Georgia Water Supply Redundancy Study
Savannah-Upper Ogeechee Water Planning Region
Georgia Environmental Finance Authority (GEFA)

Prepared for:

Georgia Environmental Finance Authority

Georgia Water Supply Redundancy Study

REVISION NO. 0

April 14, 2022

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Acronyms

ADD	Average Daily Demand
ASR	Aquifer Storage and Recovery
DIP	Ductile Iron Pipe
EPD	Environmental Protection Division
GEFA	Georgia Environmental Finance Authority
GSWCC	Georgia Soil and Water Conservation Commission
MGD	Million Gallons Per Day
MNGWPD	Metropolitan North Georgia Water Planning District
QWS	Qualified Water System(s)
RWP	Regional Water Plan
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
Wood	Wood Environment & Infrastructure Solutions, Inc.
WSIRRA	Water System Interconnection, Redundancy, and Reliability Act
WTP	Water Treatment Plant

1.0 Introduction

In May 2010, the Water System Interconnection, Redundancy, and Reliability Act (WSIRRA) was signed into law (Senate Bill 380). A main goal of the Act was to identify and increase interconnections and redundancies for the Metropolitan North Georgia Water Planning District (MNGWPD). With this Act, Georgia affirmed the importance of comprehensive water emergency planning and the value of effectively sharing our current water resources through well-considered redundancy and interconnection planning. While the Act did not apply to water planning regions outside of the MNGWPD, its concepts and framework are useful for emergency planning throughout Georgia.

The Georgia Environmental Finance Authority (GEFA), through the services of Wood Environment & Infrastructure Solutions, Inc. (Wood), conducted a study identifying opportunities for water supply redundancy for qualified water systems (QWS) located outside the MNGWPD. For the purposes of this report, a QWS is a public water system owned and operated by a city, county, or water authority that serves a total population (retail plus consecutive populations served) greater than 3,300 people. Some systems serving just below the population threshold of 3,300 are included as well. This report details the Savannah-Upper Ogeechee Water Planning Region, which consists of 20 counties in eastern Georgia, as shown in Figure 1-1. GEFA identified 23 QWS within the Savannah-Upper Ogeechee Planning Region, as shown in Figure 1-2.

1.1 Purpose

The purpose of the Water Supply Redundancy Study is to increase Georgia's water supply solvency and reliability. This study evaluates drinking water supply, demand, treatment, storage, distribution, and interconnectivity to identify redundant water supply sources capable of providing backup water supply for each QWS.

Emergency scenarios were evaluated consistent with similar emergency supply planning projects in the state, such as the GEFA Water System Interconnection, Redundancy and Reliability Act Emergency Supply Plan (CH2MHill, Jacobs, Lowe Engineers, 2011) for the MNGWPD. These emergency scenarios include:

- Failure of largest treatment facility within a planning region
- Short-term catastrophic failure of distribution system
- Short-term contamination of a raw water source
- Failure of an existing dam of a raw water source
- Water supply reduction due to drought

Potential interconnection and redundancy projects were identified and prioritized. Each planning-level potential project includes the steps required to modify a QWS's operation and infrastructure to share water with adjacent water providers. Wood developed a decision-based prioritization tool that summarizes the specific system deficiencies (in volumetric demand) from emergency situations and quantifies emergency supply goals. The prioritization tool highlights available emergency water supply and deficits under existing and future conditions. Potential projects were prioritized and recommended based on performance using weighted quantitative and qualitative criteria.

1.2 Study Approach

An overview of each step of the study approach is outlined below.

1.2.1 QWS Data Collection

A detailed questionnaire and data request list were developed to collect data from each QWS. The questionnaire included general system data, water demand and usage, infrastructure and supply, and other planning information. QWS were contacted to conduct a follow-up interview. The results of the survey and interview were tabulated and reviewed. Study participation was optional. Some QWS opted not to participate or to partially participate. If data were unavailable or incomplete, professional reasoning was used to recommend a technically-sound approach for dealing with missing or incomplete data, including use of publicly available data.

1.2.2 Redundant Water Supply Sources

The collected survey data and additional information gathered from other sources, such as the Georgia Environmental Protection Division (EPD), regional water plans (RWPs), and the *GEFA Georgia Inventory and Survey of Feasible Sites for Water Supply Reservoirs* (MACTEC, 2008) report served as the foundation to evaluate sources of water supply capable of providing redundant supply for each QWS. Such water sources include raw and potable water sources, interconnections between systems, and excess capacity of current allocations. These identified water supply sources were pre-screened for their potential to serve regional or multi-jurisdictional water needs. Where sufficient information was available, quantitative screening criteria were used to compare sites and, where quantitative information was not readily available, qualitative evaluation and professional reasoning were used for the initial screening. These locations and other nearby stream networks were examined at a planning-level scale, taking into consideration issues such as current and/or future hydrographs, low-flow conditions, stream capacity, downstream non-depletable flow requirements, water quality, pumping and transmission requirements, permitting requirements, treatment requirements, and cost.

1.2.3 Emergency Planning Benchmarks

The QWS average daily demand (ADD) obtained from the data collection process was used to quantify tiered emergency supply goals within each system. This method highlights where full supply of demand may not be available during some emergency scenarios although reduced critical needs can be met by another system. For consistency with the MNGWPD study, the following reliability targets were used:

- 100% ADD
- 65% ADD
- 35% ADD

It is assumed that the 35% and 65% reliability targets correspond to estimated usage associated with essential water needs. GEFA has identified customers with essential water needs as hospitals, nursing home/assisted living facilities, correctional facilities, critical industries, and schools.

1.2.4 Water Supply Risk Evaluations

To carry out the preliminary screening, specific system deficiencies (in volumetric demand) of the emergency scenarios and supply goals within the focus area were calculated. The purpose of this is to highlight available emergency supply and deficits under existing and future conditions. The reliability targets were applied to each QWS under specified emergency situations to evaluate the capability of a QWS to supply sufficient water during that emergency. Deficiencies (in volumetric demand) from emergency situations were quantified for each QWS. In addition, the maximum deficit (Critical Scenario Deficit) was determined for each QWS.

1.2.5 Evaluation of Potential Projects

Potential redundancy projects were conceptualized for each QWS. These projects may include infrastructure redundancy, new interconnections, and upgrades to existing interconnections. Planning-level costs were estimated for potential redundancy projects based on RSMeans (a construction cost estimating software) or manufacturer prices.

1.2.6 Recommended Projects

Using a decision-based prioritization tool, absolute and weighted scores were calculated for each option. The options were then ranked using defined criteria (e.g., cost, environmental impacts). A sensitivity assessment was undertaken to test the influence of the category weightings on the rank outcome. Potential projects were then prioritized based on performance under these weighted quantitative and qualitative criteria.

2.0 QWS Data Collection

Detailed information about each QWS was obtained via a survey-based questionnaire, follow-up interviews, publicly available documents, information supplied by EPD, and data provided by the QWS.

2.1 Data Request

Each QWS was sent a standardized questionnaire approved by GEFA. The general categories are listed as follows:

- General system data (e.g., facility type, ownership type, and population served)
- Customer information (e.g., number of customers and critical facilities served)
- Water source information (e.g., source type and capacity, purchased water information, and water sales information)
- Permit conditions and limitations
- System infrastructure data (e.g., storage, treatment, and distribution system data)
- System interconnection data
- Future water supply planning considerations

Each QWS was also sent a data request list approved by GEFA, as follows:

- Master Plan
- Capital Improvement Plan
- Water Withdrawal Permits (both groundwater and surface water withdrawal)
- Public Water System Operating Permit(s)
- Surface Water and Groundwater Withdrawal Values (2015 through 2019)
- Sanitary Surveys (2015 through 2019)
- Water Sale Documents
- Emergency Planning Documents
- Mapping Information

2.2 Current and Future Conditions

For this study, 23 QWS in the Savannah-Upper Ogeechee Water Planning Region were surveyed. Government, health care services, manufacturing, retail, and construction are the primary economic sectors in the Savannah-Upper Ogeechee Region. Land cover in the region is composed of approximately 53% forest, 23% row crops/pasture, 9% wetland, 8% urban, 2% open water, and 5% other (Savannah-Upper Ogeechee Water Planning Council, 2017).

2.2.1 General System Information

Table 2-1 shows key general information about the 23 QWS. The QWS in this region serve primarily municipal customers, and to a lesser extent, industrial customers. Water for agricultural purposes is almost exclusively obtained from private sources, such as private wells. Lincolnton serves the smallest total population and has one surface water supply source while Augusta-Richmond County serves the largest total population and has two surface water supply sources and 22 groundwater supply wells.

Findings from data collection include the following general information about the Savannah-Upper Ogeechee Region:

- Eight QWS use groundwater-only drinking water sources.
- Ten QWS use surface water-only drinking water sources.
- Two QWS (Augusta-Richmond County and Royston) have groundwater and surface water drinking water sources.
- Two QWS (Clayton and Hart County) are purchase-only systems that do not have raw water sources.
- One QWS (Harlem) has been a purchase-only system since 2012, but has three currently permitted groundwater wells.
- Systems range from approximately 8 years old to more than 100 years old, with seven systems more than 70 years old.
- The largest system customers are typically industries, educational facilities, or critical care facilities (e.g., hospitals). However, other public water systems are large customers for Banks County-Mountain Creek, Columbia County, Elberton, Franklin County, Hart County, Hartwell, Lavonia, Lincolnton, Rabun County, Royston, Thomson-McDuffie County, and Toccoa.
- Twelve QWS reported regular water sales.
- Eight QWS reported regular water purchases.
- Nineteen QWS have at least one backup power source/facility.
- Four systems reported distribution system flow surplus capabilities.
- The following system interconnections, including emergency interconnections, were reported:
    - Augusta-Richmond County is interconnected with Columbia County and Blythe.
    - Banks County-Mountain Creek is interconnected with Toccoa, Franklin County, Alto, Commerce, Homer, and Maysville.
    - Clayton is interconnected with Rabun County.
    - Columbia County is interconnected with Augusta-Richmond County, Harlem, Grovetown, Martinez, and McCormick (South Carolina).
    - Elberton is interconnected with Madison County.
    - Franklin County is interconnected with Toccoa, Martin, Royston, Carnesville, Lavonia, Banks County-Mountain Creek, Bowersville, Canon, Franklin Springs, and Madison County.
    - Harlem is interconnected with Columbia County and Thomson-McDuffie County.
    - Hart County is interconnected with Hartwell, Royston, and Lavonia.
    - Hartwell is interconnected with Hart County.
    - Lavonia is interconnected with Franklin County and Hart County.
    - Lincoln County is interconnected with Lincolnton.
    - Lincolnton is interconnected with Lincoln County.
    - Madison County is interconnected with Elberton, Franklin County, Royston, Commerce, Danielsville, and Colbert.
    - Rabun County is interconnected with Clayton and Dillard.
    - Royston is interconnected with Hart County, Madison County, Franklin County, and Franklin Springs.
    - Thomson-McDuffie County is interconnected with Harlem.
    - Toccoa is interconnected with Demorest, Banks County-Mountain Creek, Franklin County, and Martin.

Effective July 1, 2021, Columbia County purchased Harlem's water distribution and wastewater collection systems. Since data for this study were collected in 2020, Harlem will be reported as an individual QWS.

Overall, data collected show that the QWS have a 2019 combined average treatment capacity of over 74 million gallons per day (MGD) and a 2019 combined peak operational capacity of over 114 MGD. Note, these values do not include the purchase-only systems. The 23 QWS serve a total estimated direct population of approximately 463,000 people and a total estimated consecutive population of 58,200 people. Note that combining the direct and consecutive population values may result in certain users being counted twice. For example, Toccoa sells water to Franklin County.

2.2.2 Mapping Data

Mapping data were requested of the QWS. Specifically, information was requested related to drinking water infrastructure, such as: pumping and treatment facilities, storage tanks (ground and elevated), pipelines, booster pumps, distribution systems, hydrants, elevation values, etc. Digital mapping data (specifically GIS format) were preferred. However, hydraulic computer models and hard copy/PDF maps were also accepted. If hard copy/PDF maps were manually digitized, priority was given to digitizing water lines on the edges of the QWS distribution system because identifying potential interconnection opportunities was a main objective.

Table 2-2 shows mapping data (if any) received from the 23 QWS. Four systems provided GIS data. One system provided CAD data. Two systems provided Google Earth data. Hard copy/PDF maps were obtained from 15 QWS. Hard copy maps were georeferenced and digitized based on known landmarks.

2.2.3 Reports and Documents

Several reports and documents were requested from each QWS, as detailed in Section 2.1.

Table 2-3 shows the reports and other documents received from the 23 QWS. The 23 QWS had documents available, with comprehensive plans, water loss audits, permits, and sanitary surveys being the most frequently provided documents. EPD supplied recent sanitary surveys and 2015 and 2019 water audits for many systems. The Georgia Department of Community Affairs website contained comprehensive plans for many QWS. Based on review of comprehensive plans and survey responses, future (post-2019) planned water infrastructure improvements include:

- A new well for Royston and possibly a new well for Clayton
- New storage tanks for Banks County-Mountain Creek, Harlem, and Rabun County
- Water line repair/replacement projects for Clayton, Hartwell, Lavonia, Sylvania, and Thomson-McDuffie County
- An expanded distribution system for Banks County-Mountain Creek, Clayton, Franklin County, Hephzibah, Lavonia, Rabun County, Royston, and Waynesboro
- General maintenance for Augusta-Richmond County and Washington
- High service pump station upgrades for Elberton
- Water treatment plant rehabilitation for Lavonia, Thomson-McDuffie County, and Toccoa
- A new generator for Toccoa and Lavonia
- Fire hydrant replacements for Sylvania
- A potential new interconnection for Banks County-Mountain Creek
- Increased raw water pumping allotment for Lavonia
- A new clearwell for Elberton and Toccoa
- Dredging a reservoir for Toccoa

3.0 Redundant Water Supply Sources

Water supply sources were evaluated for their potential ability to provide surplus water to a neighboring water system during an emergency. Such water sources include excess capacity of current permitted allocations, new water sources, and interconnections between systems. Factors potentially affecting source availability were also noted.

3.1 Excess Capacity from Existing Water Sources

Existing water source excess capacity was evaluated for availability during short-term, defined durations, which are often less than three days but no more than 120 days. Long-term, undefined durations, as detailed further in Section 5, do not apply to this region because this region does not obtain its raw water from the Allatoona Lake/Etowah River or Lake Lanier/Chattahoochee River systems. Therefore, existing water sources were only assessed for the 2015 and 2050 short-term, defined duration scenarios.

Table 3-1 presents the 2015 and 2050 peak day design capacity, ADD, and resultant excess capacity for each QWS, as well as current permitted peak withdrawal capacity. The ADD values exclude purchased water to portray the true net regional water need. Purchase-only QWS have no reported values because their demand is accounted for in the demand allocation of their supplier(s). Appendix A describes the peak day design capacity and ADD calculations.

Excess capacity for a groundwater QWS short-term, defined emergency scenario was calculated by subtracting the ADD (water withdrawal only, not including purchased water) from the peak day design capacity. For surface water QWS, the smaller of the peak day design capacity value and the peak permitted withdrawal value (24-hr maximum) was used for the excess capacity calculation. For this region, surface water withdrawal permit limits affect the excess capacity calculation for Lincolnton. The excess capacity evaluation has a few key assumptions. It relies on readily available interconnections with the appropriate capacities. It also assumes that a QWS can increase to above-average production to supply water to another QWS experiencing an emergency. This assumption may not be appropriate if local needs of the supplying QWS are above average during the same emergency, resulting in less available excess capacity. In addition, because QWS data for this water planning region were collected in 2020, the self-reported 2015 peak day design capacity may reflect capital improvements that a QWS implemented between 2015 and the time the QWS was surveyed for this current analysis.

As Table 3-1 shows, there is sufficient excess capacity from existing sources for short-term, defined emergency durations for 2015 for 19 of the 19 non-purchase-only QWS. As noted above, purchase-only QWS are reported in Table 3-1 and Table A-4 as "not applicable." For 2015 demands, excess capacity is at least two times a given QWS's 2015 ADD for nine of the 19 QWS: Columbia County, Hartwell, Hephzibah, Lincoln County, Louisville, Millen, Toccoa, Washington, and Waynesboro. The 2015 excess capacity values range from 0.1 MGD (Lincolnton) to 51.1 MGD (Augusta-Richmond County).

For 2050 demands, there is sufficient excess capacity for 19 of the 20 non-purchase-only QWS. Madison County absorbed Madison County Industrial Park in 2019 and is no longer classified as a purchase-only system for 2050. Franklin County has a deficit of 0.1 MGD. While it may be likely that this QWS would increase peak day design capacity before the predicted ADD surpasses it, the potential lack of excess capacity highlights the need for increased capacity by 2050. Excess capacity is at least two times a given QWS's 2050 ADD for six of the 20 QWS: Lincolnton, Louisville, Millen, Sylvania, Washington, and Waynesboro. The 2050 excess capacity values range from -0.1 MGD (Franklin County) to 38.4 MGD

(Augusta-Richmond County). The QWS' capacities were scaled to allow for a comparison of excess capacities. Appendix A describes and shows the excess capacity index calculations and values. Excluding the 2050 negative excess capacities, Lincolnton's 2015 and Madison County's 2050 scaled excess capacity sufficiency is the lowest relative to other Savannah-Upper Ogeechee QWS.

3.2 Potential Water Sources and Storage Options

Potential additional water supply sources include groundwater, surface water, and surface water impoundments (e.g., dammed reservoirs). The Savannah-Upper Ogeechee Water Planning Region is divided by the Georgia fall line (Figure 1-2), which separates the Piedmont geologic region from the Coastal Plain geologic region. The northern part of the region is within the Blue Ridge geologic region. The Piedmont and Blue Ridge geologic regions are characterized by igneous and metamorphic rocks with clayey soils, while the Coastal Plain geologic region is characterized by sedimentary rocks with sandy soils.

3.2.1 Groundwater

Groundwater sources accounted for 22% of the region's 2010 water supply, whereas surface water sources accounted for 78% of the region's 2010 water supply. The 2010 groundwater withdrawal by category is as follows: 36% agriculture, 22% municipal, 21% industrial, 19% domestic/self-supply, and 2% energy (Savannah-Upper Ogeechee Water Planning Council, 2017). Aquifer systems in the Savannah-Upper Ogeechee Region include crystalline rock aquifers in the Piedmont and Blue Ridge geologic regions and the Cretaceous, Gordon, and Floridan aquifers in the Coastal Plain geologic region. Figure 3-1 shows relevant aquifers in the Savannah-Upper Ogeechee Region.

The RWP included a groundwater resource assessment of the Cretaceous, Floridan, and crystalline rock aquifers. Aquifer sustainable yield for the purposes of the resource assessment was defined as the amount of groundwater that can be withdrawn without reaching specific thresholds that indicate the potential for local or regional impacts. Impacts included localized aquifer drawdown, reduced stream baseflow, and long-term aquifer drawdown. Estimated sustainable yield for each aquifer was reported as a range, which reflects several computer model simulations with different assumptions. According to the RWP, total regional 2015 and estimated 2050 withdrawals from the Cretaceous, Floridan, and crystalline rock aquifers are below their estimated sustainable yields (Savannah-Upper Ogeechee Water Planning Council, 2017). The RWP noted that local gaps may occur if withdrawal rates exceed sustainable yield.

Three counties in the Savannah-Upper Ogeechee Region are part of the Coastal Georgia Water and Wastewater Permitting Plan for Managing Saltwater Intrusion, which applies to 24 Georgia counties. The focus of the management plan is to mitigate saltwater intrusion into the Upper Floridan Aquifer. As the three Savannah-Upper Ogeechee Region counties (Burke, Jenkins, and Screven) are in the "green zone," no pumping restrictions exist. However, conservation requirements apply.

Municipal groundwater withdrawals are from the Cretaceous, Floridan, and crystalline rock aquifers (CDM Smith, 2017). Most of the regional groundwater demand is driven by agriculture and municipal withdrawals from the Floridan and Cretaceous aquifers (CDM Smith, 2017). Municipal water demand projections increase from 2015 to 2050 by approximately 16.4 MGD. Additional municipal supply wells, other than replacement wells, may be needed in the Savannah-Upper Ogeechee Region.

The RWP indicated that at this time, no regional groundwater resource gaps are expected to occur in the Savannah-Upper Ogeechee Region over the planning horizon. However, localized gaps could occur if well densities and/or withdrawal rates result in exceedance of sustainable yield metrics. The RWP further

identified four counties that may need additional annual average withdrawal capacity (groundwater and surface water) if demand exceeds current permit limits. One of those counties, Madison County, contains the Madison County QWS. The projected, additional permitted capacity needed in 2050 for Madison County is 2.0 MGD (Savannah-Upper Ogeechee Water Planning Council, 2017).

3.2.2 Surface Water

The 2010 surface water withdrawal by category is as follows: 32% industrial, 31% municipal, 30% energy, and 7% agriculture (Savannah-Upper Ogeechee Water Planning Council, 2017). The Savannah-Upper Ogeechee Region contains portions of the following major river basins: Savannah River Basin in the northern, central, and southeastern part of the region; Ogeechee River Basin in the southwestern part of the region; Oconee River Basin in the far west-central part of the region; and Tennessee River Basin in the far northern part of the region. Figure 3-2 shows relevant river basins in the Savannah-Upper Ogeechee Region. The Savannah River and the Ogeechee River are the major rivers within the region. Lake Burton, Lake Hartwell, Lake Richard B. Russell, and Lake Thurmond (Clarks Hill Lake) are major reservoirs in the Savannah River Basin within the region. Lake Hartwell, Lake Richard B. Russell, and Lake Thurmond are owned and operated by the U.S. Army Corps of Engineers (USACE) (Savannah-Upper Ogeechee Water Planning Council, 2017). The Ogeechee River Basin does not have municipal water supply reservoirs or hydroelectric powerplants (Savannah-Upper Ogeechee Water Planning Council, 2017).

Surface water availability resource assessment models were conducted by EPD to evaluate consumptive demand and dry conditions on stream flows and lake storage. Potential gaps in terms of magnitude and duration were identified when a model fell below a threshold. Model results for 2015 and 2050 in the Savannah River Basin indicated that no potential gaps exist at the Hartwell Reservoir, Augusta, Clyo, or Savannah nodes. For context, the Hartwell Reservoir node is at Lake Hartwell and the Augusta node is near Augusta, both of which are in the Savannah-Upper Ogeechee region. The Clyo node and Savannah nodes are downstream in the Coastal Georgia Water Planning Region. Model results for 2015 and 2050 in the Ogeechee River Basin indicated that potential gaps exist at the Claxton, Eden, and Kings Ferry nodes. For context, these nodes are outside of the Savannah-Upper Ogeechee Region. The western parts of seven counties in the Savannah-Upper Ogeechee Region drain into the Ogeechee River Basin and affect the Eden and Kings Ferry nodes. The far western part of one county, Jenkins County, in the Savannah-Upper Ogeechee Region drains into the Ogeechee River Basin (Canoochee River) and affects the Claxton node. The RWP noted that local gaps may occur if withdrawal rates exceed sustainable yield. The Council identified demand management and supply management practices to avoid future potential gaps. For example, Management Practices WD1 through WD6 and WS1 through WS8.

Municipal surface water withdrawals are primarily from the Savannah River Basin (CDM Smith, 2017). Most of the regional surface water demand is driven by the industrial, municipal, and energy sectors. As municipal water demand projections increase from 2015 to 2050 by approximately 16.4 MGD, increased withdrawal from existing reservoirs and/or additional municipal supply reservoirs may be needed in the Savannah-Upper Ogeechee Region.

3.2.3 New Reservoirs

Of all the potential water source and storage options, new reservoirs are the most environmentally sensitive, costly, and time-consuming (MACTEC, 2008). Specific new reservoirs were not identified by the Savannah-Upper Ogeechee Water Planning Council, but the council noted in Management Practice WS7 the need to evaluate existing reservoir storage for potential expansion (Savannah-Upper Ogeechee Water Planning Council, 2017).

Figure 3-3 displays the potential water storage options identified in Section 3.2.3 through Section 3.2.6.

3.2.4 Georgia Inventory and Survey of Feasible Sites for Water Supply Reservoirs

In the 2008 report *GEFA Georgia Inventory and Survey of Feasible Sites for Water Supply Reservoirs*, MACTEC Engineering and Consulting, Inc., now Wood, and other consultants inventoried and surveyed drinking water supply reservoirs in Georgia (MACTEC, 2008). The effort focused on the potential to expand existing reservoirs via increasing dam heights and supplemental pumping from nearby streams. The report focused on the 78 counties above the Georgia fall line. Rabun, Stephens, Banks, Franklin, Hart, Madison, Elbert, Oglethorpe, Wilkes, Lincoln, and Taliaferro Counties are above the fall line, and parts of Warren, McDuffie, Columbia, Richmond, and Glascock Counties are above the fall line, while Jefferson, Burke, Jenkins, and Screven Counties are below the fall line. Existing reservoirs were screened for expansion potential and 16 reservoirs were identified in the report for potential expansion. Two of the 16 reservoirs are in the Savannah-Upper Ogeechee Region.

Reservoir 51 (Banks County) was identified in the 2008 report as a possible candidate for expansion. The report estimated that Reservoir 51 could increase from 3.9 to 5.2 billion gallons of storage by raising the pool elevation 10 feet. This reservoir is not used by the Banks County-Mountain Creek QWS as a water supply reservoir, although their distribution system is in the vicinity of Reservoir 51. Given Banks County-Mountain Creek's slightly decreased future ADD and slightly increased excess capacity (Table 3-1), increasing this reservoir's capacity may not be necessary.

The Rocky Comfort Creek-Warrenton Reservoir (Warren County) was identified in the 2008 report as a possible candidate for expansion. The report estimated that the Rocky Comfort Creek-Warrenton Reservoir could increase from 1.3 to 3.47 billion gallons of storage by raising the pool elevation 20 feet. This reservoir is not used by QWS in the Savannah-Upper Ogeechee Region. Therefore, increasing this reservoir's capacity may not be necessary.

Figure 3-3 displays the potential water storage options identified in Section 3.2.3 through Section 3.2.6.

3.2.5 Georgia Soil and Water Conservation Commission Flood Control Dams

In the 2007 report *Inventory and Assessment of USDA/Soil and Water Conservation District Watershed Dams: Finding Report*, the Georgia Soil and Water Conservation Commission (GSWCC), Natural Resources Conservation Service, EPD, and consultants assessed existing watershed flood control dams that could be potentially modified to serve as water supply reservoirs (GSWCC, 2007). After 357 watershed dams were assessed, 166 were prioritized for further evaluation based on environmental impacts, infrastructure impacts, and potential water supply yield. Twenty watershed dams were initially selected for more detailed studies. Eight additional watershed dams were evaluated in areas where "demand would exceed supply in the near future" (GSWCC, 2009).

The Savannah-Upper Ogeechee has 62 watershed dams: 1 in Rabun County, 13 in Stephens County, 14 in Banks County, 7 in Franklin County, 6 in Hart County, 12 in Madison County, 1 in Elbert County, 4 in Oglethorpe County, and 4 in Warren County. Of the region's watershed dams, 33 were part of the 166 prioritized watershed dams: North Fork Broad River 01, North Fork Broad River 04, North Fork Broad River 05, North Fork Broad River 06, North Fork Broad River 11, Grove River 21, Grove River 25, Grove River 59, Middle Fork Broad River 06, Middle Fork Broad River 17, Middle Fork Broad River 28, Middle Fork Broad River 30, North Broad River 28, North Broad River 32, North Broad River 33, North Broad River 38, Beaver Dam CR 04, Beaver Dam CR 05, Beaver Dam CR 06, Beaver Dam CR 08, Beaver Dam CR 17, Little Sandy Trail CR 06, South River 04, South River 27, South River 29, South River 31, South River 46, South

River 51, Beaver Dam CR 30, South Fork Broad River 06, South Fork Broad River 19, South Fork Broad River 65, and Rocky Comfort CR 14.

Four of these watershed dams were identified in the 2007 report as part of the 20 high-potential water supply reservoirs: Middle Fork Broad River 28 and Middle Fork Broad River 30 in Banks County; and South River 27 and South River 29 in Madison County. Two additional watershed dams were identified in the 2009 report as part of the 28 high-potential water supply reservoirs: Grove River 59 in Banks County, and South Fork Broad River 19 in Oglethorpe County. The GSWCC issued individual reports for each of the 28 high-potential water supply reservoirs, and the six within the Savannah-Upper Ogeechee Region are detailed below:

- Middle Fork Broad River 28. Construction of a larger dam to raise the pool level would increase the impoundment's surface area to approximately 451 acres and the safe yield to approximately 8 MGD (Schnabel 2007a).
- Middle Fork Broad River 30. Construction of a larger dam to raise the pool level would increase the impoundment's surface area to approximately 131 acres and the safe yield to approximately 3.5 MGD (Schnabel 2007b).
- Grove River 59. Construction of a larger dam to raise the pool level would increase the impoundment's surface area to approximately 530 acres and the safe yield to approximately 6.9 MGD (Schnabel 2009a).
- South River 27. Construction of a larger dam to raise the pool level would increase the impoundment's surface area to approximately 992 acres and the safe yield to approximately 3.9 MGD (Schnabel 2007c).
- South River 29. Construction of a larger dam to raise the pool level would increase the impoundment's surface area to approximately 659 acres and the safe yield to approximately 5.7 MGD (Schnabel 2007d).
- South Fork Broad River 19. Construction of a larger dam to raise the pool level would increase the impoundment's surface area to approximately 730 acres and the safe yield to approximately 6.6 MGD (Schnabel 2009b).

Given that Banks County-Mountain Creek QWS and Madison County QWS receive water from different sources, and both have relatively low ADDs, these watershed dams are not likely water supply reservoirs for these QWS.

Figure 3-3 displays the potential water storage options identified in Section 3.2.3 through Section 3.2.6.

3.2.6 Quarries

Abandoned rock quarries may serve as potential water storage reservoirs, particularly during emergency or drought scenarios. Quarry wall stability, rock permeability, and geographic proximity are important considerations for site selection. Because the Savannah-Upper Ogeechee Water Planning Region is divided by the fall line, multiple geologic regions are present. Blue Ridge and Piedmont geologic region bedrock and soils are generally igneous or metamorphic in origin and impermeable (unless fractured). Coastal Plain geologic region bedrock and soils are generally sedimentary in origin and permeable. Therefore, hard-rock (igneous or metamorphic) and mineral quarries are present in the Blue Ridge and Piedmont geologic regions, while sand and gravel quarries are present in the Coastal Plain geologic region.

A GIS investigation was performed to assess the availability of quarries as potential reservoirs. A 5-mile radius was drawn around QWS municipal boundaries. The WTP locations were used as the radius origin for County Authority QWS. Aerial imagery was visually inspected to identify quarries. In addition, publicly available online quarry inventories were checked.

In the Savannah-Upper Ogeechee Region, potential quarries were identified. USGS GIS data from *The State Geologic Map Compilation (SGMC) Geodatabase of the Conterminous United States* was used to identify quarry bedrock (Horton et al., 2017). In Stephens County, a potentially active quarry exists approximately 2 miles west of downtown Toccoa. The quarry's bedrock is metagraywacke / mica schist and quartzite / biotite granite gneiss (Horton et al., 2017). Toccoa's distribution system is in the vicinity of the quarry. In Hart County, a potentially active quarry exists approximately 3.1 miles southwest of downtown Hartwell. The quarry's bedrock is sillimanite schist / gneiss / amphibolite and undifferentiated granitic gneiss (Horton et al., 2017). Hart County's (QWS) distribution system is in the vicinity of the quarry. In Elbert County, clusters of seemingly active quarries exist approximately 3 to 5 miles north, northeast, south, and west of downtown Elberton. Fifteen quarries were identified. The quarries' bedrock is granite / gneissic biotite granite (Horton et al., 2017). Elberton's distribution system is in the vicinity of the quarries. Split between Richmond County and Columbia County, a seemingly active quarry exists approximately 5 miles northwest of downtown Augusta. The quarry's bedrock is felsic metavolcanics (Horton et al., 2017). Augusta-Richmond County's (QWS) and Columbia County's (QWS) distribution systems are in the vicinity of the quarry. In Columbia County, two seemingly active quarries exist approximately 7.5 to 8.5 miles west of downtown Evans. The quarries' bedrock is porphyritic granite (Horton et al., 2017). Columbia County's (QWS) distribution system is in the vicinity of the quarries. Therefore, these quarries could serve as potential future water storage reservoirs.

In Lincoln County, a seemingly active quarry exists approximately 5.5 miles southwest of downtown Lincolnton. The quarry's bedrock is felsic metavolcanics and quartzite / mica schist (Horton et al., 2017). However, aerial imagery suggests it is a sand and gravel quarry. Lincoln County's (QWS) distribution system is in the vicinity of the quarry. In McDuffie County, two potentially active quarries exist approximately 10 miles southeast of downtown Thomson. The quarries' bedrock is unconsolidated, undifferentiated sand and clay (Horton et al., 2017); and aerial imagery suggests it is a kaolin quarry. Thomson-McDuffie County's (QWS) distribution system is in the vicinity of the quarry. In Richmond County, a seemingly active quarry exists approximately 15 miles southwest of downtown Augusta and approximately 2 miles west of Hepzibah. The quarry's bedrock is unconsolidated, undifferentiated clay (Twiggs Clay Unit) (Horton et al., 2017). Augusta-Richmond County's (QWS) distribution system is in the vicinity of the quarry. Given the quarries' appearance as surface mining operations, these quarries are unlikely candidates for a potential future water storage reservoir.

Consideration should be given to the technical issues important for development and operation of a quarry that could serve as a water supply reservoir, including the potential for water seepage from the reservoir through the jointed and fractured rock mass and the stability of the rock quarry slopes, environmental permitting requirements, and water quality considerations.

Figure 3-3 displays the potential water storage options identified in Section 3.2.3 through Section 3.2.6.

3.2.7 Aquifer Storage and Recovery

Aquifer Storage and Recovery (ASR) involves injecting treated water into an aquifer and later recovering the stored water for beneficial reuse, such as for drinking water supply. ASR offers a redundant water

supply that can be accessed if aquifer storage is sufficient. EPD oversees the permitting and regulation of ASR projects, and to-date, EPD has not received ASR applications nor is aware of ASR projects in Georgia (EPD, 2021a). Therefore, each QWS should individually consider the feasibility of ASR.

3.3 Return Flow Reuse

There are two types of potable water reuse. Indirect potable reuse uses an environmental buffer, such as a lake, river, or a groundwater aquifer, before the water is treated at a drinking water treatment plant (EPD, 2021b). The *Indirect Potable Reuse Guidance Document* dated March 2021 describes the decision framework EPD uses to evaluate potential indirect potable reuse projects. Direct potable reuse involves the treatment and distribution of water without an environmental buffer. Potable water reuse provides another option for expanding a region's water resource portfolio.

Drinking water treatment and wastewater treatment typically occur in the same or nearby locations. When implementing direct potable reuse, the proximity of both wastewater and drinking water treatment may present considerable cost saving opportunities for municipalities. Some direct potable reuse systems may require additional water quality or process performance monitoring and/or an engineered storage buffer. In addition, because direct potable reuse has not been widely implemented, there is a lack of consensus in the scientific community about its safety. Therefore, each QWS should individually consider the feasibility of direct potable reuse. The Savannah-Upper Ogeechee RWP lists two management practices in regards to return flow reuse: 1) WS8: Promote and Evaluate Beneficial Reuse, specifically indirect potable reuse for reservoirs and non-potable reuse for irrigation; and 2) WQ7: Evaluate Restoration of Natural and/or Construction of Treatment Wetlands in Non-Urban/Low-Density Areas (Savannah-Upper Ogeechee Water Planning Council, 2017).

3.4 Current Interconnections Between Systems

Several QWS interconnections exist in the Savannah-Upper Ogeechee Region. Seventeen of 23 QWS indicated at least one interconnection with another public water system. Some of these interconnections are for regular water sales or purchases, while others are for emergencies and remain normally closed. If a QWS has excess capacity, as explained in Section 3.1, the QWS may be able to supply water to another QWS experiencing an emergency.

Figure 3-4 displays the available mapping data for the water region. As Figure 3-4 shows, multiple QWS are currently interconnected with another QWS, and several QWS have the potential to interconnect, which will be further discussed in Section 6.

3.5 Factors Affecting Availability of Water Supply

The viability of redundant water supply sources relies on certain factors, such as conveyance infrastructure, geographical barriers, permitting requirements, and source water quality compatibility.

3.5.1 Conveyance Factors

The feasibility of conveying water is a major consideration when assessing the practicality of using unused water sources to supply emergency water. Conveyance of water between two QWS or from new water sources would require construction of new pumping and piping infrastructure. The associated costs are key concerns and depend heavily on the proximity of the water source(s) to the QWS to be supplied. In

addition, interconnections may be limited by natural obstructions, such as topography and surface water bodies, as well as man-made obstructions, such as roads, railroads, and buildings.

South of the Georgia fall line, municipal groundwater systems are generally not interconnected in the Savannah-Upper Ogeechee Region due to the geographic distance between QWS and the relative ease of obtaining groundwater in this region below the fall line. With the exception of Washington, surface water systems are interconnected in the Savannah-Upper Ogeechee Region. This is likely due to the cost and upkeep requirements of surface water reservoirs and WTPs compared to groundwater systems.

3.5.2 Water Withdrawal Permitting Factors

Any entity who withdraws, obtains, or utilizes groundwater in excess of 0.1 MGD must obtain a water withdrawal permit from EPD. Any entity who withdraws from, diverts from, or impounds waters of the state by more than 0.1 MGD on a monthly average basis must obtain a water withdrawal permit from EPD. The withdrawal permit identifies the permit expiration date, withdrawal purpose, withdrawal source, and standard conditions and special conditions for resource use. Table 3-1 shows the current peak permitted withdrawal limit for each QWS. For groundwater withdrawal permits, a daily peak can be above the permitted limit if the annual and monthly average withdrawals are below their respective limits. A short-term emergency water need met by excess capacity is likely to keep the QWS below their permitted values. If new water withdrawal sources are requested, they will be subject to EPD's permitting process and associated requirements, which will focus on the protection of both water quality and water quantity and take into consideration downstream impacts. The permit application may require a drought contingency plan, water conservation plan, a watershed protection plan, and/or reservoir management plan, where applicable. Therefore, water withdrawal permitting should be a key consideration when proposing new or expanded water withdrawal.

3.5.3 Water Quality Factors

Eleven of the 23 QWS in this region utilize groundwater sources. Raw water treatment for these QWS is similar, although certain differences exist. Differences are mainly attributed to pumping from one of the multiple principal aquifer systems, which may differ in water quality compared to the other aquifers. Within an individual aquifer, localized water chemistry and heterogeneity can be further responsible for raw water quality differences and, therefore, treatment differences.

Twelve of the 23 QWS in this region utilize surface water sources. Raw water treatment for these QWS is more robust and varied compared to groundwater treatment. Differences are mainly attributed to pumping from one of the multiple surface water bodies. Factors that may affect surface water source quality include land use, potential pollutant sources, nutrient loading, and storm events within the water supply basin. If a new surface water source is proposed, a source water assessment plan may be required to evaluate its suitability.

Finished water quality should be accounted for when considering QWS interconnections such that blended water does not cause mineral precipitates, unpalatable water, or corrosion of the system infrastructure components. If interconnections are designed for water to flow in one direction, reverse flows can be another source of undesirable finished water quality. Reverse flows may resuspend settled particles or dislodge pipe scale.

4.0 Emergency Planning Benchmarks

Total demand and reliability target values were calculated for current usage (2015, immediate reliability target) and future usage (2050, long-range reliability target). The total ADD was first calculated for each QWS based on the 2015 EPD-validated water audit values. In the event a QWS is not in that dataset, as identified in Table 2-3, QWS-provided values are reported. Then, tiered reliability targets were applied to each QWS's total demand to highlight where full supply of demand may not be available during some emergency scenarios. Redundant water supply may supplement existing water sources to meet demand during these scenarios.

4.1 Calculating Total Demand

Current total ADD was calculated as follows:

Total Demand = Raw Water Withdrawal
+ Purchased Water (within county)
+ Purchased Water (outside county)

The individual values were obtained through the data collection process identified in Section 2.1. Table 4-1 shows 2015 total demand and the values that sum to total demand, as well as 2050 total demand. Note that 2050 total demand is reported the same as 2050 ADD (Water Withdrawal Only) for QWS that do not purchase water. Section 3.1 and Appendix A describe the methodology for obtaining 2015 and 2050 ADD, which are presented in Table 3-1. The same methodology for obtaining 2050 ADD was used to obtain values for purchase-only QWS, and those calculations are described in Appendix A and shown in Table A-2 and Table A-3. Purchased water values were reported by QWS, and aggregate volumes were checked against the 2015 EPD-validated water loss audit, as available. Where available, total water used (including non-revenue water) is reported rather than billed water.

Total demand is counted for customers both internal and external (i.e., other QWS to which water is sold) to a QWS. For example, Hartwell withdrew 1.12 MGD in 2015, of which 0.14 MGD was provided to Hart County. This 0.14 MGD is also reported for Hart County, which is appropriate because both Hartwell and Hart County require that amount of water to meet their total demand.

4.2 Reliability Targets

The WSIRRA states that an emergency plan should "evaluate risks and, where feasible, plan for a district-wide interconnection reliability target for immediate implementation of approximately 35% of the ADD and long-range district-wide interconnection reliability planning goal of approximately 65% of the ADD" (Senate Bill 380). These general targets provided preliminary benchmarks for emergency planning in the study and the current (i.e., year 2015) and long-range (i.e., year 2050) water demands that were calculated for each QWS. Therefore, for consistency with the MNGWPD study, the following reliability targets were used:

- 100% ADD (total demand)
- 65% ADD
- 35% ADD

The 35% and 65% reliability targets correspond to estimated usage associated with essential water needs. GEFA has identified customers with essential water needs as: hospitals, nursing home/assisted living

facilities, correctional facilities, critical industries, and schools. It should be noted that demand includes both internal customers and external customers (i.e., other QWS to which water is sold).

Table 4-2 shows each reliability target applied to the 2015 and 2050 water demands. The reliability targets were not compared with actual QWS essential water needs; they were compared to the total ADD. QWS should verify what their essential water needs are as they may be less than the 35% and 65% reliability targets. If their essential water needs are greater than the 35% and 65% reliability targets, the QWS should plan to achieve higher targets for emergency scenarios.

5.0 Water Supply Risk Evaluations

Water supply risks and corresponding emergency scenarios were identified for a statewide effort. Therefore, not every risk and scenario apply to the Savannah-Upper Ogeechee Region. To carry out the screening, specific system deficiencies (in volumetric demand) of the emergency scenarios and supply goals were calculated. Whereas Section 4 presented a general overview of the overall water availability under the reliability targets, Section 5 provides more specific information about how those reliability targets are applied to each QWS under emergency situations. The intent of Section 5 is to evaluate the capability of a QWS to supply sufficient water during a given emergency. Deficiencies from emergency situations were quantified for each QWS for current and future conditions. The maximum deficit (Critical Scenario Deficit) was determined for each QWS.

5.1 Emergency Scenarios

Table 5-1 shows the statewide water supply risks and emergency scenarios. Scenarios were assigned a duration and an evaluation selection criterion. Some of the QWS in the Savannah-Upper Ogeechee Region treat groundwater at each withdrawal well. For the purposes of this study, an individual well that receives water treatment is classified as a WTP. Alternately, a groundwater QWS can be designed with two or more wells in parallel supplying raw water to one WTP, as is the case for several QWS including Augusta, Hephzibah, and Louisville. Water supply Risks A, B, C, D, G, and H are short-term defined durations, meaning less than 120 days, and often less than 3 days. Risks E and F are long-term undefined durations, meaning greater than 365 days and potentially having an indefinite duration.

Risks A through D are more traditional emergencies that are often addressed in an emergency response plan. These risks apply to systems that own drinking water infrastructure assets, whether they are pumps, WTPs, or distribution systems. These criteria were met for the QWS in this region, with exceptions for purchase-only QWS. Only Risks B and C applied to Clayton, Harlem, Hart County, and Madison County (2015).

Risks E and F apply to QWS that receive water directly from the Allatoona Lake/Etowah River or Lake Lanier/Chattahoochee River systems. These two risks relate to the tri-state water litigation. Because the QWS in this region are not part of the specified lake/river systems, Risks E and F did not apply to QWS in this region.

Risk G applies to surface water QWS that have a raw water supply from a dammed reservoir. In the Savannah-Upper Ogeechee Region, Risk G applied to Banks County-Mountain Creek, Columbia County, Elberton, Hartwell, Lavonia, Lincolnton, Rabun County, Thomson-McDuffie County, Toccoa, and Washington.

Risk H was assessed for the most vulnerable surface water QWS during a drought scenario. Risk H is often addressed by local governments in a water conservation plan, which outlines consumer practices that are either encouraged (voluntary) or enforced. Further, EPD has drought management rules, consistent with rules and regulations of the State of Georgia Chapter 391-3-30, that require public water systems to follow drought response strategies and actions during specified levels of declared drought. It was assumed that available raw water supply for each QWS is 40% of ADD due to drought. The two screening criteria for Risk H are described below:

1. Small watersheds are defined as Hydrologic Unit Code (HUC)-10 watersheds less than 100 square miles (CH2M, Black & Veatch, 2017). The U.S. Department of Agriculture's Natural Resources Conservation Service Geospatial Data Gateway was used to obtain GIS data. Specifically, the shapefile "10 Digit Watershed Boundary Dataset in HUC8" was used to calculate square mileage for HUC-10 watersheds.
2. Strahler Stream Order is a hierarchical method of categorizing streams by size. Strahler Stream Orders range from 1 (headwaters with no tributaries) to 12 (e.g., mouth of the Amazon River). For consistency with USGS literature about Georgia rivers (Elliott et al., 2014), major rivers in this study are defined as being Strahler Stream Order 6 or greater. The National Hydrography Dataset Plus, developed and maintained by the U.S. Environmental Protection Agency and USGS, is a collection of GIS and geospatial databases. It contains Strahler Stream Order as a "value added attribute," which was used to identify major rivers for the Savannah-Upper Ogeechee Region.

To meet the Risk H criteria, a QWS would need to have 1) a dammed reservoir in small watershed; and/or 2) withdrawal is not from a major river. Both criteria were met for Hartwell, and the second criterion was met for Royston. Therefore, Risk H applies to some surface water QWS in the Savannah-Upper Ogeechee Region (see Appendix B for QWS-specific explanations).

5.2 Methodology

Water supply risk evaluations were performed to understand the capability of a QWS to supply sufficient water during a given emergency. WTP capacity and QWS demand values reported correspond to the values and concepts described in Sections 3 and 4. Note that the reliability target values were determined as described in Section 4.2. They are constants that do not depend on the emergency scenarios. The following process was performed for both 2015 and 2050 water supply risk evaluations.

Deficit was calculated as follows:

Deficit = Available Water Supply
- Reliability Target Demands

Where:

Available Water Supply = Peak Day Design Capacity
+ Maximum Possible Purchased Water Supply
+ Stored Water (Scenarios A1, B, D1, D2)
- Capacity Loss Due to Emergency

For a given QWS, each WTP peak day design capacity was identified as described in Appendix A. For surface water QWS, the smaller of the peak day design capacity value and the peak permitted withdrawal value (24-hr maximum) was used for the available water supply calculation. For this region, permit limits affected some available water supply calculations. The maximum possible purchased water supply (applicable to QWS with interconnections) and stored water (applicable only to Scenarios A1, B, D1, and D2) were then added. Other than water supply Risk C, each emergency scenario prescribes a situation that involves a QWS-wide capacity loss (e.g., critical asset failure). The available water supply is thus the capacity remaining after the loss was subtracted and the source, purchased, and stored water were added, as applicable.

The deficit for both 2015 and 2050 was then calculated by subtracting the reliability target demands from the available water supply. In the case of a negative deficit, meaning there is more available water supply than demand, the deficit is reported as zero.

5.3 Key Assumptions

Table 5-1 presents key assumptions specific to each scenario. The following key assumptions apply to all scenarios and the corresponding deficit calculations:

- Only one QWS-wide emergency occurs at a time (i.e., Scenarios A1 and C do not occur simultaneously).
- Only one region-wide emergency occurs at a time (i.e., both Lincoln County and Lincolnton do not experience an emergency) except for Risk H (drought).
- The 2050 available water supply accounts for additional capacity due to planned capital improvements. (Royston provided an estimated increase in water capacity due to planned capital improvements.)
- Under an emergency scenario, QWS permit restrictions are followed.
    - For groundwater withdrawal permits, a daily peak can be above the permitted limit if the annual and monthly average withdrawals are below their respective limits. Scenario A2 (30 days) is the only applicable scenario in which monthly average emergency withdrawals may approach permit limits. All groundwater QWS in this region have backup equipment available, rendering no capacity loss for Scenario A2. Therefore, permit limits are assumed to be followed.
    - For surface water withdrawal permits, a daily peak must adhere to the 24-hour maximum withdrawal limit. If a longer emergency scenario requires a QWS to exceed their permitted withdrawal limit, QWS may do so given EPD approval. Under Water Quality Control Rule 391-3-6-.07(9)(b), systems may receive a temporary permit modification to exceed existing permitted withdrawal limits for emergencies lasting less than 180 days (Ga. Comp. R. & Regs. r. 391-3-6-.07).
- As applicable, a QWS indefinitely maintains its current infrastructure, backup power, and backup equipment.
- As applicable, a QWS indefinitely maintains its current permitted withdrawal limits and existing water sale/purchase contracts and interconnections.

5.4 Evaluation Results

Table 5-2 summarizes calculated deficits by QWS for 2015 and 2050. As noted above, Risks A, B, C, D, G, and H applied to the Savannah-Upper Ogeechee Region. Six QWS had a 2015 total demand deficit (i.e., 100% ADD): Clayton, Columbia County, Hartwell, Lavonia, Lincolnton, and Toccoa. Toccoa's capacity loss caused a 65% ADD deficit. Hartwell's and Lincolnton's capacity losses caused 65% ADD and 35% ADD deficits. Seven QWS had a 2050 total demand deficit: Columbia County, Hartwell, Lavonia, Lincolnton, Rabun County, Thomson-McDuffie County, and Toccoa. Lavonia's capacity loss caused a 65% ADD deficit. Columbia County's, Hartwell's, Lincolnton's, and Toccoa's capacity losses caused 65% ADD and 35% ADD deficits. Detailed available water supply and deficit calculations by QWS are provided in Appendix B. Figure 5-1 is a summary schematic of QWS 2050 ADD, deficits, and interconnections. This figure demonstrates QWS potential future water withdrawal and sharing.

Surface water QWS in the Savannah-Upper Ogeechee Region perform less favorably when faced with the emergency scenarios because their often single WTP design lacks inherent redundancy. Chemical treatment redundancy and unit process redundancy can be part of the WTP design, but Risk G is especially difficult to address for surface water QWS in this region. Hartwell, Lincolnton, and Rabun County lack incoming interconnections with adjacent systems. Therefore, Scenario G leaves these QWS with a small available water supply.

Groundwater QWS in the Savannah-Upper Ogeechee Region perform well when faced with the emergency scenarios because their multi-well, multi-WTP design offers inherent redundancy. South of the Georgia fall line, the overall flat topography of the region also allows for the QWS to have systemwide distribution systems positioned mainly within city limits rather than across multiple pressure zones. This means that if one WTP fails, large portions of a system will not be without water.

For QWS experiencing more than one deficit, the highest deficit with the longest duration scenario and/or relative likelihood scenario, or the Critical Scenario Deficit, was selected for further evaluation. The Critical Scenario Deficit, if applicable, is highlighted in gray in Table 5-2.

6.0 Evaluation of Potential Projects

The water supply risk evaluations estimated the immediate and long-range potential emergency deficits for each QWS in the Savannah-Upper Ogeechee Region. As described in Section 5.4 and Table 5-2, seven Savannah-Upper Ogeechee QWS have a 2050 deficit, and the Critical Scenario Deficit was selected for further evaluation. If a QWS does not have a Critical Scenario Deficit, the scenario(s) rendering a given QWS with the least available water supply was/were further evaluated. Potential conceptual-level redundancy projects were developed for a QWS based on their reduced water supply, available information, cost of implementation, and other criteria. These projects may include, but are not limited to, internal infrastructure redundancy, new interconnections, and upgrades to existing interconnections.

6.1 Potential Projects

Emergency scenarios affecting QWS, as detailed in Appendix B, were evaluated for the feasibility of a potential project to address capacity losses. Beyond QWS with a Critical Scenario Deficit, if QWS 2050 available water supply was less than two times their 2050 total demand, a project was recommended. The one exception to this project recommendation criterion is for Clayton because they are a purchase-only QWS supplied by Rabun County. It is recommended that these two QWS evaluate where and when to upgrade infrastructure to meet Clayton's total demand. Thus, not all QWS have recommended projects. This was done to prioritize logical, implementable projects for QWS with less available water supply relative to other QWS. The starting point for identifying a potential project is deciding if it will be an interconnection project (new or upgrade to existing) or internal infrastructure redundancy project. For potential projects, the following considerations were taken, as applicable:

- Potential environmental impacts
- Withdrawal permit impacts
- Water quality impacts
- Community impacts

The above four considerations are applicable to interconnection projects. Interconnection projects can address emergency scenarios A1, A2, B, D1, D2, G, and H. Depending on the project, the above four considerations are sometimes applicable to internal infrastructure redundancy projects. Table 6-1 identifies certain internal infrastructure redundancy projects for certain emergency scenarios.

For the Savannah-Upper Ogeechee Region, three types of projects are recommended: 1) new interconnection, 2) upgrade to existing interconnection, and 3) new raw water transmission main to supply internal infrastructure redundancy. Internal infrastructure redundancy projects highlight the potential for a future management practice: encourage public water systems to enhance their water supply redundancy and treatment/unit process redundancy. Table 6-2 shows the potential projects and provides the emergency scenarios addressed, maximum capacity added, and impact considerations.

Potential environmental impacts vary widely across project types. Designations and impacts by project type are detailed below.

- For interconnection projects, impacts due to excavation (for pipelines), stream crossings, and wetlands disturbance were considered, as applicable. The relative difficulty of permitting steps is implied for the following designations. A "low" designation was applied to a potential project if known streams/wetlands are not likely affected and if offsite excavation is less than 200 feet. A "medium-low" designation was applied if known streams/wetlands are not likely affected and if

offsite excavation is greater than 200 but less than 5,000 feet. A "medium-high" designation was applied if known streams/wetlands may be affected and/or if offsite excavation is greater than 200 but less than 5,000 feet. A "high" designation was applied if more than 5,000 feet of offsite excavation is needed and/or wetlands are likely affected and/or a stream crossing is likely needed. A list of threatened/endangered species was not compiled for each potential project. Prior to construction, a review of site-specific threatened/endangered species should be conducted. Cost and permitting requirements may increase if species or critical habitats are impacted.

- Existing interconnections that would be upgraded, without extensive pipe replacement, are assumed to be in the "low" potential environmental impact designation.
- For new raw water transmission main projects, the same potential environmental impact designations as interconnection projects were applied.

Water withdrawal permit factors are described in Section 3.5.2. The QWS' 2050 ADD was compared to current peak permitted withdrawal limits (Table 3-1) to understand their ability to supply water to another QWS experiencing an emergency. Note that 24-hour maximum permitted withdrawal for surface water QWS and monthly average permitted withdrawal for groundwater QWS are higher than annual average permitted withdrawal. Using peak values is appropriate because of the short-term, defined duration scenarios considered. Hart County is a purchase-only QWS with regular purchases from Hartwell, Lavonia, and Royston. In order to reflect potential withdrawal permit and purchased water impacts for these QWS, the maximum possible purchased water value was used, minus the amount purchased from the beneficiary QWS of a potential project. For example, Potential Project 6 increases capacity from Hart County to Lavonia. Because Lavonia also supplies Hart County, the maximum possible purchased water value from Lavonia was subtracted from Hart County's total (all suppliers) maximum possible purchased water value. Similarly, Madison County has a withdrawal permit, but it purchases most of its water – including purchases from Elberton. Potential Project 3 (upgrade existing interconnection to send water from Madison County to Elberton) was evaluated by adding Madison County's permitted withdrawal and total (all suppliers) maximum possible purchased water value, minus the maximum possible purchased water value from Elberton. A "low" designation was applied to a potential project if permitted/purchased values would not limit the maximum capacity added. A "medium-low" designation was applied if combined values would limit the maximum capacity added by 1-49%, and a "medium-high" designation was applied if combined values would limit the maximum capacity added by 50-99%. A "high" designation was applied if combined values would completely limit the maximum capacity added.

Water quality factors are described in Section 3.5.3. A "low" designation was applied to a potential project if water treatment (e.g., treatment chemicals, chemistry, and processes) is compatible between QWS. For example, if chlorination and fluoridation, a common treatment scheme for groundwater systems, are used at both QWS. A "medium-low" designation was applied if one water treatment type differs between QWS, and a "medium-high" designation was applied if two water treatment types differ. A "high" designation was applied if water treatment significantly differs between QWS. For example, if three or more treatment types differ or if groundwater QWS and surface water QWS exchange water. If an interconnection project progresses beyond the planning-level evaluation discussed in this report, water chemistry analyses and hydraulic flow modeling should be conducted to assess both systems' abilities to exchange water.

Community impacts include excavation, easement/right of way acquisition, and multijurisdictional agreements. For the purposes of this project, easement/right of way considerations are included in

approximated offsite excavation distances. A "low" designation was applied to a potential project if it occurs entirely on QWS property. A "medium-low" designation was applied if offsite excavation is less than 200 feet and/or a multijurisdictional agreement is needed. A "medium-high" designation was applied if offsite excavation is greater than 200 but less than 5,000 feet and/or a multijurisdictional agreement is needed. A "high" designation was applied if offsite excavation is more than 5,000 feet and/or a multijurisdictional agreement is needed.

6.1.1 Interconnections

Nine interconnection projects were evaluated. QWS modifications for interconnection projects include connecting, metering, pumping, and operation and maintenance requirements of new pipelines, booster pump stations and associated appurtenances. The maximum capacity added (in MGD) from a potential project is an important factor that depends on each specific project's details. Interconnection project pipe diameter, average system pressure, QWS future excess capacity, and maximum capacity added are detailed in Table 6-3. Additional information is provided below.

- Project 1 – Augusta-Richmond County and Columbia County QWS water mains are within 100 linear feet and multiple interconnection options exist along the county line: Highway 232 (Figure 6-1a), Highway 104 (Figure 6-1b), and Stevens Creek Road (Figure 6-1c). Augusta-Richmond County's existing pipe diameters in the area of interest are 8 inches. Columbia County's existing pipe diameters in the area of interest are unknown. Approximately 100 feet of 8-inch diameter ductile iron pipe (DIP) are estimated for this project.
- Project 2 – Columbia County and Thomson-McDuffie County QWS water mains are within 0.3 linear mile and one interconnection option exists near White Oak Road. Figure 6-2 shows large-scale available mapping data for these QWS. Columbia County's existing pipe diameters in the area of interest are unknown. Thomson-McDuffie County's existing pipe diameters in the area of interest are 8 inches to 10 inches. Approximately 1500 feet of 8-inch diameter DIP are estimated for this project.
- Project 3 – Elberton and Madison County QWS are interconnected along Highway 72 at the Elbert County-Madison County line. It is currently a 12-inch diameter, one-way interconnection into Madison County. To upgrade the interconnection, the existing control valve station and associated appurtenances would be updated to reverse flow through existing pipes. The upgrade would allow water to flow to Elberton during an emergency.
- Project 4 – Harlem and Columbia County QWS water mains are within 0.6 linear miles and one interconnection option exists along Louisville Road. Figure 6-3 shows large-scale available mapping data for these QWS. Harlem 's existing pipe diameters in the area of interest are 4 inches to 6 inches. Columbia County's existing pipe diameters in the area of interest are unknown. Approximately 3,170 feet of 8-inch diameter DIP are estimated for this project.
- Project 5 – Hartwell and Hart County QWS are interconnected along Bowersville Highway. It is currently a one-way interconnection into Hart County. The incoming pipes from both QWS are 8 inches in diameter, but the interconnection is limited by a 4-inch diameter control valve. To upgrade the interconnection, the existing control valve station and associated appurtenances would be updated to be 8 inches in diameter and to reverse flow through existing pipes. Hart County is a purchase-only QWS that would act as a passthrough system, allowing water to flow

from to Lavonia to Hartwell during an emergency. Although Hart County will benefit from this upgrade, Hart County has sufficient available water supply, even under emergency scenarios. Therefore, Hart County is unlikely to gain utility from this interconnection upgrade and it is not included in criteria scores (Section 7).

- Project 6 – Lavonia and Hart County QWS are interconnected along Knox Bridge Crossing Road. It is currently a 6-inch diameter, one-way interconnection into Lavonia. Lavonia's existing pipe diameters in the area of interest are 6 inches. Hart County's existing pipe diameters in the area of interest are 12 inches. To upgrade the interconnection, the existing control valve station and associated appurtenances would be updated to be 10 inches in diameter. In addition, approximately 2.5 miles of 10-inch diameter DIP are estimated to replace existing, smaller diameter pipes. Hart County is a purchase-only QWS that would act as a passthrough system, allowing water to flow from its suppliers (excluding Lavonia) to Lavonia during an emergency.
- Project 7 – Lincolnton and Lincoln County QWS are interconnected along Highway 378 East. It is currently a 6-inch diameter, one-way interconnection into Lincoln County. To upgrade the interconnection, the existing control valve station and associated appurtenances would be updated to reverse flow through existing pipes. The upgrade would allow water to flow to Lincolnton during an emergency.
- Project 8 – Rabun County and Demorest (Coosa-North Georgia Water Planning Region) QWS water mains are within six linear miles and one interconnection option exists along U.S. Highway 23. Figure 6-4 shows large-scale available mapping data for these QWS. Rabun County's existing pipe diameters in the area of interest are 14 inches. Demorest's existing pipe diameters in the area of interest are 1 inch to 8 inches. Approximately 31,680 feet of 8-inch diameter DIP are estimated for this project. Water head loss due to pipe friction, pipe bends, and elevation changes becomes a more important factor when pipelines extend for longer distances. Booster pump stations are needed to overcome head losses. A 150-horsepower pump was estimated to convey water from Demorest to Rabun County and from Rabun County to Demorest.
- Project 9 – Royston and Hart County QWS are interconnected along Royston Highway. It is currently a 6-inch diameter, two-way interconnection. Royston's existing pipe diameters in the area of interest are 6 inches. Hart County's existing pipe diameters in the area of interest are 6 inches to 12 inches. To upgrade the interconnection, the existing control valve station and associated appurtenances would be updated to be 8 inches in diameter. In addition, approximately 1 mile of 8-inch diameter DIP is estimated to replace existing, smaller diameter pipes. Hart County is a purchase-only QWS that would act as a passthrough system, allowing water to flow from its suppliers (excluding Royston) to Royston during an emergency. Although Hart County will benefit from this upgrade, Hart County has sufficient available water supply, even under emergency scenarios. Therefore, Hart County is unlikely to gain utility from this interconnection upgrade and it is not included in criteria scores (Section 7).

If a QWS' future excess capacity and/or permit withdrawal limits are less than the maximum capacity added, it was assumed that the QWS would increase its future supply.

The above-mentioned interconnection projects are not a comprehensive list of all possible interconnections. Per Table 2-2, mapping data were not available or not complete for all QWS. Therefore, only select interconnections are discussed where data are available.

6.1.2 Internal Infrastructure Redundancy

As shown in Table 6-2, one internal infrastructure redundancy potential project is recommended. Project 10 is a new raw water transmission main for Toccoa that will supply internal infrastructure redundancy in the event the Lake Toccoa Reservoir fails. This project type can address emergency Risk D and Risk G. Toccoa holds permits to withdraw raw water from the Lake Toccoa Reservoir, Davidson Creek Reservoir, and Lake Yonah. Currently, water is regularly withdrawn from the Lake Toccoa Reservoir into the WTP. If needed, water can be pumped from the Davidson Creek Reservoir into the Lake Toccoa Reservoir, and water in the Davidson Creek Reservoir can be supplemented with water pumped from Lake Yonah. This potential project adds a raw water transmission main from the Davidson Creek Reservoir to the WTP, bypassing the Lake Toccoa Reservoir. QWS modifications for new transmission main projects include connecting, metering, pumping, and operation and maintenance requirements of new pipelines and associated appurtenances. The maximum capacity added (in MGD) was estimated as the value of the capacity loss under emergency Risk G (critical scenario deficit). This is because the capacity added would be limited by WTP peak day design capacity rather than pipe parameters. Therefore, this capacity is more accurately described as "capacity not lost" because the capacity added does not increase Toccoa's peak day design capacity.

6.2 Planning-Level Costs

Planning-level costs were estimated for potential redundancy projects in one of two ways: RSMeans (a construction cost estimating software) or manufacturer prices. Estimated unit prices represent rough order of magnitude project prices based on assumptions summarized in the following sections. A macro-level, approximate project timeframe in months was also scoped out for each project. For interconnection and raw water transmission main projects, it was assumed that multijurisdictional agreements and procurement would take 6 months, engineering design and hydraulic modeling would take 4 months, and procurement of materials and construction would take a minimum of 2 months. If a project requires a booster pump station, an extra 4 months was added to the materials procurement and construction time. Planning-level costs and macro-level timeframes are presented in Table 6-4.

6.2.1 Interconnections

Pipeline costs were estimated per linear foot of pipe. Manufacturer prices were obtained for several standard DIP sizes between 4 and 60 inches. Prices were adjusted to include a 20% mark-up for taxes and contractor overhead and profit. RSMeans was used to estimate excavation, backfill, and installation costs. Erosion control, sediment control, site clearing, and site grading considerations were also included. Construction mark-ups, including mobilization, temporary facilities, quality control testing, administration, and oversight, were 23% and applied to the subtotal construction unit prices. Additional mark-ups, including engineering design, permitting, and overall contingency, were 31% and applied to the subtotal construction unit prices and construction mark-ups. These cost estimates do not include land acquisition costs.

An underground concrete vault was assumed for interconnection locations such that valves can be manually opened/closed. RSMeans was used to estimate concrete vault construction, valves, water meters, and associated appurtenances. Mark-ups include installation mark-ups and overall contingency.

RSMeans was used to estimate booster pump and motor costs, while a parametric cost estimating formula was used to estimate booster pump station (structure, appurtenances, electrical system) costs. Mark-ups include construction mark-ups, engineering design, and overall contingency.

For upgrading existing interconnections, a value was estimated to encompass potential work involved based on engineering judgement. This value is consistent with the MNGWPD study, and the value will need to be adjusted based on site-specific information.

In addition to water head loss, operational pressure differences between interconnections may require a booster pump station or additional appurtenances to establish a functional interconnection. Therefore, hydraulic modeling is necessary to establish interconnection feasibility before a project can advance beyond this planning-level stage.

6.2.2 Internal Infrastructure Redundancy

The only type of internal infrastructure redundancy project recommended for this region is a new raw water transmission main. Therefore, applicable pipeline costs were estimated in the same way as interconnection projects.

7.0 Recommended Projects

Once potential projects were identified and planning-level costs were estimated, potential projects were then prioritized based on performance under weighted quantitative and qualitative criteria. Using a decision-based prioritization tool, absolute and weighted scores were calculated for each potential project. The options were then ranked using defined criteria (e.g., cost, potential environmental impacts). A sensitivity analysis was undertaken to test the influence of the criteria weightings on the project rank outcome. Ranking reflects projects that will most benefit the Savannah-Upper Ogeechee Water Planning Region as a whole.

7.1 Prioritization Approach

Potential project prioritization was done to compare complex information among QWS. Quantitative and qualitative scoring criteria and weighting were selected to reflect the objectives of the redundancy study. Table 7-1 presents the scoring criteria and their weighting.

Scores were assigned either 1, 2, 3, or 4. A score of 1 implies a lower overall benefit of a potential project (e.g., relatively low maximum capacity added, high cost, and high impacts), while a score of 4 implies a higher overall benefit of a potential project (e.g., relatively high maximum capacity added, low cost, and low impacts). For interconnection projects, which may have the capacity to benefit multiple water systems, select criteria were assigned the average of the two interconnecting system scores, as applicable. These criteria include Criterion 4 (Added Capacity as a Percent of Total Demand), Criterion 7 (Potential System and Community Impacts), and Criterion 8 (Excess Capacity Index). For example, Project 2 (Columbia County – Thomson-McDuffie County interconnection) received a Criterion 4 score of 1 for Columbia County and 2 for Thomson-McDuffie County. The assigned score was the average of these individual scores, resulting in a score of 1.5. For Criterion 3 (Critical Scenario Duration), if no Critical Scenario Deficit exists and if multiple scenarios are addressed, the highest day duration of the scenarios addressed was used to assign a score. Criterion 8 (Excess Capacity Index) did not apply to Project 4 because Harlem regularly operates as a purchase-only QWS, and therefore does not have an excess capacity, as defined in Section 3.1. Non-weighted values were summed and divided by the applicable number of criteria to obtain an absolute score. The larger the absolute score, the more beneficial the potential project.

Criterion weights were assigned either 1, 2, or 3, with 1 holding less decision weight and 3 holding the most decision weight. Initial weights were assigned based on professional judgement and later tested with a sensitivity analysis. Criterion scores were multiplied by criterion weights. Values were summed and divided by the applicable number of criteria to obtain a weighted score. The larger the weighted score, the more beneficial the potential project.

Table 7-2 shows each criterion metric and its corresponding assigned score for this region's potential projects, as well as their absolute and initial weighted scores. In addition, cost per 1 MGD yield and cost per individual supplied were calculated. Table 7-3 is a decision-making summary to present the decision metrics for each potential project. An initial manual rank was assigned to each potential project based on initial weighted scores.

7.2 Sensitivity Analysis

A sensitivity analysis was conducted to test the influence of criterion weightings on the initial manual rank outcome. First, all criteria were assigned the highest weight (3). The effect of this weighting adjustment is

equivalent to the absolute score because although it amplified score values, the rank outcome was the same. Second, one of the eight criteria was assigned the highest weight (3) with the remaining seven criteria assigned the lowest weight (1). In the case of a tie, the absolute score was considered, and in the case of a further tie, the lower cost per individual supplied broke the tie. The effects of these weighting variations are described in Appendix C. The sensitivity analysis results demonstrate that some criteria are generally sensitive to weighting. Initially assigned weights were retained nonetheless, and sensitivity analysis results can qualify the weighted scores.

7.3 Recommended Projects

With weighting reasonably assigned, as demonstrated by the sensitivity analysis results, the final manual ranks equal the initial manual ranks, which appear in Table 7-3. It is recommended that decision making priority be given to potential projects with higher rank order because the order accounts for the foremost quantitative and qualitative criteria pertinent to water supply redundancy.

Regarding interconnection projects, fair and equitable project cost allocation to each beneficiary can be achieved in several ways. First, if an interconnection primarily benefits one QWS (purchaser), that QWS will likely bear the majority of costs. The provider QWS will financially benefit if water is sold to the purchaser; thus, the provider may bear some of the costs. Second, if an interconnection primarily benefits one QWS but also adds redundancy for the provider QWS, the provider QWS may bear further costs, such as assisting with immediate costs and/or operation and maintenance costs. Third, if an interconnection mutually benefits both QWS, a cost allocation strategy would be appropriate. Such strategies can be based on QWS population served, ADD, added capacity as a percent of total demand, or other creative approaches.

7.4 Conclusion

The purpose of the Water Supply Redundancy Study is to increase Georgia's water supply solvency and reliability. This study evaluated drinking water supply, demand, treatment, storage, distribution, and interconnectivity to identify redundant water supply sources capable of providing backup water supply for each QWS.

Twenty-three QWS in the Savannah-Upper Ogeechee Water Planning Region were evaluated for water supply redundancy. QWS data were collected, summarized, and evaluated for current and future conditions. Redundant water supply sources were explored, and water supply risk evaluations were conducted. Potential redundancy projects were conceptualized and costed for QWS left with notably reduced water supply during an emergency scenario. Potential projects were scored via a decision-based prioritization tool using weighted quantitative and qualitative criteria and subsequently ranked. Table 7-4 presents the potential projects sorted by final rank order. This study illustrated opportunities for improved QWS water supply redundancy and resiliency when faced with potential emergencies in the Savannah-Upper Ogeechee Water Planning Region.

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TABLES

Table 2-1
Key General Information

County	Qualified Water System	Public Water System Identification Number	Estimated Population Directly Served[1]	Estimated Consecutive Population Served[2]	Raw Water Source(s)[3]	Regular Purchases 2015-2019[4]	Irregular / Emergency Purchases 2015-2019[4]	Regular Sales 2015-2019[4]	Irregular / Emergency Sales 2015-2019[4]
Richmond	Augusta-Richmond County	GA2450000	205,700	0	Surface Water (2) Groundwater Wells (22)	-	-	-	-
Banks	Banks County-Mountain Creek	GA0110026	6,500	1,000	Surface Water (1)	Toccoa (2017-2019) Franklin County	-	Alto (2015-2017, 2019) Homer Maysville	-
Rabun	Clayton	GA2410000	8,500	0	Wholesale Purchase	Rabun County	-		-
Columbia	Columbia County	GA0730000	111,500	20,600	Surface Water (2)	-	-	Harlem Grovetown Martinez McCormick (South Carolina)	-
Elbert	Elberton	GA1050001	8,500	3,300	Surface Water (2)	-	-	Madison County (2019)	-
Franklin	Franklin County	GA1190051	5,000	3,500	Groundwater Wells (5)[5]	Toccoa	-	Banks County-Mountain Creek Bowersville Canon Carnesville Franklin Springs Madison County	-
Columbia	Harlem	GA0730002	6,700	0	Wholesale Purchase Emergency Groundwater Wells (3)[6]	Columbia County Thomson-McDuffie County	-		-
Hart	Hart County	GA1470065	5,900	700	Wholesale Purchase	Hartwell Lavonia Royston	-	Lavonia	-
Hart	Hartwell	GA1470000	7,600	5,900	Surface Water (1)	-	-	Hart County	-
Richmond	Hephzibah	GA2450002	4,000	0	Groundwater Wells (6)	-	-		-
Franklin	Lavonia	GA1190003	8,200	3,700	Surface Water (2)	Hart County	-	Hart County	-
Lincoln	Lincoln County	GA1810038	4,300	0	Groundwater Wells (4)	Lincolnton	-		-
Lincoln	Lincolnton	GA1810000	1,500	1,000	Surface Water (1)	-	-	Lincoln County	-
Jefferson	Louisville	GA1630002	3,600	0	Groundwater Wells (4)	-	-		-
Madison	Madison County	GA1950060	3,600	0	Groundwater Wells (3)[7]	Franklin County Royston Commerce Elberton (2019)	-		-
Jenkins	Millen	GA1650000	2,500	0	Groundwater Wells (4)	-	-		-
Rabun	Rabun County	GA2410118	4,600	8,700	Surface Water (2)[8]	-	-	Clayton Dillard	-
Franklin	Royston	GA1190004	3,900	1,200	Surface Water (1) Groundwater Wells (2)	-	-	Hart County Franklin Springs Madison County	-

Table 2-1
Key General Information

County	Qualified Water System	Public Water System Identification Number	Estimated Population Directly Served[1]	Estimated Consecutive Population Served[2]	Raw Water Source(s)[3]	Regular Purchases 2015-2019[4]	Irregular / Emergency Purchases 2015-2019[4]	Regular Sales 2015-2019[4]	Irregular / Emergency Sales 2015-2019[4]
Screven	Sylvania	GA2510003	4,900	0	Groundwater Wells (3)	-	-	-	-
McDuffie	Thomson-McDuffie County	GA1890001	16,000	1,600	Surface Water (2)	-	-	Harlem	-
Stephens	Toccoa	GA2570001	30,000	7,000	Surface Water (3)	-	-	Banks County-Mountain Creek (2017-2019) Demorest Franklin County Martin	-
Wilkes	Washington	GA3170002	4,200	0	Surface Water (3)	-	-	-	-
Burke	Waynesboro	GA0330004	5,800	0	Groundwater Wells (2)	-	-	-	-

Prepared by: GJH 03/30/21
Checked by: LCT 04/01/21

Notes:

1. The population that the system directly sells water to, rounded to the nearest 100.
2. The population benefited from the system's sale to another system, rounded to the nearest 100.
3. The value in parentheses indicates the number of sources.
4. Purchases/sales are from/to other water systems.
5. These wells are operated by Franklin County but have private owners.
6. Harlem has three permitted wells but has not used them for potable water since 2012.
7. The three wells joined the QWS when Madison County absorbed GA1950050-MADISON COUNTY INDUSTRIAL PARK WS in 2019.
8. One surface water source did not come on-line until April 2017.

Table 2-2
Mapping Data Received

			Level of Mapping Data Received					
County	**Qualified Water System**	**Estimated Population Directly Served[1]**	**No Mapping Data**	**Hard Copy/PDF Maps**	**Digital Mapping Data - GIS**	**Digital Mapping Data - CAD**	**Digital Mapping Data - Google Earth**	**Hydraulic Computer Model**
Richmond	Augusta-Richmond County	205,700		◊				
Banks	Banks County-Mountain Creek	6,500		◊	◊			
Rabun	Clayton	8,500			◊			
Columbia	Columbia County	111,500		◊				
Elbert	Elberton	8,500		◊				
Franklin	Franklin County	5,000		◊				
Columbia	Harlem	6,700		◊				
Hart	Hart County	5,900			◊		◊	
Hart	Hartwell	7,600		◊			◊	
Richmond	Hephzibah	4,000		◊				
Franklin	Lavonia	8,200		◊				
Lincoln	Lincoln County	4,300	◊					
Lincoln	Lincolnton	1,500	◊					
Jefferson	Louisville	3,600		◊				
Madison	Madison County	3,600	◊					
Jenkins	Millen	2,500	◊					
Rabun	Rabun County	4,600		◊	◊	◊		
Franklin	Royston	3,900		◊				
Screven	Sylvania	4,900		◊				
McDuffie	Thomson-McDuffie County	16,000		◊				
Stephens	Toccoa	30,000		◊				
Wilkes	Washington	4,200	◊					
Burke	Waynesboro	5,800	◊					

Prepared by: GJH 03/30/21
Checked by: LCT 04/01/21

Notes:

1. The population that the system directly sells water to, rounded to the nearest 100.

Table 2-3
Reports and Documents Received

			Reports and Documents Received[3]								
County	**Qualified Water System**	**Estimated Population Directly Served[1]**	**Comprehensive / Capital Improvement Plan[2]**	**Permits**	**Sanitary Survey[4]**	**Water Sale / Purchase Agreements**	**Water Conservation Plan**	**Consumption / Withdrawal Reports**	**Insurance Services Office Report**	**2015 Water Loss Audit[4]**	**Emergency Response Plan**
Richmond	Augusta-Richmond County	205,700	◊	◊	◊		◊	◊		◊	◊
Banks	Banks County-Mountain Creek	6,500	◊	◊	◊	◊	◊			◊	◊
Rabun	Clayton	8,500	◊		◊					◊	
Columbia	Columbia County	111,500	◊	◊	◊					◊	
Elbert	Elberton	8,500	◊	◊	◊	◊	◊			◊	
Franklin	Franklin County	5,000	◊	◊	◊						◊
Columbia	Harlem	6,700	◊	◊	◊	◊	◊			◊	
Hart	Hart County	5,900	◊		◊	◊					
Hart	Hartwell	7,600	◊	◊	◊		◊	◊		◊	◊
Richmond	Hephzibah	4,000	◊	◊	◊		◊	◊			◊
Franklin	Lavonia	8,200	◊	◊	◊		◊	◊		◊	
Lincoln	Lincoln County	4,300	◊	◊	◊					◊	
Lincoln	Lincolnton	1,500	◊	◊	◊						
Jefferson	Louisville	3,600	◊	◊	◊			◊			◊
Madison	Madison County	3,600	◊	◊	◊						
Jenkins	Millen	2,500	◊	◊	◊		◊	◊		◊	
Rabun	Rabun County	4,600	◊	◊	◊	◊	◊	◊			◊
Franklin	Royston	3,900	◊	◊	◊	◊	◊	◊			◊
Screven	Sylvania	4,900	◊	◊	◊		◊	◊			◊[5]
McDuffie	Thomson-McDuffie County	16,000	◊	◊	◊					◊	
Stephens	Toccoa	30,000	◊	◊	◊	◊	◊			◊	◊
Wilkes	Washington	4,200	◊	◊	◊		◊			◊	◊
Burke	Waynesboro	5,800	◊	◊	◊					◊	

Prepared by: GJH 03/30/21
Checked by: LCT 04/01/21

Notes:

1. The population that the system directly sells water to, rounded to the nearest 100.
2. The Georgia Department of Community Affairs website contained comprehensive plans.
3. Some systems provided additional, potentially relevant documents.
4. EPD supplied recent sanitary surveys and 2015 water audits for many systems.
5. A chlorine leak emergency response document was provided.

Table 3-1
Current and Future Excess Capacity

County	Qualified Water System (QWS)	Raw Water Source(s)[1]	2015 Peak Day Design Capacity (MGD)	2015 ADD (MGD) (Water Withdrawal Only)[2]	2015 Excess Capacity (MGD)	Current Peak Permitted Withdrawal (MGD)[3]	2050 Peak Day Design Capacity (MGD)[4]	2050 ADD (MGD) (Water Withdrawal Only)[5]	2050 Excess Capacity (MGD)
Richmond	Augusta-Richmond County	Surface Water (2) Groundwater Wells (22)	86.1	34.9	51.1	89.4[(10)]	86.1	47.7	38.4
Banks	Banks County-Mountain Creek	Surface Water (1)	1.0	0.7	0.3	1.0	1.0	0.6	0.4
Rabun	Clayton	Wholesale Purchase	NA	NA	NA	NA	NA	NA	NA
Columbia	Columbia County	Surface Water (2)	53.9	15.0	38.9	53.9	53.9	35.4	18.4
Elbert	Elberton	Surface Water (2)	3.1	1.4	1.7	6.3	3.1	1.4	1.7
Franklin	Franklin County	Groundwater Wells (5)[6]	1.3	0.9	0.4	1.545	1.3	1.5	-0.1
Columbia	Harlem	Wholesale Purchase Emergency Groundwater Wells (3)[7]	NA	NA	NA	0.28	NA	NA	NA
Hart	Hart County	Wholesale Purchase	NA	NA	NA	NA	NA	NA	NA
Hart	Hartwell	Surface Water (1)	4.5	1.1	3.4	4.50	4.5	1.8	2.7
Richmond	Hephzibah	Groundwater Wells (6)	2.1	0.5	1.6	1.2	2.1	0.9	1.2
Franklin	Lavonia	Surface Water (2)	3.0	1.1	1.9	3.0	3.0	2.0	1.0
Lincoln	Lincoln County	Groundwater Wells (4)	0.4	0.04	0.4	0.35	0.4	0.2	0.2
Lincoln	Lincolnton	Surface Water (1)	1.0	0.5	0.1	0.63	1.0	0.1	0.5
Jefferson	Louisville	Groundwater Wells (4)	3.4	0.6	2.8	2.0	3.4	0.5	2.9
Madison	Madison County	Groundwater Wells (3)[8]	NA	NA	NA	0.656	0.4	0.4	0.1
Jenkins	Millen	Groundwater Wells (4)	4.6	0.4	4.2	1.0	4.6	0.2	4.4
Rabun	Rabun County	Surface Water (2)[9]	3.5	1.3	2.2	3.5	3.5	1.7	1.8
Franklin	Royston	Surface Water (1) Groundwater Wells (2)	1.2	0.5	0.6	1.341[(11)]	1.3	0.9	0.4
Screven	Sylvania	Groundwater Wells (3)	1.5	0.6	0.9	1.5	1.5	0.5	1.0
McDuffie	Thomson-McDuffie County	Surface Water (2)	5.6	2.0	3.6	5.6	5.6	2.6	3.0

Table 3-1
Current and Future Excess Capacity

County	Qualified Water System (QWS)	Raw Water Source(s)[1]	2015 Peak Day Design Capacity (MGD)	2015 ADD (MGD) (Water Withdrawal Only)[2]	2015 Excess Capacity (MGD)	Current Peak Permitted Withdrawal (MGD)[3]	2050 Peak Day Design Capacity (MGD)[4]	2050 ADD (MGD) (Water Withdrawal Only)[5]	2050 Excess Capacity (MGD)
Stephens	Toccoa	Surface Water (3)	9.0	2.7	6.3	9.0	9.0	5.2	3.8
Wilkes	Washington	Surface Water (3)	4.2	0.9	3.3	4.4	4.2	0.7	3.5
Burke	Waynesboro	Groundwater Wells (2)	3.5	0.6	2.8	4.0	3.5	0.6	2.9
Totals			**192.8**	**65.9**	**126.6**	**195.1**	**193.4**	**104.8**	**88.2**

Prepared by: GJH 06/25/21

Checked by: LCT 07/21/21

Notes:

ADD - average daily demand

NA - not applicable because these are purchase-only QWS

MGD - million gallons per day

1. The value in parentheses indicates the number of sources.
2. 2015 EPD-validated water loss audit values are reported. In the event a QWS is not in that dataset, as identified in Table 2-3, QWS-provided values are reported, as available. The 2018 EPD-validated water audit values are reported for Franklin County.
3. Values for groundwater systems are MGD - monthly average; values for surface water systems are combined (if multiple permits) MGD - 24-hour max. Surface water permitted withdrawal values include withdrawals for immediate water treatment and for reservoir filling.
4. Royston indicated adding a new 0.115 MGD well.
5. Municipal and publicly-supplied industrial demand by county were allocated to each QWS.
6. These wells are operated by Franklin County but have private owners.
7. Harlem has three permitted wells but has not used them for potable water since 2012.
8. The three wells joined the QWS when Madison County absorbed GA1950050-MADISON COUNTY INDUSTRIAL PARK WS in 2019. Therefore, Madison County was a purchase-only QWS in 2015.
9. One surface water source did not come on-line until April 2017.
10. 71 MGD is for surface water; 18.4 MGD is for groundwater.
11. 1.0 MGD is for surface water; 0.341 MGD is for groundwater.

Table 4-1
Total Water Demands

County	Qualified Water System	2015 ADD (MGD) (Water Withdrawal Only)	2015 Regular Purchased Volume - Outside County (MGD)[1]	2015 Regular Purchased Volume - Inside County (MGD)[1]	2015 Total Demand (MGD)	2050 Total Demand (MGD)
Richmond	Augusta-Richmond County	34.93	0.00	0.00	34.93	47.69
Banks	Banks County-Mountain Creek	0.67	0.01	0.00	0.68	0.61
Rabun	Clayton	0.00	0.00	1.24	1.24	1.09
Columbia	Columbia County	15.00	0.00	0.00	15.00	35.44
Elbert	Elberton	1.44	0.00	0.00	1.44	1.43
Franklin	Franklin County	0.90	0.28	0.00	1.18	1.45
Columbia	Harlem	0.00	0.10	0.33	0.43	1.79
Hart	Hart County	0.00	0.36	0.14	0.50	0.89
Hart	Hartwell	1.12	0.00	0.00	1.12	1.84
Richmond	Hephzibah	0.49	0.00	0.00	0.49	0.88
Franklin	Lavonia	1.12	0.06	0.00	1.18	2.01
Lincoln	Lincoln County	0.04	0.00	0.18	0.22	0.17
Lincoln	Lincolnton	0.52	0.00	0.00	0.52	0.10
Jefferson	Louisville	0.61	0.00	0.00	0.61	0.50
Madison	Madison County	0.00	0.05	0.00	0.05	0.36
Jenkins	Millen	0.44	0.00	0.00	0.44	0.22
Rabun	Rabun County	1.31	0.00	0.00	1.31	1.71
Franklin	Royston	0.52	0.00	0.00	0.52	0.87
Screven	Sylvania	0.62	0.00	0.00	0.62	0.49
McDuffie	Thomson-McDuffie County	1.99	0.00	0.00	1.99	2.63
Stephens	Toccoa	2.66	0.00	0.00	2.66	5.24
Wilkes	Washington	0.88	0.00	0.00	0.88	0.66
Burke	Waynesboro	0.64	0.00	0.00	0.64	0.55
	Totals	**65.89**	**0.86**	**1.89**	**68.63**	**108.61**

Prepared by: GJH 06/28/21

Checked by: LCT 07/22/21

Notes:

ADD - average daily demand

NA - not applicable because these are purchase-only QWS

MGD - million gallons per day

1. Values were reported by QWS, and aggregate volumes were verified with the 2015 EPD-validated water loss audit, as available.

Table 4-2
Reliability Targets for Current and Future Demand

			2015 - Immediate Reliability Target			2050 - Long-Range Reliability Target		
County	**Qualified Water System**	**Public Water System Identification Number**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**
Richmond	Augusta-Richmond County	GA2450000	34.93	22.70	12.23	47.69	31.00	16.69
Banks	Banks County-Mountain Creek	GA0110026	0.68	0.44	0.24	0.61	0.39	0.21
Rabun	Clayton	GA2410000	1.24	0.80	0.43	1.09	0.71	0.38
Columbia	Columbia County	GA0730000	15.00	9.75	5.25	35.44	23.03	12.40
Elbert	Elberton	GA1050001	1.44	0.93	0.50	1.43	0.93	0.50
Franklin	Franklin County	GA1190051	1.18	0.76	0.41	1.45	0.94	0.51
Columbia	Harlem	GA0730002	0.43	0.28	0.15	1.79	1.17	0.63
Hart	Hart County	GA1470065	0.50	0.33	0.18	0.89	0.58	0.31
Hart	Hartwell	GA1470000	1.12	0.73	0.39	1.84	1.19	0.64
Richmond	Hephzibah	GA2450002	0.49	0.32	0.17	0.88	0.57	0.31
Franklin	Lavonia	GA1190003	1.18	0.77	0.41	2.01	1.31	0.70
Lincoln	Lincoln County	GA1810038	0.22	0.14	0.08	0.17	0.11	0.06
Lincoln	Lincolnton	GA1810000	0.52	0.34	0.18	0.10	0.06	0.03
Jefferson	Louisville	GA1630002	0.61	0.40	0.21	0.50	0.33	0.18
Madison	Madison County	GA1950060	0.05	0.03	0.02	0.36	0.23	0.12
Jenkins	Millen	GA1650000	0.44	0.29	0.15	0.22	0.14	0.08
Rabun	Rabun County	GA2410118	1.31	0.85	0.46	1.71	1.11	0.60
Franklin	Royston	GA1190004	0.52	0.34	0.18	0.87	0.56	0.30
Screven	Sylvania	GA2510003	0.62	0.40	0.22	0.49	0.32	0.17
McDuffie	Thomson-McDuffie County	GA1890001	1.99	1.29	0.70	2.63	1.71	0.92
Stephens	Toccoa	GA2570001	2.66	1.73	0.93	5.24	3.41	1.84
Wilkes	Washington	GA3170002	0.88	0.57	0.31	0.66	0.43	0.23
Burke	Waynesboro	GA0330004	0.64	0.41	0.22	0.55	0.36	0.19
Totals			**68.6**	**44.6**	**24.0**	**108.6**	**70.6**	**38.0**

Prepared by: GJH 06/28/21

Checked by: LCT 07/22/21

Notes:

ADD - average daily demand

MGD - million gallons per day

1. Total demand (withdrawal plus purchases) is defined the same as 100% annual average day demand.

Table 5-1
Water Supply Risks and Emergency Scenarios

Water Supply Risk	Emergency Scenario	Type	Duration (Days)	Evaluation Selection Criteria	Key Assumptions
A. Failure of largest water treatment plant (WTP)	A1. Power supply failure of largest WTP	Short-term Defined Duration	1	QWS that receive water from a system-owned WTP	- Treatment capacity is based on the backup generator's capacity, if available. Otherwise, 80% of peak treatment is assumed. - In the event a QWS has a portable generator, it is assumed that generator is used at the largest WTP, per this scenario - 60% of QWS treated water storage is available at the beginning of the emergency.
	A2. Critical asset failure at largest WTP (e.g., loss of clearwell, loss of chemical treatment)	Short-term Defined Duration	30		- The longer duration excludes the availability of water storage supply. - Each WTP was evaluated for unit process redundancy and the ability to operate at a higher rate. - Critical assets for groundwater QWS include chemical treatment. Backup chemical feed equipment is required for WTPs installed after 1/1/1998.
B. Short-term catastrophic failure of a water distribution system	Critical transmission main failure from largest WTP or interconnection	Short-term Defined Duration	1	QWS with a distribution system	- 60% of QWS treated water storage is available at the beginning of the emergency.
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers a boil water notice	Short-term Defined Duration	3	QWS with a distribution system	- No capacity is lost - Water is non-potable
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	Short-term Defined Duration	1	QWS that pump from a raw water source	- In the case of groundwater QWS, the aquifer supplying the largest WTP is assumed to be locally contaminated. - 60% of QWS treated water storage is available at the beginning of the emergency. - 60% of QWS raw water storage and clearwell storage is available at the beginning of the emergency.
	D2. Chemical contamination of largest raw water source	Short-term Defined Duration	1		- In the case of groundwater QWS, the aquifer supplying the largest WTP is assumed to be locally contaminated. - 60% of QWS treated water storage is available at the beginning of the emergency. - 60% of QWS raw water storage and clearwell storage is available at the beginning of the emergency.
E. Full unavailability of major raw water sources due to federal or state government actions	--	Long-term Undefined Duration	>365	QWS that use Lake Lanier/Chattahoochee River or Allatoona Lake/Etowah River as a raw water source	- Not currently applicable
F. Limited or reduced availability of major raw water sources due to federal or state government actions	--	Long-term Undefined Duration	>365	QWS that use Lake Lanier/Chattahoochee River or Allatoona Lake/Etowah River as a raw water source	- Not currently applicable

Table 5-1
Water Supply Risks and Emergency Scenarios

Water Supply Risk	Emergency Scenario	Type	Duration (Days)	Evaluation Selection Criteria	Key Assumptions
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Short-term Defined Duration	30	QWS that have a raw water supply from a dammed reservoir (not including Lake Lanier or Lake Allatoona)	- The longer duration excludes the availability of water storage supply.
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Short-term Defined Duration	120	QWS with reservoirs in small watersheds and no direct withdrawal from a major river	- Available raw water supply for each QWS is 40% of ADD due to drought.

Prepared by: GJH 11/10/20
Checked by: LCT 11/19/20

Notes:
ADD - average daily demand
QWS - qualified water system
WTP - water treatment plant

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	**Qualified Water System**	**Scenario**	**2015 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**	**2050 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
Richmond	Augusta-Richmond County	A1	100.8	34.9	22.7	12.2	0.0	0.0	0.0	100.8	47.7	31.0	16.7	0.0	0.0	0.0
		A2	86.1	34.9	22.7	12.2	0.0	0.0	0.0	86.1	47.7	31.0	16.7	0.0	0.0	0.0
		B	50.8	34.9	22.7	12.2	0.0	0.0	0.0	50.8	47.7	31.0	16.7	0.0	0.0	0.0
		C	86.1	34.9	22.7	12.2	0.0	0.0	0.0	86.1	47.7	31.0	16.7	0.0	0.0	0.0
		D1	112.7	34.9	22.7	12.2	0.0	0.0	0.0	112.7	47.7	31.0	16.7	0.0	0.0	0.0
		D2	112.7	34.9	22.7	12.2	0.0	0.0	0.0	112.7	47.7	31.0	16.7	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Banks	Banks County-Mountain Creek	A1	4.6	0.7	0.4	0.2	0.0	0.0	0.0	3.4	0.6	0.4	0.2	0.0	0.0	0.0
		A2	3.5	0.7	0.4	0.2	0.0	0.0	0.0	2.1	0.6	0.4	0.2	0.0	0.0	0.0
		B	3.6	0.7	0.4	0.2	0.0	0.0	0.0	2.4	0.6	0.4	0.2	0.0	0.0	0.0
		C	3.5	0.7	0.4	0.2	0.0	0.0	0.0	2.1	0.6	0.4	0.2	0.0	0.0	0.0
		D1	4.5	0.7	0.4	0.2	0.0	0.0	0.0	3.3	0.6	0.4	0.2	0.0	0.0	0.0
		D2	4.5	0.7	0.4	0.2	0.0	0.0	0.0	3.3	0.6	0.4	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	2.5	0.7	0.4	0.2	0.0	0.0	0.0	1.1	0.6	0.4	0.2	0.0	0.0	0.0
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rabun	Clayton	A1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		A2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		B	1.7	1.2	0.8	0.4	0.0	0.0	0.0	1.7	1.1	0.7	0.4	0.0	0.0	0.0
		C	**1.1**	**1.2**	**0.8**	**0.4**	**0.1**	0.0	0.0	1.1	1.1	0.7	0.4	0.0	0.0	0.0
		D1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		D2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	**Qualified Water System**	**Scenario**	**2015 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**	**2050 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
Columbia	Columbia County	A1	67.2	15.0	9.8	5.3	0.0	0.0	0.0	67.2	35.4	23.0	12.4	0.0	0.0	0.0
		A2	**9.8**	**15.0**	**9.8**	**5.3**	**5.2**	0.0	0.0	**9.8**	**35.4**	**23.0**	**12.4**	**25.7**	**13.3**	**2.6**
		B	30.5	15.0	9.8	5.3	0.0	0.0	0.0	30.5	35.4	23.0	12.4	5.0	0.0	0.0
		C	55.6	15.0	9.8	5.3	0.0	0.0	0.0	55.6	35.4	23.0	12.4	0.0	0.0	0.0
		D1	34.2	15.0	9.8	5.3	0.0	0.0	0.0	34.2	35.4	23.0	12.4	1.2	0.0	0.0
		D2	34.2	15.0	9.8	5.3	0.0	0.0	0.0	34.2	35.4	23.0	12.4	1.2	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	9.8	15.0	9.8	5.3	5.2	0.0	0.0	9.8	35.4	23.0	12.4	25.7	13.3	2.6
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Elbert	Elberton	A1	4.2	1.4	0.9	0.5	0.0	0.0	0.0	4.2	1.4	0.9	0.5	0.0	0.0	0.0
		A2	3.1	1.4	0.9	0.5	0.0	0.0	0.0	3.1	1.4	0.9	0.5	0.0	0.0	0.0
		B	2.8	1.4	0.9	0.5	0.0	0.0	0.0	2.8	1.4	0.9	0.5	0.0	0.0	0.0
		C	3.1	1.4	0.9	0.5	0.0	0.0	0.0	3.1	1.4	0.9	0.5	0.0	0.0	0.0
		D1	3.6	1.4	0.9	0.5	0.0	0.0	0.0	4.1	1.4	0.9	0.5	0.0	0.0	0.0
		D2	3.6	1.4	0.9	0.5	0.0	0.0	0.0	4.1	1.4	0.9	0.5	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	2.2	1.4	0.9	0.5	0.0	0.0	0.0	2.2	1.4	0.9	0.5	0.0	0.0	0.0
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Franklin	Franklin County	A1	7.7	1.2	0.8	0.4	0.0	0.0	0.0	6.0	1.5	0.8	0.5	0.0	0.0	0.0
		A2	6.0	1.2	0.8	0.4	0.0	0.0	0.0	4.3	1.5	0.8	0.5	0.0	0.0	0.0
		B	6.8	1.2	0.8	0.4	0.0	0.0	0.0	5.1	1.5	0.8	0.5	0.0	0.0	0.0
		C	6.0	1.2	0.8	0.4	0.0	0.0	0.0	4.3	1.5	0.8	0.5	0.0	0.0	0.0
		D1	6.8	1.2	0.8	0.4	0.0	0.0	0.0	5.1	1.5	0.8	0.5	0.0	0.0	0.0
		D2	6.8	1.2	0.8	0.4	0.0	0.0	0.0	5.1	1.5	0.8	0.5	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	**Qualified Water System**	**Scenario**	**2015 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**	**2050 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
Columbia	Harlem	A1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		A2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		B	3.1	0.4	0.3	0.1	0.0	0.0	0.0	3.4	1.8	1.2	0.6	0.0	0.0	0.0
		C	4.3	0.4	0.3	0.1	0.0	0.0	0.0	4.3	1.8	1.2	0.6	0.0	0.0	0.0
		D1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		D2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hart	Hart County	A1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		A2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		B	4.8	0.5	0.3	0.2	0.0	0.0	0.0	4.2	0.9	0.6	0.3	0.0	0.0	0.0
		C	5.9	0.5	0.3	0.2	0.0	0.0	0.0	4.6	0.9	0.6	0.3	0.0	0.0	0.0
		D1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		D2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hart	Hartwell	A1	0.7	1.1	0.7	0.4	0.5	0.1	0.0	0.7	1.8	1.2	0.6	1.2	0.5	0.0
		A2	**0.0**	**1.1**	**0.7**	**0.4**	**1.1**	**0.7**	**0.4**	**0.0**	**1.8**	**1.2**	**0.6**	**1.8**	**1.2**	**0.6**
		B	0.7	1.1	0.7	0.4	0.5	0.1	0.0	0.7	1.8	1.2	0.6	1.2	0.5	0.0
		C	4.5	1.1	0.7	0.4	0.0	0.0	0.0	4.5	1.8	1.2	0.6	0.0	0.0	0.0
		D1	1.0	1.1	0.7	0.4	0.2	0.0	0.0	1.0	1.8	1.2	0.6	0.9	0.2	0.0
		D2	1.0	1.1	0.7	0.4	0.2	0.0	0.0	1.0	1.8	1.2	0.6	0.9	0.2	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	0.0	1.1	0.7	0.4	1.1	0.7	0.4	0.0	1.8	1.2	0.6	1.8	1.2	0.6
		H	0.4	1.1	0.7	0.4	0.7	0.3	0.0	0.7	1.8	1.2	0.6	1.1	0.5	0.0

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	**Qualified Water System**	**Scenario**	**2015 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**	**2050 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
Richmond	Hephzibah	A1	3.1	0.5	0.3	0.2	0.0	0.0	0.0	3.1	0.9	0.6	0.3	0.0	0.0	0.0
		A2	4.5	0.5	0.3	0.2	0.0	0.0	0.0	4.5	0.9	0.6	0.3	0.0	0.0	0.0
		B	3.1	0.5	0.3	0.2	0.0	0.0	0.0	3.1	0.9	0.6	0.3	0.0	0.0	0.0
		C	4.5	0.5	0.3	0.2	0.0	0.0	0.0	4.5	0.9	0.6	0.3	0.0	0.0	0.0
		D1	3.1	0.5	0.3	0.2	0.0	0.0	0.0	3.1	0.9	0.6	0.3	0.0	0.0	0.0
		D2	3.1	0.5	0.3	0.2	0.0	0.0	0.0	3.1	0.9	0.6	0.3	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Franklin	Lavonia	A1	1.7	1.2	0.8	0.4	0.0	0.0	0.0	3.6	2.0	1.3	0.7	0.0	0.0	0.0
		A2	**1.1**	**1.2**	**0.8**	**0.4**	**0.1**	0.0	0.0	3.6	2.0	1.3	0.7	0.0	0.0	0.0
		B	1.7	1.2	0.8	0.4	0.0	0.0	0.0	**1.2**	**2.0**	**1.3**	**0.7**	**0.8**	**0.1**	0.0
		C	4.1	1.2	0.8	0.4	0.0	0.0	0.0	3.6	2.0	1.3	0.7	0.0	0.0	0.0
		D1	4.5	1.2	0.8	0.4	0.0	0.0	0.0	4.1	2.0	1.3	0.7	0.0	0.0	0.0
		D2	4.5	1.2	0.8	0.4	0.0	0.0	0.0	4.1	2.0	1.3	0.7	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	2.6	1.2	0.8	0.4	0.0	0.0	0.0	2.1	2.0	1.3	0.7	0.0	0.0	0.0
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lincoln	Lincoln County	A1	0.8	0.2	0.1	0.1	0.0	0.0	0.0	1.3	0.2	0.1	0.1	0.0	0.0	0.0
		A2	0.7	0.2	0.1	0.1	0.0	0.0	0.0	1.1	0.2	0.1	0.1	0.0	0.0	0.0
		B	0.8	0.2	0.1	0.1	0.0	0.0	0.0	1.3	0.2	0.1	0.1	0.0	0.0	0.0
		C	0.7	0.2	0.1	0.1	0.0	0.0	0.0	1.1	0.2	0.1	0.1	0.0	0.0	0.0
		D1	0.8	0.2	0.1	0.1	0.0	0.0	0.0	1.3	0.2	0.1	0.1	0.0	0.0	0.0
		D2	0.8	0.2	0.1	0.1	0.0	0.0	0.0	1.3	0.2	0.1	0.1	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	**Qualified Water System**	**Scenario**	**2015 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**	**2050 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
Lincoln	Lincolnton	A1	1.0	0.5	0.3	0.2	0.0	0.0	0.0	1.0	0.10	0.06	0.03	0.0	0.0	0.0
		A2	0.6	0.5	0.3	0.2	0.0	0.0	0.0	0.6	0.10	0.06	0.03	0.0	0.0	0.0
		B	0.4	0.5	0.3	0.2	0.2	0.0	0.0	0.4	0.10	0.06	0.03	0.0	0.0	0.0
		C	0.6	0.5	0.3	0.2	0.0	0.0	0.0	0.6	0.10	0.06	0.03	0.0	0.0	0.0
		D1	0.7	0.5	0.3	0.2	0.0	0.0	0.0	0.7	0.10	0.06	0.03	0.0	0.0	0.0
		D2	0.7	0.5	0.3	0.2	0.0	0.0	0.0	0.7	0.10	0.06	0.03	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	**0.0**	**0.5**	**0.3**	**0.2**	**0.5**	**0.3**	**0.2**	**0.0**	**0.10**	**0.06**	**0.03**	**0.10**	**0.06**	**0.03**
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jefferson	Louisville	A1	3.3	0.6	0.4	0.2	0.0	0.0	0.0	3.3	0.5	0.3	0.2	0.0	0.0	0.0
		A2	3.4	0.6	0.4	0.2	0.0	0.0	0.0	3.4	0.5	0.3	0.2	0.0	0.0	0.0
		B	2.3	0.6	0.4	0.2	0.0	0.0	0.0	2.3	0.5	0.3	0.2	0.0	0.0	0.0
		C	3.4	0.6	0.4	0.2	0.0	0.0	0.0	3.4	0.5	0.3	0.2	0.0	0.0	0.0
		D1	2.4	0.6	0.4	0.2	0.0	0.0	0.0	2.4	0.5	0.3	0.2	0.0	0.0	0.0
		D2	2.4	0.6	0.4	0.2	0.0	0.0	0.0	2.4	0.5	0.3	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Madison	Madison County	A1	NA	NA	NA	NA	NA	NA	NA	3.9	0.4	0.2	0.1	0.0	0.0	0.0
		A2	NA	NA	NA	NA	NA	NA	NA	2.0	0.4	0.2	0.1	0.0	0.0	0.0
		B	3.7	0.1	0.0	0.0	0.0	0.0	0.0	3.9	0.4	0.2	0.1	0.0	0.0	0.0
		C	2.0	0.1	0.0	0.0	0.0	0.0	0.0	2.0	0.4	0.2	0.1	0.0	0.0	0.0
		D1	NA	NA	NA	NA	NA	NA	NA	3.9	0.4	0.2	0.1	0.0	0.0	0.0
		D2	NA	NA	NA	NA	NA	NA	NA	3.9	0.4	0.2	0.1	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	**Qualified Water System**	**Scenario**	**2015 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**	**2050 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
Jenkins	Millen	A1	5.1	0.4	0.3	0.2	0.0	0.0	0.0	5.1	0.2	0.1	0.1	0.0	0.0	0.0
		A2	4.6	0.4	0.3	0.2	0.0	0.0	0.0	4.6	0.2	0.1	0.1	0.0	0.0	0.0
		B	3.4	0.4	0.3	0.2	0.0	0.0	0.0	3.4	0.2	0.1	0.1	0.0	0.0	0.0
		C	4.6	0.4	0.3	0.2	0.0	0.0	0.0	4.6	0.2	0.1	0.1	0.0	0.0	0.0
		D1	3.4	0.4	0.3	0.2	0.0	0.0	0.0	3.4	0.2	0.1	0.1	0.0	0.0	0.0
		D2	3.4	0.4	0.3	0.2	0.0	0.0	0.0	3.4	0.2	0.1	0.1	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rabun	Rabun County	A1	3.2	1.3	0.9	0.5	0.0	0.0	0.0	3.5	1.7	1.1	0.6	0.0	0.0	0.0
		A2	3.5	1.3	0.9	0.5	0.0	0.0	0.0	3.5	1.7	1.1	0.6	0.0	0.0	0.0
		B	2.2	1.3	0.9	0.5	0.0	0.0	0.0	2.5	1.7	1.1	0.6	0.0	0.0	0.0
		C	3.5	1.3	0.9	0.5	0.0	0.0	0.0	3.5	1.7	1.1	0.6	0.0	0.0	0.0
		D1	2.7	1.3	0.9	0.5	0.0	0.0	0.0	3.5	1.7	1.1	0.6	0.0	0.0	0.0
		D2	2.7	1.3	0.9	0.5	0.0	0.0	0.0	3.5	1.7	1.1	0.6	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	1.5	1.3	0.9	0.5	0.0	0.0	0.0	**1.5**	**1.7**	**1.1**	**0.6**	**0.2**	0.0	0.0
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Franklin	Royston	A1	2.6	0.5	0.3	0.2	0.0	0.0	0.0	2.2	0.9	0.6	0.3	0.0	0.0	0.0
		A2	2.2	0.5	0.3	0.2	0.0	0.0	0.0	1.9	0.9	0.6	0.3	0.0	0.0	0.0
		B	1.6	0.5	0.3	0.2	0.0	0.0	0.0	1.2	0.9	0.6	0.3	0.0	0.0	0.0
		C	2.2	0.5	0.3	0.2	0.0	0.0	0.0	1.9	0.9	0.6	0.3	0.0	0.0	0.0
		D1	1.6	0.5	0.3	0.2	0.0	0.0	0.0	1.3	0.9	0.6	0.3	0.0	0.0	0.0
		D2	1.6	0.5	0.3	0.2	0.0	0.0	0.0	1.3	0.9	0.6	0.3	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	1.4	0.5	0.3	0.2	0.0	0.0	0.0	1.2	0.9	0.6	0.3	0.0	0.0	0.0

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	**Qualified Water System**	**Scenario**	**2015 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**	**2050 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
Screven	Sylvania	A1	2.0	0.6	0.4	0.2	0.0	0.0	0.0	2.0	0.5	0.3	0.2	0.0	0.0	0.0
		A2	1.5	0.6	0.4	0.2	0.0	0.0	0.0	1.5	0.5	0.3	0.2	0.0	0.0	0.0
		B	1.5	0.6	0.4	0.2	0.0	0.0	0.0	1.5	0.5	0.3	0.2	0.0	0.0	0.0
		C	1.5	0.6	0.4	0.2	0.0	0.0	0.0	1.5	0.5	0.3	0.2	0.0	0.0	0.0
		D1	1.5	0.6	0.4	0.2	0.0	0.0	0.0	1.5	0.5	0.3	0.2	0.0	0.0	0.0
		D2	1.5	0.6	0.4	0.2	0.0	0.0	0.0	1.5	0.5	0.3	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
McDuffie	Thomson-McDuffie County	A1	6.5	2.0	1.3	0.7	0.0	0.0	0.0	6.5	2.6	1.7	0.9	0.0	0.0	0.0
		A2	2.0	2.0	1.3	0.7	0.0	0.0	0.0	**2.0**	**2.6**	**1.7**	**0.9**	**0.6**	0.0	0.0
		B	2.9	2.0	1.3	0.7	0.0	0.0	0.0	2.9	2.6	1.7	0.9	0.0	0.0	0.0
		C	5.6	2.0	1.3	0.7	0.0	0.0	0.0	5.6	2.6	1.7	0.9	0.0	0.0	0.0
		D1	12.0	2.0	1.3	0.7	0.0	0.0	0.0	12.0	2.6	1.7	0.9	0.0	0.0	0.0
		D2	12.0	2.0	1.3	0.7	0.0	0.0	0.0	12.0	2.6	1.7	0.9	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	2.0	2.0	1.3	0.7	0.0	0.0	0.0	2.0	2.6	1.7	0.9	0.6	0.0	0.0
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Stephens	Toccoa	A1	10.8	2.7	1.7	0.9	0.0	0.0	0.0	9.7	5.2	3.4	1.8	0.0	0.0	0.0
		A2	10.1	2.7	1.7	0.9	0.0	0.0	0.0	9.0	5.2	3.4	1.8	0.0	0.0	0.0
		B	1.8	2.7	1.7	0.9	0.8	0.0	0.0	0.7	5.2	3.4	1.8	4.6	2.7	1.1
		C	10.1	2.7	1.7	0.9	0.0	0.0	0.0	9.0	5.2	3.4	1.8	0.0	0.0	0.0
		D1	2.9	2.7	1.7	0.9	0.0	0.0	0.0	2.4	5.2	3.4	1.8	2.9	1.0	0.0
		D2	2.9	2.7	1.7	0.9	0.0	0.0	0.0	2.4	5.2	3.4	1.8	2.9	1.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	**1.1**	**2.7**	**1.7**	**0.9**	**1.5**	**0.6**	0.0	**0.0**	**5.2**	**3.4**	**1.8**	**5.2**	**3.4**	**1.8**
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	**Qualified Water System**	**Scenario**	**2015 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**	**2050 Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
Wilkes	Washington	A1	2.6	0.9	0.6	0.3	0.0	0.0	0.0	2.6	0.7	0.4	0.2	0.0	0.0	0.0
		A2	2.0	0.9	0.6	0.3	0.0	0.0	0.0	2.0	0.7	0.4	0.2	0.0	0.0	0.0
		B	2.6	0.9	0.6	0.3	0.0	0.0	0.0	2.6	0.7	0.4	0.2	0.0	0.0	0.0
		C	4.2	0.9	0.6	0.3	0.0	0.0	0.0	4.2	0.7	0.4	0.2	0.0	0.0	0.0
		D1	3.1	0.9	0.6	0.3	0.0	0.0	0.0	3.1	0.7	0.4	0.2	0.0	0.0	0.0
		D2	3.1	0.9	0.6	0.3	0.0	0.0	0.0	3.1	0.7	0.4	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	2.0	0.9	0.6	0.3	0.0	0.0	0.0	2.0	0.7	0.4	0.2	0.0	0.0	0.0
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Burke	Waynesboro	A1	3.8	0.6	0.4	0.2	0.0	0.0	0.0	3.8	0.6	0.4	0.2	0.0	0.0	0.0
		A2	3.5	0.6	0.4	0.2	0.0	0.0	0.0	3.5	0.6	0.4	0.2	0.0	0.0	0.0
		B	2.4	0.6	0.4	0.2	0.0	0.0	0.0	2.4	0.6	0.4	0.2	0.0	0.0	0.0
		C	3.5	0.6	0.4	0.2	0.0	0.0	0.0	3.5	0.6	0.4	0.2	0.0	0.0	0.0
		D1	2.4	0.6	0.4	0.2	0.0	0.0	0.0	2.4	0.6	0.4	0.2	0.0	0.0	0.0
		D2	2.4	0.6	0.4	0.2	0.0	0.0	0.0	2.4	0.6	0.4	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.
= Critical Scenario Deficit

Table 6-1
Emergency Scenarios and Potential Internal Infrastructure Redundancy Projects

Water Supply Risk	Emergency Scenario	Internal Infrastructure Redundancy Project	Relevant Considerations			
			Potential Environmental Impacts	Withdrawal Permit Impacts	Water Quality Impacts	Community Impacts
A. Failure of largest water treatment plant (WTP)	A1. Power supply failure of largest WTP	Backup Generator	◊	-	-	-
	A2. Critical asset failure at largest WTP (e.g., loss of clearwell, loss of chemical treatment)	Unit Process Redundancy	-	-	-	-
B. Short-term catastrophic failure of a water distribution system	Critical transmission main failure from largest WTP or interconnection	-	-	-	-	-
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers a boil water notice	-	-	-	-	-
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	New Well/pumps New WTP New Surface Water Source Raw water transmission main	◊	◊	◊	◊
	D2. Chemical contamination of largest raw water source	New Well/pumps New WTP New Surface Water Source Raw water transmission main	◊	◊	◊	◊
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	New Well/pumps New WTP New Surface Water Source Raw water transmission main	◊	◊	◊	◊
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	New Well New WTP New Surface Water Source	◊	◊	◊	◊

Prepared by: GJH 02/11/21
Checked by: LCT 03/25/21

Notes:
ADD - average daily demand
WTP - water treatment plant

Table 6-2
Potential Projects and Details

							System Impacts	
County	**Qualified Water System**	**Project Number**	**Potential Project Description**	**Emergency Scenario(s) Addressed**	**Maximum Capacity Added (MGD)**	**Potential Environmental Impacts**	**Withdrawal Permit / Purchased Water Impacts**	**Water Quality Impacts**	**Community Impacts**
Richmond	Augusta-Richmond County	1	Interconnection: Augusta-Richmond County-Columbia County; multiple options along county line	A1, A2, B, D1, D2, G	1.13	Low: less than 200 ft excavation	Augusta-Richmond County: low Columbia County: low	High	Medium-low: excavation less than 200 feet; multijurisdictional agreement.
Banks	Banks County-Mountain Creek	-	No recommended project	-	-	-	-	-	-
Rabun	Clayton	-	No recommended project	-	-	-	-	-	-
Columbia	Columbia County	1	Interconnection: Augusta-Richmond County-Columbia County; multiple along county line	A1, A2, B, D1, D2, G	1.13	Low: less than 200 ft excavation	Augusta-Richmond County: low Columbia County: low	High	Medium-low: excavation less than 200 feet; multijurisdictional agreement.
		2	Interconnection: Columbia County-Thomson-McDuffie County; 0.3 mi near White Oak Road	A1, A2, B, D1, D2, G	1.13	Medium-low: greater than 200 ft and less than 5,000 ft excavation	Columbia County: low Thomson-McDuffie County: low	High	Medium-high: greater than 200 ft and less than 5,000 ft excavation; multijurisdictional agreement.
Elbert	Elberton	3	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton[1]	A1, A2, B, D1, D2	1.60[(2)]	Low: less than 200 ft excavation	Madison County: medium low	High	Medium-low: excavation less than 200 feet; multijurisdictional agreement.
Franklin	Franklin County	-	No recommended project	-	-	-	-	-	-
Columbia	Harlem	4	Interconnection: Harlem-Columbia County; 0.6 mi along Louisville Road[3]	B	1.13	Medium-low: greater than 200 ft and less than 5,000 ft excavation	Columbia County: low	Low[6]	Medium-high: greater than 200 ft and less than 5,000 ft excavation; multijurisdictional agreement.
Hart	Hart County	-	No recommended project	-	-	-	-	-	-
Hart	Hartwell	5	Upgrade existing interconnection: Hart County to Hartwell along Bowersville Hwy; ability to send water from Lavonia to Hartwell[4]	A1, A2, B, D1, D2, G, H	1.13	Low: less than 200 ft excavation	Lavonia: medium low	Medium-low	Medium-low: excavation less than 200 feet; multijurisdictional agreement.
Richmond	Hephzibah	-	No recommended project	-	-	-	-	-	-
Franklin	Lavonia	6	Upgrade existing interconnection: Knox Bridge Crossing Road; increased capacity to Lavonia and replace 2.5 mi with 10-inch diameter pipe	A1, A2, B, D1, D2	1.76	High: more than 5000 ft excavation; one stream crossing	Hart County: low	Low[6]	High: more than 5000 ft excavation; multijurisdictional agreement.
Lincoln	Lincoln County	-	No recommended project	-	-	-	-	-	-
Lincoln	Lincolnton	7	Upgrade existing interconnection: Hwy 378 East; ability to send water from Lincoln County to Lincolnton[5]	A1, A2, B, D1, D2, G	0.30[(2)]	Low: less than 200 ft excavation	Lincoln County: medium low	High	Medium-low: excavation less than 200 feet; multijurisdictional agreement.
Jefferson	Louisville	-	No recommended project	-	-	-	-	-	-
Madison	Madison County	-	No recommended project	-	-	-	-	-	-
Jenkins	Millen	-	No recommended project	-	-	-	-	-	-

Table 6-2
Potential Projects and Details

						System Impacts		
County	**Qualified Water System**	**Project Number**	**Potential Project Description**	**Emergency Scenario(s) Addressed**	**Maximum Capacity Added (MGD)**	**Potential Environmental Impacts**	**Withdrawal Permit / Purchased Water Impacts**	**Water Quality Impacts**	**Community Impacts**
Rabun	Rabun County	8	Interconnection: Rabun County-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	A1, A2, B, D1, D2, G	1.13	High: more than 5000 ft excavation; five stream crossings	Rabun County: low Demorest: high	High	High: more than 5000 ft excavation; multijurisdictional agreement.
Franklin	Royston	9	Upgrade existing interconnection: Royston-Hart County along Royston Highway; increased capacity to Royston and replace 1 mi with 8-inch diameter pipe	A1, A2, B, D1, D2, H	1.13	High: more than 5000 ft excavation; one stream crossing	Hart County: low	Low[6]	High: more than 5000 ft excavation; multijurisdictional agreement.
Screven	Sylvania	-	No recommended project	-	-	-	-	-	-
McDuffie	Thomson-McDuffie County	2	Interconnection: Columbia County-Thomson-McDuffie County; 0.3 mi near White Oak Road	A1, A2, B, D1, D2, G	1.13	Medium-low: greater than 200 ft and less than 5,000 ft excavation	Columbia County: low Thomson-McDuffie County: low	High	Medium-high: greater than 200 ft and less than 5,000 ft excavation; multijurisdictional agreement.
Stephens	Toccoa	10	New raw water transmission main: 2.5 miles	D1, D2, G	9.0	High: more than 5000 ft excavation	-	-	High: more than 5000 ft excavation
Wilkes	Washington	-	No recommended project	-	-	-	-	-	-
Burke	Waynesboro	-	No recommended project	-	-	-	-	-	-

Prepared by: GJH 09/13/21
Checked by: LCT 09/24/21

Notes:

ft - feet
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant

1. This is currently a one-way interconnection into Madison County.
2. This value was estimated based on QWS-specific information.
3. This potential project will only supply water to Harlem, because Harlem regularly operates as a purchase-only QWS with emergency wells.
4. Hart County is a purchase-only QWS that would act as a passthrough system. The existing interconnection is limited by a 4-inch diameter control valve, which would be upgraded to an 8-inch diameter control valve.
5. This is currently a one-way interconnection into Lincoln County.
6. Water quality/chemistry impacts are assumed to be low for existing interconnections.

Table 6-3
Interconnection Project Capacity Added

Project Number	Potential Project Description	Water System Involved	Pipe Diameter (inches)	Average Pressure (psi)	2050 Excess Capacity (MGD)	Maximum Capacity Added (MGD)[2]
1	Interconnection: Augusta-Richmond County-Columbia County; multiple along county line	Augusta-Richmond County	8[(1)]	85	38.4	1.13
		Columbia County	8[(1)]	90	18.4	1.13
2	Interconnection: Columbia County-Thomson-McDuffie County; 0.3 mi near White Oak Road	Columbia County	8[(1)]	90	18.4	1.13
		Thomson-McDuffie County	8	65	3.0	1.13
3	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton	Elberton	12	70	1.7	1.60
		Madison County	12	60	0.1	0.00
4	Interconnection: Harlem-Columbia County; 0.6 mi along Louisville Road	Harlem	8	70	NA	1.13
		Columbia County	8[(1)]	90	18.4	0.00
5	Upgrade existing interconnection: Hart County to Hartwell along Bowersville Hwy; ability to send water from Lavonia to Hartwell	Hart County[3,4]	8	55-175	4.1	0.00
		Hartwell	8	113	2.7	1.13
6	Upgrade existing interconnection: Lavonia-Hart County at Knox Bridge Crossing Road; increased capacity to Lavonia and replace 2.5 mi with 10-inch diameter pipe	Lavonia	10	100	1.0	1.76
		Hart County[3]	10	55-175	4.1	0.00
7	Upgrade existing interconnection: Hwy 378 East; ability to send water from Lincoln County to Lincolnton	Lincolnton	6	60	0.5	0.30
		Lincoln County	6	60-76	0.2	0.00
8	Interconnection: Rabun County-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	Rabun County	8	110	1.8	1.13
		Demorest	8	105	0.3	1.13
9	Upgrade existing interconnection: Royston-Hart County along Royston Highway; increased capacity to Royston and replace 1 mi with 8-inch diameter pipe	Royston	8	60	0.4	1.13
		Hart County[3,4]	8	62[(5)]	4.1	0.00

Prepared by: GJH 09/13/21
Checked by: LCT 09/24/21

Notes:

MGD - million gallons per day
NA - not applicable
psi - pound-force per square inch

1. This value is assumed based on QWS context.
2. In the case of a project benefitting one system, the supplier's maximum capacity added is 0 MGD.
3. Hart County is a purchase-only QWS, and their suppliers' cumulative 2050 excess capacity is reported.
4. Although Hart County will benefit from this upgrade, Hart County has sufficient available water supply, even under emergency scenarios. Therefore, the maximum capacity added is reported as 0 MGD.
5. This value differs because a pressure sampling location with this pressure was reported near the interconnection.

Table 6-4
Planning-Level Costs for Potential Projects

Project Number	Qualified Water System(s) Benefitted	Potential Project Description	Maximum Capacity Added (MGD)	Length of Pipes (ft)	Project Specifics	Estimated Unit Cost ($)	Additional Cost Items	Additional Cost ($)	Total Estimated Cost ($)	Macro-Level Project Timeframe
1	Augusta-Richmond County Columbia County	Interconnection: Augusta-Richmond County-Columbia County; multiple along county line	1.13	100	8-inch diameter DIP	$ 170	(1) control valve station	$ 39,050	$ 56,100	12 months
2	Columbia County Thomson-McDuffie County	Interconnection: Columbia County-Thomson-McDuffie County; 0.3 mi near White Oak Road	1.13	1500	8-inch diameter DIP	$ 170	(1) control valve station	$ 39,050	$ 294,100	12 months
3	Elberton	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton	1.60	-	12-inch diameter DIP	-	-	-	$ 50,000	12 months
4	Harlem	Interconnection: Harlem-Columbia County; 0.6 mi along Louisville Road	1.13	3170	8-inch diameter DIP	$ 170	(1) control valve station	$ 39,050	$ 578,000	12 months
5	Hartwell	Upgrade existing interconnection: Hart County to Hartwell along Bowersville Hwy; ability to send water from Lavonia to Hartwell	1.13	-	8-inch diameter DIP	-	(1) control valve station[1]	$ 39,050	$ 89,050	12 months
6	Lavonia	Upgrade existing interconnection: Lavonia-Hart County at Knox Bridge Crossing Road; increased capacity to Lavonia and replace 2.5 mi with 10-inch diameter pipe	1.76	13200	10-inch diameter DIP	$ 200	(1) control valve station[2]	$ 92,250	$ 2,732,300	12 months
7	Lincolnton	Upgrade existing interconnection: Hwy 378 East; ability to send water from Lincoln County to Lincolnton	0.30	-	6-inch diameter DIP	-	-	-	$ 50,000	12 months
8	Rabun County Demorest[3]	Interconnection: Rabun County-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	1.13	31680	8-inch diameter DIP	$ 170	(1) control valve station (1) 150 HP booster pump station	$ 2,257,050	$ 7,642,700	16 months
9	Royston	Upgrade existing interconnection: Royston-Hart County along Royston Highway; increased capacity to Royston and replace 1 mi with 8-inch diameter pipe	1.13	5280	8-inch diameter DIP	$ 170	-	$ 50,000	$ 947,600	12 months
10	Toccoa	New raw water transmission main: 2.5 miles	9.0	13200	30-inch diameter DIP	$ 770	-	-	$ 10,164,000	12 months

Prepared by: GJH 09/15/21
Checked by: LCT 09/24/21

Notes:

DIP - ductile iron pipe
ft - feet
gpm - gallons per minute
HP - horsepower
KW - kilowatts
MGD - million gallons per day
WTP - water treatment plant

1. The existing interconnection is limited by a 4-inch diameter control valve, which would be upgraded to an 8-inch diameter control valve.
2. The existing interconnection would be upgraded to a 10-inch diameter control valve.
3. Demorest is a qualified water system in the Coosa-North Georgia water planning region.

Table 7-1
Potential Project Scoring Criteria Matrix

		Assigned Score				
	Criterion	**1**	**2**	**3**	**4**	**Weighting**
1	Systems Benefitted	One (Internal Project)	Mutually Benefits One Non-QWS	Mutually Benefits Two or More Non-QWS	Mutually Benefits Another QWS	1
2	Population Benefitted	<10,000	10,000 - 25,000	25,000 - 100,000	>100,000	3
3	Critical Scenario Duration (days)	1	3	30	120	1
4	Added Capacity as a Percent of Total Demand (%)	0-25%	26-50%	50-76%	>76%	2
5	Cost ($)	> $2,000,000	$1,000,000 - $2,000,000	$150,000 - $1,000,000	< $150,000	3
6	Potential Environmental Impacts	High	Medium-high	Medium-low	Low	3
7	Potential System and Community Impacts	High	Medium-high	Medium-low	Low	3
8	Excess Capacity Index	Positive Excess Capacity >0.5	Positive Excess Capacity <0.5	Negative Excess Capacity	No Excess Capacity	2

Prepared by: GJH 09/15/21
Checked by: LCT 09/24/21

Notes:
QWS - qualified water system

Table 7-2
Potential Project Criteria Scores and Weight Calculations

			1: Systems Benefitted		2: Population Benefitted		3: Critical Scenario Duration	
Project Number	**Water System(s) Benefitted**	**Potential Project Description**	**Water System(s) Benefitted**	**Score: Systems Benefitted**	**Population Benefitted**	**Score: Population Benefitted**	**Emergency Scenario(s) Addressed**	**Score: Critical Scenario Duration**
1	Augusta-Richmond Co. Columbia Co.	Interconnection: Augusta-Richmond Co.-Columbia Co.; multiple along county line	Augusta-Richmond Co. Columbia Co.	4	337,800	4	A1, A2, B, D1, D2, G	3
2	Columbia Co. Thomson-McDuffie Co.	Interconnection: Columbia Co.-Thomson-McDuffie Co.; 0.3 mi near White Oak Road	Columbia Co. Thomson-McDuffie Co.	4	149,700	4	A1, A2, B, D1, D2, G	3
3	Elberton	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton	Elberton	1	11,800	2	A1, A2, B, D1, D2	3
4	Harlem	Interconnection: Harlem-Columbia Co.; 0.6 mi along Louisville Road	Harlem	1	6,700	1	B	1
5	Hartwell	Upgrade existing interconnection: Hart Co. to Hartwell; ability to send water from Lavonia to Hartwell	Hartwell	1	13,500	2	A1, A2, B, D1, D2, G, H	4
6	Lavonia	Upgrade existing interconnection: Lavonia-Hart Co.; increased capacity to Lavonia; replace 2.5 mi with 10-inch diameter pipe	Lavonia	1	11,900	2	A1, A2, B, D1, D2	3
7	Lincolnton	Upgrade existing interconnection: ability to send water from Lincoln County to Lincolnton	Lincolnton	1	2,500	1	A1, A2, B, D1, D2, G	3
8	Rabun County Demorest	Interconnection: Rabun Co.-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	Rabun County Demorest	4	31,000[(1)]	3	A1, A2, B, D1, D2, G	3
9	Royston	Upgrade existing interconnection: Royston-Hart Co.; increased capacity to Royston; replace 1 mi with 8-inch diameter pipe	Royston	1	5,100	1	A1, A2, B, D1, D2, H	4
10	Toccoa	New raw water transmission main: 2.5 miles	Toccoa	1	37,000	3	D1, D2, G	3

Notes:
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. Demorest serves an estimated total population of 17,700 people.

Table 7-2
Potential Project Criteria Scores and Weight Calculations

			4: Added Capacity as a Percent of Total Demand					5: Cost	
Project Number	**Water System(s) Benefitted**	**Potential Project Description**	**Maximum Capacity Added (MGD)**	**2050 Total Demand (MGD)**	**Capacity as a Percent of Total Demand (%)**	**Individual Scores**	**Score: Added Capacity as a Percent of Total Demand**	**Cost ($)**	**Score: Cost**
1	Augusta-Richmond Co. Columbia Co.	Interconnection: Augusta-Richmond Co.-Columbia Co.; multiple along county line	1.13	Augusta-Richmond Co.: 47.7 Columbia Co.: 35.4	Augusta-Richmond Co.: 2% Columbia Co.: 3%	Augusta-Richmond Co.: 1 Columbia Co.: 1	1	$ 56,100	4
2	Columbia Co. Thomson-McDuffie Co.	Interconnection: Columbia Co.-Thomson-McDuffie Co.; 0.3 mi near White Oak Road	1.13	Columbia Co.: 35.4 Thomson-McDuffie Co.: 2.63	Columbia Co.: 3% Thomson-McDuffie Co.: 43%	Columbia Co.: 1 Thomson-McDuffie Co.: 2	1.5	$ 294,100	3
3	Elberton	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton	1.60	1.43	112%	-	4	$ 50,000	4
4	Harlem	Interconnection: Harlem-Columbia Co.; 0.6 mi along Louisville Road	1.13	1.79	63%	-	3	$ 578,000	3
5	Hartwell	Upgrade existing interconnection: Hart Co. to Hartwell; ability to send water from Lavonia to Hartwell	1.13	1.84	62%	-	3	$ 89,050	4
6	Lavonia	Upgrade existing interconnection: Lavonia-Hart Co.; increased capacity to Lavonia; replace 2.5 mi with 10-inch diameter pipe	1.76	2.01	88%	-	4	$ 2,732,300	1
7	Lincolnton	Upgrade existing interconnection: ability to send water from Lincoln County to Lincolnton	0.30	0.10	306%	-	4	$ 50,000	4
8	Rabun County Demorest	Interconnection: Rabun Co.-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	1.13	Rabun Co.: 1.71 Demorest: 4.15	Rabun Co.: 66% Demorest: 27%	Rabun Co.: 3 Demorest: 2	2.5	$ 7,642,700	1
9	Royston	Upgrade existing interconnection: Royston-Hart Co.; increased capacity to Royston; replace 1 mi with 8-inch diameter pipe	1.13	0.87	130%	-	4	$ 947,600	3
10	Toccoa	New raw water transmission main: 2.5 miles	9.0	5.24	172%	-	4	$ 10,164,000	1

Notes:
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. Demorest serves an estimated total population of 17,700 people.

Table 7-2
Potential Project Criteria Scores and Weight Calculations

			6: Potential Environmental Impacts		7: Potential System and Community Impacts				
Project Number	**Water System(s) Benefitted**	**Potential Project Description**	**Potential Environmental Impacts**	**Score: Potential Environmental Impacts**	**Withdrawal Permit / Purchased Water Impacts**	**Water Quality Impacts**	**Community Impacts**	**Individual Scores**	**Score: Community Impacts**
1	Augusta-Richmond Co. Columbia Co.	Interconnection: Augusta-Richmond Co.-Columbia Co.; multiple along county line	Low	4	Augusta-Richmond Co.: low Columbia Co.: low	High	Medium-low	Withdrawal: (4+4)/2 = 4 Water Quality: 1 Community: 3	2.67
2	Columbia Co. Thomson-McDuffie Co.	Interconnection: Columbia Co.-Thomson-McDuffie Co.; 0.3 mi near White Oak Road	Medium-low	3	Columbia Co.: low Thomson-McDuffie Co.: low	High	Medium-high	Withdrawal: (4+4)/2 = 4 Water Quality: 1 Community: 2	2.33
3	Elberton	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton	Low	4	Madison County: medium low	High	Medium-low	Withdrawal: 3 Water Quality: 1 Community: 3	2.33
4	Harlem	Interconnection: Harlem-Columbia Co.; 0.6 mi along Louisville Road	Medium-low	3	Columbia County: low	Low	Medium-high	Withdrawal: 4 Water Quality: 4 Community: 2	3.33
5	Hartwell	Upgrade existing interconnection: Hart Co. to Hartwell; ability to send water from Lavonia to Hartwell	Low	4	Lavonia: medium low	Medium-low	Medium-low	Withdrawal: 3 Water Quality: 3 Community: 3	3
6	Lavonia	Upgrade existing interconnection: Lavonia-Hart Co.; increased capacity to Lavonia; replace 2.5 mi with 10-inch diameter pipe	High	1	Hart County: low	Low	High	Withdrawal: 4 Water Quality: 4 Community: 1	3
7	Lincolnton	Upgrade existing interconnection: ability to send water from Lincoln County to Lincolnton	Low	4	Lincoln County: medium low	High	Medium-low	Withdrawal: 3 Water Quality: 1 Community: 3	2.33
8	Rabun County Demorest	Interconnection: Rabun Co.-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	High	1	Rabun County: low Demorest: high	High	High	Withdrawal: (4+1)/2 = 2.5 Water Quality: 1 Community: 1	1.5
9	Royston	Upgrade existing interconnection: Royston-Hart Co.; increased capacity to Royston; replace 1 mi with 8-inch diameter pipe	High	1	Hart County: low	Low	High	Withdrawal: 4 Water Quality: 4 Community: 1	3
10	Toccoa	New raw water transmission main: 2.5 miles	High	1	NA	NA	High	-	1

Notes:
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. Demorest serves an estimated total population of 17,700 people.

Table 7-2
Potential Project Criteria Scores and Weight Calculations

			8: Excess Capacity Index				Weighing Calculation								
Project Number	**Water System(s) Benefitted**	**Potential Project Description**	**2050 Excess Capacity Index**	**Individual Scores**	**Score: Excess Capacity Index**	**Absolute Score**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Weighted Score**
1	Augusta-Richmond Co. Columbia Co.	Interconnection: Augusta-Richmond Co.-Columbia Co.; multiple along county line	Augusta-Richmond Co.: (-) Columbia Co.: (-)	Augusta-Richmond Co.: 3 Columbia Co.: 3	3	3.21	4	12	3	2	12	12	8	6	7.38
2	Columbia Co. Thomson-McDuffie Co.	Interconnection: Columbia Co.-Thomson-McDuffie Co.; 0.3 mi near White Oak Road	Columbia Co.: (-) Thomson-McDuffie Co.: (+) < 0.5	Columbia Co.: 3 Thomson-McDuffie Co.: 2	2.5	2.92	4	12	3	3	9	9	7	5	6.50
3	Elberton	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton	(+) < 0.5	-	2	2.79	1	6	3	8	12	12	7	4	6.63
4	Harlem	Interconnection: Harlem-Columbia Co.; 0.6 mi along Louisville Road	Not applicable	-	Not applicable	2.19	1	3	1	6	9	9	10	NA	5.57
5	Hartwell	Upgrade existing interconnection: Hart Co. to Hartwell; ability to send water from Lavonia to Hartwell	(+) < 0.5	-	2	2.88	1	6	4	6	12	12	9	4	6.75
6	Lavonia	Upgrade existing interconnection: Lavonia-Hart Co.; increased capacity to Lavonia; replace 2.5 mi with 10-inch diameter pipe	(-)	-	3	2.25	1	6	3	8	3	3	9	6	4.88
7	Lincolnton	Upgrade existing interconnection: ability to send water from Lincoln County to Lincolnton	(+) > 0.5	-	1	2.54	1	3	3	8	12	12	7	2	6.00
8	Rabun County Demorest	Interconnection: Rabun Co.-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	Rabun Co.: (+) < 0.5 Demorest: none	Rabun Co.: 2 Demorest: 4	3	2.38	4	9	3	5	3	3	4.5	6	4.69
9	Royston	Upgrade existing interconnection: Royston-Hart Co.; increased capacity to Royston; replace 1 mi with 8-inch diameter pipe	(-)	-	3	2.50	1	3	4	8	9	3	9	6	5.38
10	Toccoa	New raw water transmission main: 2.5 miles	(-)	-	3	2.13	1	9	3	8	3	3	3	6	4.50

Prepared by: GJH 09/15/21
Checked by: LCT 09/24/21

Notes:
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. Demorest serves an estimated total population of 17,700 people.

Table 7-3
Potential Project Decision-Making Summary

Project Number	Water System(s) Benefitted	Potential Project Description	Cost Per 1 MGD Yield ($/MGD)	Cost Per Individual Supplied ($/capita)	Absolute Score	Weighted Score	Manual Rank
1	Augusta-Richmond County Columbia County	Interconnection: Augusta-Richmond County-Columbia County; multiple along county line	$ 49,646	$ 0.17	3.21	7.38	1
2	Columbia County Thomson-McDuffie County	Interconnection: Columbia County-Thomson-McDuffie County; 0.3 mi near White Oak Road	$ 260,265	$ 1.96	2.92	6.50	4
3	Elberton	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton	$ 31,250	$ 4.24	2.79	6.63	3
4	Harlem	Interconnection: Harlem-Columbia County; 0.6 mi along Louisville Road	$ 511,504	$ 86.27	2.19	5.57	6
5	Hartwell	Upgrade existing interconnection: Hart County to Hartwell along Bowersville Hwy; ability to send water from Lavonia to Hartwell	$ 78,805	$ 6.60	2.88	6.75	2
6	Lavonia	Upgrade existing interconnection: Lavonia-Hart County at Knox Bridge Crossing Road; increased capacity to Lavonia and replace 2.5 mi with 10-inch diameter pipe	$ 1,549,801	$ 229.61	2.25	4.88	8
7	Lincolnton	Upgrade existing interconnection: Hwy 378 East; ability to send water from Lincoln County to Lincolnton	$ 166,667	$ 20.00	2.54	6.00	5
8	Rabun County Demorest	Interconnection: Rabun County-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	$ 6,763,451	$ 246.54	2.38	4.69	9
9	Royston	Upgrade existing interconnection: Royston-Hart County along Royston Highway; increased capacity to Royston and replace 1 mi with 8-inch diameter pipe	$ 840,071	$ 185.80	2.50	5.38	7
10	Toccoa	New raw water transmission main: 2.5 miles	$ 1,129,333	$ 274.70	2.13	4.50	10

Prepared by: GJH 09/15/21
Checked by: LCT 09/24/21

Notes:
WTP - water treatment plant

Table 7-4
Potential Projects Sorted by Final Rank Order

Project Number	Water System(s) Benefitted	Potential Project Description	Cost ($)	Final Rank
1	Augusta-Richmond County Columbia County	Interconnection: Augusta-Richmond County-Columbia County; multiple along county line	$ 56,100	1
5	Hartwell	Upgrade existing interconnection: Hart County to Hartwell along Bowersville Hwy; ability to send water from Lavonia to Hartwell	$ 89,050	2
3	Elberton	Upgrade existing interconnection: Hwy 72 at county line; ability to send water from Madison County to Elberton	$ 50,000	3
2	Columbia County Thomson-McDuffie County	Interconnection: Columbia County-Thomson-McDuffie County; 0.3 mi near White Oak Road	$ 294,100	4
7	Lincolnton	Upgrade existing interconnection: Hwy 378 East; ability to send water from Lincoln County to Lincolnton	$ 50,000	5
4	Harlem	Interconnection: Harlem-Columbia County; 0.6 mi along Louisville Road	$ 578,000	6
9	Royston	Upgrade existing interconnection: Royston-Hart County along Royston Highway; increased capacity to Royston and replace 1 mi with 8-inch diameter pipe	$ 947,600	7
6	Lavonia	Upgrade existing interconnection: Lavonia-Hart County at Knox Bridge Crossing Road; increased capacity to Lavonia and replace 2.5 mi with 10-inch diameter pipe	$ 2,732,300	8
8	Rabun County Demorest	Interconnection: Rabun County-Demorest; 6 mi of 8-inch diameter pipe along U.S. Hwy 23	$ 7,642,700	9
10	Toccoa	New raw water transmission main: 2.5 miles	$ 10,164,000	10

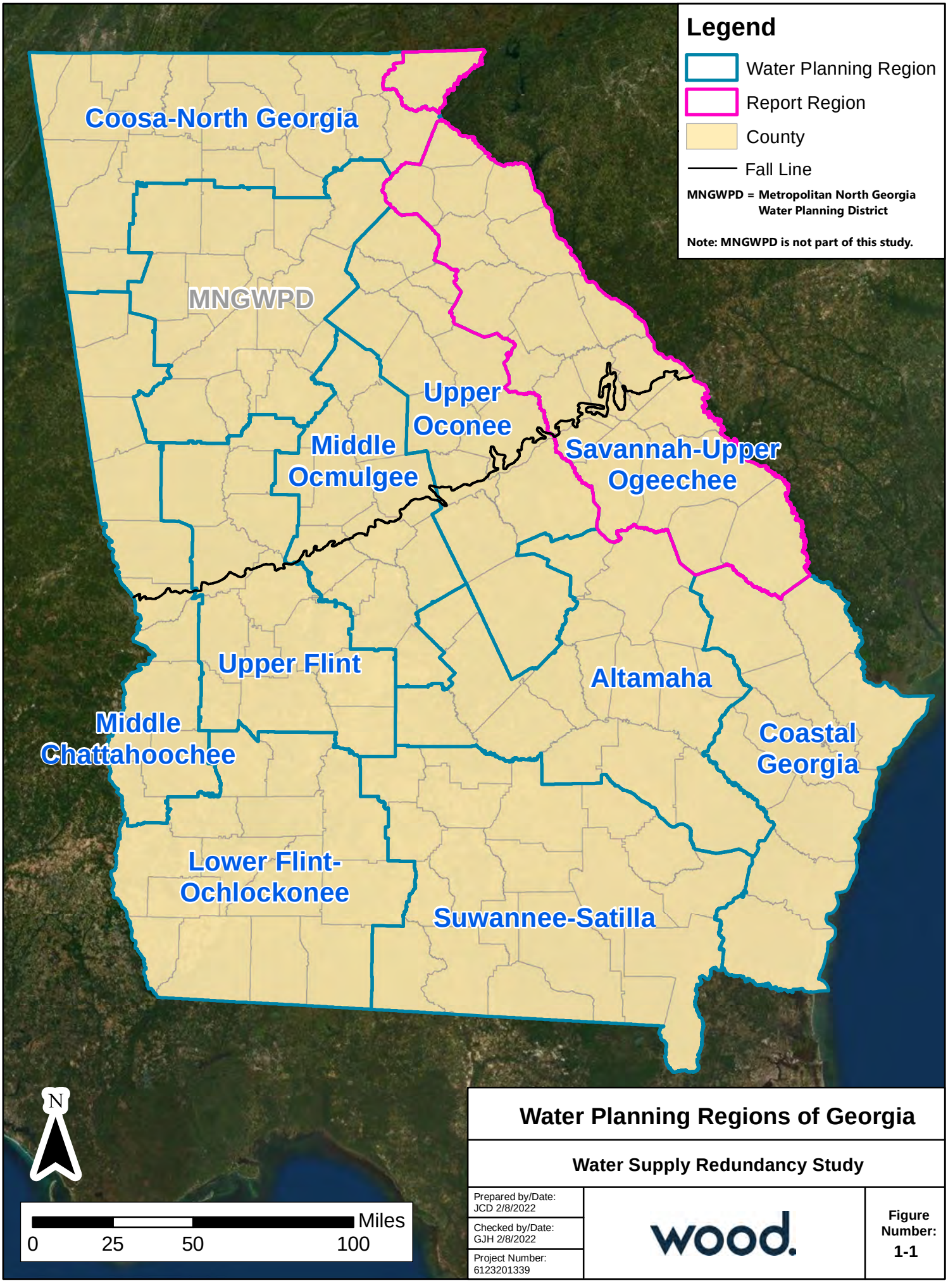
Prepared by: GJH 09/15/21

Checked by: LCT 09/24/21

Notes:

WTP - water treatment plant

FIGURES

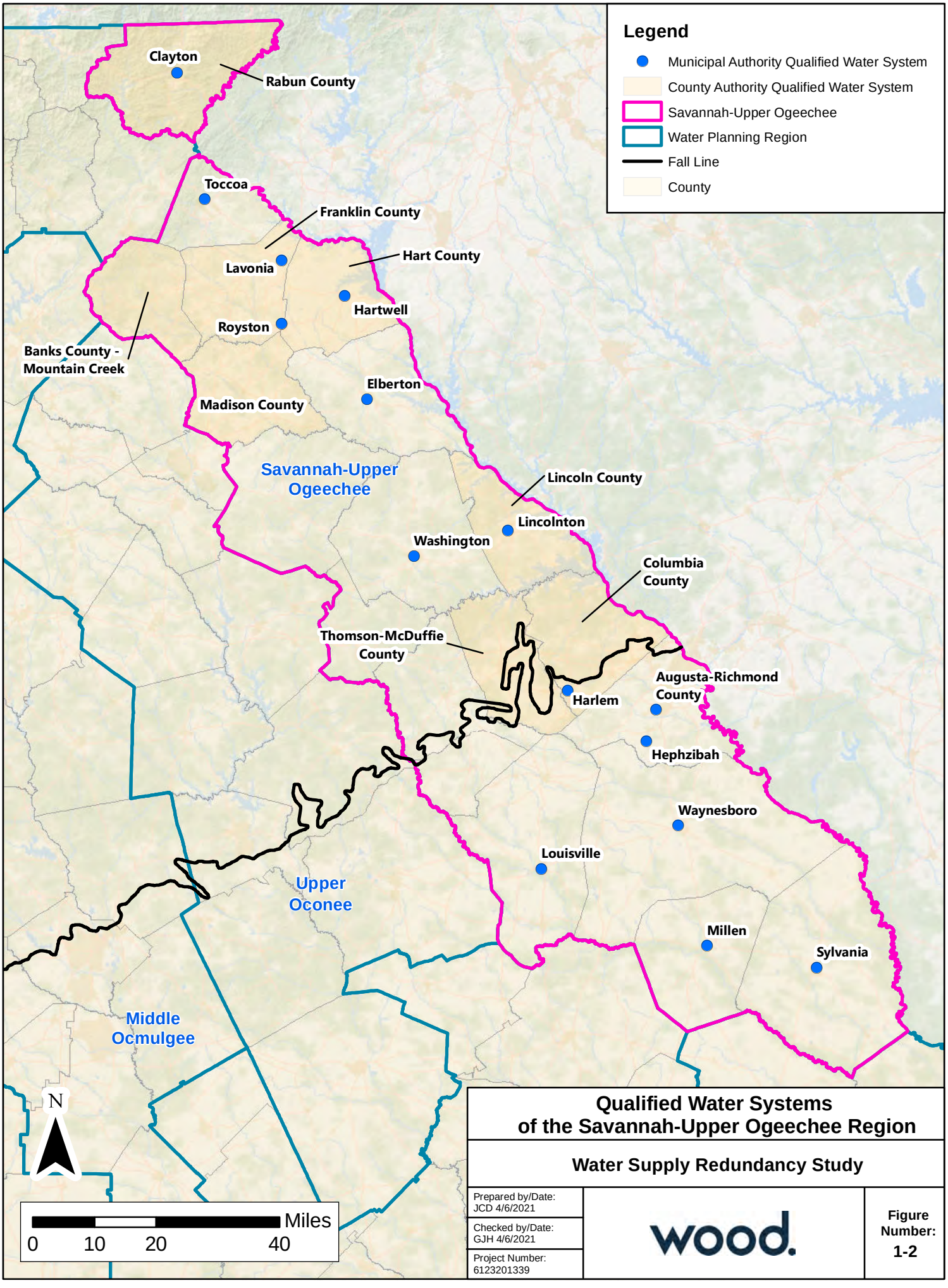


Water Planning Regions of Georgia

Water Supply Redundancy Study

Prepared by/Date: JCD 2/8/2022	wood.	Figure Number: 1-1
Checked by/Date: GJH 2/8/2022		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\Savannah Ogeechee Region.mxd



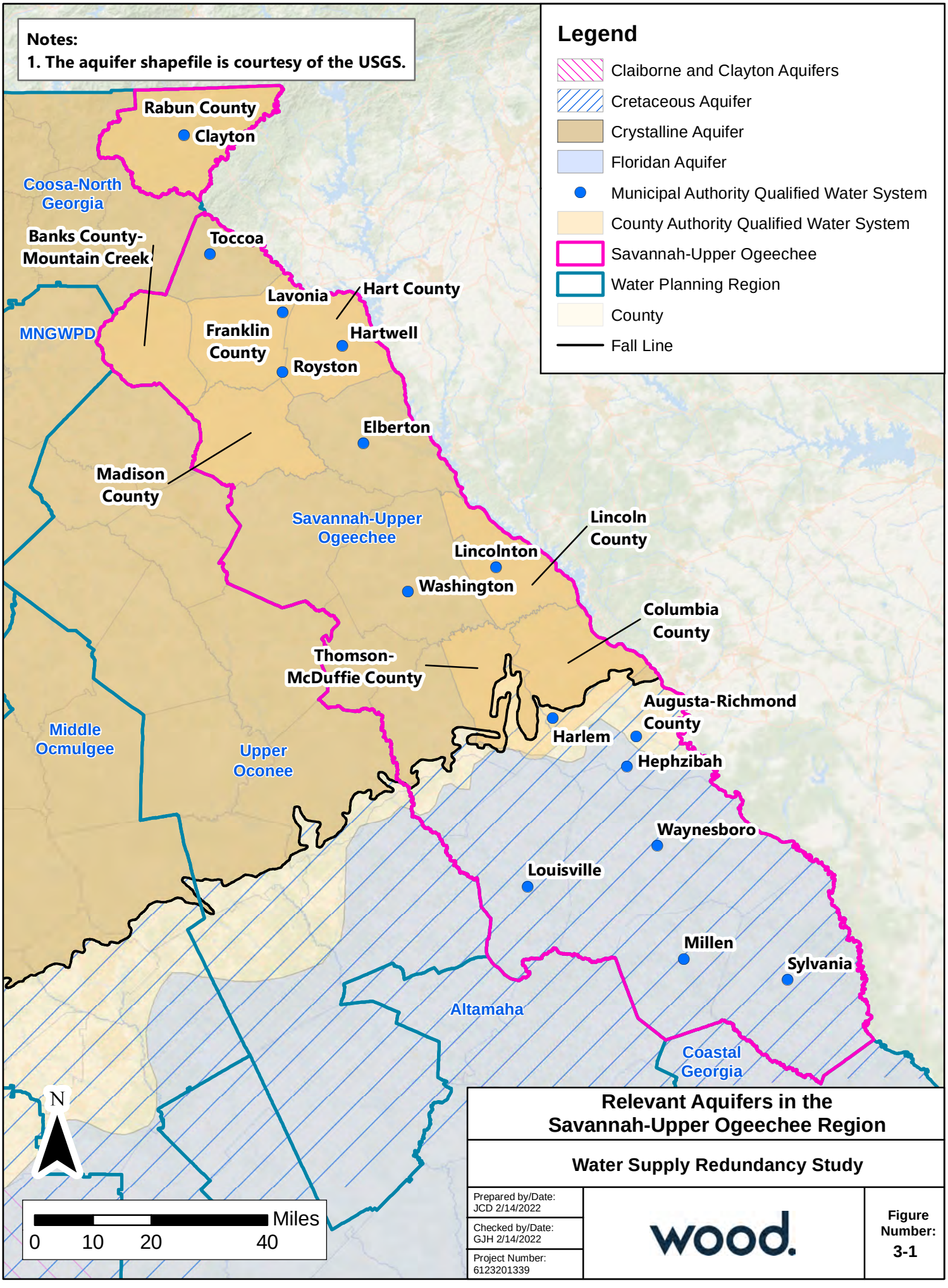
Document Path: G:\GEFA\MXD\SavannahOgeecheeLocations.mxd

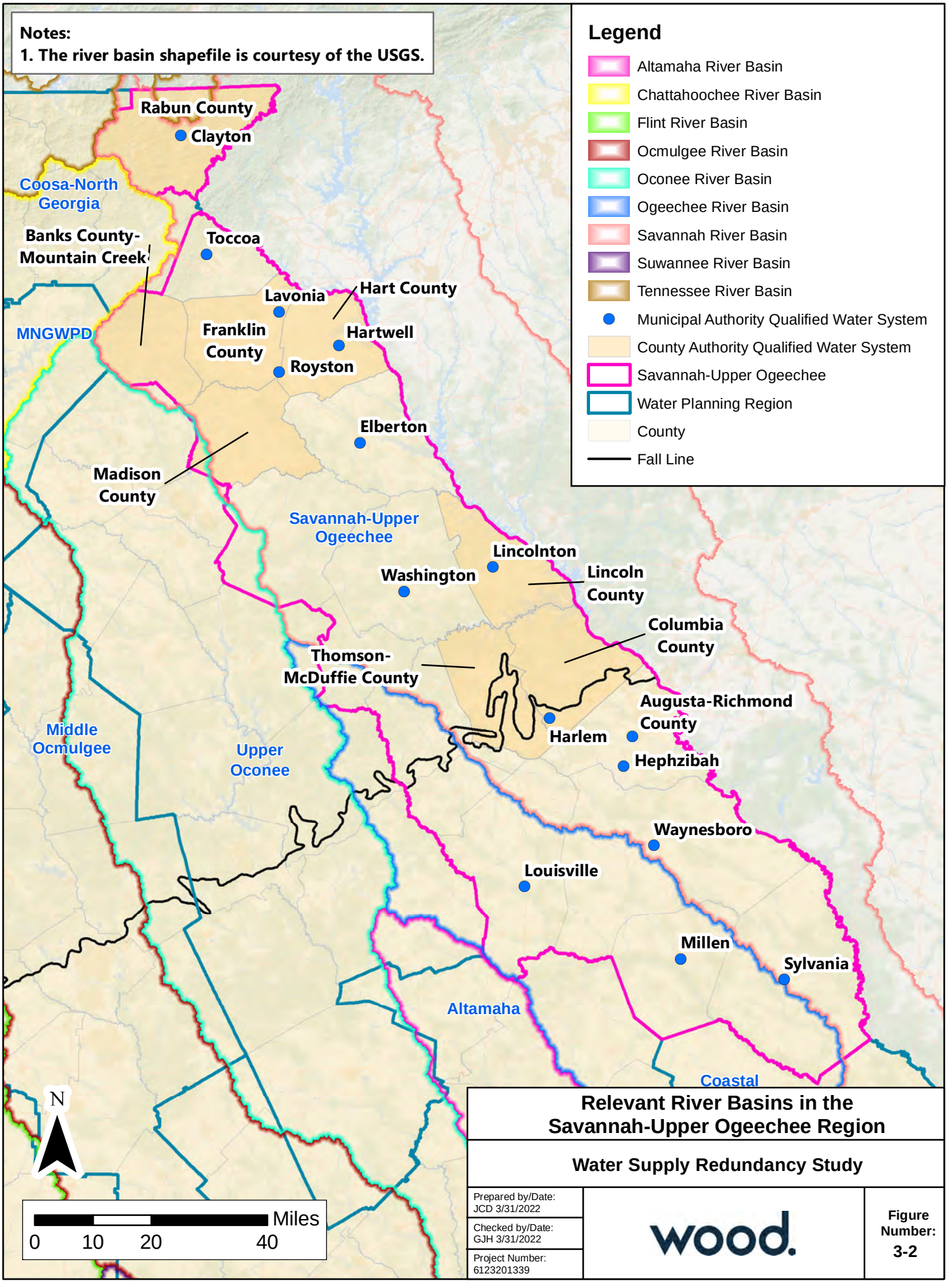
Qualified Water Systems of the Savannah-Upper Ogeechee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 4/6/2021	
Checked by/Date: GJH 4/6/2021	
Project Number: 6123201339	wood.

Figure Number: 1-2

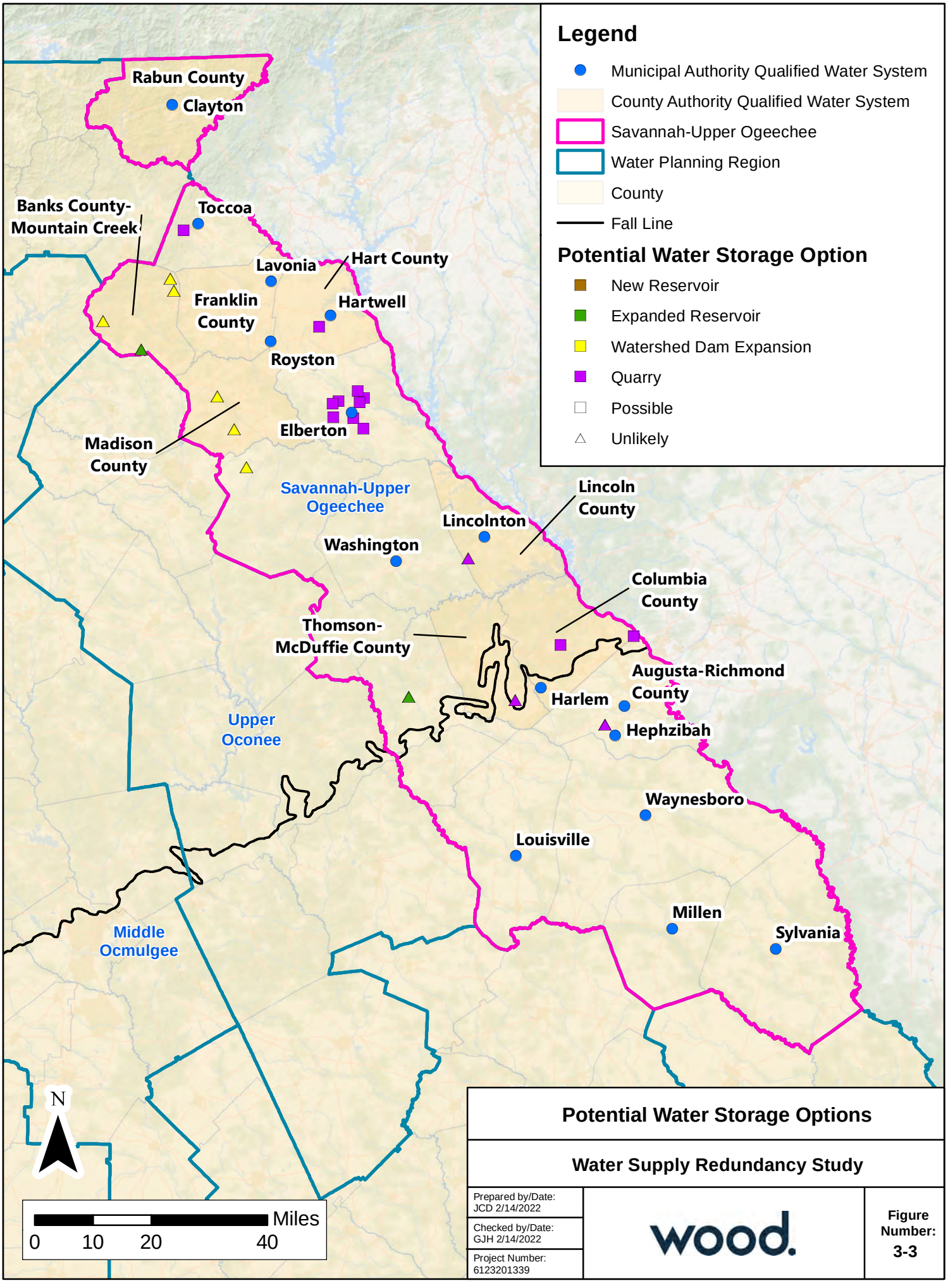

Notes:
1. The aquifer shapefile is courtesy of the USGS.
Legend
Claiborne and Clayton Aquifers
Cretaceous Aquifer
Crystalline Aquifer
Floridan Aquifer
Municipal Authority Qualified Water System
County Authority Qualified Water System
Savannah-Upper Ogeechee
Water Planning Region
County
Fall Line
Rabun County
Clayton
Coosa-North Georgia
Banks County-Mountain Creek
Toccoa
Lavonia
Hart County
Hartwell
Franklin County
Royston
MNGWPD
Elberton
Madison County
Savannah-Upper Ogeechee
Lincolnton
Lincoln County
Washington
Columbia County
Thomson-McDuffie County
Augusta-Richmond County
Harlem
Hephzibah
Middle Ocmulgee
Upper Oconee
Waynesboro
Louisville
Millen
Sylvania
Altamaha
Coastal Georgia
N
Miles
0
10
20
40
Relevant Aquifers in the Savannah-Upper Ogeechee Region
Water Supply Redundancy Study
Prepared by/Date: JCD 2/14/2022
Checked by/Date: GJH 2/14/2022
Project Number: 6123201339
wood.
Figure Number: 3-1
Document Path: G:\GEFA\MXD\savannah_ogeechee\Relevant Aquifers of the Savannah Upper Ogeechee.mxd



Relevant River Basins in the Savannah-Upper Ogeechee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 3/31/2022	wood.	Figure Number: 3-2
Checked by/Date: GJH 3/31/2022		
Project Number: 6123201339		


Legend
Municipal Authority Qualified Water System
County Authority Qualified Water System
Savannah-Upper Ogeechee
Water Planning Region
County
Fall Line
Potential Water Storage Option
New Reservoir
Expanded Reservoir
Watershed Dam Expansion
Quarry
Possible
Unlikely
Rabun County
Clayton
Banks County-
Mountain Creek
Toccoa
Lavonia
Hart County
Franklin
County
Hartwell
Royston
Elberton
Madison
County
Savannah-Upper
Ogeechee
Lincolnton
Lincoln
County
Washington
Columbia
County
Thomson-
McDuffie County
Augusta-Richmond
County
Harlem
Hephzibah
Upper
Oconee
Waynesboro
Louisville
Millen
Sylvania
Middle
Ocmulgee
N
Miles
0
10
20
40
Potential Water Storage Options
Water Supply Redundancy Study
Prepared by/Date:
JCD 2/14/2022
Checked by/Date:
GJH 2/14/2022
Project Number:
6123201339
wood.
Figure
Number:
3-3
Document Path: G:\GEFA\MXD\savannah_ogeechee\Savannah_Ogeechee_water_storage_options.mxd

Notes:

1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Rabun County
Clayton
Toccoa
Lavonia
Hartwell
Franklin County
Banks County
Hart County
Royston
Elberton
Columbia County
Thomson-McDuffie County
Augusta-Richmond County
Harlem
Louisville
Millen
Sylvania

Water System

- Augusta-Richmond County
- Banks County
- Clayton
- Columbia County
- Elberton
- Franklin County
- Harlem
- Hart County
- Hartwell
- Lavonia
- Louisville
- Millen
- Rabun County
- Royston
- Sylvania
- Thomson-McDuffie County
- Toccoa
- Savannah-Upper Ogeechee
- Water Planning Region

0 5 10 20 Miles

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Available Mapping Data for Savannah-Upper Ogeechee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 7/30/2021	wood.	Figure Number: 3-4
Checked by/Date: GJH 7/30/2021		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\Savannah_Upper_Ogeechee_Interconnection.mxd

Notes:
1. The river basin shapefile is courtesy of the USGS.
2. The aquifer shapefile is courtesy of the USGS.
3. Interconnection lines are schematic to reflect interconnected systems. They do not reflect pipeline locations.

Water Planning Region
County
Interconnection
Crystalline Aquifer
Chattahoochee River Basin
Oconee River Basin
Savannah River Basin
Tennessee River Basin

2050 Total Demand (MGD)
0 -1
1-2
2-10
> 10

Raw Water Source
Groundwater
Surface Water
Surface Water and Groundwater
Wholesale Purchase
Wholesale Purchase and Groundwater

2050 Deficit Type
None
100% ADD
65% ADD
35% ADD

Clayton
Dillard
Rabun County
Toccoa
Demorest
Banks County-
Mountain Creek
Alto
Homer
Maysville
Martin
Lavonia
Franklin County
Bowersville
Carnesville
Canon
Franklin Springs
Hartwell
Hart County
Royston
Commerce
Madison County
Danielsville
Colbert
Elberton

NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
Tallulah Falls
Mountain Rest
Walhalla
Westminster
Clemson University
Fair Play
Athens
Statham
Bogart
Jefferson
Nicholson
Arcade
Comer
Carlton
Bowman
Dewy Rose
Ruckersville

N

0 4 8 16 Miles

Document Path: G:\GEFA\MXD\savannah_ogeechee\Savannah_Ogeechee_QWS_key_data_north.mxd

Schematic of Key QWS Data for the Savannah-Upper Ogeechee Region-North

Water Supply Redundancy Study

Prepared by/Date: JCD 3/28/2022	wood.	Figure Number: 5-1a
Checked by/Date: GJH 3/28/2022		
Project Number: 6123201339		

Notes:
1. The river basin shapefile is courtesy of the USGS.
2. The aquifer shapefile is courtesy of the USGS.
3. Interconnection lines are schematic to reflect interconnected systems. They do not reflect pipeline locations.

Lincolnton

Lincoln County

Washington

Thomson-McDuffie County

Columbia County

Harlem

Augusta-Richmond County

Hephzibah

Waynesboro

Louisville

Millen

Sylvania

Water Planning Region
County
Interconnection
Fall Line
Cretaceous Aquifer
Crystalline Aquifer
Floridan Aquifer
Altamaha River Basin
Oconee River Basin
Ogeechee River Basin
Savannah River Basin

2050 Total Demand (MGD)
0 -1
1-2
2-10
> 10

Raw Water Source
Groundwater
Surface Water
Surface Water and Groundwater
Wholesale Purchase and Groundwater

2050 Deficit Type
None
100% ADD
65% ADD
35% ADD

N

0 4 8 16 Miles

Schematic of Key QWS Data for the Savannah-Upper Ogeechee Region-South

Water Supply Redundancy Study

Prepared by/Date: JCD 3/28/2022	wood.	Figure Number: 5-1b
Checked by/Date: GJH 3/28/2022		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\savannah_ogeechee\Savannah_Ogeechee_QWS_key_data_south.mxd

Notes:

1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Tie-in Point

Water System

- Columbia County
- Augusta-Richmond County

0 300 600 1,200 Feet

N

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors,

Augusta-Richmond County and Columbia County Pipes - Hwy 232

Water Supply Redundancy Study

Prepared by/Date: JCD 9/15/2021	Figure Number: 6-1a
Checked by/Date: GJH 9/15/2021	
Project Number: 6123201339	

wood.

Document Path: G:\GEFA\MXD\Augusta-Richmond County and Columbia County Pipes HWY 232.mxd

Notes:

1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Potential Interconnection

Martinez

Augusta

Fort Gordon

Groveto wn

Furys Ferry Rd

Stardust Dr

Rainbow St

Kemp Rd

Cedar Ln

River Watch Pkwy

Washington Rd

Martinez Blvd

CSX Transportation

Baston Rd

Old Ferry Rd

Stephens Rd

Napier Ct

Weldon Rd

Petersburg Cir

New Petersburg Dr

Applecross Dr

Cullen Dr

Crosshaven Dr

Hornhead Dr

Dursey Dr

Middleton Dr

Cockaloo Rd

Skylark Rd

Sandpiper Ln

Ravenwood Dr

Montebello Ln

Ansley Ct

Belle Ct

Cammaron Way

Berrien Ct

Tiburon Trl

Thread Needle Rd W

Montclair

Folkstone Cir

Dunbarton Rd

Cooper Dr

Cooper Ct

Columbia Richmond

Heatherwood Pkwy

Cherry St

Poinciana Dr

Indigo Hall Dr

Marlboro Ct

Marlboro Way

Sally Dr

Twin Lakes Dr

Crane Ferry Rd

Pleasant Home Rd

Savannah River

SOUTH CAROLINA

GEORGIA

RICHMOND

West Lake Country Club

First Citizens

Earth Fare

Re-Bath

Badcock Home Furniture & More

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors,

Water System

- Augusta-Richmond County
- Columbia County
- Potential Interconnection

0 400 800 1,600 Feet

N

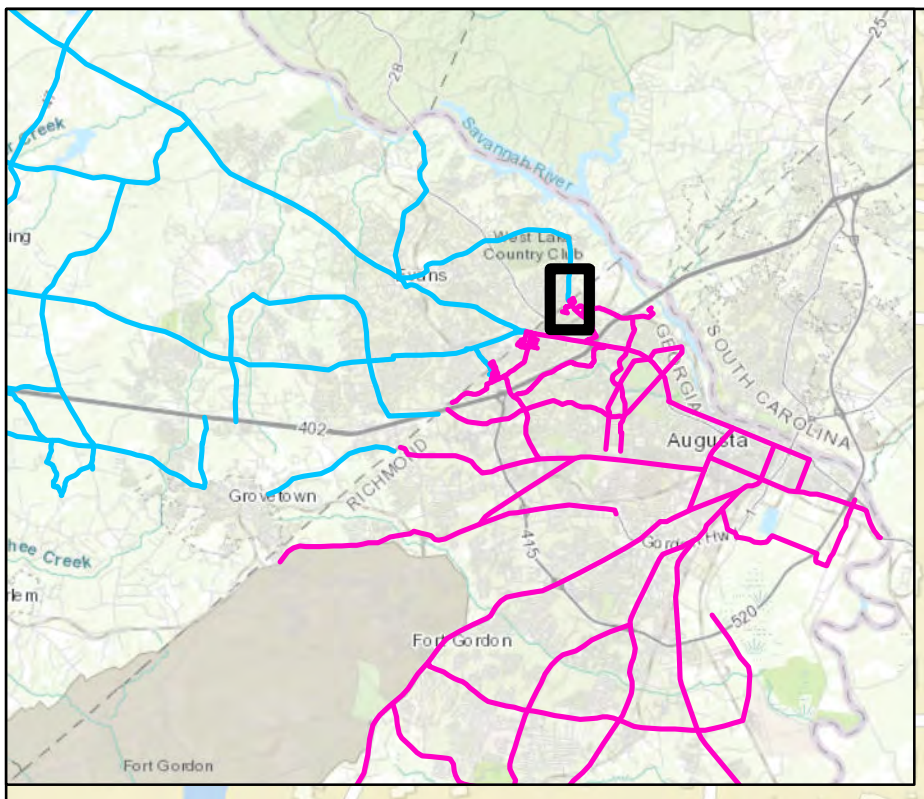
Augusta-Richmond County and Columbia County Pipes - Hwy 104

Water Supply Redundancy Study

Prepared by/Date: JCD 9/15/2021	
Checked by/Date: GJH 9/15/2021	
Project Number: 6123201339	wood.

Figure Number: 6-1b

Document Path: G:\GEFA\MXD\Augusta-Richmond County and Columbia County Pipes HWY 104.mxd



Notes:

1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Tie-in Point

Water System

- Augusta-Richmond County
- Columbia County

0 400 800 1,600 Feet

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors,

Augusta-Richmond County and Columbia County Pipes - Stevens Creek Rd

Water Supply Redundancy Study

Prepared by/Date: JCD 9/15/2021	wood.	Figure Number: 6-1c
Checked by/Date: GJH 9/15/2021		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\Augusta-Richmond County and Columbia County Pipes Stevens Creek Rd.mxd

Notes:
1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Potential Interconnection

Thomson-McDuffie County Mains
Diameter (in)
- 8
- 10
- Columbia County Mains
- Potential Interconnection

0 600 1,200 2,400 Feet

N

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors,

Thomson-McDuffie County and Columbia County Pipes

Water Supply Redundancy Study

Prepared by/Date: JCD 9/15/2021	wood.	Figure Number: 6-2
Checked by/Date: GJH 9/15/2021		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\Thomson-McDuffie County and Columbia County Pipes.mxd

Notes:

1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Potential Interconnection

Water System

- Columbia County
- Harlem
- Potential Interconnection

0 600 1,200 2,400 Feet

N

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors,

Harlem and Columbia County Pipes

Water Supply Redundancy Study

Prepared by/Date: JCD 9/15/2021	wood.	Figure Number: 6-3
Checked by/Date: GJH 9/15/2021		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\Harlem and Columbia County Pipes.mxd

Notes:
1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Potential Interconnection

Demorest Mains
Diameter (in)
- 2
- 6
- 8
- 10
- 12
- Rabun County Mains
- Potential Interconnection
- Water Planning Region

0 1,500 3,000 6,000 Feet

N

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors,

Rabun County and Demorest Pipes

Water Supply Redundancy Study

Prepared by/Date: JCD 9/15/2021	
Checked by/Date: GJH 9/15/2021	
Project Number: 6123201339	wood.

Figure Number: 6-4

Document Path: G:\GEFA\MXD\Rabun County and Demorest Pipes.mxd

Appendix A: Excess Capacity Calculations

Contents

List of Tables

Acronyms

ADD	Average Daily Demand
EPD	Environmental Protection Division
GEFA	Georgia Environmental Finance Authority
GPM	Gallons Per Minute
MGD	Million Gallon(s) Per Day
QWS	Qualified Water System(s)
RWP	Regional Water Plan
USGS	U.S. Geological Survey

1.0 Introduction

This appendix describes the peak day design capacity, average daily demand (ADD), and excess capacity index calculations.

2.0 Calculations

2.1 Peak Day Design Capacity

Peak day design capacity, defined as the maximum amount of water that can be pumped and treated within 24 hours, depends mostly on the water treatment plant configuration. For a groundwater-based qualified water system(s) (QWS), if water is treated at each well, then the peak day design value was calculated as the sum of each pump peak capacity (in gallons per minute [GPM] converted to million gallon(s) per day [MGD]). If water is treated at a single treatment plant after being pumped from multiple wells, then the peak day design value was calculated as the sum of each treatment plant's peak treatment capacity.

The 2050 peak day design capacity reflects current 2015 QWS peak day design capacity plus any capacity-expanding capital improvements identified by the QWS. For this water planning region, Royston indicated adding a new 0.115 MGD well.

2.2 Average Daily Demand

The 2015 ADD (water withdrawal only, not including purchased water) was obtained from the Environmental Protection Division (EPD)-validated 2015 water loss audit data by dividing "volume from own sources (million gallons per year)" by 365 days to convert values to MGD. Franklin County, Hart County, Hephzibah, Lincolnton, Louisville, Madison County, Rabun County, Royston, and Sylvania did not have 2015 water loss audit data. Franklin County had 2018 water loss audit data, which was used in place of 2015 data. Madison County was a purchase only system in 2015 before absorbing the Madison County Industrial Park in 2019. The Hephzibah, Lincolnton, Louisville, Madison County, Rabun County, Royston, and Sylvania 2015 ADD values were obtained during the data collection stage. Clayton, Harlem, and Hart County are purchase-only QWS, which do not require a 2015 ADD value.

The 2050 ADD (water withdrawal or purchased water) for each QWS was estimated from each individual county's total municipal and industrial water demand projections. The region's *Water and Wastewater Forecasting Technical Memorandum* included 2050 population data and municipal water demand projections by county (CDM Smith, 2017). As defined by the Savannah-Upper Ogeechee Regional Water Planning Council, the municipal sector includes public and private water withdrawal data for residences, commercial businesses, small industries, institutions, and military bases. County municipal water demand values were allocated to each QWS based on the QWS' current total population served, obtained during the data collection stage. Table A-1 shows population forecasts and 2050 municipal demand by county. QWS 2050 municipal demand estimates are shown in Table A-2.

Because the 2015 ADD values include industrial water use, it is necessary to incorporate the 2050 regional industrial demand projections into the 2050 ADD estimates. The Regional Water Plan (RWP) provided a total regional projection for industrial water use rather than projections by county. However, the U.S. Geological Survey (USGS) report *Estimated Use of Water in Georgia for 2015 and Water-Use Trends, 1985–2015* showed 2015 county-level withdrawals and use by category, including industrial (Painter, 2019). It also reported withdrawals by major public suppliers, and values for 14 of 23 QWS were used. For the other

nine QWS, values either do not appear or they appear anomalous in the 2019 Painter report. Of note in this region are the Lincoln County values which appear to all be anomalous. The values were reported for consistency, but, aside from the public supply value, do not represent an accurate picture for the systems within Lincoln County. There was no industrial demand, so this error does not impact the calculations. For these nine QWS, 2015 total demand values from Table 4-1 are reported. This USGS report was used to calculate the municipally-supplied industrial use per county. The county industrial use was allocated to a QWS based on the QWS water use as a percent of the county water use. The 2015 QWS-supplied industrial demand value was then divided by the 2015 RWP regional industrial value (91.8 MGD) to obtain a QWS-specific percent. This percent was then applied to the 2050 RWP regional industrial projection (107.3 MGD) to obtain the 2050 QWS-supplied industrial demand (MGD). Table A-3 shows 2015 withdrawal and use data by county and the estimated 2050 municipally-supplied industrial demand values for each QWS.

2.3 Excess Capacity Index

The QWS' capacities were scaled to allow for a comparison of excess capacities. The index was calculated, as applicable, for each QWS for 2015 and 2050 capacities using the following equation:

$$(1) \qquad Index = 1 - \frac{ADD}{Excess\ Capacity}$$

Where:

Excess Capacity = Peak Day Design Capacity - ADD

A comparison of indices provides insight into the magnitude of difference with respect to each QWS' excess capacity. The following index regimes exist, which depend upon the relationship between ADD and excess capacity. Excess capacity, in turn, depends on both ADD and peak day design capacity.

(a) If ADD is zero, the index is 1.
(b) If ADD is greater than zero and less than 50% of the peak day design capacity, the index is a positive value between 0 and 1.
    i. As ADD approaches 50% of the peak day design capacity, the index approaches zero.
    ii. The higher the index in this regime, the more excess capacity the QWS has relative to other QWS.
(c) If ADD is more than 50% but less than 100% of the peak day design capacity, the index is a negative value.
    i. As ADD approaches 100% of the peak day design capacity, the index approaches negative infinity.
    ii. In this regime, the closer the index is to zero, the more excess capacity the QWS has relative to other QWS.
(d) If ADD is more than peak day design capacity, excess capacity is negative. The index was not calculated for this regime because there is no excess capacity sufficiency.

Regime (a) above is not meaningful to this study because the ADD is not zero for the QWS in this region. Regime (b) is meaningful to the Savannah-Upper Ogeechee QWS because the majority of QWS' ADD is less than 50% of their peak day design capacity. Regime (c) is also meaningful to the Savannah-Upper Ogeechee QWS because three QWS's 2015 ADD and seven QWS's 2050 ADD exceed 50% but remain

below 100% of their peak day design capacity. Regime (d) Applies to one QWS' 2050 ADD because their ADD exceeds their peak day design capacity.

Table A-4 shows the 2015 and 2050 peak day design capacity, ADD, resultant excess capacity, and calculated excess capacity index, as applicable, for each QWS. Franklin County has no 2050 excess capacity sufficiency, as defined by Regime (d). The QWS with the lowest 2015 excess capacity sufficiency, as defined by Regime (c), is Lincolnton. The next two QWS with the lowest 2015 excess capacity sufficiency, as defined by Regime (c), are Franklin County and Banks County-Mountain Creek. The QWS with the lowest 2050 excess capacity sufficiency, as defined by Regime (c), is Madison County. The next six QWS with the lowest 2050 excess capacity sufficiency, as defined by Regime (c), are Royston, Lavonia, Columbia County, Banks County-Mountain Creek, Toccoa, and Augusta-Richmond County.

References

CDM Smith, 2017. *Water and Wastewater Forecasting Technical Memorandum. Supplemental Material, Savannah – Upper Ogeechee Regional Water Plan*. March 2017.

Painter, 2019. *Estimated Use of Water in Georgia for 2015 and Water-Use Trends, 1985–2015*. U.S. Geological Survey Open-File Report 2019–1086.

Table A-1
Population Forecasts and 2050 Municipal Demand by County

County	2015 Population Forecast[1]	2050 Population Forecast[1]	2050 Municipal Demand Forecast (MGD)[1]
Banks	18,586	19,129	1.50
Burke	23,006	21,032	1.80
Columbia	142,402	305,680	38.00
Elbert	19,537	16,947	1.40
Franklin	22,282	25,946	3.40
Glascock	3,139	3,605	0.20
Hart	25,628	25,969	3.40
Jefferson	16,286	14,139	2.20
Jenkins	9,292	8,980	0.80
Lincoln	7,659	4,857	0.30
McDuffie	21,781	21,703	2.80
Madison	28,467	31,648	2.80
Oglethorpe	14,612	13,947	1.20
Rabun	16,320	15,992	2.10
Richmond	203,625	203,352	41.50
Screven	14,267	12,933	1.30
Stephens	25,794	25,355	3.40
Taliaferro	1,683	1,174	0.10
Warren	5,462	3,925	0.30
Wilkes	9,906	7,705	0.80
Totals	**629,734**	**784,018**	**109.30**

Prepared by: GJH 06/25/21

Checked by: LCT 07/22/21

Notes:

MGD - million gallons per day

1. Values are from the 2017 CDM Smith *Water and Wastewater Forecasting Technical Memorandum. Supplemental Material, Savannah-Upper Ogeechee Regional Water Plan.*

Table A-2
2050 Municipal Demand Estimates

County	Qualified Water System (QWS)	Estimated Population Directly Served[1]	Estimated Consecutive Population Served[2]	Estimated Total Population	Serves Out-of-County Population	QWS Percent of County Population (%)[3]	QWS 2050 Municipal Demand Estimate (MGD)[4]
Richmond	Augusta-Richmond County	205,700	0	205,700		101%	41.92
Banks	Banks County-Mountain Creek	6,500	1,000	7,500	◊	40%	0.61
Rabun	Clayton	8,500	0	8,500		52%	1.09
Columbia	Columbia County	111,500	20,600	132,100	◊	93%	35.25
Elbert	Elberton	8,500	3,300	11,800	◊	60%	0.85
Franklin	Franklin County	5,000	3,500	8,500	◊	38%	1.30
Columbia	Harlem	6,700	0	6,700		5%	1.79
Hart	Hart County	5,900	700	6,600	◊	26%	0.88
Hart	Hartwell	7,600	5,900	13,500		53%	1.79
Richmond	Hephzibah	4,000	0	4,000		2%	0.82
Franklin	Lavonia	8,200	3,700	11,900	◊	53%	1.82
Lincoln	Lincoln County	4,300	0	4,300		56%	0.17
Lincoln	Lincolnton	1,500	1,000	2,500		33%	0.10
Jefferson	Louisville	3,600	0	3,600		22%	0.49
Madison	Madison County	3,600	0	3,600		13%	0.35
Jenkins	Millen	2,500	0	2,500		27%	0.22
Rabun	Rabun County	4,600	8,700	13,300		81%	1.71
Franklin	Royston	3,900	1,200	5,100	◊	23%	0.78
Screven	Sylvania	4,900	0	4,900		34%	0.45
McDuffie	Thomson-McDuffie County	16,000	1,600	17,600	◊	81%	2.26
Stephens	Toccoa	30,000	7,000	37,000	◊	143%	4.88
Wilkes	Washington	4,200	0	4,200		42%	0.34
Burke	Waynesboro	5,800	0	5,800		25%	0.45
	Totals	**463,000**	**58,200**	**521,200**	**-**	**-**	**100.29**

Prepared by: GJH 06/25/21

Checked by: LCT 07/22/21

Notes:

MGD - million gallons per day

QWS - qualified water system

1. The population that the system directly sells water to, rounded to the nearest 100.
2. The population benefited from the system's regular sales to another system, rounded to the nearest 100.
3. 2015 county populations presented in Table A-1 and QWS estimated total populations are used to calculate these QWS-specific values.
4. 2050 county municipal demand forecasts presented in Table A-1 and QWS percent of county population values are used to calculate these QWS-specific values.

Table A-3

2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Regional Water Plan - 2015 Regional Industrial Projection[1]	91.8 MGD
Regional Water Plan - 2050 Regional Industrial Projection[1]	107.3 MGD

Augusta-Richmond County

Richmond County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.45	13.69	13.24
Commercial	0.12	13.24	13.12
Industrial	66.15	71.16	5.01
Water Loss	-	-	7.80
Inter-County Delivery	-	-	0.00
		Total (MGD)	39.17
		Augusta-Richmond County Public Supply (MGD)	38.59
		QWS's Percent of County's Public Supply (%)	99%
		QWS's Supplied Industrial Demand (MGD)	4.94
		2015 QWS Percent of Regional Industrial Demand (%)	5.38%
		2050 QWS Industrial Demand Estimate (MGD)	5.77

Banks County-Mountain Creek

Banks County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.68	1.17	0.49
Commercial	0.00	0.04	0.04
Industrial	0.00	0.01	0.01
Water Loss	-	-	2.07
Inter-County Delivery	-	-	1.73
		Total (MGD)	4.34
		Banks County-Mountain Creek Public Supply (MGD)	0.79
		QWS's Percent of County's Public Supply (%)	18%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

Clayton

Rabun County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.39	1.35	0.96
Commercial	0.00	0.04	0.04
Industrial	0.38	0.38	0.00
Water Loss	-	-	0.60
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.60
		Clayton Public Supply (MGD)[3]	1.24
		QWS's Percent of County's Public Supply (%)	77%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

Columbia County

Columbia County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.86	12.29	10.43
Commercial	0.00	3.95	3.95
Industrial	0.01	0.17	0.16
Water Loss	-	-	1.38
Inter-County Delivery	-	-	0.00
		Total (MGD)	15.92
		Columbia County Public Supply (MGD)	15.86
		QWS's Percent of County's Public Supply (%)	100%
		QWS's Supplied Industrial Demand (MGD)	0.16
		2015 QWS Percent of Regional Industrial Demand (%)	0.17%
		2050 QWS Industrial Demand Estimate (MGD)	0.19

Table A-3

2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Elberton

Elbert County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.79	1.47	0.68
Commercial	0.02	0.19	0.17
Industrial	0.00	0.52	0.52
Water Loss	-	-	0.22
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.59
		Elberton Public Supply (MGD)	1.52
		QWS's Percent of County's Public Supply (%)	96%
		QWS's Supplied Industrial Demand (MGD)	0.50
		2015 QWS Percent of Regional Industrial Demand (%)	0.54%
		2050 QWS Industrial Demand Estimate (MGD)	0.58

Franklin County

Franklin County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.46	1.36	0.90
Commercial	0.00	0.33	0.33
Industrial	0.00	0.32	0.32
Water Loss	-	-	0.40
Inter-County Delivery	-	-	0.25
		Total (MGD)	2.20
		Franklin County Public Supply (MGD)[3]	0.90
		QWS's Percent of County's Public Supply (%)	41%
		QWS's Supplied Industrial Demand (MGD)	0.13
		2015 QWS Percent of Regional Industrial Demand (%)	0.14%
		2050 QWS Industrial Demand Estimate (MGD)	0.15

Harlem

Columbia County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.86	12.29	10.43
Commercial	0.00	3.95	3.95
Industrial	0.01	0.17	0.16
Water Loss	-	-	1.38
Inter-County Delivery	-	-	0.00
		Total (MGD)	15.92
		Harlem Public Supply (MGD)[3]	0.43
		QWS's Percent of County's Public Supply (%)	3%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.01

Hart County

Hart County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.00	2.07	1.07
Commercial	0.00	0.38	0.38
Industrial	0.00	0.04	0.04
Water Loss	-	-	0.03
Inter-County Delivery	-	-	-0.29
		Total (MGD)	1.23
		Hart County Public Supply (MGD)[3]	0.50
		QWS's Percent of County's Public Supply (%)	41%
		QWS's Supplied Industrial Demand (MGD)	0.02
		2015 QWS Percent of Regional Industrial Demand (%)	0.02%
		2050 QWS Industrial Demand Estimate (MGD)	0.02

Table A-3

2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Hartwell

Hart County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.00	2.07	1.07
Commercial	0.00	0.38	0.38
Industrial	0.00	0.04	0.04
Water Loss	-	-	0.03
Inter-County Delivery	-	-	-0.29
		Total (MGD)	1.23
		Hartwell Public Supply (MGD)	1.21
		QWS's Percent of County's Public Supply (%)	98%
		QWS's Supplied Industrial Demand (MGD)	0.04
		2015 QWS Percent of Regional Industrial Demand (%)	0.04%
		2050 QWS Industrial Demand Estimate (MGD)	0.05

Hephzibah

Richmond County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.45	13.69	13.24
Commercial	0.12	13.24	13.12
Industrial	66.15	71.16	5.01
Water Loss	-	-	7.80
Inter-County Delivery	-	-	0.00
		Total (MGD)	39.17
		Hephzibah Public Supply (MGD)	0.45
		QWS's Percent of County's Public Supply (%)	1%
		QWS's Supplied Industrial Demand (MGD)	0.06
		2015 QWS Percent of Regional Industrial Demand (%)	0.06%
		2050 QWS Industrial Demand Estimate (MGD)	0.07

Lavonia

Franklin County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.46	1.36	0.90
Commercial	0.00	0.33	0.33
Industrial	0.00	0.32	0.32
Water Loss	-	-	0.40
Inter-County Delivery	-	-	0.25
		Total (MGD)	2.20
		Lavonia Public Supply (MGD)	1.13
		QWS's Percent of County's Public Supply (%)	51%
		QWS's Supplied Industrial Demand (MGD)	0.16
		2015 QWS Percent of Regional Industrial Demand (%)	0.18%
		2050 QWS Industrial Demand Estimate (MGD)	0.19

Lincoln County

Lincoln County[2,3]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.19	0.20	0.01
Commercial	0.00	0.00	0.00
Industrial	0.00	0.00	0.00
Water Loss	-	-	0.00
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.01
		Lincoln County Public Supply (MGD)[3]	0.22
		QWS's Percent of County's Public Supply (%)	2154%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

Table A-3

2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Lincolnton

Lincolnton[2,3]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.19	0.20	0.01
Commercial	0.00	0.00	0.00
Industrial	0.00	0.00	0.00
Water Loss	-	-	0.00
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.01
		Lincolnton Public Supply (MGD)[3]	0.52
		QWS's Percent of County's Public Supply (%)	5205%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

Louisville

Jefferson County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.49	1.38	0.89
Commercial	0.00	0.26	0.26
Industrial	7.08	7.11	0.03
Water Loss	-	-	0.14
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.32
		Louisville Public Supply (MGD)	0.60
		QWS's Percent of County's Public Supply (%)	45%
		QWS's Supplied Industrial Demand (MGD)	0.01
		2015 QWS Percent of Regional Industrial Demand (%)	0.01%
		2050 QWS Industrial Demand Estimate (MGD)	0.02

Madison County

Madison County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.50	1.85	0.35
Commercial	0.00	0.04	0.04
Industrial	0.11	0.12	0.01
Water Loss	-	-	0.13
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.53
		Madison County Public Supply (MGD)[3]	0.05
		QWS's Percent of County's Public Supply (%)	10%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

Millen

Jenkins County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.36	0.64	0.28
Commercial	0.00	0.08	0.08
Industrial	0.07	0.07	0.00
Water Loss	-	-	0.09
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.45
		Millen Public Supply (MGD)	0.44
		QWS's Percent of County's Public Supply (%)	98%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

Table A-3

2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Rabun County

Rabun County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.39	1.35	0.96
Commercial	0.00	0.04	0.04
Industrial	0.38	0.38	0.00
Water Loss	-	-	0.60
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.60
		Rabun County Public Supply (MGD)	1.46
		QWS's Percent of County's Public Supply (%)	91%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

Royston

Franklin County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.46	1.36	0.90
Commercial	0.00	0.33	0.33
Industrial	0.00	0.32	0.32
Water Loss	-	-	0.40
Inter-County Delivery	-	-	0.25
		Total (MGD)	2.20
		Royston Public Supply (MGD)[3]	0.52
		QWS's Percent of County's Public Supply (%)	23%
		QWS's Supplied Industrial Demand (MGD)	0.08
		2015 QWS Percent of Regional Industrial Demand (%)	0.08%
		2050 QWS Industrial Demand Estimate (MGD)	0.09

Sylvania

Screven County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.71	1.03	0.32
Commercial	0.01	0.22	0.21
Industrial	1.34	1.38	0.04
Water Loss	-	-	0.17
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.74
		Sylvania Public Supply (MGD)	0.62
		QWS's Percent of County's Public Supply (%)	84%
		QWS's Supplied Industrial Demand (MGD)	0.03
		2015 QWS Percent of Regional Industrial Demand (%)	0.04%
		2050 QWS Industrial Demand Estimate (MGD)	0.04

Thomson-McDuffie County

McDuffie County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.29	1.43	1.14
Commercial	0.00	0.61	0.61
Industrial	0.00	0.41	0.41
Water Loss	-	-	0.43
Inter-County Delivery	-	-	0.00
		Total (MGD)	2.59
		Thomson-McDuffie County Public Supply (MGD)[3]	1.99
		QWS's Percent of County's Public Supply (%)	77%
		QWS's Supplied Industrial Demand (MGD)	0.31
		2015 QWS Percent of Regional Industrial Demand (%)	0.34%
		2050 QWS Industrial Demand Estimate (MGD)	0.37

Table A-3

2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Toccoa

Stephens County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.18	2.17	1.99
Commercial	0.08	0.55	0.47
Industrial	0.00	0.34	0.34
Water Loss	-	-	0.58
Inter-County Delivery	-	-	0.12
		Total (MGD)	3.50
		Toccoa Public Supply (MGD)	3.24
		QWS's Percent of County's Public Supply (%)	93%
		QWS's Supplied Industrial Demand (MGD)	0.31
		2015 QWS Percent of Regional Industrial Demand (%)	0.34%
		2050 QWS Industrial Demand Estimate (MGD)	0.37

Washington

Wilkes County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.36	0.84	0.48
Commercial	0.00	0.11	0.11
Industrial	0.00	0.29	0.29
Water Loss	-	-	0.13
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.01
		Washington Public Supply (MGD)	0.95
		QWS's Percent of County's Public Supply (%)	94%
		QWS's Supplied Industrial Demand (MGD)	0.27
		2015 QWS Percent of Regional Industrial Demand (%)	0.30%
		2050 QWS Industrial Demand Estimate (MGD)	0.32

Waynesboro

Burke County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.08	1.58	0.50
Commercial	0.01	0.09	0.08
Industrial	0.23	0.34	0.11
Water Loss	-	-	0.16
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.85
		Waynesboro Public Supply (MGD)	0.64
		QWS's Percent of County's Public Supply (%)	75%
		QWS's Supplied Industrial Demand (MGD)	0.08
		2015 QWS Percent of Regional Industrial Demand (%)	0.09%
		2050 QWS Industrial Demand Estimate (MGD)	0.10

Prepared by: GJH 06/28/21

Checked by: LCT 07/22/21

Notes:

MGD - million gallons per day

QWS - qualified water system

1. Values are from the 2017 CDM Smith *Water and Wastewater Forecasting Technical Memorandum. Supplemental Material, Savannah-Upper Ogeechee Regional Water Plan.*
2. Values in the box with thick borders are from Painter, 2019: *Estimated Use of Water in Georgia for 2015 and Water-Use Trends, 1985–2015.*
3. Values do not appear or they appear anomalous in the 2019 Painter report; rather, 2015 Total Demand values from Table 4-1 are reported.

Table A-4
Excess Capacity Index Values

County	Qualified Water System (QWS)	2015 Peak Day Design Capacity (MGD)	2015 ADD (MGD) (Water Withdrawal Only)[1]	2015 Excess Capacity (MGD)	2015 Excess Capacity Index	2050 Peak Day Design Capacity (MGD)[2]	2050 ADD (MGD) (Water Withdrawal Only)[3]	2050 Excess Capacity (MGD)	2050 Excess Capacity Index
Richmond	Augusta-Richmond County	86.1	34.9	51.1	0.32	86.1	47.7	38.4	-0.24
Banks	Banks County-Mountain Creek	1.0	0.7	0.3	-1.06	1.0	0.6	0.4	-0.55
Rabun	Clayton	NA	NA	NA	NA	NA	NA	NA	NA
Columbia	Columbia County	53.9	15.0	38.9	0.61	53.9	35.4	18.4	-0.92
Elbert	Elberton	3.1	1.4	1.7	0.13	3.1	1.4	1.7	0.15
Franklin	Franklin County	1.3	0.9	0.4	-1.13	1.3	1.5	-0.1	-
Columbia	Harlem	NA	NA	NA	NA	NA	NA	NA	NA
Hart	Hart County	NA	NA	NA	NA	NA	NA	NA	NA
Hart	Hartwell	4.5	1.1	3.4	0.67	4.5	1.8	2.7	0.31
Richmond	Hephzibah	2.1	0.5	1.6	0.70	2.1	0.9	1.2	0.28
Franklin	Lavonia	3.0	1.1	1.9	0.40	3.0	2.0	1.0	-1.02
Lincoln	Lincoln County	0.4	0.0	0.4	0.90	0.4	0.2	0.2	0.27
Lincoln	Lincolnton	1.0	0.5	0.1	-3.76	1.0	0.1	0.5	0.82
Jefferson	Louisville	3.4	0.6	2.8	0.78	3.4	0.5	2.9	0.83
Madison	Madison County	NA	NA	NA	NA	0.4	0.4	0.1	-3.05
Jenkins	Millen	4.6	0.4	4.2	0.89	4.6	0.2	4.4	0.95
Rabun	Rabun County	3.5	1.3	2.2	0.40	3.5	1.7	1.8	0.04
Franklin	Royston	1.2	0.5	0.6	0.20	1.3	0.9	0.4	-1.09
Screven	Sylvania	1.5	0.6	0.9	0.30	1.5	0.5	1.0	0.52
McDuffie	Thomson-McDuffie County	5.6	2.0	3.6	0.45	5.6	2.6	3.0	0.11
Stephens	Toccoa	9.0	2.7	6.3	0.58	9.0	5.2	3.8	-0.40
Wilkes	Washington	4.2	0.9	3.3	0.73	4.2	0.7	3.5	0.81
Burke	Waynesboro	3.5	0.6	2.8	0.77	3.5	0.6	2.9	0.81
	Totals	**192.8**	**65.9**	**126.6**	**-**	**193.4**	**104.8**	**88.2**	**-**

Prepared by: GJH 06/28/21
Checked by: LCT 07/21/21

Notes:

ADD - average daily demand

MGD - million gallons per day

1. 2015 EPD-validated water loss audit values are reported. In the event a QWS is not in that dataset, as identified in Table 2-3, QWS-provided values are reported, as available. The 2018 EPD-validated water audit values are reported for Franklin County.
2. Royston indicated adding a new 0.115 MGD well.
3. Municipal and publicly-supplied industrial demand by county were allocated to each QWS.

Appendix B: Water Supply and Deficit Calculations

Table B-1a
Augusta-Richmond County Emergency Scenario Evaluation: 2015

				Peak Day Design Capacity (MGD)					Peak Permitted Withdrawal (MGD-24-hour maximum)[3]						
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**Highland WTP**	**Max Hicks WTP**	**WTP Wells 111-118**	**WTP Wells 102-108, 110, 130**	**WTP Wells 131, 132, 134, 135, 125**	**Augusta Canal (Highland WTP)**	**Savannah River (Max Hicks WTP)**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[4]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	14.76	100.82	0.00	100.82
	A2. Critical asset failure at largest WTP[2]	0.1	30	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	NA	86.06	0.00	86.06
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	14.76	100.82	50.00	50.82
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	NA	86.06	0.00	86.06
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source[5]	0.5	1	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	26.64	112.70	0.00	112.70
	D2. Chemical contamination of largest raw water source[5]	0.1	1	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	26.64	112.70	0.00	112.70
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable													
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable													
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[6]	Not Applicable													
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[7]	Not Applicable													

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. Highland WTP has a backup generator able to supply full treatment capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. For surface water supply, the smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. The Highland WTP has two raw water ponds, large enough to meet the WTP peak day design capacity, rendering no capacity loss.
6. Their on-site raw water ponds are not dammed river impoundments.
7. The Savannah River at the withdrawal point is Strahler Stream Order 7 (a major river).

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-1b
Augusta-Richmond County Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	100.82	34.93	22.70	12.23	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	86.06	34.93	22.70	12.23	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	50.82	34.93	22.70	12.23	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	86.06	34.93	22.70	12.23	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	112.70	34.93	22.70	12.23	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	112.70	34.93	22.70	12.23	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-1c
Augusta-Richmond County Emergency Scenario Evaluation: 2050

				Peak Day Design Capacity (MGD)					Peak Permitted Withdrawal (MGD-24-hour maximum)[3]						
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**Highland WTP**	**Max Hicks WTP**	**WTP Wells 111-118**	**WTP Wells 102-108, 110, 130**	**WTP Wells 131, 132, 134, 135, 125**	**Augusta Canal (Highland WTP)**	**Savannah River (Max Hicks WTP)**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[4]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	14.76	100.82	0.00	100.82
	A2. Critical asset failure at largest WTP[2]	0.1	30	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	NA	86.06	0.00	86.06
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	14.76	100.82	50.00	50.82
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	NA	86.06	0.00	86.06
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source[5]	0.5	1	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	26.64	112.70	0.00	112.70
	D2. Chemical contamination of largest raw water source[5]	0.1	1	50.00	15.00	7.23	8.57	5.26	50.00	21.00	NA	26.64	112.70	0.00	112.70
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable													
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable													
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[6]	Not Applicable													
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[7]	Not Applicable													

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. Highland WTP has a backup generator able to supply full treatment capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. For surface water supply, the smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. The Highland WTP has two raw water ponds, large enough to meet the WTP peak day design capacity, rendering no capacity loss.
6. Their on-site raw water ponds are not dammed river impoundments.
7. The Savannah River at the withdrawal point is Strahler Stream Order 7 (a major river).

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-1d
Augusta-Richmond County Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	100.82	47.69	31.00	16.69	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	86.06	47.69	31.00	16.69	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	50.82	47.69	31.00	16.69	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	86.06	47.69	31.00	16.69	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	112.70	47.69	31.00	16.69	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	112.70	47.69	31.00	16.69	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-2a
Banks County - Mountain Creek Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Mountain Creek WTP	Mountain Creek Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.00	1.00	2.50	1.14	4.64	0.00	4.64
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.00	1.00	2.50	NA	3.50	0.00	3.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.00	1.00	2.50	1.14	4.64	1.00	3.64
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	1.00	1.00	2.50	NA	3.50	0.00	3.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.00	1.00	2.50	2.04	5.54	1.00	4.54
	D2. Chemical contamination of largest raw water source	0.1	1	1.00	1.00	2.50	2.04	5.54	1.00	4.54
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	1.00	1.00	2.50	NA	3.50	1.00	2.50
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable								

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. WTP has a backup generator able to supply full treatment capacity, rendering no capacity loss at the WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Mountain Creek Reservoir is their sole raw water source and a failure would result in complete water loss other than purchased sources.
6. Mountain Creek is in Hydrologic Unit Code-10 "Hudson River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-2b

Banks County - Mountain Creek Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	4.64	0.68	0.44	0.24	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.50	0.68	0.44	0.24	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.64	0.68	0.44	0.24	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.50	0.68	0.44	0.24	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.54	0.68	0.44	0.24	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.54	0.68	0.44	0.24	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.50	0.68	0.44	0.24	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-2c
Banks County - Mountain CreekEmergency Scenario Evaluation: 2050

				Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]					
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**Mountain Creek WTP**	**Mountain Creek Reservoir**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[4]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.00	1.00	1.13	1.29	3.42	0.00	3.42
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.00	1.00	1.13	NA	2.13	0.00	2.13
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.00	1.00	1.13	1.29	3.42	1.00	2.42
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	1.00	1.00	1.13	NA	2.13	0.00	2.13
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.00	1.00	1.13	2.19	4.32	1.00	3.32
	D2. Chemical contamination of largest raw water source	0.1	1	1.00	1.00	1.13	2.19	4.32	1.00	3.32
E. Full unavailability of major raw water sources due to federal or state government actions	--					Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--					Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	1.00	1.00	1.13	NA	2.13	1.00	1.13
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]					Not Applicable				

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. WTP has a backup generator able to supply full treatment capacity, rendering no capacity loss at the WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage. Banks County plans to install new 0.25 MG tank.
5. Mountain Creek Reservoir is their sole raw water source and a failure would result in complete water loss other than purchased sources.
6. Mountain Creek is in Hydrologic Unit Code-10 "Hudson River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-2d

Banks County - Mountain Creek Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.42	0.61	0.40	0.21	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	2.13	0.61	0.40	0.21	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.42	0.61	0.40	0.21	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.13	0.61	0.40	0.21	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.32	0.61	0.40	0.21	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.32	0.61	0.40	0.21	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	1.13	0.61	0.40	0.21	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-2e
Banks County - Mountain Creek Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)[2]	Individual System Excess Capacity[3]	
									2015	2050
1	GA2570001 - Toccoa	3789 Hwy. 105	8	5	1.745	1.128	0.007[(4)]	0.946[(5)]	1.662	-0.925
2	GA1190051 - Franklin County	3685 Hwy. 59	8	5	1.745	1.128	0.009	1.128	0.422	-0.128
3	GA1370000 - Alto[6]	1489 North County Line Road	8	5	1.745	1.128	0.000	1.128	unknown	unknown

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Notes:

in - inches

fps - feet per second

cfs - cubic feet per second

MGD - million gallons per day

1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The QWS reported a maximum possible purchased water value. The more conservative value was chosen.
3. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.
4. The 2019 purchase value was utilized as this connection was not established in 2015.
5. Toccoa has a purchase agreement with Banks County that states this is the hydraulic limit of their water delivery capability.
6. The excess capacity of Alto is unknown. It is assumed to provide full capacity.

Table B-3a
Clayton Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP				Not Applicable			
	A2. Critical asset failure at largest WTP				Not Applicable			
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[1]	0.1	1	1.13	0.61	1.74	0.00	1.74
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	1.13	NA	1.13	0.00	1.13
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source				Not Applicable			
	D2. Chemical contamination of largest raw water source				Not Applicable			
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable			
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. There are a total of 45 interconnections, with redundancy, with Rabun County, resulting in no capacity loss.
2. It was assumed that the interconnections can supply full capacity.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-3b
Clayton Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	Not Applicable						
	A2. Critical asset failure at largest WTP	Not Applicable						
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.74	1.24	0.81	0.43	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.13	1.24	0.81	0.43	0.11	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	Not Applicable						
	D2. Chemical contamination of largest raw water source	Not Applicable						
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-3c
Clayton Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP				Not Applicable			
	A2. Critical asset failure at largest WTP				Not Applicable			
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[1]	0.1	1	1.13	0.61	1.74	0.00	1.74
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	1.13	NA	1.13	0.00	1.13
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source				Not Applicable			
	D2. Chemical contamination of largest raw water source				Not Applicable			
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable			
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. There are a total of 45 interconnections, with redundancy, with Rabun County, resulting in no capacity loss.
2. It was assumed that the interconnections can supply full capacity.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-3d
Clayton Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	Not Applicable						
	A2. Critical asset failure at largest WTP	Not Applicable						
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.74	1.09	0.71	0.38	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.13	1.09	0.71	0.38	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	Not Applicable						
	D2. Chemical contamination of largest raw water source	Not Applicable						
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-3e
Clayton Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[2]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)[3]	Individual System Excess Capacity[4] 2015	Individual System Excess Capacity[4] 2050
4	GA2410118 - Rabun County[1]	Golf Course	8	5	1.745	1.128	1.011	1.128	2.200	1.800

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day

1. There are a total of 45 interconnections with Rabun County, but 98% of customers are served by this connection. This connection can be bypassed if there is an issue and serviced with the other connections.
2. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
3. The QWS reported a maximum possible purchased water value. The more conservative value was chosen.
4. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.

Table B-4a
Columbia County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Blanchard WTP	Clarks Hill WTP	Stevens Creek Reservoir	Clarks Hill/J. Thurmond Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	45.87	8.00	45.90	8.00	1.76	20.70	76.33	9.17	67.16
	A2. Critical asset failure at largest WTP[2]	0.1	30	45.87	8.00	45.90	8.00	1.76	NA	55.63	45.87	9.76
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	45.87	8.00	45.90	8.00	1.76	20.70	76.33	45.87	30.46
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	45.87	8.00	45.90	8.00	1.76	NA	55.63	0.00	55.63
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	45.87	8.00	45.90	8.00	1.76	24.48	80.11	45.87	34.24
	D2. Chemical contamination of largest raw water source	0.1	1	45.87	8.00	45.90	8.00	1.76	24.48	80.11	45.87	34.24
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	45.87	8.00	45.90	8.00	1.76	NA	55.63	45.87	9.76
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. Pumps all have backup power, but their capacity is unknown. Therefore, 80% capacity is assumed.
2. Meets chemical, but not unit process redundancy, rendering full capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. The loss of the Stevens Creek Reservoir in the Savannah River Basin would not impact the Clarks Hill Reservoir.
6. Stevens Creek Reservoir is in Hydrologic Unit Code-10 "Kiokee Creek-Savannah River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-4b
Columbia County Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	67.16	15.00	9.75	5.25	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	9.76	15.00	9.75	5.25	5.24	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	30.46	15.00	9.75	5.25	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	55.63	15.00	9.75	5.25	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	34.24	15.00	9.75	5.25	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	34.24	15.00	9.75	5.25	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	9.76	15.00	9.75	5.25	5.24	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-4c
Columbia County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Blanchard WTP	Clarks Hill WTP	Stevens Creek Reservoir	Clarks Hill/J. Thurmond Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	45.87	8.00	45.90	8.00	1.76	20.70	76.33	9.17	67.16
	A2. Critical asset failure at largest WTP[2]	0.1	30	45.87	8.00	45.90	8.00	1.76	NA	55.63	45.87	9.76
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	45.87	8.00	45.90	8.00	1.76	20.70	76.33	45.87	30.46
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	45.87	8.00	45.90	8.00	1.76	NA	55.63	0.00	55.63
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	45.87	8.00	45.90	8.00	1.76	24.48	80.11	45.87	34.24
	D2. Chemical contamination of largest raw water source	0.1	1	45.87	8.00	45.90	8.00	1.76	24.48	80.11	45.87	34.24
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	45.87	8.00	45.90	8.00	1.76	NA	55.63	45.87	9.76
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. Pumps all have backup power, but their capacity is unknown. Therefore, 80% capacity is assumed.
2. Meets chemical, but not unit process redundancy, rendering full capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. The loss of the Stevens Creek Reservoir in the Savannah River Basin would not impact the Clarks Hill Reservoir.
6. Stevens Creek Reservoir is in Hydrologic Unit Code-10 "Kiokee Creek-Savannah River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-4d
Columbia County Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	67.16	35.44	23.04	12.40	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	9.76	35.44	23.04	12.40	25.68	13.27	2.64
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	30.46	35.44	23.04	12.40	4.98	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	55.63	35.44	23.04	12.40	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	34.24	35.44	23.04	12.40	1.20	0.00	0.00
	D2. Chemical contamination of largest raw water source	34.24	35.44	23.04	12.40	1.20	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	9.76	35.44	23.04	12.40	25.68	13.27	2.64
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Table B-4e
Columbia County Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)	Individual System Excess Capacity[2]	
									2015	2050
5	GA2450000 - Augusta-Richmond County	Wrightsboro Road	8	5	1.745	1.128	0.000	1.128	51.100	38.400
6	GA2450000 - Augusta-Richmond County	River Watch Pkwy and Furys Ferry Road	6	5	0.982	0.635	0.000	0.635		

Prepared by: LCT 07/30/21
Checked by: GJH 08/04/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.

Table B-5a
Elberton Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Elberton WTP	Beaverdam Creek Branch of Lake Russell[4]	Beaverdam Creek (emergency source)[4]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	3.10	4.10	2.20	NA	1.05	4.15	0.00	4.15
	A2. Critical asset failure at largest WTP[2]	0.1	30	3.10	4.10	2.20	NA	NA	3.10	0.00	3.10
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[6]	0.1	1	3.10	4.10	2.20	NA	1.05	4.15	1.34	2.81
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	3.10	4.10	2.20	NA	NA	3.10	0.00	3.10
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source[7]	0.5	1	3.10	4.10	2.20	NA	1.41	4.51	0.90	3.61
	D2. Chemical contamination of largest raw water source[7]	0.1	1	3.10	4.10	2.20	NA	1.41	4.51	0.90	3.61
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[7]	0.05	30	3.10	4.10	2.20	NA	NA	3.10	0.90	2.20
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[8]	Not Applicable									

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full treatment capacity, rendering no capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. The total combined withdrawal is not to exceed Lake Russell Limits.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
6. Two transmission mains (10-inch diameter and 16-inch diameter) exit the WTP and enter the distribution system, indicating redundancy and rendering partial capacity loss.
7. If Lake Russell is contaminated or has a dam failure, Elberton can still withdraw water from Beaverdam Creek.
8. Beaverdam Creek and Lake Russell are in Hydrologic Unit Code-10 "Beaverdam Creek," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-5b
Elberton Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	4.15	1.44	0.94	0.50	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.10	1.44	0.94	0.50	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.81	1.44	0.94	0.50	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.10	1.44	0.94	0.50	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.61	1.44	0.94	0.50	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.61	1.44	0.94	0.50	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.20	1.44	0.94	0.50	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-5c
Elberton Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Elberton WTP	Beaverdam Creek Branch of Lake Russell[4]	Beaverdam Creek (emergency source)[4]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	3.10	4.10	2.20	NA	1.05	4.15	0.00	4.15
	A2. Critical asset failure at largest WTP[2]	0.1	30	3.10	4.10	2.20	NA	NA	3.10	0.00	3.10
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[6]	0.1	1	3.10	4.10	2.20	NA	1.05	4.15	1.34	2.81
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	3.10	4.10	2.20	NA	NA	3.10	0.00	3.10
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source[7]	0.5	1	3.10	4.10	2.20	NA	1.86	4.96	0.90	4.06
	D2. Chemical contamination of largest raw water source[7]	0.1	1	3.10	4.10	2.20	NA	1.86	4.96	0.90	4.06
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[7]	0.05	30	3.10	4.10	2.20	NA	NA	3.10	0.90	2.20
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[8]	Not Applicable									

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full treatment capacity, rendering no capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. The total combined withdrawal is not to exceed Lake Russell Limits.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage. Elberton indicated a new 0.75 MG clearwell.
6. Two transmission mains (10-inch diameter and 16-inch diameter) exit the WTP and enter the distribution system, indicating redundancy and rendering partial capacity loss.
7. If Lake Russell is contaminated or has a dam failure, Elberton can still withdraw water from Beaverdam Creek.
8. Beaverdam Creek and Lake Russell are in Hydrologic Unit Code-10 "Beaverdam Creek," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-5d
Elberton Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	4.15	1.43	0.93	0.50	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.10	1.43	0.93	0.50	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.81	1.43	0.93	0.50	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.10	1.43	0.93	0.50	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.06	1.43	0.93	0.50	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.06	1.43	0.93	0.50	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.20	1.43	0.93	0.50	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-6a
Franklin County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 106	WTP Well 111	WTP Wells 109, 110, 112					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.23	0.15	0.86	4.75	1.68	7.67	0.00	7.67
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.23	0.15	0.86	4.75	NA	5.99	0.00	5.99
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.23	0.15	0.86	4.75	1.68	7.67	0.86	6.81
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.23	0.15	0.86	4.75	NA	5.99	0.00	5.99
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.23	0.15	0.86	4.75	1.68	7.67	0.86	6.81
	D2. Chemical contamination of largest raw water source	0.1	1	0.23	0.15	0.86	4.75	1.68	7.67	0.86	6.81
E. Full unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment						Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought						Not Applicable				

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. All WTPs have backup generators able to supply full treatment capacity, rendering no capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-6b
Franklin County Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	7.67	1.18	0.77	0.41	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	5.99	1.18	0.77	0.41	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	6.81	1.18	0.77	0.41	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	5.99	1.18	0.77	0.41	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	6.81	1.18	0.77	0.41	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	6.81	1.18	0.77	0.41	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-6c
Franklin County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 106	WTP Well 111	WTP Wells 109, 110, 112					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.23	0.15	0.86	3.07	1.68	5.99	0.00	5.99
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.23	0.15	0.86	3.07	NA	4.31	0.00	4.31
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.23	0.15	0.86	3.07	1.68	5.99	0.86	5.13
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.23	0.15	0.86	3.07	NA	4.31	0.00	4.31
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.23	0.15	0.86	3.07	1.68	5.99	0.86	5.13
	D2. Chemical contamination of largest raw water source	0.1	1	0.23	0.15	0.86	3.07	1.68	5.99	0.86	5.13
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable									
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable									

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. All WTPs have backup generators able to supply full treatment capacity, rendering no capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-6d
Franklin County Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	5.99	1.45	0.80	0.51	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.31	1.45	0.80	0.51	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	5.13	1.45	0.80	0.51	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.31	1.45	0.80	0.51	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	5.13	1.45	0.80	0.51	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	5.13	1.45	0.80	0.51	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-6e
Franklin County Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)[2]	Individual System Excess Capacity[3]	
									2015	2050
7	GA2570001 - Toccoa	Highway 106 & Sunshine Church Road	6	5	0.982	0.635	0.276	0.635	1.657	-0.925
8	GA2570000 - Martin[4]	Greater Hope Road	6	5	0.982	0.635	0.000	0.635	unknown	unknown
9	GA1190003 - Lavonia	Pleasant Hill Circle	6	5	0.982	0.635	0.000	0.635	1.879	0.992
10	GA1190003 - Lavonia	GA Hwy 17	6	5	0.982	0.635	0.000	0.635		
11	GA1190003 - Lavonia	GA Hwy 59	6	5	0.982	0.635	0.000	0.635		
12	GA1190001 - Carnesville[4]	SR 59	6	5	0.982	0.635	0.000	0.635	unknown	unknown
13	GA1190004 - Royston	Harbin Lumber Hwy 17	6	5	0.982	0.635	0.000	0.635	0.649	0.414
2	GA0110026 - Banks County-Mountain Creek	3685 Hwy. 59	8	5	1.745	1.128	0.000	1.128	0.326	0.393

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The QWS reported maximum possible purchased water values for each interconnection. The more conservative values were chosen.
3. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.
4. The excess capacity of these connections are unknown. It is assumed they will provide full capacity.

Table B-7a
Harlem Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)[3] WTP Well 101	WTP Well 103	WTP Well 104	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP						Not Applicable				
	A2. Critical asset failure at largest WTP						Not Applicable				
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[1]	0.1	1	0.04	0.04	0.04	4.16	0.61	4.88	1.76	3.12
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	0.04	0.04	0.04	4.16	NA	4.27	0.00	4.27
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source						Not Applicable				
	D2. Chemical contamination of largest raw water source						Not Applicable				
E. Full unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment						Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought						Not Applicable				

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. It was assumed the largest interconnection is lost.
2. It was assumed that the interconnections can supply full capacity.
3. The system is a purchased water system that has backup wells in the event of a service interruption. They are not operated during normal conditions.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-7b
Harlem Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	Not Applicable						
	A2. Critical asset failure at largest WTP	Not Applicable						
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.12	0.43	0.28	0.15	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.27	0.43	0.28	0.15	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	Not Applicable						
	D2. Chemical contamination of largest raw water source	Not Applicable						
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-7c
Harlem Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)[3] WTP Well 303	WTP Well 304	WTP Well 305	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP						Not Applicable				
	A2. Critical asset failure at largest WTP						Not Applicable				
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[1]	0.1	1	0.04	0.04	0.04	4.16	0.91	5.18	1.76	3.42
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	0.04	0.04	0.04	4.16	NA	4.27	0.00	4.27
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source						Not Applicable				
	D2. Chemical contamination of largest raw water source						Not Applicable				
E. Full unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment						Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought						Not Applicable				

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. It was assumed the largest interconnection is lost.
2. It was assumed that the interconnections can supply full capacity.
3. The system is a purchased water system that has backup wells in the event of a service interruption. They are not operated during normal conditions.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage. Harlem plans to add a 0.5 MG tank.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-7d
Harlem Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	Not Applicable						
	A2. Critical asset failure at largest WTP	Not Applicable						
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.42	1.79	1.17	0.63	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.27	1.79	1.17	0.63	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	Not Applicable						
	D2. Chemical contamination of largest raw water source	Not Applicable						
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-7e
Harlem Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)[2]	Maximum Possible Purchased Water (MGD)	Individual System Excess Capacity[3]	
									2015	2050
14	GA0730000 - Columbia County	Appling Harlem Hwy/Wrightsboro Road	10	5	2.727	1.763	0.164	1.763	38.900	18.463
15	GA0730000 - Columbia County	Old Louisville Road	10	5	2.727	1.763	0.164	1.763		
16	GA1890001 - Thomson-McDuffie County	W. Milledgeville Road	6	5	0.982	0.635	0.101	0.635	3.614	2.970

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day

1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The 2015 purchased value from GA0730000 - Columbia County was split between those two interconnections.
3. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.

Table B-8a
Hart County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP				Not Applicable			
	A2. Critical asset failure at largest WTP				Not Applicable			
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[1]	0.1	1	5.92	0.60	6.52	1.76	4.76
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	5.92	NA	5.92	0.00	5.92
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source				Not Applicable			
	D2. Chemical contamination of largest raw water source				Not Applicable			
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable			
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. It was assumed the largest interconnection is lost.
2. It was assumed that the interconnections can supply full capacity.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-8b
Hart County Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	Not Applicable						
	A2. Critical asset failure at largest WTP	Not Applicable						
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	4.76	0.50	0.33	0.18	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	5.92	0.50	0.33	0.18	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	Not Applicable						
	D2. Chemical contamination of largest raw water source	Not Applicable						
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-8c
Hart County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP				Not Applicable			
	A2. Critical asset failure at largest WTP				Not Applicable			
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[1]	0.1	1	4.57	0.60	5.17	0.99	4.18
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	4.57	NA	4.57	0.00	4.57
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source				Not Applicable			
	D2. Chemical contamination of largest raw water source				Not Applicable			
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable			
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. It was assumed the largest interconnection is lost. Here, the capacity loss is limited by Lavonia's excess capacity.
2. It was assumed that the interconnections can supply full capacity.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-8d
Hart County Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	Not Applicable						
	A2. Critical asset failure at largest WTP	Not Applicable						
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	4.18	0.89	0.58	0.31	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.57	0.89	0.58	0.31	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	Not Applicable						
	D2. Chemical contamination of largest raw water source	Not Applicable						
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-8e
Hart County Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)[2]	Maximum Possible Purchased Water (MGD)[3]	Individual System Excess Capacity[4]	
									2015	2050
17	GA1470000-Hartwell	1651 Anderson Highway	10	5	2.727	1.763	0.035	1.763	3.380	2.663
18	GA1470000-Hartwell	972 Bowman Highway	6	5	0.982	0.635	0.035	0.635		
19	GA1470000-Hartwell	2042 Royston Highway	10	5	2.727	1.763	0.035	1.763		
20	GA1470000-Hartwell	1230 Bowersville Highway	4	5	0.436	0.282	0.035	0.282		
21	GA1190003-Lavonia	2569 Knox Bridge Crossing Road	10	5	2.727	1.763	0.316	1.763	1.879	0.992
22	GA1190004-Royston	10260 Royston Highway - US 29	6	5	0.982	0.635	0.045	0.635	0.649	0.414

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The 2015 purchased value from GA147000 - Hartwell was split between those four interconnections.
3. The QWS reported maximum possible purchased water values for each interconnection. The more conservative values were chosen.
4. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.

Table B-9a
Hartwell Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP	Peak Permitted Withdrawal (MGD-24-hour maximum)[3] Lake Hartwell	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.50	4.50	NA	0.66	5.16	4.50	0.66
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.50	4.50	NA	NA	4.50	4.50	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.50	4.50	NA	0.66	5.16	4.50	0.66
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	4.50	4.50	NA	NA	4.50	0.00	4.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.50	4.50	NA	0.96	5.46	4.50	0.96
	D2. Chemical contamination of largest raw water source	0.1	1	4.50	4.50	NA	0.96	5.46	4.50	0.96
E. Full unavailability of major raw water sources due to federal or state government actions	--					Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--					Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	4.50	4.50	NA	NA	4.50	4.50	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	0.1	120	4.50	4.50	NA	NA	0.45	-	0.45

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The Hartwell WTP does not have backup generators, rendering full capacity loss.
2. Meets chemical, but not unit process redundancy, rendering full capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Lake Hartwell failure would result in total capacity loss.
6. Lake Hartwell is in Hydrologic Unit Code-10 "Hartwell Lake-Savannah River," which is less than 100 square miles. The Strahler Stream Order at the withdrawal point is 3 (not a major river).

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-9b
Hartwell Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	0.66	1.12	0.73	0.39	0.46	0.07	0.00
	A2. Critical asset failure at largest WTP	0.00	1.12	0.73	0.39	1.12	0.73	0.39
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.66	1.12	0.73	0.39	0.46	0.07	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.50	1.12	0.73	0.39	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.96	1.12	0.73	0.39	0.16	0.00	0.00
	D2. Chemical contamination of largest raw water source	0.96	1.12	0.73	0.39	0.16	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	0.00	1.12	0.73	0.39	1.12	0.73	0.39
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	0.45	1.12	0.73	0.39	0.67	0.28	0.00

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-9c
Hartwell Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP	Peak Permitted Withdrawal (MGD-24-hour maximum)[3] Lake Hartwell	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.50	4.50	NA	0.66	5.16	4.50	0.66
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.50	4.50	NA	NA	4.50	4.50	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.50	4.50	NA	0.66	5.16	4.50	0.66
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	4.50	4.50	NA	NA	4.50	0.00	4.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.50	4.50	NA	0.96	5.46	4.50	0.96
	D2. Chemical contamination of largest raw water source	0.1	1	4.50	4.50	NA	0.96	5.46	4.50	0.96
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	4.50	4.50	NA	NA	4.50	4.50	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	0.1	120	4.50	4.50	NA	NA	0.74	-	0.74

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The Hartwell WTP does not have backup generators, rendering full capacity loss.
2. Meets chemical, but not unit process redundancy, rendering full capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Lake Hartwell failure would result in total capacity loss.
6. Lake Hartwell is in Hydrologic Unit Code-10 "Hartwell Lake-Savannah River," which is less than 100 square miles. The Strahler Stream Order at the withdrawal point is 3 (not a major river).

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-9d
Hartwell Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	0.66	1.84	1.20	0.64	1.18	0.54	0.00
	A2. Critical asset failure at largest WTP	0.00	1.84	1.20	0.64	1.84	1.20	0.64
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.66	1.84	1.20	0.64	1.18	0.54	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.50	1.84	1.20	0.64	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.96	1.84	1.20	0.64	0.88	0.24	0.00
	D2. Chemical contamination of largest raw water source	0.96	1.84	1.20	0.64	0.88	0.24	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	0.00	1.84	1.20	0.64	1.84	1.20	0.64
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	0.74	1.84	1.20	0.64	1.10	0.46	0.00

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-10a
Hephzibah Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)				Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP 202	WTP 203	WTP 204	WTP 205					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.29	1.51	1.80	0.86	NA	0.47	4.94	1.80	3.14
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.29	1.51	1.80	0.86	NA	NA	4.46	0.00	4.46
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.29	1.51	1.80	0.86	NA	0.47	4.94	1.80	3.14
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.29	1.51	1.80	0.86	NA	NA	4.46	0.00	4.46
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.29	1.51	1.80	0.86	NA	0.47	4.94	1.80	3.14
	D2. Chemical contamination of largest raw water source	0.1	1	0.29	1.51	1.80	0.86	NA	0.47	4.94	1.80	3.14
E. Full unavailability of major raw water sources due to federal or state government actions	--							Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--							Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment							Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought							Not Applicable				

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. WTP 204 does not have a backup generator, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-10b
Hephzibah Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.14	0.49	0.32	0.17	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.46	0.49	0.32	0.17	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.14	0.49	0.32	0.17	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.46	0.49	0.32	0.17	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.14	0.49	0.32	0.17	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.14	0.49	0.32	0.17	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-10c
Hephzibah Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)				Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP 202	WTP 203	WTP 204	WTP 205					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.29	1.51	1.80	0.86	NA	0.47	4.94	1.80	3.14
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.29	1.51	1.80	0.86	NA	NA	4.46	0.00	4.46
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.29	1.51	1.80	0.86	NA	0.47	4.94	1.80	3.14
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.29	1.51	1.80	0.86	NA	NA	4.46	0.00	4.46
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.29	1.51	1.80	0.86	NA	0.47	4.94	1.80	3.14
	D2. Chemical contamination of largest raw water source	0.1	1	0.29	1.51	1.80	0.86	NA	0.47	4.94	1.80	3.14
E. Full unavailability of major raw water sources due to federal or state government actions	--							Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--							Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment							Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought							Not Applicable				

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. WTP 204 does not have a backup generator, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-10d
Hephzibah Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.14	0.88	0.57	0.31	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.46	0.88	0.57	0.31	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.14	0.88	0.57	0.31	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.46	0.88	0.57	0.31	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.14	0.88	0.57	0.31	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.14	0.88	0.57	0.31	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-11a
Lavonia Emergency Scenario Evaluation: 2015

				Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]						
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**Lavonia WTP**	**Lake Hartwell**	**Crawford Creek**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[4]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	3.00	3.00	1.50	1.06	0.60	4.66	3.00	1.66
	A2. Critical asset failure at largest WTP[2]	0.1	30	3.00	3.00	1.50	1.06	NA	4.06	3.00	1.06
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	3.00	3.00	1.50	1.06	0.60	4.66	3.00	1.66
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	3.00	3.00	1.50	1.06	NA	4.06	0.00	4.06
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source[5]	0.5	1	3.00	3.00	1.50	1.06	1.98	6.04	1.50	4.54
	D2. Chemical contamination of largest raw water source[5]	0.1	1	3.00	3.00	1.50	1.06	1.98	6.04	1.50	4.54
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	3.00	3.00	1.50	1.06	NA	4.06	1.50	2.56
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable									

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The Lavonia WTP does not have a backup generator able to supply full capacity, rendering full capacity loss at the largest WTP.
2. The WTP met chemical redundancy but not unit process redundancy, rendering full capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. The loss of Lake Hartwell would not impact the Crawford Creek station.
6. Lake Hartwell and Crawford Creek are in Hydrologic Unit Code-10 "Hartwell Lake-Lower Tugaloo River," which is more than 100 square miles. Purchased water is still available because their suppliers would not suffer from Risk H.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-11b
Lavonia Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	1.66	1.18	0.77	0.41	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.06	1.18	0.77	0.41	0.12	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.66	1.18	0.77	0.41	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.06	1.18	0.77	0.41	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.54	1.18	0.77	0.41	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.54	1.18	0.77	0.41	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.56	1.18	0.77	0.41	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-11c
Lavonia Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Lavonia WTP	Lake Hartwell	Crawford Creek					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	3.00	3.00	1.50	0.64	0.60	4.24	0.60	3.64
	A2. Critical asset failure at largest WTP[2]	0.1	30	3.00	3.00	1.50	0.64	NA	3.64	0.00	3.64
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	3.00	3.00	1.50	0.64	0.60	4.24	3.00	1.24
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	3.00	3.00	1.50	0.64	NA	3.64	0.00	3.64
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source[5]	0.5	1	3.00	3.00	1.50	0.64	1.98	5.62	1.50	4.12
	D2. Chemical contamination of largest raw water source[5]	0.1	1	3.00	3.00	1.50	0.64	1.98	5.62	1.50	4.12
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	3.00	3.00	1.50	0.64	NA	3.64	1.50	2.14
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable									

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The Lavonia WTP plans to install a backup generator at the WTP. The capacity is unknown so it assumed there will be 80% of the capacity.
2. The QWS indicated WTP rehab and redundancy projects, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. The loss of Lake Hartwell would not impact the Crawford Creek station.
6. Lake Hartwell and Crawford Creek are in Hydrologic Unit Code-10 "Hartwell Lake-Lower Tugaloo River," which is more than 100 square miles. Purchased water is still available because their suppliers would not suffer from Risk H.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-11d
Lavonia Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.64	2.01	1.31	0.70	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.64	2.01	1.31	0.70	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.24	2.01	1.31	0.70	0.78	0.07	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.64	2.01	1.31	0.70	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.12	2.01	1.31	0.70	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.12	2.01	1.31	0.70	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.14	2.01	1.31	0.70	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-11e
Lavonia Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)[2]	Individual System Excess Capacity[3] 2015	Individual System Excess Capacity[3] 2050
9	GA1190051 - Franklin County	Pleasant Hill Circle	6	5	0.982	0.635	0.000	0.635	0.422	-0.128
10	GA1190051 - Franklin County	GA Hwy 17	6	5	0.982	0.635	0.000	0.635		
11	GA1190051 - Franklin County	GA Hwy 59	6	5	0.982	0.635	0.000	0.635		
21	GA1470065 - Hart County[4]	1257 Knox Bridge Crossing Road	6	5	0.982	0.635	0.061	0.635	4.029	3.077

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day

1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The QWS reported a maximum possible purchased water value. The more conservative value was chosen.
3. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.
4. Hart county is a wholesale purchase system which utilizes Hartwell, Lavonia, and Royston as a water source. The cumulative excess capacity for the non-Lavonia systems is listed here. Hart County would act as a passthrough system.

Table B-12a
Lincoln County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP 201	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.40	0.29	0.54	1.23	0.40	0.83
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.40	0.29	NA	0.69	0.00	0.69
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[4]	0.1	1	0.40	0.29	0.54	1.23	0.40	0.83
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.40	0.29	NA	0.69	0.00	0.69
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.40	0.29	0.54	1.23	0.40	0.83
	D2. Chemical contamination of largest raw water source	0.1	1	0.40	0.29	0.54	1.23	0.40	0.83
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable				

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. There are no backup generators rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
4. Lincoln County's interconnections are critical assets. The larger of these two values was chosen to be the capacity loss: WTP's peak day design capacity; maximum possible purchased water via largest interconnection.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-12b
Lincoln County Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	0.83	0.22	0.14	0.08	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	0.69	0.22	0.14	0.08	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.83	0.22	0.14	0.08	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	0.69	0.22	0.14	0.08	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.83	0.22	0.14	0.08	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	0.83	0.22	0.14	0.08	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-12c
Lincoln County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP 201	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.40	0.71	0.54	1.65	0.40	1.25
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.40	0.71	NA	1.11	0.00	1.11
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[4]	0.1	1	0.40	0.71	0.54	1.65	0.40	1.25
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.40	0.71	NA	1.11	0.00	1.11
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.40	0.71	0.54	1.65	0.40	1.25
	D2. Chemical contamination of largest raw water source	0.1	1	0.40	0.71	0.54	1.65	0.40	1.25
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable				

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. There are no backup generators rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
4. Lincoln County's interconnections are critical assets. The larger of these two values was chosen to be the capacity loss: WTP's peak day design capacity; maximum possible purchased water via largest interconnection.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-12d
Lincoln County Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	1.25	0.17	0.11	0.06	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.11	0.17	0.11	0.06	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.25	0.17	0.11	0.06	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.11	0.17	0.11	0.06	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.25	0.17	0.11	0.06	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.25	0.17	0.11	0.06	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-12e
Lincoln County Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)[2]	Maximum Possible Purchased Water (MGD)[3]	Individual System Excess Capacity[4] 2015	Individual System Excess Capacity[4] 2050
23	GA1810000 - Lincolnton	Hwy 378 East	6	5	0.982	0.635	0.090	0.300	0.109	0.532
24	GA1810000 - Lincolnton	At Lincolnton WTP	12	5	3.927	2.538	0.090	0.500		

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The 2015 purchased value from GA18810000 - Lincolnton was split between those two interconnections.
3. The QWS reported a maximum possible purchased water value. The more conservative value was chosen.
4. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.

Table B-13a
Lincolnton Emergency Scenario Evaluation: 2015

				Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]					
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**James Allen Reed WTP**	**Clarks Hill Reservoir**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[4]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.00	0.63	NA	0.36	0.99	0.00	0.99
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.00	0.63	NA	NA	0.63	0.00	0.63
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.00	0.63	NA	0.36	0.99	0.63	0.36
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.00	0.63	NA	NA	0.63	0.00	0.63
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.00	0.63	NA	0.72	1.35	0.63	0.72
	D2. Chemical contamination of largest raw water source	0.1	1	1.00	0.63	NA	0.72	1.35	0.63	0.72
E. Full unavailability of major raw water sources due to federal or state government actions	--					Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--					Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	1.00	0.63	NA	NA	0.63	0.63	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]					Not Applicable				

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. The WTP met chemical and unit process redundancy, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Clarks Hill Reservoir is their only source of water.
6. Clarks Hill Reservoir is in Hydrologic Unit Code-10 "Thurmond Lake-Savannah River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-13b
Lincolnton Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	0.99	0.52	0.34	0.18	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	0.63	0.52	0.34	0.18	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.36	0.52	0.34	0.18	0.16	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	0.63	0.52	0.34	0.18	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.72	0.52	0.34	0.18	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	0.72	0.52	0.34	0.18	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	0.00	0.52	0.34	0.18	0.52	0.34	0.18
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-13c
Lincolnton Emergency Scenario Evaluation: 2050

				Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]					
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**James Allen Reed WTP**	**Clarks Hill Reservoir**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[4]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.00	0.63	NA	0.36	0.99	0.00	0.99
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.00	0.63	NA	NA	0.63	0.00	0.63
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.00	0.63	NA	0.36	0.99	0.63	0.36
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.00	0.63	NA	NA	0.63	0.00	0.63
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.00	0.63	NA	0.72	1.35	0.63	0.72
	D2. Chemical contamination of largest raw water source	0.1	1	1.00	0.63	NA	0.72	1.35	0.63	0.72
E. Full unavailability of major raw water sources due to federal or state government actions	--					Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--					Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	1.00	0.63	NA	NA	0.63	0.63	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]					Not Applicable				

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. The WTP met chemical and unit process redundancy, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Clarks Hill Reservoir is their only source of water.
6. Clarks Hill Reservoir is in Hydrologic Unit Code-10 "Thurmond Lake-Savannah River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-13d
Lincolnton Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	0.99	0.10	0.06	0.03	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	0.63	0.10	0.06	0.03	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.36	0.10	0.06	0.03	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	0.63	0.10	0.06	0.03	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.72	0.10	0.06	0.03	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	0.72	0.10	0.06	0.03	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	0.00	0.10	0.06	0.03	0.10	0.06	0.03
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-14a
Louisville Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Wells 104, 106, 107	WTP Well 102					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.00	1.44	NA	0.84	4.28	1.00	3.28
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.00	1.44	NA	NA	3.44	0.00	3.44
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.00	1.44	NA	0.84	4.28	2.00	2.28
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.00	1.44	NA	NA	3.44	0.00	3.44
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.00	1.44	NA	0.92	4.36	2.00	2.36
	D2. Chemical contamination of largest raw water source	0.1	1	2.00	1.44	NA	0.92	4.36	2.00	2.36
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable								
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable								

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The largest WTP has a backup generator able to supply 1 MGD capacity, rendering partial capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-14b
Louisville Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.28	0.61	0.40	0.21	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.44	0.61	0.40	0.21	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.28	0.61	0.40	0.21	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.44	0.61	0.40	0.21	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.36	0.61	0.40	0.21	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.36	0.61	0.40	0.21	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-14c
Louisville Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Wells 104, 106, 107	WTP Well 102					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.00	1.44	NA	0.84	4.28	1.00	3.28
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.00	1.44	NA	NA	3.44	0.00	3.44
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.00	1.44	NA	0.84	4.28	2.00	2.28
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.00	1.44	NA	NA	3.44	0.00	3.44
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.00	1.44	NA	0.92	4.36	2.00	2.36
	D2. Chemical contamination of largest raw water source	0.1	1	2.00	1.44	NA	0.92	4.36	2.00	2.36
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable								
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable								

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The largest WTP has a backup generator able to supply 1 MGD capacity, rendering partial capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-14d
Louisville Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.28	0.50	0.33	0.18	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.44	0.50	0.33	0.18	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.28	0.50	0.33	0.18	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.44	0.50	0.33	0.18	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.36	0.50	0.33	0.18	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.36	0.50	0.33	0.18	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-15a
Madison County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP				Not Applicable			
	A2. Critical asset failure at largest WTP				Not Applicable			
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[1]	0.1	1	2.02	2.16	4.18	0.50	3.68
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	2.02	NA	2.02	0.00	2.02
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source				Not Applicable			
	D2. Chemical contamination of largest raw water source				Not Applicable			
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable			
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. It was assumed the largest interconnection is lost.
2. It was assumed that the interconnections can supply full capacity.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-15b
Madison County Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	Not Applicable						
	A2. Critical asset failure at largest WTP	Not Applicable						
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.68	0.05	0.03	0.02	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.02	0.05	0.03	0.02	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	Not Applicable						
	D2. Chemical contamination of largest raw water source	Not Applicable						
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-15c
Madison County Emergency Scenario Evaluation: 2050[1]

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 201	WTP Well 202	WTP Well 203					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[2]	0.5	1	0.14	0.08	0.22	1.52	2.16	4.12	0.22	3.91
	A2. Critical asset failure at largest WTP[3]	0.1	30	0.14	0.08	0.22	1.52	NA	1.96	0.00	1.96
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.14	0.08	0.22	1.52	2.16	4.12	0.22	3.91
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.14	0.08	0.22	1.52	NA	1.96	0.00	1.96
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.14	0.08	0.22	1.52	2.16	4.12	0.22	3.91
	D2. Chemical contamination of largest raw water source	0.1	1	0.14	0.08	0.22	1.52	2.16	4.12	0.22	3.91
E. Full unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment						Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought						Not Applicable				

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. Madison County absorbed GA1950050-Madison County Industrial Park WS in 2019
2. The QWS does not have a backup generator, rendering full capacity loss at the largest WTP.
3. Backup equipment is available, rendering no capacity loss.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-15d
Madison County Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.91	0.36	0.23	0.13	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.96	0.36	0.23	0.13	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.91	0.36	0.23	0.13	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.96	0.36	0.23	0.13	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.91	0.36	0.23	0.13	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.91	0.36	0.23	0.13	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-15e
Madison County Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)[5]	Individual System Excess Capacity[6] 2015	Individual System Excess Capacity[6] 2050
25	GA1050001 - Elberton	Hwy 72 at county line	12	5	3.927	2.538	0.123[(2)]	0.400	1.700	1.700
26	GA1190051 - Franklin County	US 29	8	5	1.745	1.128	0.009[(3)]	0.700	0.400	-0.100
27	GA1190051 - Franklin County	Dovetown Road	8	5	1.745	1.128	0.009[(3)]	0.700		
28	GA1190004 - Royston	Hwy 281	6	5	0.982	0.635	0.001	0.500	0.600	0.400
29	GA1570001 - Commerce	Ila Road	6	5	1.745	1.128	0.016[(4)]	0.360	2.541	2.454
30	GA1570001 - Commerce	Mize Road	6	5	1.745	1.128	0.016[(4)]	0.360		
31	GA1950003 - Danielsville[7]	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
32	GA1950001 - Colbert[7]	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The 2019 reported value was used in the absence of 2015 data.
3. The 2017 purchased value from GA1190051 - Franklin County was split between those two interconnections.
4. The 2015 purchased value from GA1570001 - Commerce was split between those two interconnections.
5. The QWS reported a maximum possible purchased water value. The more conservative value was chosen.
6. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.
7. The details of these connections are unknown.

Table B-16a
Millen Emergency Scenario Evaluation: 2015

				Peak Day Design Capacity (MGD)								
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**WTP Well 201**	**WTP Well 202**	**WTP Well 203**	**WTP Well 204**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[3]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.44	0.72	0.72	1.73	NA	0.54	5.15	0.00	5.15
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.44	0.72	0.72	1.73	NA	NA	4.61	0.00	4.61
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.44	0.72	0.72	1.73	NA	0.54	5.15	1.73	3.42
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.44	0.72	0.72	1.73	NA	NA	4.61	0.00	4.61
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.44	0.72	0.72	1.73	NA	0.54	5.15	1.73	3.42
	D2. Chemical contamination of largest raw water source	0.1	1	1.44	0.72	0.72	1.73	NA	0.54	5.15	1.73	3.42
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable										
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The QWS has a backup generator able to supply full capacity at WTP Well 204, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-16b
Millen Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	5.15	0.44	0.29	0.15	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.61	0.44	0.29	0.15	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.42	0.44	0.29	0.15	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.61	0.44	0.29	0.15	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.42	0.44	0.29	0.15	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.42	0.44	0.29	0.15	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-16c
Millen Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)				Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 201	WTP Well 202	WTP Well 203	WTP Well 204					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.44	0.72	0.72	1.73	NA	0.54	5.15	0.00	5.15
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.44	0.72	0.72	1.73	NA	NA	4.61	0.00	4.61
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.44	0.72	0.72	1.73	NA	0.54	5.15	1.73	3.42
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.44	0.72	0.72	1.73	NA	NA	4.61	0.00	4.61
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.44	0.72	0.72	1.73	NA	0.54	5.15	1.73	3.42
	D2. Chemical contamination of largest raw water source	0.1	1	1.44	0.72	0.72	1.73	NA	0.54	5.15	1.73	3.42
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable										
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The QWS has a backup generator able to supply full capacity at WTP Well 204, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-16d
Millen Deficits: 2050

			2050 - Long-Range Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	5.15	0.22	0.14	0.08	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.61	0.22	0.14	0.08	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.42	0.22	0.14	0.08	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.61	0.22	0.14	0.08	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.42	0.22	0.14	0.08	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.42	0.22	0.14	0.08	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-17a
Rabun County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Lake Rabun WTP	Little Tennessee WTP	Lake Rabun	Little Tennessee River					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.00	1.50	2.00	1.50	NA	0.65	4.15	1.00	3.15
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.00	1.50	2.00	1.50	NA	NA	3.50	0.00	3.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.00	1.50	2.00	1.50	NA	0.65	4.15	2.00	2.15
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.00	1.50	2.00	1.50	NA	NA	3.50	0.00	3.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.00	1.50	2.00	1.50	NA	1.18	4.68	2.00	2.68
	D2. Chemical contamination of largest raw water source	0.1	1	2.00	1.50	2.00	1.50	NA	1.18	4.68	2.00	2.68
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	0.05	30	2.00	1.50	2.00	1.50	NA	NA	3.50	2.00	1.50
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[5]	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The Lake Rabun WTP has a backup generator able to supply 1 MGD capacity, rendering partial capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Lake Rabun and the Little Tennessee River are in Hydrologic Unit Code-10 "Tallulah River" and "Headwaters Little Tennessee River," respectively, which are more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-17b
Rabun County Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.15	1.31	0.85	0.46	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.50	1.31	0.85	0.46	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.15	1.31	0.85	0.46	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.50	1.31	0.85	0.46	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.68	1.31	0.85	0.46	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.68	1.31	0.85	0.46	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	1.50	1.31	0.85	0.46	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-17c
Rabun County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Lake Rabun WTP	Little Tennessee WTP	Lake Rabun	Little Tennessee River					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.00	1.50	2.00	1.50	NA	0.95	4.45	1.00	3.45
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.00	1.50	2.00	1.50	NA	NA	3.50	0.00	3.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.00	1.50	2.00	1.50	NA	0.95	4.45	2.00	2.45
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.00	1.50	2.00	1.50	NA	NA	3.50	0.00	3.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.00	1.50	2.00	1.50	NA	1.48	4.98	1.50	3.48
	D2. Chemical contamination of largest raw water source	0.1	1	2.00	1.50	2.00	1.50	NA	1.48	4.98	1.50	3.48
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	0.05	30	2.00	1.50	2.00	1.50	NA	NA	3.50	2.00	1.50
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[5]	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The Lake Rabun WTP has a backup generator able to supply 1 MGD capacity, rendering partial capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Lake Rabun and the Little Tennessee River are in Hydrologic Unit Code-10 "Tallulah River" and "Headwaters Little Tennessee River," respectively, which are more than 100 square miles.
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-17d
Rabun County Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.45	1.71	1.11	0.60	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.50	1.71	1.11	0.60	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.45	1.71	1.11	0.60	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.50	1.71	1.11	0.60	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.48	1.71	1.11	0.60	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.48	1.71	1.11	0.60	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	1.50	1.71	1.11	0.60	0.21	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-18a
Royston Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Peak Permitted Withdrawal (MGD-24-hour maximum)[3]	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				City of Royston WTP	WTP Well 201	WTP Well 202	North Fork Broad River					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.00	0.09	0.08	1.00	1.06	0.33	2.55	0.00	2.55
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.00	0.09	0.08	1.00	1.06	NA	2.22	0.00	2.22
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.00	0.09	0.08	1.00	1.06	0.33	2.55	1.00	1.55
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.00	0.09	0.08	1.00	1.06	NA	2.22	0.00	2.22
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.00	0.09	0.08	1.00	1.06	0.41	2.63	1.00	1.63
	D2. Chemical contamination of largest raw water source	0.1	1	1.00	0.09	0.08	1.00	1.06	0.41	2.63	1.00	1.63
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	Not Applicable										
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	0.1	120	1.00	0.09	0.08	1.00	1.06	NA	1.37	-	1.37

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. They do not withdraw from an impounded river.
6. The Strahler Stream Order at the withdrawal point, the north fork of the Broad River, is 4 (not a major river).

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-18b
Royston Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	2.55	0.52	0.34	0.18	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	2.22	0.52	0.34	0.18	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.55	0.52	0.34	0.18	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.22	0.52	0.34	0.18	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.63	0.52	0.34	0.18	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.63	0.52	0.34	0.18	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	1.37	0.52	0.34	0.18	0.00	0.00	0.00

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-18c
Royston Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)				Peak Permitted Withdrawal (MGD-24-hour maximum)[3]	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				City of Royston WTP	WTP Well 201	WTP Well 202	New WTP Well	North Fork Broad River					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.00	0.09	0.08	0.12	1.00	0.64	0.33	2.25	0.00	2.25
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.00	0.09	0.08	0.12	1.00	0.64	NA	1.92	0.00	1.92
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.00	0.09	0.08	0.12	1.00	0.64	0.33	2.25	1.00	1.25
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.00	0.09	0.08	0.12	1.00	0.64	NA	1.92	0.00	1.92
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.00	0.09	0.08	0.12	1.00	0.64	0.41	2.32	1.00	1.32
	D2. Chemical contamination of largest raw water source	0.1	1	1.00	0.09	0.08	0.12	1.00	0.64	0.41	2.32	1.00	1.32
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable											
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable											
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	Not Applicable											
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	0.1	120	1.00	0.09	0.08	0.12	1.00	0.64	NA	1.15	-	1.15

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. They do not withdraw from an impounded river.
6. The Strahler Stream Order at the withdrawal point, the north fork of the Broad River, is 4 (not a major river).

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-18d
Royston Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Immediate Reliability Target					
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)	Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	2.25	0.87	0.56	0.30	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.92	0.87	0.56	0.30	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.25	0.87	0.56	0.30	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.92	0.87	0.56	0.30	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.32	0.87	0.56	0.30	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.32	0.87	0.56	0.30	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	1.15	0.87	0.56	0.30	0.00	0.00	0.00

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-18e
Royston Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)[2]	Individual System Excess Capacity[3] 2015	Individual System Excess Capacity[3] 2050
13	GA1190051 - Franklin County	Harbin Lumber Hwy 17	6	5	0.982	0.635	0.000	0.635	0.422	-0.128
22	GA1470065 - Hart County[4]	10260 Royston Highway - US 29	6	5	0.982	0.635	0.000	0.635	5.259	3.655

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The QWS reported a maximum possible purchased water value. The more conservative value was chosen.
3. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.
4. Hart county is a wholesale purchase system which utilizes Hartwell, Lavonia, and Royston as a water source. The cumulative excess capacity for the non-Royston systems is listed here. Hart County would act as a passthrough system.

Table B-19a
Sylvania Emergency Scenario Evaluation: 2015

				Peak Day Design Capacity (MGD)							
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**WTP Well 203**	**WTP Well 204**	**WTP Well 205**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[3]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.50	0.50	0.50	NA	0.45	1.95	0.00	1.95
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.50	0.50	0.50	NA	NA	1.50	0.00	1.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.50	0.50	0.50	NA	0.45	1.95	0.50	1.45
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.50	0.50	0.50	NA	NA	1.50	0.00	1.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.50	0.50	0.50	NA	0.45	1.95	0.50	1.45
	D2. Chemical contamination of largest raw water source	0.1	1	0.50	0.50	0.50	NA	0.45	1.95	0.50	1.45
E. Full unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment						Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought						Not Applicable				

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-19b
Sylvania Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	1.95	0.62	0.40	0.22	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.50	0.62	0.40	0.22	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.45	0.62	0.40	0.22	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.50	0.62	0.40	0.22	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.45	0.62	0.40	0.22	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.45	0.62	0.40	0.22	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-19c
Sylvania Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 203	WTP Well 204	WTP Well 205					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.50	0.50	0.50	NA	0.45	1.95	0.00	1.95
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.50	0.50	0.50	NA	NA	1.50	0.00	1.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.50	0.50	0.50	NA	0.45	1.95	0.50	1.45
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.50	0.50	0.50	NA	NA	1.50	0.00	1.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.50	0.50	0.50	NA	0.45	1.95	0.50	1.45
	D2. Chemical contamination of largest raw water source	0.1	1	0.50	0.50	0.50	NA	0.45	1.95	0.50	1.45
E. Full unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--						Not Applicable				
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment						Not Applicable				
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought						Not Applicable				

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-19d
Sylvania Deficits: 2050

			2050 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	1.95	0.49	0.32	0.17	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.50	0.49	0.32	0.17	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.45	0.49	0.32	0.17	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.50	0.49	0.32	0.17	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.45	0.49	0.32	0.17	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.45	0.49	0.32	0.17	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-20a

Thomson-McDuffie County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Big Creek WTP	Augusta Rd WTP	Big Creek	Usry Pond					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	3.60	2.00	3.60	2.00	NA	0.87	6.47	0.00	6.47
	A2. Critical asset failure at largest WTP[2]	0.1	30	3.60	2.00	3.60	2.00	NA	NA	5.60	3.60	2.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	3.60	2.00	3.60	2.00	NA	0.87	6.47	3.60	2.87
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	3.60	2.00	3.60	2.00	NA	NA	5.60	0.00	5.60
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	3.60	2.00	3.60	2.00	NA	10.02	15.62	3.60	12.02
	D2. Chemical contamination of largest raw water source	0.1	1	3.60	2.00	3.60	2.00	NA	10.02	15.62	3.60	12.02
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	3.60	2.00	3.60	2.00	NA	NA	5.60	3.60	2.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. Big Creek WTP met chemical but not unit process redundancy, rendering full capacity loss at this WTP.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. There could be a failure at Clark Hills Reservoir (for which Big Creek feeds into).
6. Their reservoirs are in Hydrologic Unit Code-10 "Big Creek," and "Upper Brier Creek," respectively, which are more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-20b
Thomson-McDuffie County Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	6.47	1.99	1.29	0.70	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	2.00	1.99	1.29	0.70	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.87	1.99	1.29	0.70	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	5.60	1.99	1.29	0.70	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	12.02	1.99	1.29	0.70	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	12.02	1.99	1.29	0.70	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.00	1.99	1.29	0.70	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-20c
Thomson-McDuffie County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Big Creek WTP	Augusta Rd WTP	Big Creek	Usry Pond					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	3.60	2.00	3.60	2.00	NA	0.87	6.47	0.00	6.47
	A2. Critical asset failure at largest WTP[2]	0.1	30	3.60	2.00	3.60	2.00	NA	NA	5.60	3.60	2.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	3.60	2.00	3.60	2.00	NA	0.87	6.47	3.60	2.87
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	3.60	2.00	3.60	2.00	NA	NA	5.60	0.00	5.60
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	3.60	2.00	3.60	2.00	NA	10.02	15.62	3.60	12.02
	D2. Chemical contamination of largest raw water source	0.1	1	3.60	2.00	3.60	2.00	NA	10.02	15.62	3.60	12.02
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	3.60	2.00	3.60	2.00	NA	NA	5.60	3.60	2.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. Big Creek WTP met chemical but not unit process redundancy, rendering full capacity loss at this WTP.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. There could be a failure at Clark Hills Reservoir (for which Big Creek feeds into).
6. Their reservoirs are in Hydrologic Unit Code-10 "Big Creek," and "Upper Brier Creek," respectively, which are more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-20d
Thomson-McDuffie County Deficits: 2050

			2050 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	6.47	2.63	1.71	0.92	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	2.00	2.63	1.71	0.92	0.63	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.87	2.63	1.71	0.92	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	5.60	2.63	1.71	0.92	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	12.02	2.63	1.71	0.92	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	12.02	2.63	1.71	0.92	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.00	2.63	1.71	0.92	0.63	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-21a
Toccoa Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Toccoa WTP	Lake Toccoa (Ceder Creek) and Davidson Creek Reservoir	Lake Yonah (Tugaloo River)[4]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	9.00	9.00	6.00	1.13	0.69	10.82	0.00	10.82
	A2. Critical asset failure at largest WTP[2]	0.1	30	9.00	9.00	6.00	1.13	NA	10.13	0.00	10.13
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	9.00	9.00	6.00	1.13	0.69	10.82	9.00	1.82
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	9.00	9.00	6.00	1.13	NA	10.13	0.00	10.13
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	9.00	9.00	6.00	1.13	1.77	11.90	9.00	2.90
	D2. Chemical contamination of largest raw water source	0.1	1	9.00	9.00	6.00	1.13	1.77	11.90	9.00	2.90
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[6]	0.05	30	9.00	9.00	6.00	1.13	NA	10.13	9.00	1.13
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[7]	Not Applicable									

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. The WTP met chemical redundancy and unit process redundancy.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. The withdrawals from Lake Yonah are for the purpose of filling Davidson Creek Reservoir. Therefore, this does not factor into the water supply.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
6. A failure of the Lake Toccoa Reservoir would result in full loss of water. Water from Davidson Creek only feeds Lake Toccoa.
7. Their reservoirs are in Hydrologic Unit Code-10 "Hartwell Lake-Upper Tugaloo River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-21b
Toccoa Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	10.82	2.66	1.73	0.93	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	10.13	2.66	1.73	0.93	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.82	2.66	1.73	0.93	0.84	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	10.13	2.66	1.73	0.93	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.90	2.66	1.73	0.93	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.90	2.66	1.73	0.93	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	1.13	2.66	1.73	0.93	1.53	0.60	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-21c
Toccoa Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Toccoa WTP	Lake Toccoa (Ceder Creek) and Davidson Creek Reservoir	Lake Yonah (Tugaloo River)[4]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	9.00	9.00	6.00	0.00	0.69	9.69	0.00	9.69
	A2. Critical asset failure at largest WTP[2]	0.1	30	9.00	9.00	6.00	0.00	NA	9.00	0.00	9.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	9.00	9.00	6.00	0.00	0.69	9.69	9.00	0.69
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	9.00	9.00	6.00	0.00	NA	9.00	0.00	9.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	9.00	9.00	6.00	0.00	2.37	11.37	9.00	2.37
	D2. Chemical contamination of largest raw water source	0.1	1	9.00	9.00	6.00	0.00	2.37	11.37	9.00	2.37
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[6]	0.05	30	9.00	9.00	6.00	0.00	NA	9.00	9.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[7]	Not Applicable									

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator able to supply full capacity, rendering no capacity loss at the largest WTP.
2. The WTP met chemical redundancy and unit process redundancy.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. The withdrawals from Lake Yonah are for the purpose of filling Davidson Creek Reservoir. Therefore, this does not factor into the water supply.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage. Toccoa indicated a new 1 MG clearwell.
6. A failure of the Lake Toccoa Reservoir would result in full loss of water. Water from Davidson Creek only feeds Lake Toccoa.
7. Their reservoirs are in Hydrologic Unit Code-10 "Hartwell Lake-Upper Tugaloo River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-21d
Toccoa Deficits: 2050

			2050 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	9.69	5.24	3.41	1.84	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	9.00	5.24	3.41	1.84	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.69	5.24	3.41	1.84	4.55	2.72	1.15
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	9.00	5.24	3.41	1.84	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.37	5.24	3.41	1.84	2.87	1.04	0.00
	D2. Chemical contamination of largest raw water source	2.37	5.24	3.41	1.84	2.87	1.04	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	0.00	5.24	3.41	1.84	5.24	3.41	1.84
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-21e
Toccoa Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)	Maximum Flow (MGD)	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)[2]	Individual System Excess Capacity[3]	
									2015	2050
33	GA1370004 - Demorest	Hwy 17 at Stephens / Habersham County line	8	5	1.745	1.128	0.000	1.128	1.6	-2.3

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
1. The maximum velocity is assumed to be 3 fps for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches.
2. The QWS reported a maximum possible purchased water value. The more conservative value was chosen.
3. The maximum possible purchased water is limited by the provider's ADD, permit limits, and their peak design capacity. The provider's excess capacity is listed here, if available, and can also be found in Table 3-1.

Table B-22a
Washington Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Aonia WTP (Clark Hills Lake)	Skull Shoals WTP	Little Beaverdam Creek (Lake Wall) and Beaverdam Creek (Lake Boline)	Clarks Hill Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.20	2.00	2.20	2.20	NA	0.57	4.77	2.20	2.57
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.20	2.00	2.20	2.20	NA	NA	4.20	2.20	2.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.20	2.00	2.20	2.20	NA	0.57	4.77	2.20	2.57
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.20	2.00	2.20	2.20	NA	NA	4.20	0.00	4.20
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.20	2.00	2.20	2.20	NA	1.07	5.27	2.20	3.07
	D2. Chemical contamination of largest raw water source	0.1	1	2.20	2.00	2.20	2.20	NA	1.07	5.27	2.20	3.07
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	2.20	2.00	2.20	2.20	NA	NA	4.20	2.20	2.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. Aonia WTP does not have a backup generator able to supply full capacity, rendering full capacity loss at the largest WTP.
2. Aonia WTP met chemical but not unit process redundancy, rendering full capacity loss at this WTP.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. A failure of the Clark Hills Reservoir would result in full loss of this water source. There is an alternative source which is separate from this source.
6. Their reservoirs are in Hydrologic Unit Code-10 "Williams Creek-Little River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-22b
Washington Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	2.57	0.88	0.57	0.31	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	2.00	0.88	0.57	0.31	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.57	0.88	0.57	0.31	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.20	0.88	0.57	0.31	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.07	0.88	0.57	0.31	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.07	0.88	0.57	0.31	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.00	0.88	0.57	0.31	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-22c
Washington Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Aonia WTP (Clark Hills Lake)	Skull Shoals WTP	Little Beaverdam Creek (Lake Wall) and Beaverdam Creek (Lake Boline)	Clarks Hill Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.20	2.00	2.20	2.20	NA	0.57	4.77	2.20	2.57
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.20	2.00	2.20	2.20	NA	NA	4.20	2.20	2.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.20	2.00	2.20	2.20	NA	0.57	4.77	2.20	2.57
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.20	2.00	2.20	2.20	NA	NA	4.20	0.00	4.20
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.20	2.00	2.20	2.20	NA	1.07	5.27	2.20	3.07
	D2. Chemical contamination of largest raw water source	0.1	1	2.20	2.00	2.20	2.20	NA	1.07	5.27	2.20	3.07
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment[5]	0.05	30	2.20	2.00	2.20	2.20	NA	NA	4.20	2.20	2.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. Aonia WTP does not have a backup generator able to supply full capacity, rendering full capacity loss at the largest WTP.
2. Aonia WTP met chemical but not unit process redundancy, rendering full capacity loss at this WTP.
3. The smaller of the peak day design capacity and the peak permitted withdrawal value was selected for the total possible water supply calculation.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. A failure of the Clark Hills Reservoir would result in full loss of this water source. There is an alternative source which is separate from this source.
6. Their reservoirs are in Hydrologic Unit Code-10 "Williams Creek-Little River," which is more than 100 square miles.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-22d
Washington Deficits: 2050

			2050 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	2.57	0.66	0.43	0.23	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	2.00	0.66	0.43	0.23	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.57	0.66	0.43	0.23	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.20	0.66	0.43	0.23	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.07	0.66	0.43	0.23	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.07	0.66	0.43	0.23	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	2.00	0.66	0.43	0.23	0.00	0.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-23a
Waynesboro Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 202	WTP Well 203					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.73	1.73	NA	0.71	4.16	0.35	3.82
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.73	1.73	NA	NA	3.46	0.00	3.46
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.73	1.73	NA	0.71	4.16	1.73	2.43
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.73	1.73	NA	NA	3.46	0.00	3.46
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.73	1.73	NA	0.71	4.16	1.73	2.43
	D2. Chemical contamination of largest raw water source	0.1	1	1.73	1.73	NA	0.71	4.16	1.73	2.43
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable								
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable								

Notes:

Prepared by: LCT 07/30/21

Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator whose capacity is unknown. Assumed it is able to supply 80% of capacity, rendering partial capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-23b
Waynesboro Deficits: 2015

			2015 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.82	0.64	0.41	0.22	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.46	0.64	0.41	0.22	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.43	0.64	0.41	0.22	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.46	0.64	0.41	0.22	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.43	0.64	0.41	0.22	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.43	0.64	0.41	0.22	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Table B-23c
Waynesboro Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 202	WTP Well 203					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.73	1.73	NA	0.71	4.16	0.35	3.82
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.73	1.73	NA	NA	3.46	0.00	3.46
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.73	1.73	NA	0.71	4.16	1.73	2.43
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.73	1.73	NA	NA	3.46	0.00	3.46
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.73	1.73	NA	0.71	4.16	1.73	2.43
	D2. Chemical contamination of largest raw water source	0.1	1	1.73	1.73	NA	0.71	4.16	1.73	2.43
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable								
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable								
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable								

Notes:

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant

1. The WTP has a backup generator whose capacity is unknown. Assumed it is able to supply 80% of capacity, rendering partial capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

Table B-23d
Waynesboro Deficits: 2050

			2050 - Immediate Reliability Target					
Risk	**Scenario**	**Available Water Supply (MGD)**	**Total Demand (MGD)[1]**	**65% ADD (MGD)**	**35% ADD (MGD)**	**Total Demand Deficit (MGD)**	**65% ADD Deficit (MGD)**	**35% ADD Deficit (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	3.82	0.55	0.36	0.19	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.46	0.55	0.36	0.19	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.43	0.55	0.36	0.19	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.46	0.55	0.36	0.19	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.43	0.55	0.36	0.19	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.43	0.55	0.36	0.19	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

ADD - average daily demand
MGD - million gallons per day
QWS - qualified water system
WTP - water treatment plant

1. Total demand (withdrawal plus purchases) is defined the same as 100% ADD.

Prepared by: LCT 07/30/21
Checked by: GJH 08/05/21

Appendix C: Sensitivity Analysis

Contents

Acronyms

GEFA	Georgia Environmental Finance Authority
QWS	Qualified Water System(s)

1.0 Introduction

This appendix describes the sensitivity analysis that was conducted to test the influence of criterion weightings on the initial manual rank outcome.

2.0 Sensitivity Analysis

As described in Section 7.1 of the report, scores were assigned either 1, 2, 3, or 4 using a methodology shown in Table 7-1. Criterion weights were initially assigned either 1, 2, or 3 based on professional judgement.

To conduct the sensitivity analysis, scenarios were considered to test the influence of criterion weightings on the rank outcome. In the case of a tie, the absolute score was considered, and in the case of a further tie, the lower cost per individual supplied broke the tie. First, all criteria were assigned the highest weight (3). The effect of this weighting adjustment is equivalent to the absolute score because although it amplified score values, the rank outcome was the same. Second, one of the eight criteria was assigned the highest weight (3) with the remaining seven criteria assigned the lowest weight (1). The effects of these weighting variations are described below:

1. Systems Benefitted weight = 3; all other criteria weights = 1
    a. Project 2 improved rank by two ranks.
    b. Project 8 improved rank by six ranks.
    c. Project 7 worsened rank by one rank.
    d. Projects 3 and 5 each worsened rank by two ranks.
    e. Project 4 worsened rank by three ranks.
    f. All other projects maintained rank.
    g. Interpretation: this weighting adjustment yielded a noticeable effect. Projects 1, 2, and 8 are the only projects in this region that serves two QWS. Although Project 1 maintained rank (due to other factors), it is expected that Projects 2 and 8 improve rank because higher priority is given to projects that benefit multiple systems.
2. Population Benefitted weight = 3; all other criteria weights = 1
    a. Project 2 improved rank by two ranks.
    b. Projects 8 and 10 each improved rank by four ranks.
    c. Projects 3, 5, 6, and 9 each worsened rank by one rank.
    d. Project 7 worsened rank by two ranks.
    e. Project 4 worsened rank by four ranks.
    f. Project 1 maintained rank.
    g. Interpretation: this weighting adjustment yielded a noticeable effect. Higher priority is given to projects that benefit larger populations. Projects adjusted rank according to this interpretation.
3. Critical Scenario Duration (days) weight = 3; all other criteria weights = 1
    a. Projects 2 and 10 each improved rank by one rank.
    b. Projects 8 and 9 each improved rank by two ranks.
    c. Projects 3 and 7 each worsened rank by one rank.
    d. Project 4 worsened rank by four ranks.
    e. All other projects maintained rank.

   f. Interpretation: this weighting adjustment yielded a moderate effect. Higher priority is given to projects that aid longer critical scenario durations. The projects that adjusted rank did so according to this interpretation, especially Project 4 which has the lowest critical scenario duration score relative to other projects.

4. Added Capacity as a Percent of Total Demand (%) weight = 3; all other criteria weights = 1
   a. Project 6 improved rank by one rank.
   b. Projects 3, 7, and 10 each improved rank by two ranks.
   c. Project 9 improved rank by three ranks.
   d. Project 8 worsened rank by one rank.
   e. Project 2 worsened rank by two ranks.
   f. Project 4 worsened rank by three ranks.
   g. Project 1 worsened rank by four ranks.
   h. Project 5 maintained rank.
   i. Interpretation: this weighting adjustment yielded a noticeable effect. Higher priority is given to projects that yield a higher added capacity as a percent of total demand. The projects that improved rank had a score of 4.
5. Cost ($) weight = 3; all other criteria weights = 1
   a. Projects 8 and 9 each improved rank by one rank.
   b. Projects 4 and 6 each worsened rank by one rank.
   c. All other projects maintained rank.
   d. Interpretation: this weighting adjustment yielded an overall small effect and is likely driven by other factors.
6. Potential Environmental Impacts weight = 3; all other criteria weights = 1
   a. Project 8 improved rank by one rank.
   b. Project 6 worsened rank by one rank.
   c. All other projects maintained rank.
   d. Interpretation: this weighting adjustment yielded an overall small effect and is likely driven by other factors.
7. Potential System and Community Impacts weight = 3; all other criteria weights = 1
   a. Project 2 improved rank by one rank.
   b. Project 9 improved rank by two ranks.
   c. Project 3 worsened rank by one rank.
   d. Project 7 worsened rank by two ranks.
   e. All other projects maintained rank.
   f. Interpretation: this weighting adjustment yielded an overall small effect and is likely driven by other factors.
8. Excess Capacity Index weight = 3; all other criteria weights = 1
   a. Project 6 improved rank by one rank.
   b. Projects 2, 9, and 10 each improved rank by two ranks.
   c. Project 8 improved rank by three ranks.
   d. Projects 3 and 5 each worsened rank by one rank.
   e. Projects 4 and 7 each worsened rank by two ranks.
   f. Project 1 maintained rank.

g. Interpretation: this weighting adjustment yielded a noticeable effect. Higher priority is given to projects that benefit QWS with lower relative excess capacities. Except for Project 1, the projects that improved rank had a score of 2.5 or higher.

The sensitivity analysis results demonstrate that some criteria are generally sensitive to weighting. Regardless, initially assigned weights were retained because sensitivity analysis results are meant to be informative rather than correctional.

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