town of Farmville are calculated based on a MDD:ADD peaking factor of 1.70, based on historical demand trends.
- Peak day demands for Greene County are calculated based on a MDD:ADD peaking factor of 1.75, based on historical demand trends.
- Consumptive water use for Farmville and Greene County is assumed to be 30 percent.
- Process water use at the GUC WTP is 8 percent of raw water withdrawal based on operating records.
- The service area for the Town of Farmville is entirely within the Contentnea Creek subbasin.
- The portion of Greene County in the Contentnea Creek subbasin is estimated at 95 percent.
- No wastewater produced in the Town of Farmville and Greene County service areas is returned to the Tar River subbasin.

In Table 15, water demands for the Town of Farmville and Greene County are based on Average Day Bulk Sales as shown in Tables 5 and 7, respectively. This demonstrates the average day IBT amounts that are expected on an annual basis. These demands account for bulk purchases from GUC required for Farmville and Greene County to meet customer their demands, to comply with CCPCUA rules, and to allow for “banking” of groundwater.

In Table 16, the maximum day IBT amount was determined using the maximum day bulk sales projected for Greene County and the Town of Farmville. The maximum day bulk sales represent the total peak day demands for Greene County and Farmville less the average annual allowable well pumping rate.

In Table 17, the emergency bulk sales projected for Greene County and Farmville are used to determine the emergency condition for the IBT. The emergency condition represents the total peak day demand. This strategy will allow GUC to provide water to Greene County and Farmville in the event a catastrophic event was to occur, e.g. aquifer contamination, drought, or major mechanical or electrical failure. GUC requests that the IBT certificate be written such that notification would be required to DWR to trigger the emergency request.



Table 15: Water Balance Table – Tar River to Contentnea Creek (Average Day)

| Year | Farmville Estimated Bulk Purchase | Greene County Estimated Bulk Purchase | Total Bulk Sales to Contentnea Basin | Withdrawal from Tar Basin (associated with bulk sales only) | Consumptive Use | | | Wastewater Discharge | | WTP Discharge Tar River Basin | Total Return to Tar River Basin | Interbasin Transfer |
|------|--|---|---|--|-------------------|-----------------------|-----------------------------------|-------------------------|-----------------------------------|--|---|------------------------|
| | | | | | % Tar River | Tar River Basin | Content- nea Creek Basin | Tar River Basin | Content- nea Creek Basin | | | |
| 2005 | 1.66 | 1.19 | 2.85 | 3.08 | 0 | 0.0 | 0.9 | 0.0 | 2.0 | 0.2 | 0.2 | 2.9 |
| 2010 | 1.32 | 1.22 | 2.54 | 2.74 | 0 | 0.0 | 0.8 | 0.0 | 1.8 | 0.2 | 0.2 | 2.5 |
| 2015 | 1.42 | 1.76 | 3.18 | 3.43 | 0 | 0.0 | 1.0 | 0.0 | 2.2 | 0.3 | 0.3 | 3.2 |
| 2020 | 1.52 | 2.31 | 3.83 | 4.14 | 0 | 0.0 | 1.1 | 0.0 | 2.7 | 0.3 | 0.3 | 3.8 |
| 2025 | 1.63 | 2.51 | 4.14 | 4.47 | 0 | 0.0 | 1.2 | 0.0 | 2.9 | 0.3 | 0.3 | 4.1 |
| 2030 | 1.74 | 2.71 | 4.45 | 4.81 | 0 | 0.0 | 1.3 | 0.0 | 3.1 | 0.4 | 0.4 | 4.5 |
| 2035 | 1.86 | 2.91 | 4.77 | 5.15 | 0 | 0.0 | 1.4 | 0.0 | 3.3 | 0.4 | 0.4 | 4.8 |
| 2040 | 1.99 | 3.11 | 5.10 | 5.51 | 0 | 0.0 | 1.5 | 0.0 | 3.6 | 0.4 | 0.4 | 5.1 |



Table 16: Water Balance Table – Tar River to Contentnea Creek (Maximum Day)

| Year | Farmville Estimated Bulk Purchase | Greene County Estimated Bulk Purchase | Total Bulk Sales to Contentnea Basin | Withdrawal from Tar Basin (associated with bulk sales only) | Consumptive Use | | | Wastewater Discharge | | WTP Discharge | Total Return to Tar River Basin | Interbasin Transfer |
|------|--|---|---|--|-------------------------|-----------------------|-----------------------------------|-------------------------|-----------------------------------|--------------------|---|------------------------|
| | | | | | % Tar River Basin | Tar River Basin | Content- nea Creek Basin | Tar River Basin | Content- nea Creek Basin | Tar River Basin | | |
| 2005 | 1.66 | 2.08 | 3.74 | 4.04 | 0 | 0.0 | 1.1 | 0.0 | 2.6 | 0.3 | 0.3 | 3.7 |
| 2010 | 2.07 | 1.87 | 3.93 | 4.25 | 0 | 0.0 | 1.2 | 0.0 | 2.8 | 0.3 | 0.3 | 3.9 |
| 2015 | 2.63 | 2.91 | 5.54 | 5.99 | 0 | 0.0 | 1.7 | 0.0 | 3.9 | 0.4 | 0.4 | 5.5 |
| 2020 | 3.19 | 3.95 | 7.15 | 7.72 | 0 | 0.0 | 2.1 | 0.0 | 5.0 | 0.6 | 0.6 | 7.1 |
| 2025 | 3.38 | 4.30 | 7.68 | 8.29 | 0 | 0.0 | 2.3 | 0.0 | 5.4 | 0.6 | 0.6 | 7.7 |
| 2030 | 3.57 | 4.65 | 8.22 | 8.88 | 0 | 0.0 | 2.5 | 0.0 | 5.8 | 0.7 | 0.7 | 8.3 |
| 2035 | 3.77 | 5.00 | 8.77 | 9.47 | 0 | 0.0 | 2.6 | 0.0 | 6.1 | 0.7 | 0.7 | 8.8 |
| 2040 | 3.98 | 5.35 | 9.33 | 10.08 | 0 | 0.0 | 2.8 | 0.0 | 6.5 | 0.7 | 0.7 | 9.3 |



Table 17: Water Balance Table – Tar River to Contentnea Creek (Emergency Condition)

| Year | Farmville Estimated Bulk Purchase | Greene County Estimated Bulk Purchase | Total Bulk Sales to Contentnea Basin | Withdrawal from Tar Basin (associated with bulk sales only) | Consumptive Use | | | Wastewater Discharge | | WTP Discharge | Total Return to Tar River Basin | Interbasin Transfer |
|------|--|---|---|--|-----------------|---------------------------|-----------------------------------|-------------------------|-----------------------------------|--------------------|---|------------------------|
| | | | | | % Tar River | Tar River Basi n | Content- nea Creek Basin | Tar River Basin | Content- nea Creek Basin | Tar River Basin | | |
| 2005 | 1.66 | 3.64 | 5.30 | 5.73 | 0 | 0.0 | 1.6 | 0.0 | 3.7 | 0.4 | 0.4 | 5.3 |
| 2010 | 3.25 | 3.98 | 7.22 | 7.80 | 0 | 0.0 | 2.2 | 0.0 | 5.1 | 0.6 | 0.6 | 7.2 |
| 2015 | 3.41 | 4.32 | 7.73 | 8.35 | 0 | 0.0 | 2.3 | 0.0 | 5.4 | 0.6 | 0.6 | 7.7 |
| 2020 | 3.59 | 4.66 | 8.24 | 8.90 | 0 | 0.0 | 2.5 | 0.0 | 5.8 | 0.7 | 0.7 | 8.2 |
| 2025 | 3.77 | 5.01 | 8.78 | 9.48 | 0 | 0.0 | 2.6 | 0.0 | 6.1 | 0.7 | 0.7 | 8.8 |
| 2030 | 3.96 | 5.35 | 9.32 | 10.06 | 0 | 0.0 | 2.8 | 0.0 | 6.5 | 0.7 | 0.7 | 9.3 |
| 2035 | 4.17 | 5.70 | 9.87 | 10.66 | 0 | 0.0 | 3.0 | 0.0 | 6.9 | 0.8 | 0.8 | 9.9 |
| 2040 | 4.38 | 6.05 | 10.43 | 11.27 | 0 | 0.0 | 3.1 | 0.0 | 7.3 | 0.8 | 0.8 | 10.4 |



5. IBT Management Strategy

Greene County, the Town of Farmville, and the Town of Winterville have each entered into Water Purchase Agreements with GUC in response to the CCPCUA rules. Key provisions that are similar to each contract are as follows:

- Contract terms are valid for 40 years, beginning August 1, 2008.
- The minimum daily amount that GUC is committed to provide is equal to water supply reductions required by CCPCUA rules for each customer.
- Interruption or curtailment of water supply will occur no more than 10 percent of the time (36 days per year). GUC will provide at least a 24-hour notice prior to interruption or curtailment of water service.

GUC currently has system interconnections with the Town of Winterville. GUC has constructed a 24-inch transmission main to the end of its water system for the purposes of interconnecting to the Farmville and Greene County water systems. Greene County and the Town of Farmville are currently constructing a booster pumping station and 10 miles of 24-inch transmission mains to complete the system interconnection with GUC.

The projected average daily bulk purchases for Greene County, the Town of Farmville and the Town of Winterville are shown in Tables 5, 7, and 9. These tables illustrate the typical amount of water that GUC will sell to these water systems on an annual average daily basis. These estimated purchase amounts include “banking” from 2008 through 2018.

GUC will sell additional potable water to help its customers meet their peak demands if water supply is available. The maximum day IBT calculations are based on GUC selling water to meet wholesale customers’ peak day demands less the allowable well pumping rate (Tables 13 and 16).

The emergency condition represents the total peak day demand for each of the wholesale customers. This strategy will allow GUC to provide water to Greene County, Farmville, and Winterville in the event a catastrophic event was to occur, e.g. aquifer contamination, drought, or major mechanical or electrical failure. The intent is for the IBT Certificate to allow this flexibility for GUC to meet the needs of its wholesale customers during an emergency even if it occurs during a peak demand period. GUC also intends to help its wholesale customers meet peak demands if supply is available.

When GUC experiences peak demands, GUC may limit distribution to the wholesale customers as necessary. However, GUC will supply the wholesale customers with the Estimated Minimum Purchase. Wholesale customers will rely on well pumping to meet their customer’s demands during those periods and GUC will provide sufficient water during the remainder of the year to allow its customers to meet CCPCUA rules. In the event that GUC experiences a mechanical failure, pipeline break, unusually high demand or other situation in its water system, the Water Purchase Agreements include a provision that allows GUC to curtail or interrupt service.

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GUC and its wholesale customers will be required to balance requirements of two regulations: CCPCUA rules and requirements of the IBT Certificate. CCPCUA rules limit the amount of well pumping from the Cretaceous aquifer system over an **annual period** (e.g. total annual volume). The IBT Certificate will limit the transfer amount on a **maximum day basis**. This IBT management strategy was developed to meet the requirements of two sets of rules with different criteria. GUC and its wholesale customers will develop more detailed standard operating procedures to guide bulk sales and purchases to ensure compliance with both rules and to ensure that the needs of each water system are met.

6. ATTACHMENTS



North Carolina Department of Environment and Natural Resources
Division of Water Resources

Michael F. Easley, Governor

William G. Ross Jr., Secretary
John Morris, Director

July 6, 2004

Albert V. Lewis, Jr.
McDavid Associates, Inc.
120 N. Main Street
Farmville, NC 27828

Dear Mr. Lewis:

This letter is in response to your June 28, 2004 "Banking Request" inquiry for the City of Farmville and for Greene County water systems. We have previously approved the concept of "banking" Cretaceous aquifer withdrawals. In this letter we formally approve your plan to use this banking concept and set out guidelines to participate in that process.

At the outset, users of this banking concept should understand that the Environmental Management Commission and the Division of Water Resources strongly believe, based on the hydrologic information available to us, that the three phases of water withdrawal reduction will be necessary to bring withdrawals from the Cretaceous aquifer system in balance with recharge. Positive water level responses made in the short term as a result of banking credits must be weighed carefully during the Central Coastal Plain Capacity Use Area reviews conducted in 2008, 2013, and 2018 against the effects on water levels of the future withdrawal of this banked water.

CCPCUA permit holders or applicants who have implemented alternative sources of water may establish accounts of banked Cretaceous aquifer water by prior agreement with the Division of Water Resources. Water bank years will be based on the anniversary of the effective date of the rule (August 1, 2002), so a banking year will start on August 1 and run through July 31. Credits to a Cretaceous water bank account may be made in any year prior to August 1, 2018. During the period extending from the present day through July 31, 2008, the bank may be credited with the positive volume of water calculated by subtracting the actual annual use from the Approved Base Rate (ABR). During the August 1, 2008 through July 31, 2013 time period, the bank may be credited with the positive volume of water calculated by subtracting the actual annual use from the ABR less Phase I reduction. During the August 1, 2013 through July 31, 2018 time period, the bank may be credited with the positive volume of water calculated by subtracting the actual annual use from the ABR less Phase II reduction.

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CCPCUA permit holders or applicants must submit a letter of intent to establish a Cretaceous water bank, which will be subject to review and approval by the Division of Water Resources. This document will be added to their permit file. They also must sign an annual water withdrawal summary provided to them by the Division of Water Resources within 60 days after August 1 of each year. That summary will contain the previous year's withdrawal, their ABR less any phased reduction amount as applicable, the Cretaceous water bank credit, the Cretaceous water bank debit, and their Cretaceous water bank balance.

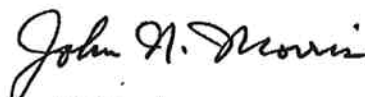
Debits from a Cretaceous water bank may occur after July 31, 2010 only. Future permits may have stipulations about how debits may occur. For example, there may be annual limits on the amount of debits from the Cretaceous water bank as needed to protect the Cretaceous aquifers.

As far as the Town of Farmville and Greene County (and the CCPCUA permit holders and applicants it represents) are concerned, your June 28, 2004 letter with attachments is sufficient information to add to these respective permit files signifying their intent to participate in Cretaceous banking. The Division of Water Resources approves the banking proposal described in these documents.

We appreciate the thoughtful approach that Farmville and Greene County have taken to meet their water supply needs. Your Cretaceous banking idea and alternative water supply purchase agreements with the Greenville Utility Commission are excellent examples of creative and farsighted action to assure that your communities have water supplies to support a sound economy.

Please let me or Nat Wilson know if you have any questions. I can be reached at 919-715-5422 and Nat can be reached at 919-715-5445.

Sincerely,



John N. Morris

cc: Mr. Bennie Heath
Mr. Lee Worsley
Mr. Richard Hicks
✓ Mr. Randy Emory
Dr. Richard Spruill



North Carolina Department of Environment and Natural Resources
Division of Water Resources

Received
B106

SEP 22 2003

Michael F. Easley, Governor

William G. Ross Jr., Secretary
John N. Morris, Director

September 17, 2003

Mr. Randall D. Emory
Greenville Utilities Commission
PO Box 1847
Greenville, NC 27835-1847

Dear Mr. Emory:

I am responding to your letter of August 20, 2003, which followed up on our meeting on July 17 when we discussed the concept developed by Greenville Utilities to provide for "banking" of allowed withdrawals under Central Coastal Plain Capacity Use Area permits.

As we discussed at the meeting, the goal of the Central Coastal Plain Capacity Use Area is to provide a fair and predictable schedule for reducing unsustainable withdrawals from the Cretaceous aquifer system and to make the transition to sustainable water sources that can support a healthy economy. Our goal is to interpret this rule in a flexible manner that will help local governments solve this critical water supply problem. In our interpretation of the rule we are guided by the necessity to be fair to all water users in the region and to assure that we make steady progress in protecting the aquifer, which is a critical resource for the region's future.

Under your proposal, a local government water system would reduce water withdrawals faster than required by the rule and "bank" the difference between the system's permitted withdrawal and their actual withdrawal. Later, this banked water would be drawn upon in a way that would allow higher withdrawals later in the process but still meet the average reduction requirement over the first two reduction phases. This banking concept appears to be fair, in that the average rate of reductions is met. The proposal has the benefit of achieving significant earlier reductions above what would be required.

We support this banking concept in principle. The Division of Water Resources does not have the authority to approve a specific permit involving this banking concept until a permit is applied for and acted upon after the required public notice period. During the review of a permit application, we would carefully review the details of the proposal to make sure that our standards of fairness and aquifer protection are achieved.

Your example of the application of the banking concept extends only through the second water use reduction phase and does not explain what would happen in the third reduction phase. A permit applicant will need to have a practical plan to deal with this third phase to make sure that a satisfactory water supply is available after the banked water is exhausted. We would not want

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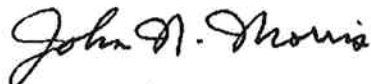
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to put a water system at risk by allowing the higher withdrawals later in the process unless the water system has a satisfactory plan to cover the whole sixteen-year transition process.

We appreciate the efforts made by Greenville Utilities to work toward creative and workable solutions to assure adequate future water supplies to support the economy of this region. We will look forward to continuing to work with you toward these goals.

Sincerely,



John N. Morris

JM/km

cc: Mr. Nat Wilson



**Greenville
Utilities**

August 20, 2003

Mr. John N. Morris, Director
Division of Water Resources
NCDENR
1611 Mail Service Center
Raleigh, NC 27699-1611

**Subject: Central Coastal Plain Capacity Use Area Rules
Inter System Banking Concept**

Dear John:

At our meeting with you and your staff on July 17, 2003, we presented information on a concept that, if implemented, could result in significant voluntary reductions in withdrawals from the Cretaceous aquifer system prior to the mandatory reductions which begin in 2008 during Phase II of the Central Coastal Plain Capacity Use Area (CCPCUA) rules. We referred to this concept as "Inter-System Trading/Banking Credits", hereinafter referred to simply as, "Banking".

Under the Banking concept; a water system subject to the CCPCUA rules could immediately begin reducing the quantity of water they withdraw from the aquifer, off-setting those reductions using supplemental water purchased from a surface water system such as Greenville Utilities. The quantities of water **not pumped** from the aquifer would be aggregated and set aside (i.e., "banked") for later withdrawal from the aquifer during Phase III of the rules, beginning in 2013.

In the example we presented to you during the presentation, the affected system would reduce their withdrawals from the aquifer during Phase I by 876 million gallons or approximately 44% of the total quantity they would otherwise have pumped from the aquifer. During Phase II of the rule, they would continue their reduced withdrawals at the required reduction rate (25%). During Phase III (50% reduction phase), they would continue reduced withdrawals at the 25% level, thus effectively using the previously "banked" water to account for the other 25% of the required reduction.

We believe that "Banking" is an environmentally sound concept that is consistent with the intent of the Central Coastal Plain Capacity Use Area rule and one that could have a measurable, positive effect on the aquifer system.

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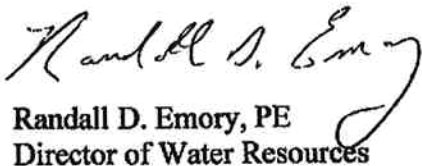
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Mr. John N. Morris
August 20, 2003
Page 2

At this time, two of the Pitt County systems that have expressed interest in purchasing supplemental water from Greenville Utilities have asked us whether Banking has been approved by the State. The purpose of this letter is to formally request your approval of the Banking concept. If possible, we would appreciate a response by September 5, 2003.

In the meantime, if you should have any questions or need any additional information regarding this matter, please do not hesitate to let us know.

Sincerely,



Randall D. Emory, PE
Director of Water Resources

RDE/jhb

cc: Mr. Malcolm A. Green, PE, General Manager/CEO
Mr. Ronald D. Elks, Assistant General Manager
Mr. J. Steven Porter, PE, W/S Systems Engineer ✓
Mr. Barrett L. Lasater, Plants Manager
Dr. Richard Spruill

**Greenville Utilities Commission
Interbasin Transfer Petition**

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Appendix C

Greenville Utilities Commission Local
Water Supply Plan

Greenville Utilities Commission

2008

1. System Information**Contact Information**

| | | | |
|--------------------|-------------------------------------|------------|-------------------------------------|
| Water System Name: | Greenville Utilities Commission | PWSID: | 04-74-010 |
| Mailing Address: | PO Box 1847 Greenville, NC 27835 | Ownership: | Municipality |
| Contact Person: | Ricky Langley | Title: | Water Treatment Plant Superintenden |
| Phone: | 252-551-1561 | Fax: | 252-551-1493 |
| Secondary Contact: | Barrett Lasater | Phone: | 252-329-2160 |
| Mailing Address: | PO Box 1847 Greenville, NC 27835 | Fax: | 252-551-1498 |

Distribution System

| Line Type | Size Range (Inches) | Estimated % of lines |
|--------------------|---------------------|----------------------|
| Asbestos Cement | 6-16 | 18.00 % |
| Cast Iron | 6-12 | 13.00 % |
| Ductile Iron | 6-36 | 4.00 % |
| Other | 6-16 | 2.00 % |
| Polyvinyl Chloride | 2-24 | 63.00 % |

What are the estimated total miles of distribution system lines? 604 Miles

How many feet of distribution lines were replaced during 2008? 1,340 Feet

How many feet of new water mains were added during 2008? 69,913 Feet

How many meters were replaced in 2008? 448

How old are the oldest meters in this system? 17 Year(s)

How many meters for outdoor water use, such as irrigation, are not billed for sewer services? 1,320

What is this system's finished water storage capacity? 8.500 Million Gallons

Has water pressure been inadequate in any part of the system since last update? No

Programs

Does this system have a program to work or flush hydrants? Yes, 2 Years or More

Does this system have a valve exercise program? Yes, 2 Years or More

Does this system have a cross-connection program? Yes

Does this system have a program to replace meters? Yes

Does this system have a plumbing retrofit program? No

Does this system have an active water conservation public education program? Yes

Does this system have a leak detection program? Yes

Leak detection is initiated whenever system annual average unaccounted for losses exceed AWWA standard for comparable systems or whenever there is a known or suspected significant leak. The system is divided into 10 geographically defined zones and systematically visually inspected. Priority crossings at waterways are also inspected. Leak detection equipment (Metrotech HL 400) is utilized by trained personnel to pinpoint leaks not readily detectable by visual observation or where the location of the leak cannot otherwise be adequately determined. Significant leaks are repaired immediately following detection and all minor leaks are repaired as soon as practicable following their detection.

Water Conservation

What type of rate structure is used? Uniform

How much reclaimed water does this system use? 0.000 MGD For how many connections? 0

Does this system have an interconnection with another system capable of providing water in an emergency? Yes

2. Water Use Information

Service Area

| Sub-Basin(s) | % of Service Population | County(s) | % of Service Population |
|--------------------|-------------------------|-----------|-------------------------|
| Tar River (15-1) | 81 % | Pitt | 100 % |
| Neuse River (10-1) | 19 % | | |

What was the year-round population served in 2008? 87,167

System Map: upload [GUCWaterServiceArea2009](#)

Has this system's acquired another system since last report? No

Water Use by Type

| Type of Use | Metered Connections | Metered Average Use (MGD) | Non-Metered Connections | Non-Metered Estimated Use (MGD) |
|---------------|---------------------|---------------------------|-------------------------|---------------------------------|
| Residential | 30,014 | 5.839 | 0 | 0.000 |
| Commercial | 3,397 | 2.777 | 0 | 0.000 |
| Industrial | 24 | 0.904 | 0 | 0.000 |
| Institutional | 0 | 0.000 | 0 | 0.000 |

How much water was used for system processes (backwash, line cleaning, flushing, etc.)? 2.792 MGD

Wholesale customers are not included in Water use by type

Water Sales

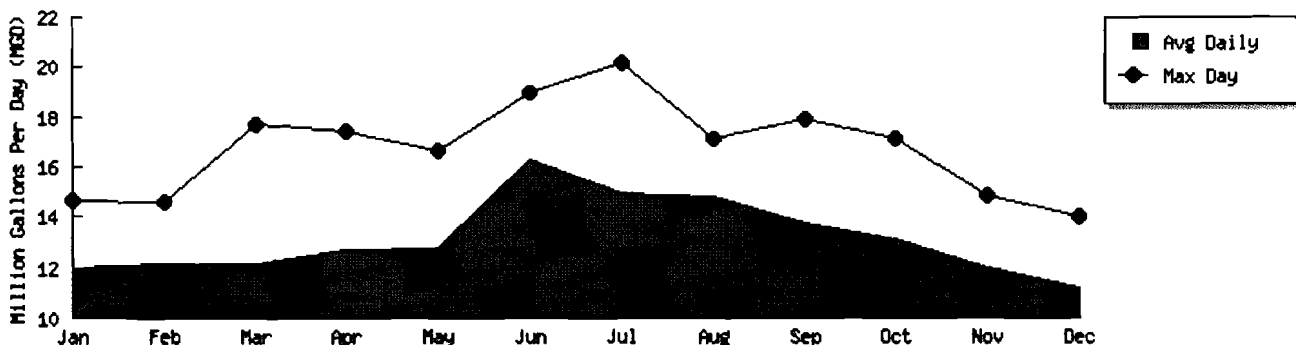
| Purchaser | PWSID | Average Daily Sold (MGD) | Days Used | MGD | Contract Expiration | Recurring | Required to comply with water use restrictions? | Pipe Size (s) (Inches) | Use Type |
|---------------------------|-----------|--------------------------|-----------|-------|---------------------|-----------|---|------------------------|-----------|
| Bell Arthur WC | 04-74-045 | 0.000 | 0 | 0.000 | | Yes | Yes | 6 | Emergency |
| Eastern Pines WC | 04-74-015 | 0.000 | 0 | 0.000 | | Yes | Yes | 6 | Emergency |
| Homestead Community Water | 04-74-109 | 0.006 | 366 | 0.000 | | Yes | Yes | 4 | Regular |
| Winterville | 04-74-040 | 0.192 | 366 | 0.000 | 2008 | Yes | Yes | 10 | Regular |

3. Water Supply Sources

Monthly Withdrawals & Purchases

| | Average Daily Use (MGD) | Max Day Use (MGD) | | Average Daily Use (MGD) | Max Day Use (MGD) | | Average Daily Use (MGD) | Max Day Use (MGD) |
|-----|-------------------------|-------------------|-----|-------------------------|-------------------|-----|-------------------------|-------------------|
| Jan | 11.942 | 14.676 | May | 12.750 | 16.620 | Sep | 13.752 | 17.893 |
| Feb | 12.148 | 14.574 | Jun | 16.285 | 18.972 | Oct | 13.137 | 17.100 |
| Mar | 12.146 | 17.699 | Jul | 14.961 | 20.152 | Nov | 11.944 | 14.860 |
| Apr | 12.653 | 17.435 | Aug | 14.807 | 17.120 | Dec | 11.198 | 13.996 |

Greenville Utilities Commission's 2008 Monthly Withdrawals & Purchases



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Ground Water Sources

| Name or Number | Average Daily Withdrawal (MGD) | | Max Day Withdrawal (MGD) | 12-Hour Supply (MGD) | CUA Reduction | Year Offline | Use Type |
|----------------|--------------------------------|-----------|--------------------------|----------------------|---------------|--------------|----------|
| | MGD | Days Used | | | | | |
| BWW | 0.021 | 8 | 0.045 | 0.158 | CUA25 | | Regular |
| ESW | 0.013 | 4 | 0.038 | 0.198 | CUA25 | | Regular |
| EW2 | 0.008 | 5 | 0.025 | 0.143 | CUA25 | | Regular |
| EW4 | 0.017 | 4 | 0.035 | 0.143 | CUA25 | | Regular |
| IBW | 0.052 | 18 | 0.115 | 0.219 | CUA25 | | Regular |
| NGW | 0.013 | 4 | 0.034 | 0.184 | CUA25 | | Regular |
| NSW | 0.022 | 10 | 0.046 | 0.219 | CUA25 | | Regular |
| WSW | 0.008 | 4 | 0.022 | 0.133 | CUA25 | | Regular |

Ground Water Sources (continued)

| Name or Number | Well Depth (Feet) | Casing Depth (Feet) | Screen Depth (Feet) | | Well Diameter (Inches) | Pump Intake Depth (Feet) | Metered? |
|----------------|-------------------|---------------------|---------------------|--------|------------------------|--------------------------|----------|
| | | | Top | Bottom | | | |
| BWW | 435 | 435 | 251 | 430 | 12 | 282 | Yes |
| ESW | 489 | 489 | 209 | 486 | 6 | 192 | Yes |
| EW2 | 452 | 452 | 210 | 452 | 12 | 246 | Yes |
| EW4 | 458 | 458 | 192 | 458 | 14 | 249 | Yes |
| IBW | 429 | 429 | 250 | 424 | 12 | 277 | Yes |
| NGW | 404 | 404 | 258 | 391 | 6 | 214 | Yes |
| NSW | 454 | 454 | 178 | 454 | 14 | 245 | Yes |
| WSW | 421 | 421 | 166 | 417 | 6 | 193 | Yes |

Are ground water levels monitored? Yes, Monthly

Does this system have a wellhead protection program? Yes

Surface Water Sources

| Stream | Reservoir | Average Daily Withdrawal | | Maximum Day Withdrawal (MGD) | Available Raw Water Supply | | Usable On-Stream Raw Water Supply Storage (MG) |
|-----------|-----------|--------------------------|-----------|------------------------------|----------------------------|-----------|--|
| | | MGD | Days Used | | MGD | Qualifier | |
| Tar River | | 13.143 | 366 | 20.152 | 22.500 | F | 63.000 |

Surface Water Sources (continued)

| Stream | Reservoir | Drainage Area (sq mi) | Metered? | Sub-Basin | County | Year Offline | Use Type |
|-----------|-----------|-----------------------|----------|------------------|--------|--------------|----------|
| Tar River | | 2,620 | Yes | Tar River (15-1) | Pitt | | Regular |

What is this system's off-stream raw water supply storage capacity? 63 Million gallons

Are surface water sources monitored? Yes, Daily

Are you required to maintain minimum flows downstream of its intake or dam? No

Does this system have the ability to transfer surface water between river basins? Yes

Does this system rely on the transfer of surface water between river basins for any of its existing water supply? No

Does this system anticipate transferring surface water between river basins? Yes

We do not have the ability to transfer raw water from one basin to another however currently 19% of the population served by GUC is in the Neuse River Basin. A transfer is made through those homes that have septic tanks. As a result of required cutbacks in ground water withdrawal associated with the CCPCUA, sometime in 2009 we will begin selling water to Greene County and the Town of Farmville which are located in the Contentnea Creek Sub-Basin and the Town of Winterville which is located in the Neuse River Sub-basin. A GUC consulting engineering firm is currently in the process of completing the required documentation for an IBT certification for both the Neuse and the Contentnea River Sub-Basins. Submission of IBT worksheets will be forthcoming.

Water Purchases From Other Systems

| Purchaser | PWSID | Average Daily Purchased (MGD) | Days Used | Contract | | | Required to comply with water use restrictions? | Pipe Size (s) (Inches) | Use Type |
|-----------|-------|-------------------------------|-----------|----------|------------|-----------|---|------------------------|----------|
| | | | | MGD | Expiration | Recurring | | | |

B114

| | | | | | | | | |
|------------------|-----------|-------|---|-------|-----|-----|----|-----------|
| Bell Arthur WC | 04-74-045 | 0.000 | 0 | 0.000 | Yes | No | 6 | Emergency |
| Eastern Pines WC | 04-74-015 | 0.000 | 0 | 0.000 | Yes | No | 6 | Emergency |
| Winterville | 04-74-040 | 0.000 | 0 | 0.000 | Yes | Yes | 10 | Emergency |

Water Treatment Plants

| Plant Name | Permitted Capacity (MGD) | Is Raw Water Metered? | Is Finished Water Output Metered? | Source |
|--------------------------------|--------------------------|-----------------------|-----------------------------------|-----------|
| Greenville Utilities Commissio | 22.500 | Yes | Yes | Tar River |

Did average daily water production exceed 80% of approved plant capacity for five consecutive days during 2008? No
 If yes, was any water conservation implemented?

Did average daily water production exceed 90% of approved plant capacity for five consecutive days during 2008? No
 If yes, was any water conservation implemented?

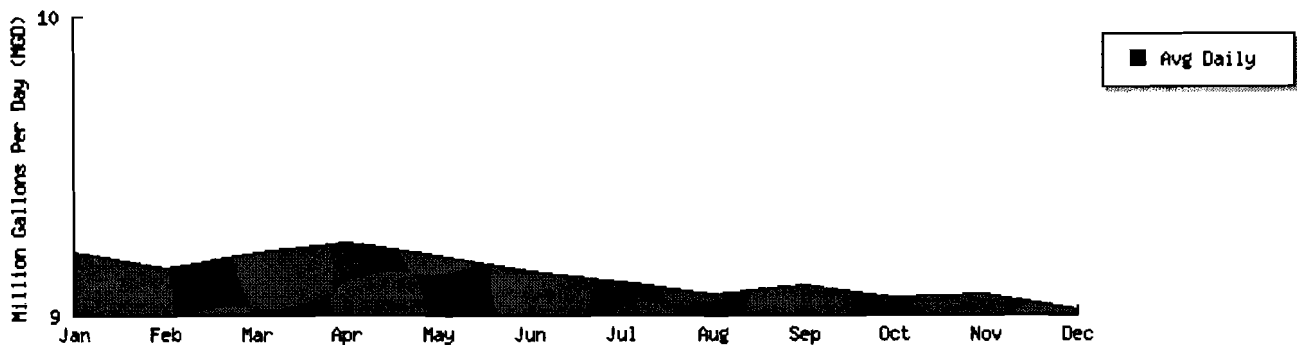
Are peak day demands expected to exceed the water treatment plant capacity in the next 10 years? No

4. Wastewater Information

Monthly Discharges

| | Average Daily Discharge (MGD) | | Average Daily Discharge (MGD) | | Average Daily Discharge (MGD) |
|-----|-------------------------------|-----|-------------------------------|-----|-------------------------------|
| Jan | 9.210 | May | 9.200 | Sep | 9.100 |
| Feb | 9.160 | Jun | 9.150 | Oct | 9.060 |
| Mar | 9.210 | Jul | 9.110 | Nov | 9.070 |
| Apr | 9.250 | Aug | 9.070 | Dec | 9.020 |

Greenville Utilities Commission's 2008 Monthly Discharges



How many sewer connections does this system have? 26,917

How many water service connections with septic systems does this system have? 6,520

Are there plans to build or expand wastewater treatment facilities in the next 10 years? No

Wastewater Permits

| Permit Number | Permitted Capacity (MGD) | Design Capacity (MGD) | Average Annual Daily Discharge (MGD) | Maximum Day Discharge (MGD) | Receiving Stream | Receiving Basin |
|---------------|--------------------------|-----------------------|--------------------------------------|-----------------------------|------------------|------------------|
| NC0023931 | 17.500 | 17.500 | 9.020 | 14.090 | Tar River | Tar River (15-1) |
| NC0082139 | 1.000 | 0.500 | 0.673 | 0.720 | TAR RIVER | Tar River (15-1) |

Wastewater Interconnections

| Water System | PWSID | Type | Average Daily Amount | | Contract Maximum (MGD) |
|--------------|-----------|-----------|----------------------|-----------|------------------------|
| | | | MGD | Days Used | |
| Bethel | 04-74-030 | Receiving | 0.230 | 366 | 0.300 |

B115

Grimesland 04-74-055 Receiving 0.025 366 0.053

5. Planning

Projections

| | 2008 | 2010 | 2020 | 2030 | 2040 | 2050 |
|-----------------------|--------|--------|---------|---------|---------|---------|
| Year-Round Population | 87,167 | 90,000 | 108,000 | 129,000 | 154,000 | 184,000 |
| Seasonal Population | 0 | 0 | 0 | 0 | 0 | 0 |
| Residential | 5.839 | 6.118 | 6.549 | 6.979 | 7.437 | 7.437 |
| Commercial | 2.777 | 2.908 | 3.112 | 3.317 | 3.535 | 3.535 |
| Industrial | 0.904 | 0.951 | 1.018 | 1.085 | 1.156 | 1.156 |
| Institutional | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| System Process | 2.792 | 2.930 | 3.135 | 3.341 | 3.561 | 3.794 |
| Unaccounted-for | 0.672 | 0.704 | 0.754 | 0.804 | 0.856 | 0.869 |

Future Water Sales

| Purchaser | PWSID | MGD | Contract | | Pipe Size(s) (Inches) | Use Type |
|-----------------------------------|-----------|-------|------------|----------|-----------------------|----------|
| | | | Year Begin | Year End | | |
| Greene County | 04-40-106 | 0.715 | 2008 | 2048 | 24 | Regular |
| Stokes Regional Water Corporation | 04-74-060 | 0.048 | 2008 | 2048 | 10 | Regular |
| Town of Bethel | 04-74-045 | 0.040 | 2008 | 2048 | 12 | Regular |
| Town of Farmville | 04-74-020 | 0.378 | 2008 | 2048 | 24 | Regular |

Future Supply Sources

| Source Name | PWSID | Source Type | Additional Supply | Year Online | Year Offline | Type |
|--|-----------|-------------|-------------------|-------------|--------------|---------|
| Aquifer Storage and Recovery Well System | 04-74-010 | Ground | 1.500 | 2010 | | Regular |

Demand v/s Percent of Supply

| | 2008 | 2010 | 2020 | 2030 | 2040 | 2050 |
|------------------------------|--------|--------|--------|--------|--------|--------|
| Surface Water Supply | 22.500 | 22.500 | 22.500 | 22.500 | 22.500 | 22.500 |
| Ground Water Supply | 1.397 | 1.048 | 0.349 | 0.349 | 0.349 | 0.349 |
| Purchases | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Future Supplies | | 1.500 | 1.500 | 1.500 | 1.500 | 1.500 |
| Total Available Supply (MGD) | 23.897 | 25.048 | 24.349 | 24.349 | 24.349 | 24.349 |
| Service Area Demand | 12.984 | 13.611 | 14.568 | 15.526 | 16.545 | 16.791 |
| Sales | 0.199 | 0.198 | 0.198 | 0.198 | 0.198 | 0.198 |
| Future Sales | | 1.181 | 1.181 | 1.181 | 1.181 | 0.000 |
| Total Demand (MGD) | 13.183 | 14.990 | 15.947 | 16.905 | 17.924 | 16.989 |
| Demand as Percent of Supply | 55% | 60% | 65% | 69% | 74% | 70% |

Additional Information

Has this system participated in regional water supply or water use planning? Yes, Regional water supply planning with adjacent systems has come about due to the CCPCUA and the necessity for these systems to find alternate water sources. GUC has become a regional water supply for these systems as a result of this planning.

What major water supply reports or studies were used for planning? GUC Water System Master Plan, Water Supply/Demand Reports provided by Other Systems, GUC Evaluation of Needed Capacity and Treatment Methodology for the Water Treatment Plant Expansion.

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: We are currently in the design phase of a raw water intake project. This project will add a redundant set of intake screens to our existing raw water pump station. The screens will be located approximately 4.5 feet lower than the existing screens which will provide additional water over the screens during drought conditions. The project is not increasing the pump stations capacity. Permitting and obtaining SRF funding are the two major hurdles for this project.