Compliance and Monitoring Plan

Prepared for

Kerr Lake Regional Water System

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This document has been prepared in accordance with the Kerr Lake Regional Water System's 2015 Interbasin Transfer Certificate.

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Acronyms and Abbreviations

EA	Environmental Assessment
FONSI	Finding of No Significant Impact
I&I	Inflow and infiltration
IBT	Interbasin transfer
Kerr Lake	John H. Kerr Reservoir
KLRWS	Kerr Lake Regional Water System
LWSP	Local Water Supply Plan
mgd	million gallons per day
MMD	average day of a maximum month
NCDEQ	North Carolina Department of Environmental Quality
NCDWR	North Carolina Division of Water Resources
NC EMC	North Carolina Environmental Management Commission
SGWSA	South Granville Water and Sewer Authority
WSRP	Water Shortage Response Plan
WWTP	Wastewater Treatment Plant

SECTION 1

Introduction

On November 5, 2015, the North Carolina Environmental Management Commission (EMC) granted an interbasin transfer (IBT) certificate to the Kerr Lake Regional Water System (KLRWS). Permitted transfers from the Roanoke River basin include: 10.7 mgd to the Tar River basin, 1.7 mgd to the Fishing Creek basin, and 1.8 mgd to the Neuse River basin.

The owners of the KLRWS and primary bulk customers served by the system are the City of Henderson, the City of Oxford, and Warren County, known as the "Partners." Ownership responsibility is 60 percent, 20 percent, and 20 percent, respectively. They also currently sell water to secondary bulk customers including Stovall, Warrenton, Norlina, Vance County, Kittrell, and Franklin County. Future sales will occur from Oxford to South Granville Water and Sewer Authority (SGWSA) for use in Creedmoor's service area. Franklin County owns the Youngsville water system and also sells water to Bunn and Lake Royale. Water sales are shown in Figure 1.

In addition to the permitted transfer, the IBT certificate includes seven conditions (NC EMC, 2015):

1. **Water Conservation Plan** – Within 90 days of receipt of the IBT certificate, the KLRWS is required to submit a water conservation plan subject to approval by the North Carolina Division of Water Resources (NCDWR) that specifies the water conservation measures that will be implemented by the KLRWS, its Partners and its wholesale customers to ensure the efficient use of the transferred water.
2. **Drought Management Plan** – Within 90 days of receipt of the IBT certificate, the KLRWS is required to submit a drought management plan subject to approval by the NCDWR that specifies how the transfer will be managed to protect the source river basin (Roanoke River basin) during drought conditions or other water emergencies that occur within the source river basin.
3. **Compliance and Monitoring Plan** – Within 90 days of receipt of the IBT certificate, the KLRWS is required to submit a quarterly compliance and monitoring plan subject to approval by the NCDWR.
4. **EMC Consideration of Alternative Sources** – The EMC may reopen and amend the maximum amount of the IBT authorized if it appears that an alternative source of water is available to the Partners of the KLRWS within the receiving basin (Tar River basin, Neuse River basin, and Fishing Creek basin).
5. **EMC Consideration of Future Water Demands** – The EMC may reopen and amend the certificate if it is determined that the Partners' actual future water needs are significantly less than the projected water needs at the time the certificate was granted.
6. **Resale of Transferred Water** – The Partners shall not resell the water that would be transferred pursuant to the IBT certificate to another public water system not listed in the certificate.
7. **EMC Consideration of Impacts** – The EMC may reopen the certificate and amend existing or require new conditions to ensure detrimental impacts are mitigated if environmental impacts are found to be substantially different from those on which the EMC's Findings of Fact were based.

To meet Condition 3, the following sections of this Compliance and Monitoring Plan include a description of how the KLRWS and its Partners will monitor the amount of IBT, and also as required by the certificate, methodologies, and schedules for reporting the following information:

- Monthly average day transfer amounts (calculated)
- Compliance with IBT certificate conditions
- Reporting – both quarterly and with an annual report

SECTION 2

Interbasin Transfer Calculation

The combined transfer from the Roanoke River basin and the amount of transfer to each river basin will be calculated on a daily basis and presented as average values for each calendar month. The methodology for calculating the daily IBT amount is consistent with NCDWR guidelines for estimating IBT amounts as part of the local water supply planning process (NCDWR, 2009).

The KLRWS is a complex network of water systems and, to calculate IBT, tracking of sales to other parties and wastewater discharges is necessary. Water is transferred (and not returned to the Roanoke River basin) via potable water consumptive use and wastewater discharge. Daily IBT is calculated based on a combination of sales data and assumptions including the percentage of each customer's service area in each river basin as reported in Local Water Supply Plans (LWSPs). Daily IBT data are then used to calculate the IBT certificate compliance metric – IBT calculated as the daily average of a calendar month.

2.1 Definitions

The following definitions are used to assign collected water system data and conduct calculations for IBT compliance and monitoring, as shown in Table 1.

- ***Water Withdrawal*** is the total volume of water pumped from Kerr Lake by Henderson, Oxford, and Warren County in the Roanoke River basin.
- ***Return to the Roanoke River basin*** includes:
  - The amount of water discharged by the KLRWS water treatment plant (WTP) back to Kerr Lake as a result of the treatment process
  - The amount of treated wastewater discharged back to the Roanoke River basin via the City of Henderson's wastewater treatment plant
- ***Interbasin Transfer*** is calculated as the ***withdrawal*** from the source basin (Roanoke River Basin) minus the ***return*** to the source basin. IBT is then calculated for each of the three receiving basins (Tar River basin, Neuse River basin and Fishing Creek basin). Components of this calculation include:
  - **Sales**: The amount of water sold to each Partner and each wholesale customer, as metered at the point of sale.
  - **Consumptive Use: T**he water used by customers that does not end up in the wastewater collection system; septic systems and irrigation are the most common consumptive uses.
  - **Water Use Discharged as Wastewater:** The non-consumptive water use discharged as wastewater in each basin, based on effluent flow meter data. The following utilities discharge in each basin:
    - Roanoke River Basin
      - Henderson
      - Stovall
    - Tar River Basin
      - Franklin County
        - Bunn
        - Lake Royale
      - Oxford

    - Granville County
- Fishing Creek Basin
    - Warren County
    - Warrenton
    - Norlina
- Neuse River Basin
    - SGWSA (for Creedmoor)

Table 1

Interbasin Transfer Annual Statistics - 2015 Example

Date		Withdrawal	Return to	Interbasin Transfer to			Total IBT
Month	Year	Roanoke	Roanoke	Tar	Fishing Creek	Neuse	
MAXIMUM	2015			**10.7**	**1.7**	**1.8**	**14.2**
January							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November	2015	**6.1**	1.7	3.5	0.8	0.1	**4.4**
December	2015	**5.8**	1.2	3.8	0.7	0.1	**4.6**
Maximum Month Average Day	**2015**		**1.2**	**3.8**	**0.7**	**0.1**	**4.6**

2.2 Data Compilation

Metered data are used to calculate IBT. The following data are collected and input into the KLRWS' IBT tracking spreadsheet:

- Water Withdrawal, comprising:
  - Kerr Lake withdrawal from the Roanoke River basin
- Water Sales to the Partners and their Wholesale Customers
  - Henderson sells to:
    - Kittrell
    - Vance County
    - Franklin County. Franklin County sells to:
      - Bunn
      - Lake Royale
  - Oxford sells to:
    - Stovall
    - Granville County
    - SGWSA (future, for Creedmoor)
  - Warren County sells to:
    - Warrenton
    - Norlina
- Water Use Discharged as Wastewater, including:
  - Henderson discharges to Roanoke
    - Kittrell discharges to the Tar River basin
    - Franklin County discharges to the Tar River basin
      - Bunn discharges to the Tar River basin
      - Lake Royale discharges to the Tar River basin
  - Oxford discharges to the Tar River basin
    - Stovall discharges to the Roanoke River basin
    - Granville County discharges to the Tar River basin
    - SGWSA (Creedmoor) discharges to the Tar River basin
  - Warren County discharges to the Fishing Creek subbasin
    - Warrenton discharges to the Fishing Creek subbasin
    - Norlina discharges to the Fishing Creek subbasin
- Consumptive Use
  - Consumptive use in Henderson occurs in both the Roanoke and Tar River basins
    - Consumptive use in Kittrell is wholly in the Tar River basin
    - Consumptive use in Vance County occurs in both the Roanoke and Tar River basins
    - Consumptive use in Franklin County occurs in both the Tar and Neuse River basins
      - Consumptive use in Bunn occurs wholly in the Tar River basin
      - Consumptive use in Lake Royale occurs wholly in the Tar River basin
  - Consumptive use in Oxford occurs wholly in the Tar River basin
    - Consumptive use in Stovall occurs wholly in the Roanoke River basin
    - Consumptive use in Granville County occurs in both the Roanoke and Tar River basins
    - Consumptive use in SGWSA is wholly in the Neuse River basin
  - Consumptive use in Warren County occurs in both the Roanoke River Basin and the Fishing Creek subbasin
    - Consumptive use in Warrenton is wholly in the Fishing Creek subbasin

- Consumptive use in Norlina occurs in both the Fishing Creek subbasin and the Roanoke River Basin

2.3 Data Assumptions

The calculation of IBT is essentially similar to performing a water balance – estimating how much of the water withdrawn from the source basin ends up in each IBT basin as either treated wastewater discharge or consumptive use. The following assumptions are used to estimate consumptive use and to account for factors such as wastewater system infiltration and inflow (I/I):

- The percentages of consumptive use that occurs in the source basin and each IBT receiving basin are estimated based on the percentage of each service area in each IBT basin as reported in LWSPs and the difference between total water use and wastewater discharge.
- When wastewater discharge is greater than water used (including consumptive use), it is likely the result of wastewater system I/I during very rainy periods. In these instances, the proportion of water use discharged as wastewater in each IBT basin is assumed to be the same as the proportion of measured wastewater discharged in each basin.

2.4 Metering

Some KLRWS wholesale customers are very small utilities with limited resources. As such, meters that track sales from the Partners and Franklin County may need to be read manually and are not currently being read daily. Instead, some meters are read monthly. The average day of a calendar month value, per the meter, will be used in data compilation for the IBT calculation. Should reporting issues arise with any of the monthly readings, the individual water provider will work with both the KLRWS and NCDWR to resolve and remedy those issues from reoccurring. This may include switching to daily readings, as deemed appropriate. Table 2 lists each wholesale customer meter and the frequency with which it is read by the water provider.

Table 2
KLRWS Wholesale Water Meters

Partner	Customer	Meter
City of Henderson	Franklin County	daily
	Bunn	monthly
	Lake Royale	monthly
	Vance County	monthly
	Kittrell	monthly
City of Oxford	Stovall	monthly
	SGWSA	(future)
	Granville County	monthly
Warren County	Warrenton	monthly
	Norlina	daily

2.5 Interbasin Transfer Calculation

Generally, the sequence of the daily IBT calculations is as follows:

1. Calculate consumptive use as the difference between total water use and wastewater discharges:
    a. Calculate the difference for each entity.
    b. Calculate consumptive use by basin by using service area statistics from LWSPs.
2. Distribute consumptive use and water use discharged as wastewater by IBT basin: Tar and Neuse River basins and Fishing Creek Subbasin.
3. Calculate the total returned and used in each basin, calculated as the total amount of consumptive use and water use discharged as wastewater within the Roanoke, Tar, and Neuse River basins and the Fishing Creek subbasin.
4. Determine IBT from the Roanoke River basin to the Tar and Neuse River basins and Fishing Creek subbasin based on metered wastewater discharge and calculated consumptive use data.

The average day IBT values will be calculated for each month in a calendar year from the daily IBT values developed following the calculation steps outlined herein.

SECTION 3

Reporting Methodologies and Schedules

Compliance with the permitted IBT limits from the Roanoke River basin to the Neuse River basin, from the Roanoke River basin to the Tar River basin, and from the Roanoke River basin to the Fishing Creek subbasin, is required in the IBT certificate to be reported quarterly. The status of the additional seven conditions that the Partners must meet in order to maintain compliance with the IBT certificate will be reported annually.

3.1 Quarterly Reporting

At the end of each quarter, the Partners will calculate the daily average IBT amount for each month in the quarter and submit a brief fact sheet to NCDWR within 30 days after the end of the quarter. The KLRWS will also post this information on its website (http://ci.henderson.nc.us/departments/public-utilties/kerr-lake-regional-water-system/).

The schedule for quarterly reporting is as follows:

- Quarter 1 (Q1) – report due by April 30 (Q1 includes January, February, and March)
- Quarter 2 (Q2) – report due by July 30 (Q2 includes April, May, and June)
- Quarter 3 (Q3) – report due by October 30 (Q3 includes July, August, and September)
- Quarter 4 (Q4) – report due by January 30 (Q4 includes October, November, and December)

3.2 Annual Reporting

By April 1 of the following year, the Partners will submit an Annual IBT Report to NCDWR with the following information:

1. Summary of historical water withdrawals, wastewater discharges, and IBT, beginning with the 2015 award date of this IBT certificate for the 2015 Annual Report and reported for the January to December calendar year thereafter.
2. Table and graph of calculated daily average of a calendar month IBT amounts for the reporting year.
3. Status of compliance with IBT certificate limits and conditions as listed in Table 3.

Table 3

KLRWS Interbasin Transfer Compliance Monitoring and Reporting

Item	Description [a]	Comments
IBT Limits (from the Roanoke River Basin)	Daily average of a calendar month: - 10.7 mgd to Tar - 1.7 mgd to Fishing Creek - 1.8 mgd to Neuse - 14.2 mgd total	Daily IBT is calculated. The average day of the maximum month IBT is thenreported in the Annual IBT Report. IBT calculated as the daily average of a calendar month reported on the KLRWS website quarterly and in the Annual IBT Report. The percentages of water use in each basin, summarized historically, and set for calculating daily IBT for the next year will be reported in the Annual IBT Report.
Condition 1	Water Conservation Plan	Initial submittal to NCDWR by February 7, 2016, and then revised as needed to obtain NCDWR approval. Water Conservation Plan will always be available on the KLRWS website. Status of the plan will be included in the Annual IBT Report.
Condition 2	Drought Management Plan	Initial submittal to NCDWR by February 7, 2016, and then revised as needed to obtain NCDWR approval. Updates will be provided to NCDWR as needed. Drought Management Plan will always be available on the KLRWS website. Status of the plan will be included in the Annual IBT Report.
Condition 3	Compliance and Monitoring Plan	Initial submittal to NCDWR by February 7, 2016, and then revised as needed to obtain NCDWR approval. Compliance and Monitoring Plan will always be available on the KLRWS website. The Annual IBT Report will always be available on the KLRWS website. Status of the plan will be included in the Annual IBT Report.
Condition 4	EMC Consideration of Alternative Sources	No reporting necessary.
Condition 5	EMC Consideration of Future Water Demands	No reporting necessary.
Condition 6	Resale of Transferred Water	Included in the Annual IBT Report.
Condition 7	EMC Consideration of Impacts	No reporting necessary.

[a] Certificate conditions are described in Section 1.

SECTION 4

References

North Carolina Division of Water Resources (NCDWR). 2009. *Regulation of Surface Water Transfers Statutory Guidance*. http://www.ncwater.org/files/IBT_guidance_v1.pdf. Accessed April 10, 2015.

North Carolina Environmental Management Commission (NC EMC). 2015. Certificate Authorizing the Interbasin Transfer from the Roanoke River basin by the Kerr Lake Regional Water System. http://www.ncwater.org/?page=294.

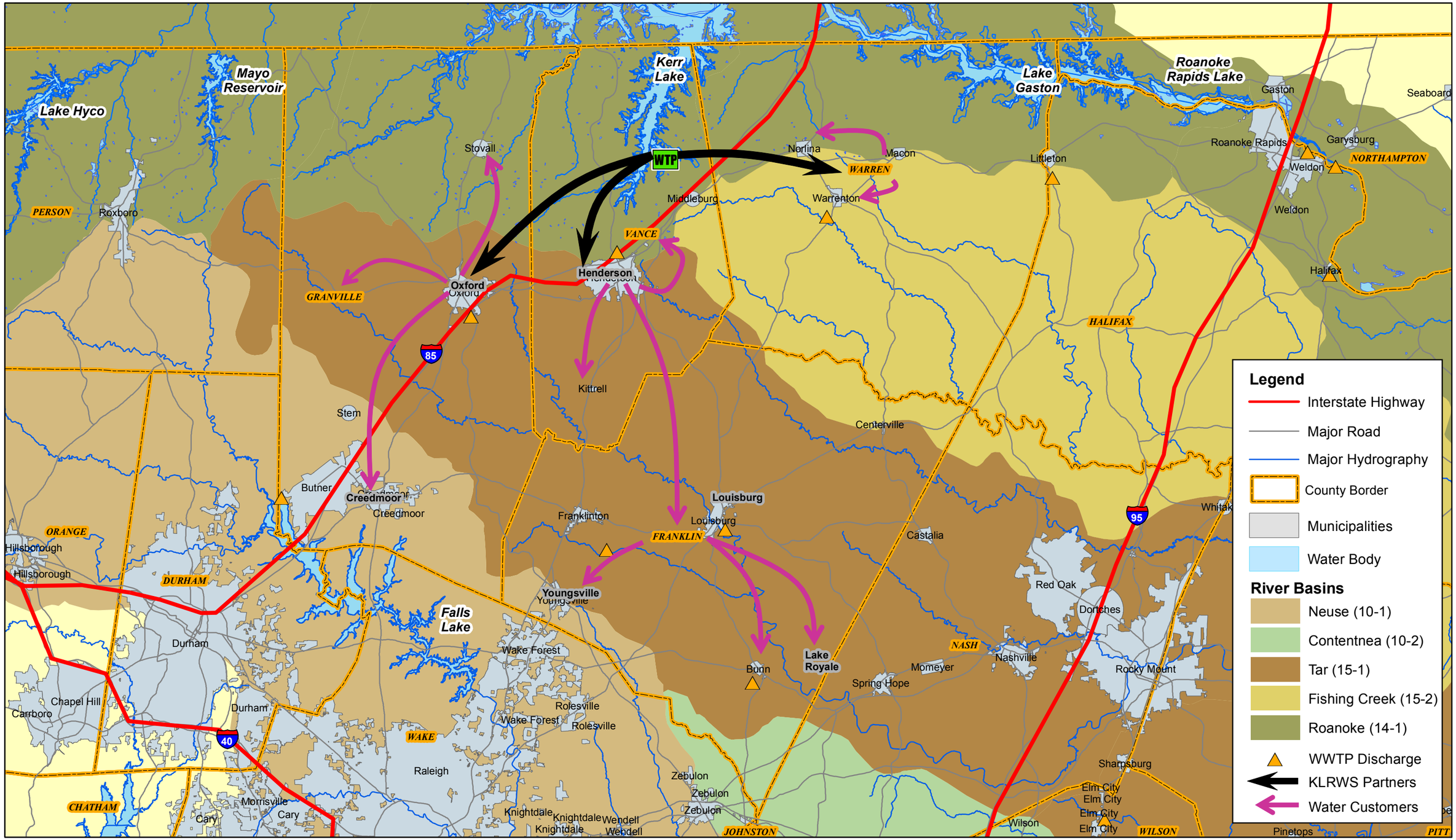

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Figure 1
KLRWS Water Sales
Interbasin Transfer from Roanoke River Basin
IBT Compliance and Monitoring Plan

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