Georgia Water Supply Redundancy Study
Middle Ocmulgee Water Planning Region
Georgia Environmental Finance Authority (GEFA)

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Georgia Water Supply Redundancy Study

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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
USGS	U.S. Geological Survey
Wood	Wood Environment and 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 and 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 Middle Ocmulgee Water Planning Region, which consists of 12 counties in southeast Georgia, as shown in Figure 1-1. GEFA identified 21 QWS within the Middle Ocmulgee 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 industry needs, 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 the EPD *Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison* that was developed to provide a state-wide reference tool for planning contractors to encourage consistency in relative cost estimates throughout the state and to support regional water planning council decision making (EPD, 2011).

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, 21 QWS in the Middle Ocmulgee Water Planning Region were surveyed. Government, health care, service industries, and agriculture are the primary economic sectors in the Middle Ocmulgee Region. Land cover in the region is composed of approximately 54% forest, 19% row crops/pasture, 10% wetland, 9% urban, 1% open water, and 6% other (Middle Ocmulgee Water Planning Council, 2017).

2.2.1 General System Information

Table 2-1 shows key general information about the 21 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. The Milner QWS serves the smallest total population and is a purchase-only system while Macon serves the largest total population and has one surface water supply source.

Findings from data collection include the following general information about the Middle Ocmulgee Region:

- Nine QWS use groundwater-only drinking water sources.

- Five QWS use surface water-only drinking water sources.
- One QWS (Monticello) has groundwater and surface water drinking water sources.
- Six QWS are purchase-only systems that do not have raw water sources.
- Systems range from approximately 20 years old to more than 100 years old, with 8 systems more than 70 years old. Three QWS are of an unknown system age.
- The largest system customers are typically industries, educational facilities, correctional facilities, or critical care facilities (e.g., hospitals). However, other public water systems are large customers for Butts County/Jackson/Jenkinsburg, Houston County, Jones County, Macon, and Newton County.
- Seven QWS reported regular water sales.
- Twelve QWS reported regular water purchases.
- Seven QWS have at least one backup power source/facility.
- Two systems reported distribution system flow surplus capabilities.
- The following system interconnections, including emergency interconnections, were reported:
    - Barnesville is interconnected with Butts County/Jackson/Jenkinsburg, Spalding County / Griffin, and Milner.
    - Butts County/Jackson/Jenkinsburg is interconnected to Henry County, Spalding County / Griffin, North Monroe County, Barnesville, and Flovilla.
    - Centerville is interconnected with Houston County-Feagin Mill.
    - Covington is interconnected with Newton County, Newton County Water-Sewerage Authority, Oxford, and Porterdale.
    - Forsyth is interconnected with North Monroe County and South Monroe County.
    - Gray is interconnected with Jones County.
    - Houston County-Feagin Mill is interconnected with Centerville, Perry, and Warner Robins.
    - Jones County is interconnected with Macon and Gray.
    - Macon is interconnected with South Monroe County and Jones County.
    - Milner is interconnected with Barnesville.
    - Newton County Water-Sewerage Authority is interconnected with Covington, Newton County, Oxford, and Rockdale County.
    - Newton County is interconnected with Newton County Water-Sewerage Authority, Covington, Oxford, Walton County, Porterdale, Mansfield, Newborn, Jasper County, and Alcovy Shores.
    - North Monroe County is interconnected with Forsyth and Butts County/ Jackson/Jenkinsburg.
    - Oxford is interconnected with Covington, Newton County, and Newton County Water-Sewerage Authority.
    - Perry is interconnected with Houston County-Feagin Mill.
    - South Monroe County is interconnected with Macon and Forsyth.
    - Warner Robins is interconnected with Houston County-Feagin Mill.

Overall, data collected show that the QWS have a 2019 combined average treatment capacity of over 77 million gallons per day (MGD) and a 2019 combined peak operational capacity of over 110 MGD. Note, these values do not include the purchase only systems. The 21 QWS serve a total estimated direct population of approximately 459,500 people and a total estimated consecutive population of

169,700 people. Note that combining the direct and consecutive population values may result in certain users being counted twice. For example, Barnesville sells water to Milner.

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 21 QWS. Seven systems provided GIS data. Three systems provided CAD data. Hard copy/PDF maps were obtained from 14 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 21 QWS. The 21 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:

- New wells for Warner Robins, Perry, Jones County, and Byron
- New storage tanks for Byron, Macon, Jones County, Newton County Water-Sewerage Authority, Newton County, Perry, and Warner Robins
- Water line repair/replacement projects for Barnesville, Butts County/Jackson/Jenkinsburg, Covington, Forsyth, Perry, and Oxford
- An expanded distribution system for Barnesville, Butts County/Jackson/Jenkinsburg, Centerville, Macon, and South Monroe County
- General maintenance for Forsyth and Covington
- Increased treatment capacity for Butts County/Jackson/Jenkinsburg and Forsyth
- New booster pump station for Macon
- Water treatment plant rehabilitation for Forsyth, Newton County, and Warner Robins
- New generators for Forsyth, Jones County, and Hawkinsville
- Fire hydrant replacements for Perry
- Potential new surface water source for Newton County

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, permit limits do not affect the excess capacity calculation. 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 14 of the 15 non-purchase-only QWS. As noted above, purchase-only QWS are reported in Table 3-1 and Table A-4 as "not applicable." Gray has no 2015 excess capacity. For 2015 demands, excess capacity is at least two times a given QWS's 2015 ADD for five of the 15 QWS: Barnesville, Byron, Fort Valley, Hawkinsville, and Perry. The 2015 excess capacity values range from 0 MGD (Gray) to 37.6 MGD (Macon).

For 2050 demands, there is sufficient capacity for 13 of the 15 QWS, while Centerville and Gray have a deficit of 0.5 MGD. While it may be likely that these two 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 in 2050. Excess capacity is at least two times a given QWS's 2050 ADD for 7 of the 15 QWS: Barnesville, Butts County/Jackson/Jenkinsburg, Byron, Fort Valley, Hawkinsville, Jones County, and Monticello. The 2050 excess capacity values range from -0.5 MGD (Centerville and Gray) to 34.7 MGD (Macon). 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, Jones County's 2015 and Newton County's 2050 scaled excess capacity sufficiency is the lowest relative to other Middle Ocmulgee 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 Middle Ocmulgee Water Planning Region is bisected by the Georgia fall line (Figure 1-2), which separates the Piedmont geologic region from the Coastal Plain geologic region. The Piedmont geologic region is 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 39% of the region's 2010 water supply, whereas surface water sources accounted for 61% of the region's 2010 water supply. The 2010 groundwater withdrawal by category is as follows: 40% municipal, 33% agriculture, 16% industrial, and 11% domestic/self-supply (Middle Ocmulgee Water Planning Council, 2017). Aquifer systems in the Middle Ocmulgee Region include crystalline rock aquifers in the Piedmont geologic region and the Cretaceous and Floridan aquifers in the Coastal Plain geologic region. Figure 3-1 shows relevant aquifers in the Middle Ocmulgee 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 (Middle Ocmulgee Water Planning Council, 2017). The RWP noted that local gaps may occur if withdrawal rates exceed sustainable yield.

Municipal groundwater withdrawals are from the Cretaceous, Floridan, and crystalline rock aquifers (CDM Smith, 2017). Most of the regional groundwater demand is driven by municipal and agriculture withdrawals from the Cretaceous aquifer (CDM Smith, 2017). Municipal water demand projections increase from 2015 to 2050 by approximately 21 MGD. Additional municipal supply wells, other than replacement wells, may be needed in the Middle Ocmulgee Region.

3.2.2 Surface Water

The 2010 surface water withdrawal by category is as follows: 46% energy, 37% municipal, 11% industrial, and 6% agriculture (Middle Ocmulgee Water Planning Council, 2017). The Middle Ocmulgee Region contains portions of the following major river basins: Ocmulgee River Basin in the northern, central, and southern part of the region; Oconee River Basin in the eastern part of the region; and Flint River Basin in the far western part of the region. Figure 3-2 shows relevant river basins in the Middle Ocmulgee Region. The Ocmulgee River is the major river within the region. Jackson Lake and Lake Juliette are major reservoirs within the region. Jackson Lake is owned and operated by the Georgia Power Company, which uses the lake for hydropower generation (Middle Ocmulgee Water Planning Council, 2017). Discharges from Jackson Lake are regulated by the Federal Energy Regulatory Commission.

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 Ocmulgee River Basin indicated that no potential gaps exist at Jackson, Macon/Macon2, or Lumber City nodes. For context, the Jackson node is at Jackson Lake while the Macon/Macon2 nodes are along the Ocmulgee River in Macon. The Lumber City node is in the Altamaha Water Planning Region, approximately 5 miles northwest of Hazlehurst, an Altamaha Region QWS.

Model results for 2015 and 2050 in the Oconee River Basin indicated that no potential gaps exist at the Milledgeville or Mount Vernon nodes. For context, these nodes are outside of the Middle Ocmulgee Region, but the eastern parts of four counties in the Middle Ocmulgee Region drain into the Oconee River Basin. Model results for 2015 and 2050 in the Flint River Basin indicated that no potential gaps exist at the Montezuma node. For context, this node is outside of the Middle Ocmulgee Region, but the western parts of five counties in the Middle Ocmulgee Region drain into the Flint River Basin. 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 WD-1 through WD-3 and WS-1 through WS-9.

Municipal surface water withdrawals are primarily from the Ocmulgee River Basin (CDM Smith, 2017). Most of the regional surface water demand is driven by the energy and municipal sectors. As municipal water demand projections increase from 2015 to 2050 by approximately 21 MGD, increased withdrawal from existing reservoirs and/or additional municipal supply reservoirs may be needed in the Middle Ocmulgee 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). The Middle Ocmulgee Water Planning Council noted the need to evaluate existing reservoir storage for potential expansion (Management Practice WS3), as well as identify and evaluate potential new reservoirs (Management Practice WS4) (Middle Ocmulgee Water Planning Council, 2017).

Newton County (QWS) identified two potential new water supply sources within Newton County: Bear Creek and the Yellow River. Given Newton County's increased future ADD and decreased excess capacity (Table 3-1), these water supply sources are options for increased capacity.

Figure 3-3 displays the potential water storage options identified in Section 3.2.3 through Section 3.2.6. A potential reservoir location on the Yellow River was not identified, so it does not appear in Figure 3-3.

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. Newton, Butts, Jasper, Lamar, and Monroe Counties are above the fall line, and parts of Jones, Bibb, and Crawford Counties are above the fall line, while Peach, Houston, Twiggs, and Pulaski Counties are below the fall line. Existing reservoirs were screened for expansion potential and 16 reservoirs were identified in the report for potential expansion. Three of the 16 reservoirs are in the Middle Ocmulgee Region.

The Edie Creek-Barnesville Reservoir (Lamar County) was identified in the 2008 report as a possible candidate for expansion. The report estimated that the Edie Creek-Barnesville Reservoir could increase from 0.4 to 2.9 billion gallons of storage by raising the pool elevation 20 feet. This reservoir is used by the Barnesville QWS as a water supply reservoir. Given Barnesville's slightly decreased future ADD and slightly increased excess capacity (Table 3-1), increasing this reservoir's capacity may not be necessary.

The Tobesofkee Creek Reservoir (Monroe County) was identified in the 2008 report as a possible candidate for expansion. The report estimated that the Tobesofkee Creek Reservoir could increase from 0.26 to 9.94 billion gallons of storage by raising the pool elevation 40 feet. This reservoir is used by the Forsyth QWS as a water supply reservoir. Given Forsyth's increased future excess capacity (Table 3-1) due to increased water treatment plant (WTP) capacity, increasing this reservoir's capacity may not be necessary.

The Town Creek Reservoir (Jones County) was identified in the 2008 report as a possible candidate for expansion. The report estimated that the Town Creek Reservoir could increase from 8.7 to 11.95 billion gallons of storage by raising the pool elevation 10 feet. This reservoir is used by the Macon QWS as a water supply reservoir. Given Macon's increased future ADD and decreased excess capacity (Table 3-1), this reservoir may be an option for increased capacity.

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 Resource 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 Middle Ocmulgee Region has 6 watershed dams: 4 in Lamar County, 1 in Monroe County, and 1 in Bibb County. Of the region's watershed dams, 4 were part of the 166 prioritized watershed dams: Potato CR 078, Potato CR 115, Tobesofkee CR 41, and Tobesofkee CR 70. Two of these watershed dams, Potato CR 078 and Tobesofkee CR 70 located in Lamar County, were identified by GSWCC as a high-potential water supply reservoir in the 2009 study. The GSWCC issued individual reports for each of the 28 high-potential water supply reservoirs, and the two within the Middle Ocmulgee Region are detailed below:

- Potato CR 078. Construction of a larger dam to raise the pool level would increase the impoundment's surface area to approximately 310 acres and the safe yield to approximately 2 MGD (Schnabel 2009a). This watershed dam is located approximately 3 miles northwest of Milner and approximately 6 miles south of Griffin (Upper Flint Water Planning Region QWS).
- Tobesofkee CR 70. Construction of a larger dam to raise the pool level would increase the impoundment's surface area to approximately 550 acres and the safe yield to approximately 4.5 MGD (Schnabel 2009b). This watershed dam is located approximately 7 miles southeast of Barnesville and approximately 7 miles southwest of Forsyth.

Given that Milner purchases from Barnesville, and Barnesville has a slightly decreased future ADD (Table 3-1), Potato CR 078 is not a likely water supply reservoir for these QWS. However, Potato CR 078 may be a potential water supply reservoir for Griffin. Given Forsyth's increased future excess capacity (Table 3-1), Tobesofkee CR 70 is not a likely water supply reservoir for Forsyth.

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 Middle Ocmulgee Water Planning Region is bisected by the fall line, both the Piedmont and Coastal Plain geologic regions are present. 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 Piedmont geologic region, 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 Middle Ocmulgee 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 Jones County, an area of seemingly active quarries exists approximately 8 miles northeast of downtown Macon. The quarry's bedrock is undifferentiated granite gneiss and granite (Horton et al., 2017). Macon's and Jones County's (QWS) distribution systems are in the vicinity of the quarries. In Newton County, a potentially active quarry exists approximately 2.25 miles northwest of Oxford. The quarries' bedrock is undifferentiated granitic gneiss (Horton et al., 2017). Oxford's and Newton County Water-Sewerage Authority's distribution systems are in the vicinity of the quarry. Therefore, these quarries could serve as potential future water storage reservoirs.

In Peach County, a seemingly active quarry exists approximately 3.5 miles northeast of downtown Byron. The quarry is unconsolidated, undifferentiated sand and clay (Horton et al., 2017). Byron's distribution system is in the vicinity of the quarry. Given its sedimentary nature, this quarry is an unlikely candidate 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 Middle Ocmulgee RWP lists two management practices in regards to return flow reuse: 1) WS9: Promote and Evaluate Beneficial Reuse, specifically indirect potable reuse for reservoirs and non-potable reuse for irrigation; and 2) WQ6: Evaluate Constructed Treatment Wetlands (Beneficial Reuse) (Middle Ocmulgee Water Planning Council, 2017).

3.4 Current Interconnections Between Systems

Several QWS interconnections exist in the Middle Ocmulgee Region. Seventeen of 21 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.

Outside of Houston County, municipal groundwater systems are generally not interconnected in the Middle Ocmulgee Region due to the geographic distance between QWS and the relative ease of obtaining groundwater in this region below the Georgia fall line. With the exception of Monticello, surface water systems are interconnected in the Middle Ocmulgee Region due to the relatively higher cost and upkeep requirements of surface water reservoirs and WTPs.

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

Ten of the 21 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.

Six of the 21 QWS in this region utilize surface water sources. Raw water treatment for these QWS is more robust and can vary. Differences are mainly attributed to pumping from one of the multiple surface water systems. 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, Jones County withdrew 1.46 MGD in 2015, of which 0.24 MGD was provided to Gray. This 0.24 MGD is also reported for Gray, which is appropriate because both Jones County and Gray 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 Middle Ocmulgee 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 Middle Ocmulgee 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 Fort Valley, Gray, and Warner Robins. 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 apply to Covington, Milner, Newton County Water-Sewerage Authority, North Monroe County, Oxford, and South Monroe County.

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 Middle Ocmulgee Region, Risk G applied to Barnesville, Forsyth, Macon, and Newton County.

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 Middle Ocmulgee 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 not met for surface water QWS in the Middle Ocmulgee 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 Jones County and Gray do not experience an emergency) except for Risk H (drought).
- The 2050 available water supply accounts for additional capacity due to planned capital improvements. (Butts County/Jackson/Jenkinsburg, Byron, Forsyth, Jones County, and Warner Robins each 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, and G applied to the Middle Ocmulgee Region. Three QWS had a 2015 total demand deficit (i.e., 100% ADD): Forsyth, Macon, and Newton County. Newton County's capacity loss caused a 65% ADD deficit. Macon's capacity loss caused 65% ADD and 35% ADD deficits. Four QWS had a 2050 total demand deficit: Forsyth, Macon, Newton County, and Newton County Water-Sewerage Authority. Macon's and Newton County'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 Middle Ocmulgee 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. Macon and Newton County are

particularly vulnerable because with relatively high ADD values and no active incoming interconnections, Scenario G leaves each with a small available water supply.

Groundwater QWS in the Middle Ocmulgee 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 Middle Ocmulgee Region. As described in Section 5.4 and Table 5-2, four Middle Ocmulgee 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 Newton County Water-Sewerage Authority because they are a purchase-only QWS primarily supplied by Newton County. It is recommended that these two QWS evaluate where and when to upgrade infrastructure to meet Newton County Water-Sewerage Authority's increased projected 2050 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 Middle Ocmulgee Region, five types of projects are recommended: 1) new interconnection, 2) upgrade to existing interconnection, 3) backup generators to supply internal infrastructure redundancy, 4) new pumps to increase well withdrawal capacity to supply internal infrastructure redundancy, and 5) new raw water transmission main to supply internal infrastructure redundancy. Interconnection projects support the Middle Ocmulgee Water Planning Council's Management Practice WS6: Evaluate System Interconnections for Water Supply. Project Type 4 supports Management Practice WS7: Expand Existing Water Treatment Plant (Middle Ocmulgee Water Planning Council, 2017). 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.
- For backup generator projects, a "low" designation was applied; however, fuel storage, stormwater runoff control, and air permitting requirements should be considered. Cost and permitting requirements may increase depending on QWS-specific site conditions, electrical loading requirements, and electrical infrastructure layout.
- For new pumps to increase well withdrawal capacity projects, impacts due regional groundwater resource gaps were considered. This project type does not involve drilling or excavation. Designations were applied for regional resource gaps by aquifer: "low" was applied if no gaps were identified; "medium-low" was applied if aquifer withdrawals are within the aquifer's estimated sustainable yield; "medium-high" was applied if aquifer withdrawals are above the aquifer's estimated sustainable yield.
- 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. South Monroe County is a purchase-only QWS that has Macon as a sole supplier. In order to reflect potential withdrawal permit and purchased water impacts for these QWS, the maximum possible purchased water value from Macon was used because South Monroe County does not have a withdrawal permit. 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

Two interconnection projects were evaluated. QWS modifications for interconnection projects include connecting, metering, pumping, and operation and maintenance requirements of new pipelines 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 – Butts County/Jackson/Jenkinsburg and Barnesville QWS are interconnected along Highway 36 West. It is currently a 12-inch diameter, emergency-only, one-way interconnection into Barnesville. To upgrade the interconnection, the existing booster pump station and associated appurtenances would be updated to reverse flow through existing pipes. The upgrade would allow water to flow to Butts County/Jackson/Jenkinsburg during an emergency.
- Project 3 – Forsyth and South Monroe County QWS water mains are within 0.8 linear miles and one interconnection option exists along Montpelier Road. Figure 6-1 shows large-scale available mapping data for these QWS. Forsyth's existing pipe diameters in the area of interest are 8 inches and 12 inches. South Monroe County's existing pipe diameters in the area of interest are 8 inches. Approximately 4,224 feet of 8-inch diameter ductile iron pipe (DIP) is estimated for this project.

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, three of the recommended potential projects include the addition of a new generator to supply internal infrastructure redundancy. These projects specifically address emergency

scenario A1: power supply failure of the largest WTP. QWS modifications for generator projects include the ability to connect and store a backup generator. The maximum capacity added (in MGD) from a potential generator project was assumed to be the peak day design capacity of the WTP receiving the generator.

Project 4 is for three new submersible pumps to increase groundwater well withdrawal capacity. Gray's future available water supply is limited by relatively low-capacity pumps. Although Gray's 2015 ADD is below their permitted withdrawal limit by approximately 0.40 MGD, Gray's 2050 ADD exceeds their permitted withdrawal limit. Therefore, Gray will likely need to request a permit increase or establish additional raw or treated water sources.

Project 6 is a new raw water transmission main for Macon that will supply internal infrastructure redundancy in the event the Town Creek Reservoir fails. This project type can address emergency Risk D and Risk G. Although Macon lacks incoming interconnections, it holds permits to withdraw raw water from the Ocmulgee River and Town Creek Reservoir. Currently, water is pumped from the Ocmulgee River into the reservoir, and from the reservoir into the WTP. This potential project adds a raw water transmission main from the Ocmulgee River to the WTP, bypassing the 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 maximum flow value through a 60-inch diameter pipe, assuming a flow velocity of 3 feet per second. This is because the capacity added would be limited by the pipe parameters rather than the WTP peak day design capacity. Therefore, this capacity is more accurately described as "capacity not lost" because the capacity added does not increase Macon's peak day design capacity.

Project 8 is a new raw water transmission main for Newton County that will supply internal infrastructure redundancy in the event the Cornish Creek Reservoir fails. This project type can address emergency Risk D and Risk G. Although Newton County lacks incoming interconnections because it is a wholesale water supplier, it holds permits to withdraw raw water from the Alcovy River and Cornish Creek Reservoir. Currently, water is pumped from the Alcovy River into the reservoir, and from the reservoir into the WTP. This potential project adds a raw water transmission main from the Alcovy River to the WTP, bypassing the reservoir. 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 Newton County'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. For new pumps to increase well withdrawal capacity projects, it was assumed that procurement and installation would take

approximately 6 months. For generator projects, it was assumed that procurement and installation would take approximately 6 months. 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.

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

For generator projects, the generators considered have a standby rating, meaning they can supply power for short-term, defined durations, as opposed to a prime rating, which is meant for power needs when a system is not regularly wired to the electrical grid. QWS-specific electrical loads and configurations are needed to accurately scale and cost a generator. Therefore, a relationship between known QWS peak day design capacity and generator power was developed to estimate the generator power needed for a proposed project. Prices were then estimated based on generator power needed.

For new pump projects, RSMeans was used to estimate costs for submersible pumps that are specific to drinking water wells. The pumps considered can supply at least 100 gallons per minute, or 0.144 MGD. Well construction details and configurations are needed to accurately scale and cost a pump, and this information would be needed before a project can advance beyond this planning-level stage.

Applicable pipeline costs for new raw water transmission mains 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 Middle Ocmulgee 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 3 (Forsyth – South Monroe County interconnection) received a Criterion 4 score of 3 for Forsyth and 4 for South Monroe County. The assigned score was the average of these individual scores, resulting in a score of 3.5. 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. 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 the 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-one QWS in the Middle Ocmulgee 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 Middle Ocmulgee 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]
Lamar	Barnesville	GA1710000	9,400	1,300	Surface Water (3)	Butts County/Jackson/Jenkinsburg (2019)	-	Milner	-
Butts	Butts County/Jackson/Jenkinsburg	GA0350051	22,300	2,700	Surface Water (2)	-	Griffin	North Monroe County Barnesville Flovilla	-
Peach	Byron	GA2250000	8,500	0	Groundwater Wells (3)	-	-	-	-
Houston	Centerville	GA1530000	11,100	0	Groundwater Wells (3)	Houston County-Feagin Mill	-	-	-
Newton	Covington	GA2170001	17,200	0	Wholesale Purchase	Newton County	-	-	-
Monroe	Forsyth	GA2070001	8,000	2,000	Surface Water (1)	-	South Monroe County (2019)	-	North Monroe County (2015, 2017-2019)
Peach	Fort Valley	GA2250001	16,400	0	Groundwater Wells (6)	-	-	-	-
Jones	Gray	GA1690000	9,200	200	Groundwater Wells (7)	Jones County	-	Jones County	-
Pulaski	Hawkinsville	GA2350001	5,100	0	Groundwater Wells (2)	-	-	-	-
Houston	Houston County-Feagin Mill	GA1530021	46,800	25,800	Groundwater Wells (14)	-	-	Centerville Perry Warner Robins	-
Jones	Jones County	GA1690002	11,100	3,100	Groundwater Wells (9)	Macon Gray	-	Gray	-
Bibb	Macon	GA0210001	130,000	7,400	Surface Water (1)	-	-	South Monroe County Jones County	-
Lamar	Milner	GA1710001	1,300	0	Wholesale Purchase	Barnesville	-	-	-
Jasper	Monticello	GA1590000	2,700	0	Surface Water (3) Groundwater Wells (3)	-	-	-	-
Newton	Newton County Water-Sewerage Auth.	GA2170004	67,200	0	Wholesale Purchase	Newton County	-	-	-
Newton	Newton County	GA2170097	0	127,200	Surface Water (3)	-	-	Newton County Water-Sewage Auth. Covington Walton County Oxford Porterdale Mansfield Newborn Jasper County Alcovy Shores	-
Monroe	North Monroe County	GA2070072	2,500	0	Wholesale Purchase	Butts County/Jackson/Jenkinsburg	Forsyth	-	-
Newton	Oxford	GA2170020	2,100	0	Wholesale Purchase	Newton County	-	-	-
Houston	Perry	GA1530006	18,700	0	Groundwater Wells (4)	Houston County-Feagin Mill	-	-	-
Monroe	South Monroe County	GA2070074	5,700	0	Wholesale Purchase	Macon	-	-	Forsyth (2015, 2019)
Houston	Warner Robins	GA1530007	64,200	0	Groundwater Wells (14)	Houston County-Feagin Mill	-	-	-

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.

Prepared by: LCT 02/22/21
Checked by: GJH 02/24/21

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**
Lamar	Barnesville	9,400		◊		◊		
Butts	Butts County/Jackson/Jenkinsburg	22,300		◊	◊			
Peach	Byron	8,500		◊				
Houston	Centerville	11,100	◊					
Newton	Covington	17,200		◊	◊			
Monroe	Forsyth	8,000		◊				
Peach	Fort Valley	16,400		◊				
Jones	Gray	9,200		◊		◊		
Pulaski	Hawkinsville	5,100		◊				
Houston	Houston County-Feagin Mill	46,800	◊					
Jones	Jones County	11,100	◊					
Bibb	Macon	130,000			◊			
Lamar	Milner	1,300	◊					
Jasper	Monticello	2,700		◊				
Newton	Newton County Water-Sewerage Auth.	67,200		◊	◊			
Newton	Newton County	0		◊	◊			
Monroe	North Monroe County	2,500		◊				
Newton	Oxford	2,100		◊	◊			
Houston	Perry	18,700			◊			
Monroe	South Monroe County	5,700		◊				
Houston	Warner Robins	64,200				◊		

Notes:

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

Prepared by: LCT 02/22/21
Checked by: GJH 02/24/21

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**
Lamar	Barnesville	9,400	◊	◊	◊	◊	◊			◊	
Butts	Butts County/Jackson/Jenkinsburg	22,300	◊	◊	◊	◊	◊			◊	◊
Peach	Byron	8,500	◊	◊	◊		◊	◊		◊	◊
Houston	Centerville	11,100	◊		◊					◊	
Newton	Covington	17,200	◊		◊					◊	◊
Monroe	Forsyth	8,000	◊	◊	◊	◊	◊	◊		◊	
Peach	Fort Valley	16,400	◊		◊					◊	
Jones	Gray	9,200	◊		◊		◊			◊	
Pulaski	Hawkinsville	5,100	◊	◊	◊		◊	◊		◊	
Houston	Houston County-Feagin Mill	46,800	◊		◊					◊	◊
Jones	Jones County	11,100	◊		◊					◊	
Bibb	Macon	130,000	◊	◊	◊		◊	◊		◊	◊
Lamar	Milner	1,300	◊		◊						
Jasper	Monticello	2,700	◊	◊	◊		◊			◊	
Newton	Newton County Water-Sewerage Auth.	67,200	◊		◊					◊	◊
Newton	Newton County	0	◊	◊	◊		◊	◊			◊
Monroe	North Monroe County	2,500	◊		◊	◊					
Newton	Oxford	2,100	◊		◊		◊				◊
Houston	Perry	18,700	◊	◊	◊	◊	◊			◊	◊
Monroe	South Monroe County	5,700	◊		◊	◊				◊	
Houston	Warner Robins	64,200	◊		◊		◊			◊	◊

Notes:

Prepared by: LCT 02/22/21
Checked by: GJH 02/24/21

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.

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)
Lamar	Barnesville	Surface Water (3)	6.0	1.8	3.7	5.5	6.0	1.7	3.8
Butts	Butts County/ Jackson/Jenkinsburg	Surface Water (2)	5.0	2.3	2.7	11.75	11.0	3.6	7.4
Peach	Byron	Groundwater Wells (3)	3.3	0.8	2.5	1.3	4.3	0.9	3.3
Houston	Centerville	Groundwater Wells (3)	2.2	1.0	1.2	2.5	2.2	2.6	-0.5
Newton	Covington	Wholesale Purchase	NA	NA	NA	NA	NA	NA	NA
Monroe	Forsyth	Surface Water (1)	3.1	1.4	1.6	4.0	4.1	1.5	2.5
Peach	Fort Valley	Groundwater Wells (6)	7.8	1.4	6.4	4.0	7.8	1.8	6.0
Jones	Gray	Groundwater Wells (7)	0.3	0.3	0.0	0.75	0.3	0.8	-0.5
Pulaski	Hawkinsville	Groundwater Wells (2)	3.9	1.0	2.9	1.85	3.9	0.5	3.3
Houston	Houston County-Feagin Mill	Groundwater Wells (14)	27.2[(6)]	11.8	15.4	27.2	27.2	17.7	9.5
Jones	Jones County	Groundwater Wells (9)	3.1	1.5	1.6	2.5	3.9	1.3	2.7
Bibb	Macon	Surface Water (1)	60.0	22.4	37.6	173.0	60.0	25.3	34.7
Lamar	Milner	Wholesale Purchase	NA	NA	NA	NA	NA	NA	NA
Jasper	Monticello	Surface Water (3) Groundwater Wells (3)	2.6	0.4	0.7	1.125[(7)]	2.6	0.3	0.8
Newton	Newton County Water-Sewerage Auth.	Wholesale Purchase	NA	NA	NA	NA	NA	NA	NA
Newton	Newton County	Surface Water (3)	29.5	12.7	16.8	74.5	29.5	26.5	3.0
Monroe	North Monroe County	Wholesale Purchase	NA	NA	NA	NA	NA	NA	NA
Newton	Oxford	Wholesale Purchase	NA	NA	NA	NA	NA	NA	NA
Houston	Perry	Groundwater Wells (4)	6.0	1.8	4.2	6.15	6.0	4.5	1.5
Monroe	South Monroe County	Wholesale Purchase	NA	NA	NA	NA	NA	NA	NA
Houston	Warner Robins	Groundwater Wells (14)	21.8	7.3	14.4	14.5	27.1	15.4	11.7
Totals			**181.6**	**67.9**	**111.7**	**330.6**	**195.8**	**104.4**	**89.3**

Prepared by: GJH 05/12/21
Checked by: LCT 05/28/21

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.
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. Butts County/Jackson/Jenkinsburg indicated increasing a WTP by 6.0 MGD; Byron indicated adding a new 1.0 MGD well; Forsyth indicated increasing a WTP by 1.0 MGD; Jones County indicated adding two new wells summing to 0.874 MGD; Warner Robins indicated adding a new 1.0 MGD well and bringing a 4.32 MGD WTP (and its two wells) back online.
5. Municipal and publicly-supplied industrial demand by county were allocated to each QWS.
6. This value is assumed based on the current peak permitted withdrawal.
7. 0.75 MGD is for surface water; 0.375 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)
Lamar	Barnesville	1.76	0.00	0.00	1.76	1.72
Butts	Butts County/ Jackson/Jenkinsburg	2.27	0.00	0.00	2.27	3.55
Peach	Byron	0.77	0.00	0.00	0.77	0.94
Houston	Centerville	0.99	0.00	0.02	1.01	2.64
Newton	Covington	0.00	0.00	3.06	3.06	2.64
Monroe	Forsyth	1.43	0.00	0.00	1.43	1.49
Peach	Fort Valley	1.39	0.00	0.00	1.39	1.82
Jones	Gray	0.33	0.00	0.24	0.56	0.84
Pulaski	Hawkinsville	0.96	0.00	0.00	0.96	0.55
Houston	Houston County-Feagin Mill	11.83	0.00	0.00	11.83	17.67
Jones	Jones County	1.46	0.07	0.01	1.54	1.27
Bibb	Macon	22.37	0.00	0.00	22.37	25.27
Lamar	Milner	0.00	0.00	0.05	0.05	0.21
Jasper	Monticello	0.44	0.00	0.00	0.44	0.31
Newton	Newton County Water-Sewerage Auth.	0.00	0.00	4.95	4.95	13.95
Newton	Newton County	12.73	0.00	0.00	12.73	26.54
Monroe	North Monroe County	0.00	0.15	0.00	0.15	0.37
Newton	Oxford	0.00	0.00	0.19	0.19	0.44
Houston	Perry	1.85	0.00	0.31	2.16	4.47
Monroe	South Monroe County	0.00	0.46	0.00	0.46	0.84
Houston	Warner Robins	7.31	0.00	1.84	9.15	15.36
	Totals	**67.88**	**0.69**	**10.66**	**79.23**	**122.87**

Prepared by: GJH 05/20/21
Checked by: LCT 05/28/21

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)**
Lamar	Barnesville	GA1710000	1.8	1.1	0.6	1.7	1.1	0.6
Butts	Butts County/ Jackson/Jenkinsburg	GA0350051	2.3	1.5	0.8	3.6	2.3	1.2
Peach	Byron	GA2250000	0.8	0.5	0.3	0.9	0.6	0.3
Houston	Centerville	GA1530000	1.0	0.7	0.4	2.6	1.7	0.9
Newton	Covington	GA2170001	3.1	2.0	1.1	2.6	1.7	0.9
Monroe	Forsyth	GA2070001	1.4	0.9	0.5	1.5	1.0	0.5
Peach	Fort Valley	GA2250001	1.4	0.9	0.5	1.8	1.2	0.6
Jones	Gray	GA1690000	0.6	0.4	0.2	0.8	0.5	0.3
Pulaski	Hawkinsville	GA2350001	1.0	0.6	0.3	0.5	0.4	0.2
Houston	Houston County-Feagin Mill	GA1530021	11.8	7.7	4.1	17.7	11.5	6.2
Jones	Jones County	GA1690002	1.5	1.0	0.5	1.3	0.8	0.4
Bibb	Macon	GA0210001	22.4	14.5	7.8	25.3	16.4	8.8
Lamar	Milner	GA1710001	0.1	0.0	0.0	0.2	0.1	0.1
Jasper	Monticello	GA1590000	0.4	0.3	0.2	0.3	0.2	0.1
Newton	Newton County Water-Sewerage Auth.	GA2170004	4.9	3.2	1.7	13.9	9.1	4.9
Newton	Newton County	GA2170097	12.7	8.3	4.5	26.5	17.2	9.3
Monroe	North Monroe County	GA2070072	0.2	0.1	0.1	0.4	0.2	0.1
Newton	Oxford	GA2170020	0.2	0.1	0.1	0.4	0.3	0.2
Houston	Perry	GA1530006	2.2	1.4	0.8	4.5	2.9	1.6
Monroe	South Monroe County	GA2070074	0.5	0.3	0.2	0.8	0.5	0.3
Houston	Warner Robins	GA1530007	9.1	5.9	3.2	15.4	10.0	5.4
Totals			**79.2**	**51.5**	**27.7**	**122.9**	**79.9**	**43.0**

Prepared by: GJH 05/20/21

Checked by: LCT 05/28/21

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 evaluated

Table 5-1
Water Supply Risks and Emergency Scenarios

Water Supply Risk	Emergency Scenario	Type	Duration (Days)	Evaluation Selection Criteria	Key Assumptions
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 evaluated
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 12/22/20

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)**
Lamar	Barnesville	A1	8.8	1.8	1.1	0.6	0.0	0.0	0.0	9.8	1.7	1.1	0.6	0.0	0.0	0.0
		A2	11.6	1.8	1.1	0.6	0.0	0.0	0.0	12.6	1.7	1.1	0.6	0.0	0.0	0.0
		B	8.8	1.8	1.1	0.6	0.0	0.0	0.0	9.8	1.7	1.1	0.6	0.0	0.0	0.0
		C	11.6	1.8	1.1	0.6	0.0	0.0	0.0	12.6	1.7	1.1	0.6	0.0	0.0	0.0
		D1	12.6	1.8	1.1	0.6	0.0	0.0	0.0	13.5	1.7	1.1	0.6	0.0	0.0	0.0
		D2	12.6	1.8	1.1	0.6	0.0	0.0	0.0	13.5	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	6.1	1.8	1.1	0.6	0.0	0.0	0.0	7.1	1.7	1.1	0.6	0.0	0.0	0.0
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butts	Butts County/ Jackson/Jenkinsburg	A1	10.9	2.3	1.5	0.8	0.0	0.0	0.0	10.9	3.6	2.3	1.2	0.0	0.0	0.0
		A2	8.5	2.3	1.5	0.8	0.0	0.0	0.0	14.5	3.6	2.3	1.2	0.0	0.0	0.0
		B	6.9	2.3	1.5	0.8	0.0	0.0	0.0	6.9	3.6	2.3	1.2	0.0	0.0	0.0
		C	8.5	2.3	1.5	0.8	0.0	0.0	0.0	14.5	3.6	2.3	1.2	0.0	0.0	0.0
		D1	7.2	2.3	1.5	0.8	0.0	0.0	0.0	7.2	3.6	2.3	1.2	0.0	0.0	0.0
		D2	7.2	2.3	1.5	0.8	0.0	0.0	0.0	7.2	3.6	2.3	1.2	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
Peach	Byron	A1	3.8	0.8	0.5	0.3	0.0	0.0	0.0	5.0	0.9	0.6	0.3	0.0	0.0	0.0
		A2	3.3	0.8	0.5	0.3	0.0	0.0	0.0	4.3	0.9	0.6	0.3	0.0	0.0	0.0
		B	2.0	0.8	0.5	0.3	0.0	0.0	0.0	3.2	0.9	0.6	0.3	0.0	0.0	0.0
		C	3.3	0.8	0.5	0.3	0.0	0.0	0.0	4.3	0.9	0.6	0.3	0.0	0.0	0.0
		D1	2.0	0.8	0.5	0.3	0.0	0.0	0.0	3.2	0.9	0.6	0.3	0.0	0.0	0.0
		D2	2.0	0.8	0.5	0.3	0.0	0.0	0.0	3.2	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

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)**
Houston	Centerville	A1	3.6	1.0	0.7	0.4	0.0	0.0	0.0	3.6	2.6	1.7	0.9	0.0	0.0	0.0
		A2	4.1	1.0	0.7	0.4	0.0	0.0	0.0	4.1	2.6	1.7	0.9	0.0	0.0	0.0
		B	3.6	1.0	0.7	0.4	0.0	0.0	0.0	3.6	2.6	1.7	0.9	0.0	0.0	0.0
		C	4.1	1.0	0.7	0.4	0.0	0.0	0.0	4.1	2.6	1.7	0.9	0.0	0.0	0.0
		D1	3.6	1.0	0.7	0.4	0.0	0.0	0.0	3.6	2.6	1.7	0.9	0.0	0.0	0.0
		D2	3.6	1.0	0.7	0.4	0.0	0.0	0.0	3.6	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	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
Newton	Covington	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	7.0	3.1	2.0	1.1	0.0	0.0	0.0	7.0	2.6	1.7	0.9	0.0	0.0	0.0
		C	7.3	3.1	2.0	1.1	0.0	0.0	0.0	7.3	2.6	1.7	0.9	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
Monroe	Forsyth	A1	2.9	1.4	0.9	0.5	0.0	0.0	0.0	5.3	1.5	1.0	0.5	0.0	0.0	0.0
		A2	4.2	1.4	0.9	0.5	0.0	0.0	0.0	5.1	1.5	1.0	0.5	0.0	0.0	0.0
		B	2.9	1.4	0.9	0.5	0.0	0.0	0.0	2.9	1.5	1.0	0.5	0.0	0.0	0.0
		C	4.2	1.4	0.9	0.5	0.0	0.0	0.0	5.1	1.5	1.0	0.5	0.0	0.0	0.0
		D1	2.2	1.4	0.9	0.5	0.0	0.0	0.0	2.2	1.5	1.0	0.5	0.0	0.0	0.0
		D2	2.2	1.4	0.9	0.5	0.0	0.0	0.0	2.2	1.5	1.0	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	**1.1**	**1.4**	**0.9**	**0.5**	**0.3**	0.0	0.0	1.1	**1.5**	**1.0**	**0.5**	**0.4**	0.0	0.0
		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)**
Peach	Fort Valley	A1	8.6	1.4	0.9	0.5	0.0	0.0	0.0	8.6	1.8	1.2	0.6	0.0	0.0	0.0
		A2	7.8	1.4	0.9	0.5	0.0	0.0	0.0	7.8	1.8	1.2	0.6	0.0	0.0	0.0
		B	5.2	1.4	0.9	0.5	0.0	0.0	0.0	5.2	1.8	1.2	0.6	0.0	0.0	0.0
		C	7.8	1.4	0.9	0.5	0.0	0.0	0.0	7.8	1.8	1.2	0.6	0.0	0.0	0.0
		D1	5.6	1.4	0.9	0.5	0.0	0.0	0.0	5.6	1.8	1.2	0.6	0.0	0.0	0.0
		D2	5.6	1.4	0.9	0.5	0.0	0.0	0.0	5.6	1.8	1.2	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	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
Jones	Gray	A1	2.0	0.6	0.4	0.2	0.0	0.0	0.0	2.0	0.8	0.5	0.3	0.0	0.0	0.0
		A2	1.5	0.6	0.4	0.2	0.0	0.0	0.0	1.5	0.8	0.5	0.3	0.0	0.0	0.0
		B	1.7	0.6	0.4	0.2	0.0	0.0	0.0	1.7	0.8	0.5	0.3	0.0	0.0	0.0
		C	1.5	0.6	0.4	0.2	0.0	0.0	0.0	1.5	0.8	0.5	0.3	0.0	0.0	0.0
		D1	2.0	0.6	0.4	0.2	0.0	0.0	0.0	2.0	0.8	0.5	0.3	0.0	0.0	0.0
		D2	2.0	0.6	0.4	0.2	0.0	0.0	0.0	2.0	0.8	0.5	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
Pulaski	Hawkinsville	A1	1.7	1.0	0.6	0.3	0.0	0.0	0.0	3.7	0.5	0.4	0.2	0.0	0.0	0.0
		A2	3.9	1.0	0.6	0.3	0.0	0.0	0.0	3.9	0.5	0.4	0.2	0.0	0.0	0.0
		B	1.7	1.0	0.6	0.3	0.0	0.0	0.0	1.7	0.5	0.4	0.2	0.0	0.0	0.0
		C	3.9	1.0	0.6	0.3	0.0	0.0	0.0	3.9	0.5	0.4	0.2	0.0	0.0	0.0
		D1	1.8	1.0	0.6	0.3	0.0	0.0	0.0	1.8	0.5	0.4	0.2	0.0	0.0	0.0
		D2	1.8	1.0	0.6	0.3	0.0	0.0	0.0	1.8	0.5	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

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)**
Houston	Houston County-Feagin Mill	A1	27.5	11.8	7.7	4.1	0.0	0.0	0.0	26.8	17.7	11.5	6.2	0.0	0.0	0.0
		A2	29.5	11.8	7.7	4.1	0.0	0.0	0.0	28.7	17.7	11.5	6.2	0.0	0.0	0.0
		B	27.5	11.8	7.7	4.1	0.0	0.0	0.0	26.8	17.7	11.5	6.2	0.0	0.0	0.0
		C	29.5	11.8	7.7	4.1	0.0	0.0	0.0	28.7	17.7	11.5	6.2	0.0	0.0	0.0
		D1	27.8	11.8	7.7	4.1	0.0	0.0	0.0	27.0	17.7	11.5	6.2	0.0	0.0	0.0
		D2	27.8	11.8	7.7	4.1	0.0	0.0	0.0	27.0	17.7	11.5	6.2	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
Jones	Jones County	A1	6.0	1.5	1.0	0.5	0.0	0.0	0.0	7.2	1.3	0.8	0.4	0.0	0.0	0.0
		A2	3.7	1.5	1.0	0.5	0.0	0.0	0.0	4.6	1.3	0.8	0.4	0.0	0.0	0.0
		B	4.9	1.5	1.0	0.5	0.0	0.0	0.0	5.7	1.3	0.8	0.4	0.0	0.0	0.0
		C	3.7	1.5	1.0	0.5	0.0	0.0	0.0	4.6	1.3	0.8	0.4	0.0	0.0	0.0
		D1	4.9	1.5	1.0	0.5	0.0	0.0	0.0	5.7	1.3	0.8	0.4	0.0	0.0	0.0
		D2	4.9	1.5	1.0	0.5	0.0	0.0	0.0	5.7	1.3	0.8	0.4	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
Bibb	Macon	A1	70.2	22.4	14.5	7.8	0.0	0.0	0.0	72.0	25.3	16.4	8.8	0.0	0.0	0.0
		A2	60.0	22.4	14.5	7.8	0.0	0.0	0.0	60.0	25.3	16.4	8.8	0.0	0.0	0.0
		B	70.2	22.4	14.5	7.8	0.0	0.0	0.0	72.0	25.3	16.4	8.8	0.0	0.0	0.0
		C	60.0	22.4	14.5	7.8	0.0	0.0	0.0	60.0	25.3	16.4	8.8	0.0	0.0	0.0
		D1	22.2	22.4	14.5	7.8	0.2	0.0	0.0	24.0	25.3	16.4	8.8	1.3	0.0	0.0
		D2	22.2	22.4	14.5	7.8	0.2	0.0	0.0	24.0	25.3	16.4	8.8	1.3	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**	**22.4**	**14.5**	**7.8**	**22.4**	**14.5**	**7.8**	**0.0**	**25.3**	**16.4**	**8.8**	**25.3**	**16.4**	**8.8**
		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)**
Lamar	Milner	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	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.8	0.2	0.1	0.1	0.0	0.0	0.0
		C	1.8	0.1	0.0	0.0	0.0	0.0	0.0	1.8	0.2	0.1	0.1	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
Jasper	Monticello	A1	0.5	0.4	0.3	0.2	0.0	0.0	0.0	0.5	0.3	0.2	0.1	0.0	0.0	0.0
		A2	1.1	0.4	0.3	0.2	0.0	0.0	0.0	1.1	0.3	0.2	0.1	0.0	0.0	0.0
		B	0.5	0.4	0.3	0.2	0.0	0.0	0.0	0.5	0.3	0.2	0.1	0.0	0.0	0.0
		C	1.1	0.4	0.3	0.2	0.0	0.0	0.0	1.1	0.3	0.2	0.1	0.0	0.0	0.0
		D1	1.7	0.4	0.3	0.2	0.0	0.0	0.0	1.7	0.3	0.2	0.1	0.0	0.0	0.0
		D2	1.7	0.4	0.3	0.2	0.0	0.0	0.0	1.7	0.3	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
Newton	Newton County Water-Sewerage Authority	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	12.3	4.9	3.2	1.7	0.0	0.0	0.0	12.6	13.9	9.1	4.9	1.3	0.0	0.0
		C	13.3	4.9	3.2	1.7	0.0	0.0	0.0	**12.4**	**13.9**	**9.1**	**4.9**	**1.5**	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)**
Newton	Newton County	A1	16.3	12.7	8.3	4.5	0.0	0.0	0.0	18.1	26.5	17.2	9.3	8.4	0.0	0.0
		A2	29.5	12.7	8.3	4.5	0.0	0.0	0.0	29.5	26.5	17.2	9.3	0.0	0.0	0.0
		B	6.3	12.7	8.3	4.5	6.4	2.0	0.0	8.1	26.5	17.2	9.3	18.4	9.1	1.2
		C	29.5	12.7	8.3	4.5	0.0	0.0	0.0	29.5	26.5	17.2	9.3	0.0	0.0	0.0
		D1	8.0	12.7	8.3	4.5	4.8	0.3	0.0	12.2	26.5	17.2	9.3	14.4	5.1	0.0
		D2	8.0	12.7	8.3	4.5	4.8	0.3	0.0	12.2	26.5	17.2	9.3	14.4	5.1	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	**4.5**	**12.7**	**8.3**	**4.5**	**8.2**	**3.8**	0.0	**4.5**	**26.5**	**17.2**	**9.3**	**22.0**	**12.7**	**4.8**
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Monroe	North Monroe 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	1.9	0.2	0.1	0.1	0.0	0.0	0.0	2.8	0.4	0.2	0.1	0.0	0.0	0.0
		C	3.4	0.2	0.1	0.1	0.0	0.0	0.0	4.3	0.4	0.2	0.1	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
Newton	Oxford	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	4.0	0.2	0.1	0.1	0.0	0.0	0.0	1.5	0.4	0.3	0.2	0.0	0.0	0.0
		C	5.6	0.2	0.1	0.1	0.0	0.0	0.0	3.2	0.4	0.3	0.2	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)**
Houston	Perry	A1	22.7	2.2	1.4	0.8	0.0	0.0	0.0	16.9	4.5	2.9	1.6	0.0	0.0	0.0
		A2	21.7	2.2	1.4	0.8	0.0	0.0	0.0	15.8	4.5	2.9	1.6	0.0	0.0	0.0
		B	18.7	2.2	1.4	0.8	0.0	0.0	0.0	12.9	4.5	2.9	1.6	0.0	0.0	0.0
		C	21.7	2.2	1.4	0.8	0.0	0.0	0.0	15.8	4.5	2.9	1.6	0.0	0.0	0.0
		D1	19.5	2.2	1.4	0.8	0.0	0.0	0.0	13.7	4.5	2.9	1.6	0.0	0.0	0.0
		D2	19.5	2.2	1.4	0.8	0.0	0.0	0.0	13.7	4.5	2.9	1.6	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	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
Monroe	South Monroe 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	6.4	0.5	0.3	0.2	0.0	0.0	0.0	6.4	0.8	0.5	0.3	0.0	0.0	0.0
		C	7.5	0.5	0.3	0.2	0.0	0.0	0.0	7.5	0.8	0.5	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

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)**
Houston	Warner Robins	A1	37.9	9.1	5.9	3.2	0.0	0.0	0.0	37.6	15.4	10.0	5.4	0.0	0.0	0.0
		A2	39.0	9.1	5.9	3.2	0.0	0.0	0.0	37.5	15.4	10.0	5.4	0.0	0.0	0.0
		B	35.5	9.1	5.9	3.2	0.0	0.0	0.0	35.2	15.4	10.0	5.4	0.0	0.0	0.0
		C	39.0	9.1	5.9	3.2	0.0	0.0	0.0	37.5	15.4	10.0	5.4	0.0	0.0	0.0
		D1	35.7	9.1	5.9	3.2	0.0	0.0	0.0	35.4	15.4	10.0	5.4	0.0	0.0	0.0
		D2	35.7	9.1	5.9	3.2	0.0	0.0	0.0	35.4	15.4	10.0	5.4	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: GJH 06/07/21
Checked by: LCT 06/28/21

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**
Lamar	Barnesville	-	No recommended project	-	-	-	-	-	-
Butts	Butts County/ Jackson/ Jenkinsburg	1	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts County[1]	A1, A2, B, D1, D2	2.54	Low: less than 200 ft excavation	Barnesville: low Butts County: NA	High	Medium-low: multijurisdictional agreement.
Peach	Byron	-	No recommended project	-	-	-	-	-	-
Houston	Centerville	2	New generator: WTP/Well 101 or WTP/Wells 102/103	A1	1.08	Low	NA	NA	Low
Newton	Covington	-	No recommended project	-	-	-	-	-	-
Monroe	Forsyth	3	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	A1, A2, B, D1, D2, G	1.13	Medium-low: excavation greater than 200 but less than 5,000 ft	Forsyth: low South Monroe County: low	High	Medium-high: excavation greater than 200 but less than 5,000 ft; multijurisdictional agreement.
Peach	Fort Valley	-	No recommended project	-	-	-	-	-	-
Jones	Gray	4	New pumps to increase well withdrawal capacity	A2, D1, D2	0.43	Low: no regional groundwater resource gaps for crystalline rock aquifer	High[2]	Low	Low
Pulaski	Hawkinsville	-	No recommended project	-	-	-	-	-	-
Houston	Houston County-Feagin Mill	5	New generator: WTP/Wells 110/111	A1	4.09	Low	NA	NA	Low
Jones	Jones County	-	No recommended project	-	-	-	-	-	-
Bibb	Macon	6	New raw water transmission main: 1.5 miles	D1, D2, G	38.07	High: more than 5000 ft excavation	NA	NA	High: more than 5000 ft excavation
Lamar	Milner	-	No recommended project	-	-	-	-	-	-
Jasper	Monticello	7	New generator: Monticello WTP	A1	1.13	Low	NA	NA	Low
Newton	Newton County Water-Sewerage Auth.	-	No recommended project	-	-	-	-	-	-
Newton	Newton County	8	New raw water transmission main: 1.25 miles	D1, D2, G	25.0	High: more than 5000 ft excavation	NA	NA	High: more than 5000 ft excavation
Monroe	North Monroe County	-	No recommended project	-	-	-	-	-	-
Newton	Oxford	-	No recommended project	-	-	-	-	-	-
Houston	Perry	-	No recommended project	-	-	-	-	-	-
Monroe	South Monroe County	3	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	A1, A2, B, D1, D2, G	1.13	Medium-low: excavation greater than 200 but less than 5,000 ft	Forsyth: low South Monroe County: low	High	Medium-high: excavation greater than 200 but less than 5,000 ft; multijurisdictional agreement.
Houston	Warner Robins	-	No recommended project	-	-	-	-	-	-

Prepared by: GJH 08/16/21
Checked by: LCT 08/25/21

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

1. This is currently a one-way interconnection into Barnesville.
2. The 2015 ADD is below permitted withdrawal limits by approximately 0.40 MGD; however, when considering 2050 ADD, permitted withdrawal limits are insufficient. Therefore, withdrawal permit impacts are high when considering future conditions.

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)[1]
1	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts County	Butts County/Jackson/ Jenkinsburg	12	65	7.4	2.54
		Barnesville	12	60	3.8	0.00
3	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	Forsyth	12	75	2.5	1.13
		South Monroe County	8	40	NA[2]	1.13

Prepared by: GJH 08/16/21
Checked by: LCT 08/25/21

Notes:
MGD - million gallons per day
psi - pound-force per square inch
1. In the case of a project benefitting one system, the supplier's maximum capacity added is 0 MGD.
2. South Monroe County is a purchase-only QWS, and their supplier, Macon, has sufficient 2050 excess capacity (34.7 MGD).

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	Butts County/ Jackson/ Jenkinsburg	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts County	2.5	-	12-inch diameter DIP	-	-	-	$ 50,000	12 months
2	Centerville	New generator: WTP/Well 101 or WTP/Wells 102/103	1.08	-	-	-	(1) 200 KW generator	-	$ 61,500	6 months
3	Forsyth South Monroe County	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	1.13	4224	8-inch diameter DIP	$ 170	(1) control valve station	$ 39,050	$ 757,100	12 months
4	Gray	New pumps to increase well withdrawal capacity	0.43	-	Three 100 gpm (0.144 MGD) submersible pumps	$ 11,555	-	-	$ 34,700	6 months
5	Houston County-Feagin Mill	New generator: WTP/Wells 110/111	4.09	-	-	-	(1) 400 KW generator	-	$ 137,000	6 months
6	Macon	New raw water transmission main: 1.5 miles	38.1	7920	60-inch diameter DIP	$ 2,370	-	-	$ 18,770,400	12 months
7	Monticello	New generator: Monticello WTP	1.13	-	-	-	(1) 200 KW generator	-	$ 61,500	6 months
8	Newton County	New raw water transmission main: 1.25 miles	25.0	6600	60-inch diameter DIP	$ 2,370	-	-	$ 15,642,000	12 months

Prepared by: GJH 08/18/21
Checked by: LCT 08/25/21

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

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 - 50,000	50,000 - 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 08/18/21
Checked by: LCT 08/25/21

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	Butts County/ Jackson/ Jenkinsburg	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts County	Butts County/Jackson/ Jenkinsburg	1	25,000	2	A1, A2, B, D1, D2	3
2	Centerville	New generator: WTP/Well 101 or WTP/Wells 102/103	Centerville	1	11,100	2	A1	1
3	Forsyth South Monroe County	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	Forsyth South Monroe County	4	15,700	2	A1, A2, B, D1, D2, G	3
4	Gray	New pumps to increase well withdrawal capacity	Gray	1	9,400	1	A2, D1, D2	3
5	Houston County-Feagin Mill	New generator: WTP/Wells 110/111	Houston County-Feagin Mill	1	72,600	3	A1	1
6	Macon	New raw water transmission main: 1.5 miles	Macon	1	137,400	4	D1, D2, G	3
7	Monticello	New generator: Monticello WTP	Monticello	1	2,700	1	A1	1
8	Newton County	New raw water transmission main: 1.25 miles	Newton County	1	127,200	4	D1, D2, G	3

Notes:
MGD - million gallons per day
WTP - water treatment plant

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	Butts County/ Jackson/ Jenkinsburg	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts County	2.54	3.55	71%	-	3	$ 50,000	4
2	Centerville	New generator: WTP/Well 101 or WTP/Wells 102/103	1.08	2.64	41%	-	2	$ 61,500	4
3	Forsyth South Monroe County	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	1.13	Forsyth: 1.49 South Monroe County: 0.84	Forsyth: 76% South Monroe County: 135%	Forsyth: 3 South Monroe County: 4	3.5	$ 757,100	3
4	Gray	New pumps to increase well withdrawal capacity	0.43	0.84	51%	-	3	$ 34,700	4
5	Houston County-Feagin Mill	New generator: WTP/Wells 110/111	4.09	17.67	23%	-	1	$ 137,000	4
6	Macon	New raw water transmission main: 1.5 miles	38.07	25.27	151%	-	4	$ 18,770,400	1
7	Monticello	New generator: Monticello WTP	1.13	0.31	364%	-	4	$ 61,500	4
8	Newton County	New raw water transmission main: 1.25 miles	25.0	26.54	94%	-	4	$ 15,642,000	1

Notes:
MGD - million gallons per day
WTP - water treatment plant

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	Butts County/ Jackson/ Jenkinsburg	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts County	Low	4	Barnesville: low Butts County: NA	High	Medium-low	Withdrawal: 4 Water Quality: 1 Community: 3	2.7
2	Centerville	New generator: WTP/Well 101 or WTP/Wells 102/103	Low	4	NA	NA	Low	-	4
3	Forsyth South Monroe County	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	Medium-low	3	Forsyth: low South Monroe County: low	High	Medium-high	Withdrawal: (4+4)/2 = 4 Water Quality: 1 Community: 2	2.3
4	Gray	New pumps to increase well withdrawal capacity	Low	4	High	Low	Low	Withdrawal: 1 Water Quality: 4 Community: 4	3
5	Houston County-Feagin Mill	New generator: WTP/Wells 110/111	Low	4	NA	NA	Low	-	4
6	Macon	New raw water transmission main: 1.5 miles	High	1	NA	NA	High	-	1
7	Monticello	New generator: Monticello WTP	Low	4	NA	NA	Low	-	4
8	Newton County	New raw water transmission main: 1.25 miles	High	1	NA	NA	High	-	1

Notes:
MGD - million gallons per day
WTP - water treatment plant

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	Butts County/ Jackson/ Jenkinsburg	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts County	Barnesville: NA Butts County: (+) > 0.5	-	1	2.58	1	6	3	6	12	12	8	2	6.25
2	Centerville	New generator: WTP/Well 101 or WTP/Wells 102/103	none	-	4	2.75	1	6	1	4	12	12	12	8	7.00
3	Forsyth South Monroe County	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	Forsyth: (+) < 0.5 South Monroe County: NA	-	2	2.85	4	6	3	7	9	9	7	4	6.13
4	Gray	New pumps to increase well withdrawal capacity	none	-	4	2.88	1	3	3	6	12	12	9	8	6.75
5	Houston County-Feagin Mill	New generator: WTP/Wells 110/111	(-)	-	3	2.63	1	9	1	2	12	12	12	6	6.88
6	Macon	New raw water transmission main: 1.5 miles	(+) < 0.5	-	2	2.13	1	12	3	8	3	3	3	4	4.63
7	Monticello	New generator: Monticello WTP	(+) > 0.5	-	1	2.50	1	3	1	8	12	12	12	2	6.38
8	Newton County	New raw water transmission main: 1.25 miles	(-)	-	3	2.25	1	12	3	8	3	3	3	6	4.88

Prepared by: GJH 08/18/21
Checked by: LCT 08/25/21

Notes:
MGD - million gallons per day
WTP - water treatment plant

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	Butts County/ Jackson/ Jenkinsburg	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts	$ 19,701	$ 2.00	2.58	6.25	5
2	Centerville	New generator: WTP/Well 101 or WTP/Wells 102/103	$ 56,944	$ 5.54	2.75	7.00	1
3	Forsyth South Monroe County	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	$ 671,188	$ 48.22	2.85	6.13	6
4	Gray	New pumps to increase well withdrawal capacity	$ 80,324	$ 3.69	2.88	6.75	3
5	Houston County-Feagin Mill	New generator: WTP/Wells 110/111	$ 33,496	$ 1.89	2.63	6.88	2
6	Macon	New raw water transmission main: 1.5 miles	$ 493,050	$ 136.61	2.13	4.63	8
7	Monticello	New generator: Monticello WTP	$ 54,425	$ 22.78	2.50	6.38	4
8	Newton County	New raw water transmission main: 1.25 miles	$ 625,680	$ 122.97	2.25	4.88	7

Prepared by: GJH 08/18/21
Checked by: LCT 08/25/21

Notes:
WTP - water treatment plant

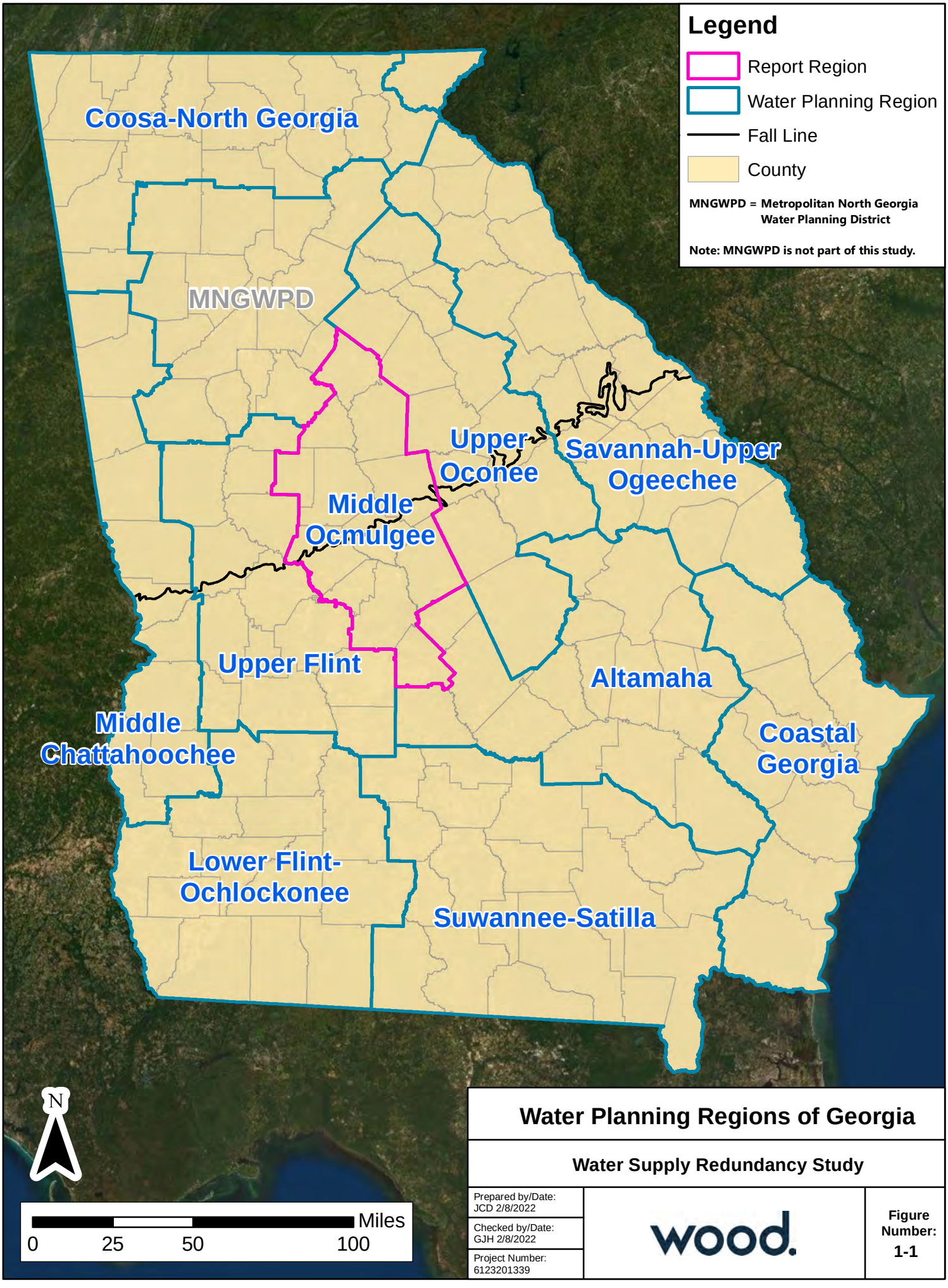
Table 7-4
Potential Projects Sorted by Final Rank Order

Project Number	Water System(s) Benefitted	Potential Project Description	Cost ($)	Final Rank
2	Centerville	New generator: WTP/Well 101 or WTP/Wells 102/103	$ 61,500	1
5	Houston County-Feagin Mill	New generator: WTP/Wells 110/111	$ 137,000	2
4	Gray	New pumps to increase well withdrawal capacity	$ 34,700	3
7	Monticello	New generator: Monticello WTP	$ 61,500	4
1	Butts County/ Jackson/ Jenkinsburg	Upgrade existing interconnection: Hwy 36 West; ability to send water from Barnesville to Butts	$ 50,000	5
3	Forsyth South Monroe County	Interconnection: Forsyth-South Monroe County; 0.8 mi along Montpelier Road	$ 757,100	6
8	Newton County	New raw water transmission main: 1.25 miles	$ 15,642,000	7
6	Macon	New raw water transmission main: 1.5 miles	$ 18,770,400	8

Prepared by: GJH 08/18/21
Checked by: LCT 08/25/21

Notes:
WTP - water treatment plant

FIGURES

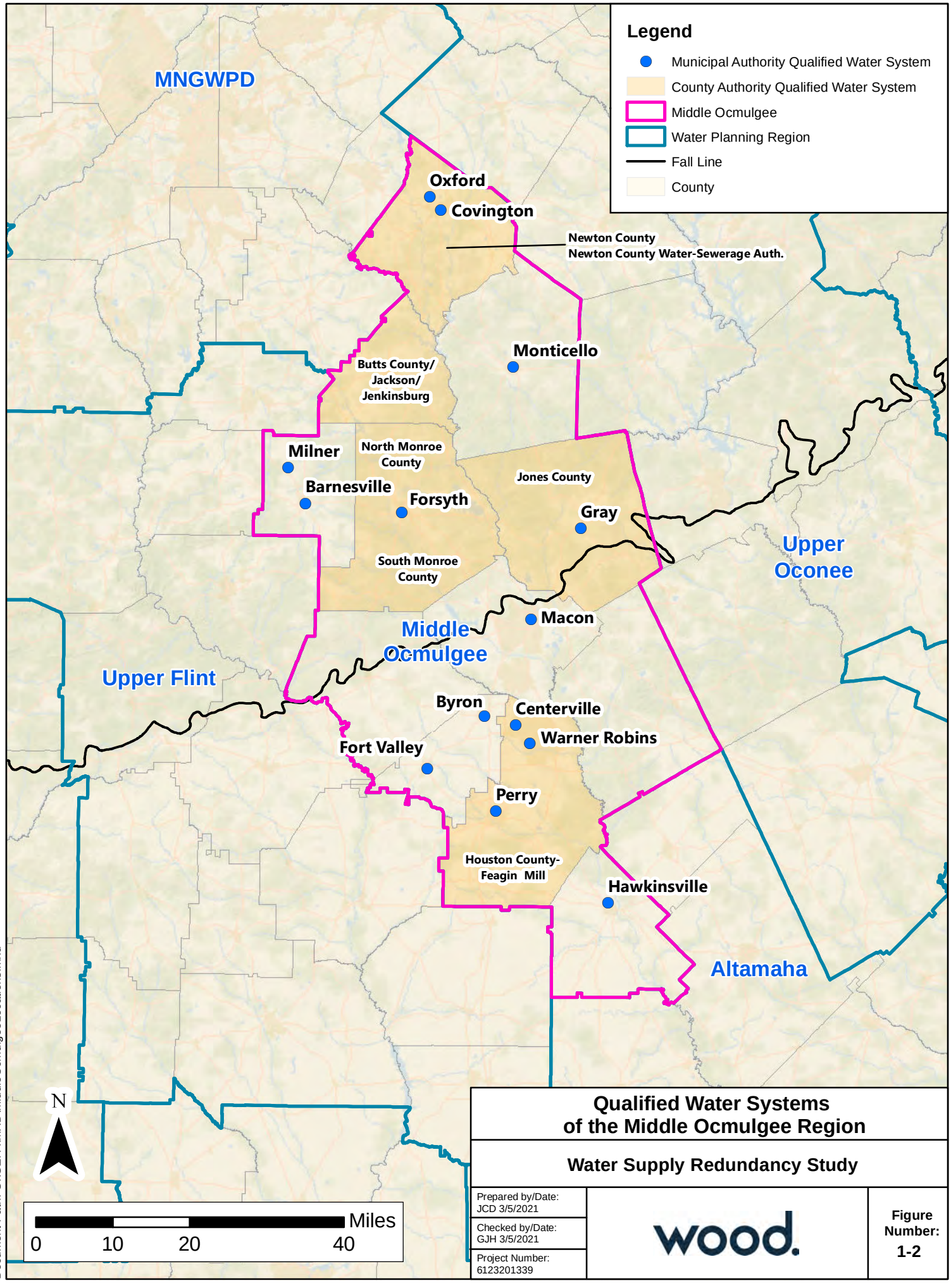


Water Planning Regions of Georgia

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\MidOcmulgeeRegion.mxd

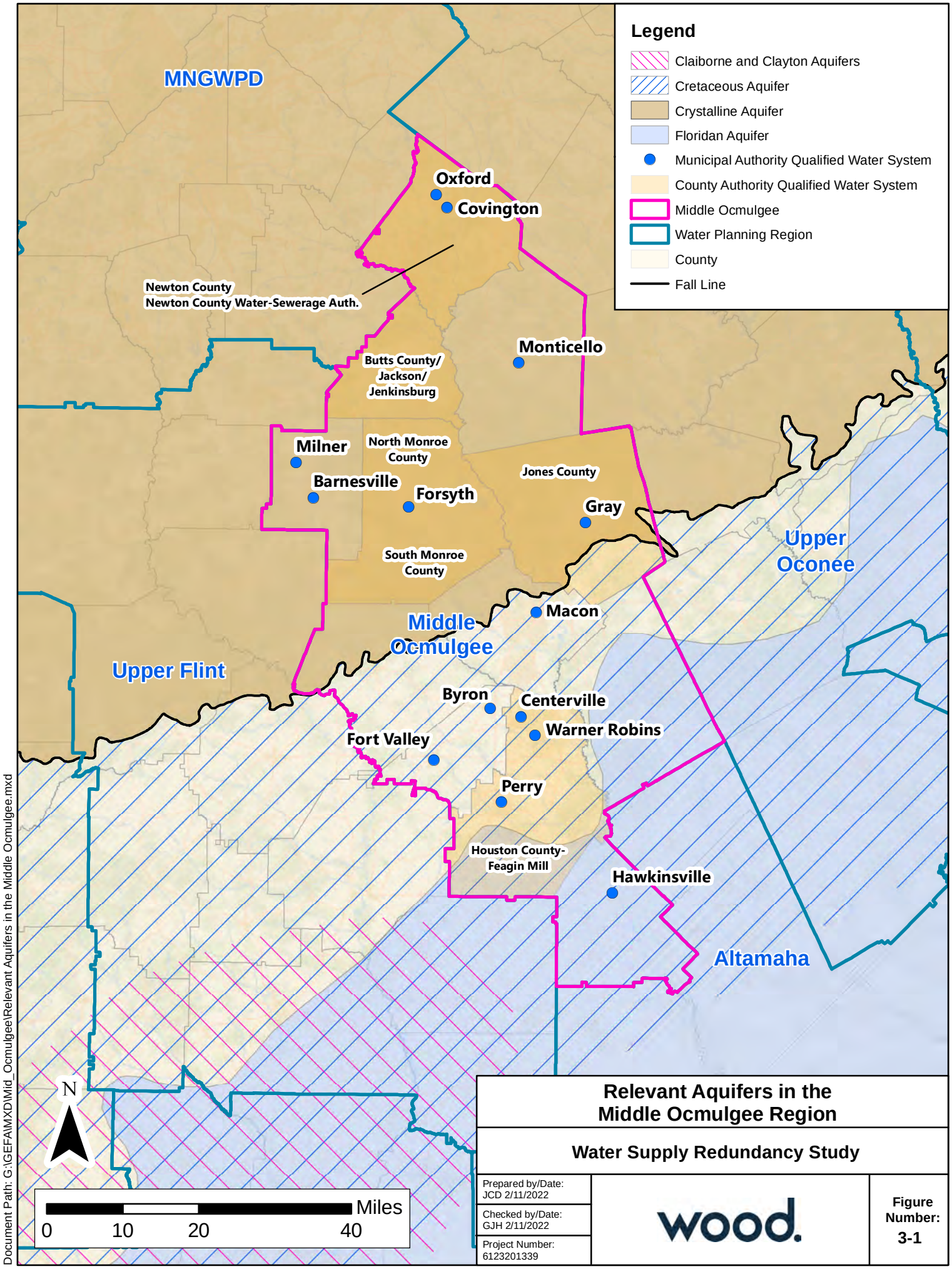


Qualified Water Systems of the Middle Ocmulgee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 3/5/2021	wood.	Figure Number: 1-2
Checked by/Date: GJH 3/5/2021		
Project Number: 6123201339		

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

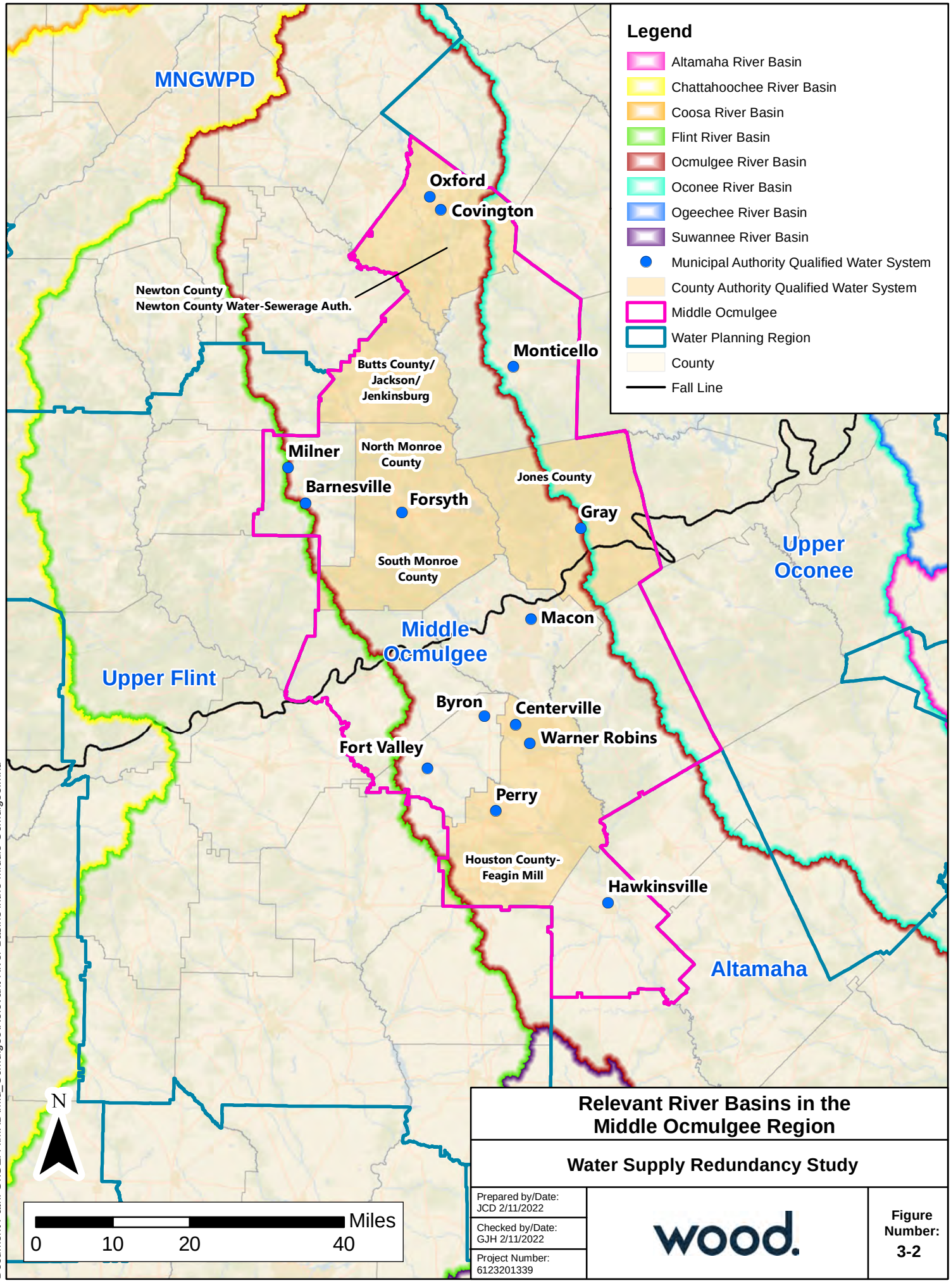


Relevant Aquifers in the Middle Ocmulgee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 2/11/2022	wood.	Figure Number: 3-1
Checked by/Date: GJH 2/11/2022		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\Mid_Ocmulgee\Relevant Aquifers in the Middle Ocmulgee.mxd

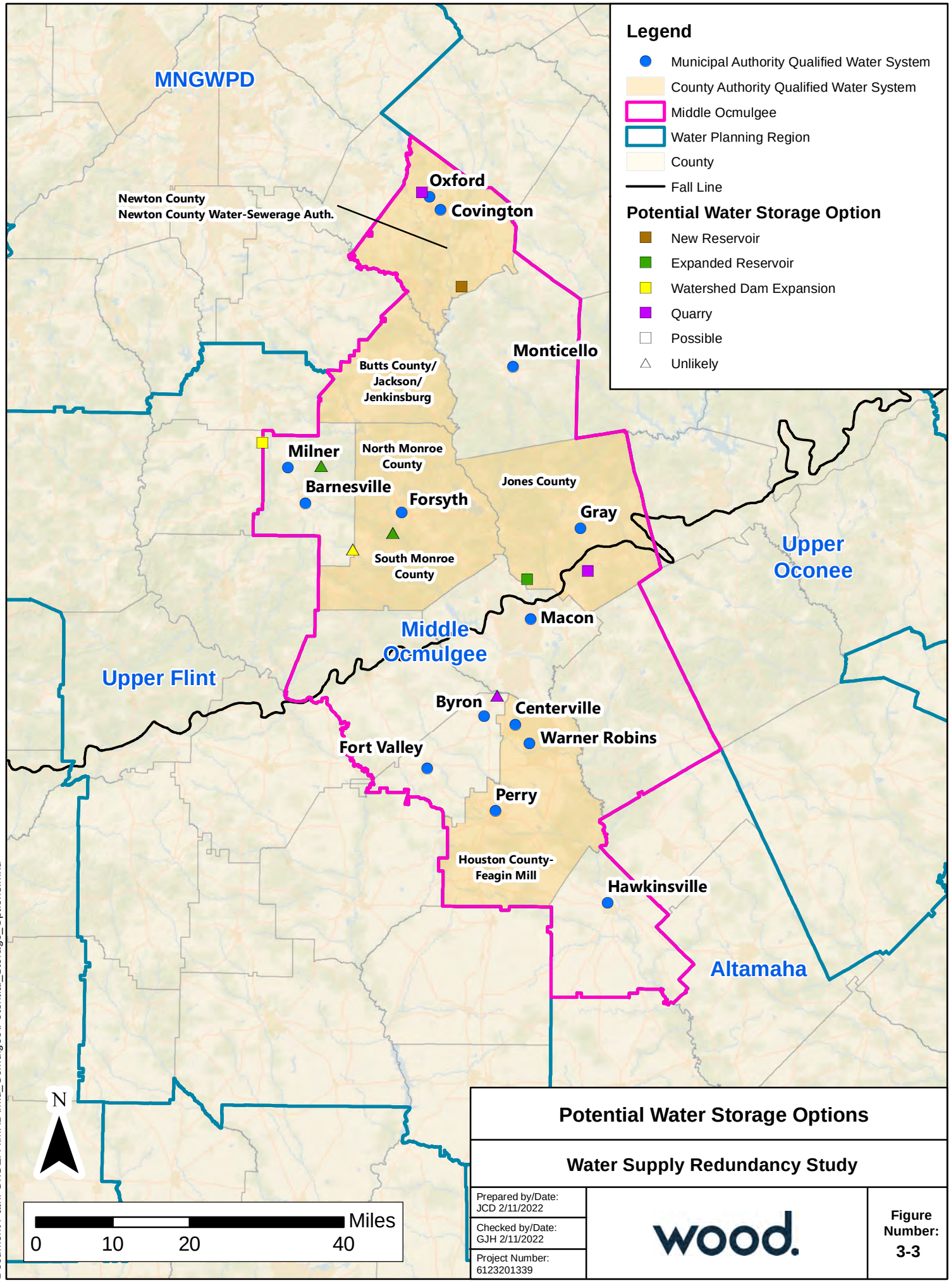


Relevant River Basins in the Middle Ocmulgee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 2/11/2022	
Checked by/Date: GJH 2/11/2022	
Project Number: 6123201339	wood.
	Figure Number: 3-2

Document Path: G:\GEFA\MXD\Mid_Ocmulgee\Relevant River Basins inthe Middle Ocmulgee.mxd


Legend
Municipal Authority Qualified Water System
County Authority Qualified Water System
Middle Ocmulgee
Water Planning Region
County
Fall Line
Potential Water Storage Option
New Reservoir
Expanded Reservoir
Watershed Dam Expansion
Quarry
Possible
Unlikely
MNGWPD
Newton County
Newton County Water-Sewerage Auth.
Oxford
Covington
Monticello
Butts County/
Jackson/
Jenkinsburg
Milner
North Monroe
County
Barnesville
Forsyth
Jones County
Gray
South Monroe
County
Upper
Oconee
Macon
Middle
Ocmulgee
Upper Flint
Byron
Centerville
Warner Robins
Fort Valley
Perry
Houston County-
Feagin Mill
Hawkinsville
Altamaha
N
0
10
20
40
Miles
Potential Water Storage Options
Water Supply Redundancy Study
Prepared by/Date:
JCD 2/11/2022
Checked by/Date:
GJH 2/11/2022
Project Number:
6123201339
wood.
Figure
Number:
3-3
Document Path: G:\GEFA\MXD\Mid_Ocmulgee\Potential_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.

Oxford
Covington
Newton County Water-Sewerage Auth.
Newton County-Mansfield
Monticello
Butts County
Barnesville
Forsyth
Gray
Jones County
Macon
Byron
Warner Robbins
Fort Valley
Perry
Hawkinsville

Water System
- Barnesville
- Butts County
- Byron
- Covington
- Forsyth
- Fort Valley
- Gray
- Hawkinsville
- Jones County
- Macon
- Monticello
- Newton County-Mansfield
- Newton County Water-Sewerage Auth.
- Oxford
- Perry
- Warner Robbins
- Water Planning Region

0 5 10 20 Miles

Available Mapping Data for Middle Ocmulgee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 5/25/2021	
Checked by/Date: GJH 5/25/2021	
Project Number: 6123201339	wood.
	Figure Number: 3-4

Document Path: G:\GEFA\MXD\middleOcmulgeeInterconnection.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.

Oxford
Newton County
Walton County
Rockdale County
Porterdale
Newton Co. Water-Sewage Auth
Covington
Alcovy Shores
Jasper County
Mansfield
Newborn
McDonough
Henry County
Butts County/ Jackson/Jenkinsburg
Monticello
Spalding County
Flovilla
Milner
North Monroe County
Barnesville
Forsyth
South Monroe County
Gray
Macon
Jones County
Byron
Centerville
Warner Robins
Fort Valley
Houston County-Feagin Mill
Perry
Hawkinsville

Water Planning Region
County
Interconnection
Claiborne and Clayton Aquifers
Cretaceous Aquifer
Crystalline Aquifer
Floridan Aquifer
Chattahoochee River Basin
Flint River Basin
Ocmulgee River Basin
Oconee River Basin
Suwannee River Basin

2050 Total Demand (MGD)
0 -1
1-5
5-15
> 15

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

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

N

0 4 8 16 Miles

Schematic of Key QWS Data for the Middle Ocmulgee Region

Water Supply Redundancy Study

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

Document Path: G:\GEFA\MXD\Mid_OcmulgeeMid_Ocmulgee_QWS_key_data.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.

Forsyth Tie-in

South Monroe Tie-in

Forsyth Mains
Diameter (in)
- 4
- 6
- 8
- 10
- 12
- Potential Interconnection

Feet
0 200 400 800

Forsyth and South Monroe County Potential Interconnection

Water Supply Redundancy Study

Prepared by/Date: JCD 8/30/2021	wood.	Figure Number: 6-1
Checked by/Date: GJH 8/30/2021		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\Forsyth and South Monroe County Potential Interconnection.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, Butts County/Jackson/Jenkinsburg indicated increasing a WTP by 6.0 MGD; Byron indicated adding a new 1.0 MGD well; Forsyth indicated increasing a WTP by 1.0 MGD; Jones County indicated adding two new wells summing to 0.874 MGD; and Warner Robins indicated adding a new 1.0 MGD well and bringing a 4.32 MGD WTP (and its two wells) back online.

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. Milner, Newton County, North Monroe County, and Oxford did not have 2015 water loss audit data. Milner, North Monroe County, and Oxford are purchase-only QWS, which do not require a 2015 ADD value. The Newton County 2015 ADD value was obtained during the data collection stage.

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 Middle Ocmulgee 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 21 QWS were used. For the other

seven QWS, values either do not appear or they appear anomalous in the 2019 Painter report. For these seven 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 (45.5 MGD) to obtain a QWS-specific percent. This percent was then applied to the 2050 RWP regional industrial projection (65.8 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 Middle Ocmulgee QWS because many QWS' ADD is less than 50% of their peak day design capacity. Regime (c) is also meaningful to the Middle Ocmulgee QWS because four QWS' 2050 ADD exceed 50% but remain below 100% of their peak day design capacity. Regime (d) Applies to one QWS' 2015 ADD and two 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. Gray has no excess capacity sufficiency, as defined by Regime (d). 2015 The QWS with the lowest 2015 excess capacity sufficiency, as defined by Regime (c), is Jones County. Centerville and Gray have no 2050 excess capacity sufficiency, as defined by Regime (d). The next four QWS with the lowest 2050 excess capacity sufficiency, as defined by Regime (c), are Jones County, Perry, Houston County-Feagin Mill, and Warner Robins.

References

CDM Smith, 2017. *Water and Wastewater Forecasting Technical Memorandum. Supplemental Material, Middle Ocmulgee 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]
Bibb	155,778	159,124	24.80
Butts	23,718	27,881	3.10
Crawford	12,453	9,408	0.70
Houston	152,213	224,438	35.10
Jasper	13,759	15,460	1.40
Jones	29,024	34,259	2.60
Lamar	18,233	24,161	2.90
Monroe	27,516	37,452	4.00
Newton	106,470	195,320	21.80
Peach	27,214	28,738	2.90
Pulaski	11,475	10,049	1.20
Twiggs	8,337	4,672	0.40
Totals	**586,190**	**770,962**	**100.90**

Prepared by: GJH 05/12/21
Checked by: LCT 05/28/21

Notes:
MGD - million gallons per day
1. Values are from the 2017 CDM Smith *Water and Wastewater Forecasting Technical Memorandum. Supplemental Material, Middle Ocmulgee 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]
Lamar	Barnesville	9,400	1,300	10,700		59%	1.70
Butts	Butts County/ Jackson/Jenkinsburg	22,300	2,700	25,000	◊	105%	3.27
Peach	Byron	8,500	0	8,500		31%	0.91
Houston	Centerville	11,100	0	11,100		7%	2.56
Newton	Covington	17,200	0	17,200		16%	3.52
Monroe	Forsyth	8,000	2,000	10,000		36%	1.45
Peach	Fort Valley	16,400	0	16,400		60%	1.75
Jones	Gray	9,200	200	9,400		32%	0.84
Pulaski	Hawkinsville	5,100	0	5,100		44%	0.53
Houston	Houston County-Feagin Mill	46,800	25,800	72,600		48%	16.74
Jones	Jones County	11,100	3,100	14,200		49%	1.27
Bibb	Macon	130,000	7,400	137,400	◊	88%	21.87
Lamar	Milner	1,300	0	1,300		7%	0.21
Jasper	Monticello	2,700	0	2,700		20%	0.27
Newton	Newton County Water-Sewerage Auth.	67,200	0	67,200		63%	13.76
Newton	Newton County	0	127,200	127,200	◊	119%	26.04
Monroe	North Monroe County	2,500	0	2,500		9%	0.36
Newton	Oxford	2,100	0	2,100		2%	0.43
Houston	Perry	18,700	0	18,700		12%	4.31
Monroe	South Monroe County	5,700	0	5,700		21%	0.83
Houston	Warner Robins	64,200	0	64,200		42%	14.80
	Totals	**459,500**	**169,700**	**629,200**	**-**	**-**	**117.44**

Prepared by: GJH 05/13/21

Checked by: LCT 05/28/21

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]	45.5 MGD
Regional Water Plan - 2050 Regional Industrial Projection[1]	65.8 MGD

Barnesville

Lamar County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.78	2.14	1.36
Commercial	0.00	0.22	0.22
Industrial	0.00	0.01	0.01
Water Loss	-	-	0.28
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.87
		Barnesville Public Supply (MGD)	1.86
		QWS's Percent of County's Public Supply (%)	99%
		QWS's Supplied Industrial Demand (MGD)	0.01
		2015 QWS Percent of Regional Industrial Demand (%)	0.02%
		2050 QWS Industrial Demand Estimate (MGD)	0.01

Butts County/Jackson/Jenkinsburg

Butts County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.00	1.72	1.72
Commercial	0.00	0.38	0.38
Industrial	0.00	0.22	0.22
Water Loss	-	-	0.42
Inter-County Delivery	-	-	0.12
		Total (MGD)	2.86
		Butts County/Jackson/Jenkinsburg Public Supply (MGD)	2.58
		QWS's Percent of County's Public Supply (%)	90%
		QWS's Supplied Industrial Demand (MGD)	0.20
		2015 QWS Percent of Regional Industrial Demand (%)	0.44%
		2050 QWS Industrial Demand Estimate (MGD)	0.29

Byron

Peach County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.69	2.03	1.34
Commercial	0.00	0.46	0.46
Industrial	0.20	0.28	0.08
Water Loss	-	-	0.43
Inter-County Delivery	-	-	0.00
		Total (MGD)	2.31
		Byron Public Supply (MGD)	0.77
		QWS's Percent of County's Public Supply (%)	33%
		QWS's Supplied Industrial Demand (MGD)	0.03
		2015 QWS Percent of Regional Industrial Demand (%)	0.06%
		2050 QWS Industrial Demand Estimate (MGD)	0.04

Centerville

Houston County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.61	16.36	15.75
Commercial	0.00	2.78	2.78
Industrial	2.69	3.95	1.26
Water Loss	-	-	3.96
Inter-County Delivery	-	-	0.00
		Total (MGD)	23.75
		Centerville Public Supply[3]	1.01
		QWS's Percent of County's Public Supply (%)	4%
		QWS's Supplied Industrial Demand (MGD)	0.05
		2015 QWS Percent of Regional Industrial Demand (%)	0.12%
		2050 QWS Industrial Demand Estimate (MGD)	0.08

Table A-3
2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Covington

Newton County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.30	7.65	6.35
Commercial	0.00	1.10	1.10
Industrial	0.00	0.48	0.48
Water Loss	-	-	5.80
Inter-County Delivery	-	-	4.38
		Total (MGD)	18.11
		Covington Public Supply[3]	5.80
		QWS's Percent of County's Public Supply (%)	32%
		QWS's Supplied Industrial Demand (MGD)	0.15
		2015 QWS Percent of Regional Industrial Demand (%)	0.34%
		2050 QWS Industrial Demand Estimate (MGD)	0.22

Forsyth

Monroe County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.96	2.35	1.39
Commercial	0.00	0.23	0.23
Industrial	0.00	0.02	0.02
Water Loss	-	-	0.06
Inter-County Delivery	-	-	-0.36
		Total (MGD)	1.34
		Forsyth Public Supply (MGD)	1.57
		QWS's Percent of County's Public Supply (%)	117%
		QWS's Supplied Industrial Demand (MGD)	0.02
		2015 QWS Percent of Regional Industrial Demand (%)	0.05%
		2050 QWS Industrial Demand Estimate (MGD)	0.03

Fort Valley

Peach County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.69	2.03	1.34
Commercial	0.00	0.46	0.46
Industrial	0.20	0.28	0.08
Water Loss	-	-	0.43
Inter-County Delivery	-	-	0.00
		Total (MGD)	2.31
		Fort Valley Public Supply (MGD)	1.52
		QWS's Percent of County's Public Supply (%)	66%
		QWS's Supplied Industrial Demand (MGD)	0.05
		2015 QWS Percent of Regional Industrial Demand (%)	0.12%
		2050 QWS Industrial Demand Estimate (MGD)	0.08

Gray

Jones County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.99	2.28	1.29
Commercial	0.00	0.14	0.14
Industrial	0.00	0.00	0.00
Water Loss	-	-	1.30
Inter-County Delivery	-	-	1.04
		Total (MGD)	3.77
		Gray Public Supply (MGD)	0.37
		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

Table A-3
2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Hawkinsville

Pulaski County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.45	1.09	0.64
Commercial	0.00	0.19	0.19
Industrial	0.30	0.31	0.01
Water Loss	-	-	0.25
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.09
		Hawkinsville Public Supply	1.01
		QWS's Percent of County's Public Supply (%)	93%
		QWS's Supplied Industrial Demand (MGD)	0.01
		2015 QWS Percent of Regional Industrial Demand (%)	0.02%
		2050 QWS Industrial Demand Estimate (MGD)	0.01

Houston County-Feagin Mill

Houston County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.61	16.36	15.75
Commercial	0.00	2.78	2.78
Industrial	2.69	3.95	1.26
Water Loss	-	-	3.96
Inter-County Delivery	-	-	0.00
		Total (MGD)	23.75
		Houston County-Feagin Mill (MGD)	12.05
		QWS's Percent of County's Public Supply (%)	51%
		QWS's Supplied Industrial Demand (MGD)	0.64
		2015 QWS Percent of Regional Industrial Demand (%)	1.41%
		2050 QWS Industrial Demand Estimate (MGD)	0.92

Jones County

Jones County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.99	2.28	1.29
Commercial	0.00	0.14	0.14
Industrial	0.00	0.00	0.00
Water Loss	-	-	1.30
Inter-County Delivery	-	-	1.04
		Total (MGD)	3.77
		Jones County Public Supply (MGD)	1.23
		QWS's Percent of County's Public Supply (%)	33%
		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

Macon

Bibb County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.65	15.95	14.30
Commercial	0.00	6.87	6.87
Industrial	19.92	21.90	1.98
Water Loss	-	-	0.98
Inter-County Delivery	-	-	-3.01
		Total (MGD)	21.12
		Macon Public Supply (MGD)	25.02
		QWS's Percent of County's Public Supply (%)	118%
		QWS's Supplied Industrial Demand (MGD)	2.35
		2015 QWS Percent of Regional Industrial Demand (%)	5.16%
		2050 QWS Industrial Demand Estimate (MGD)	3.39

Table A-3
2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Milner

Lamar County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.78	2.14	1.36
Commercial	0.00	0.22	0.22
Industrial	0.00	0.01	0.01
Water Loss	-	-	0.28
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.87
		Milner Public Supply (MGD)[3]	0.05
		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)	0.00

Monticello

Jasper County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.45	0.97	0.52
Commercial	0.00	0.17	0.17
Industrial	0.00	0.03	0.03
Water Loss	-	-	0.03
Inter-County Delivery	-	-	-0.07
		Total (MGD)	0.68
		Monticello Public Supply (MGD)	0.56
		QWS's Percent of County's Public Supply (%)	82%
		QWS's Supplied Industrial Demand (MGD)	0.02
		2015 QWS Percent of Regional Industrial Demand (%)	0.05%
		2050 QWS Industrial Demand Estimate (MGD)	0.04

Newton County Water-Sewerage Auth.

Newton County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.30	7.65	6.35
Commercial	0.00	1.10	1.10
Industrial	0.00	0.48	0.48
Water Loss	-	-	5.80
Inter-County Delivery	-	-	4.38
		Total (MGD)	18.11
		Newton County Water-Sewerage Auth. Public Supply (MGD)[3]	4.95
		QWS's Percent of County's Public Supply (%)	27%
		QWS's Supplied Industrial Demand (MGD)	0.13
		2015 QWS Percent of Regional Industrial Demand (%)	0.29%
		2050 QWS Industrial Demand Estimate (MGD)	0.19

Newton County

Newton County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.30	7.65	6.35
Commercial	0.00	1.10	1.10
Industrial	0.00	0.48	0.48
Water Loss	-	-	5.80
Inter-County Delivery	-	-	4.38
		Total (MGD)	18.11
		Newton County Public Supply (MGD)	12.87
		QWS's Percent of County's Public Supply (%)	71%
		QWS's Supplied Industrial Demand (MGD)	0.34
		2015 QWS Percent of Regional Industrial Demand (%)	0.75%
		2050 QWS Industrial Demand Estimate (MGD)	0.49

Table A-3
2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

North Monroe County

Monroe County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.96	2.35	1.39
Commercial	0.00	0.23	0.23
Industrial	0.00	0.02	0.02
Water Loss	-	-	0.06
Inter-County Delivery	-	-	-0.36
		Total (MGD)	1.34
		North Monroe County Public Supply (MGD)[3]	0.15
		QWS's Percent of County's Public Supply (%)	11%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.01%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

Oxford

Newton County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.30	7.65	6.35
Commercial	0.00	1.10	1.10
Industrial	0.00	0.48	0.48
Water Loss	-	-	5.80
Inter-County Delivery	-	-	4.38
		Total (MGD)	18.11
		Oxford Public Supply (MGD)[3]	0.19
		QWS's Percent of County's Public Supply (%)	1%
		QWS's Supplied Industrial Demand (MGD)	0.01
		2015 QWS Percent of Regional Industrial Demand (%)	0.01%
		2050 QWS Industrial Demand Estimate (MGD)	0.01

Perry

Houston County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.61	16.36	15.75
Commercial	0.00	2.78	2.78
Industrial	2.69	3.95	1.26
Water Loss	-	-	3.96
Inter-County Delivery	-	-	0.00
		Total (MGD)	23.75
		Perry Public Supply (MGD)	2.04
		QWS's Percent of County's Public Supply (%)	9%
		QWS's Supplied Industrial Demand (MGD)	0.11
		2015 QWS Percent of Regional Industrial Demand (%)	0.24%
		2050 QWS Industrial Demand Estimate (MGD)	0.16

South Monroe County

Monroe County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.96	2.35	1.39
Commercial	0.00	0.23	0.23
Industrial	0.00	0.02	0.02
Water Loss	-	-	0.06
Inter-County Delivery	-	-	-0.36
		Total (MGD)	1.34
		South Monroe County Public Supply (MGD)[3]	0.46
		QWS's Percent of County's Public Supply (%)	35%
		QWS's Supplied Industrial Demand (MGD)	0.01
		2015 QWS Percent of Regional Industrial Demand (%)	0.02%
		2050 QWS Industrial Demand Estimate (MGD)	0.01

Table A-3
2015 Withdrawal and Use Data by County and 2050 Industrial Demand Estimates

Warner Robins

Houston County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.61	16.36	15.75
Commercial	0.00	2.78	2.78
Industrial	2.69	3.95	1.26
Water Loss	-	-	3.96
Inter-County Delivery	-	-	0.00
		Total (MGD)	23.75
		Warner Robins Public Supply (MGD)	7.30
		QWS's Percent of County's Public Supply (%)	31%
		QWS's Supplied Industrial Demand (MGD)	0.39
		2015 QWS Percent of Regional Industrial Demand (%)	0.85%
		2050 QWS Industrial Demand Estimate (MGD)	0.56

Prepared by: GJH 05/20/21

Checked by: LCT 05/28/21

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, Middle Ocmulgee 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 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
Lamar	Barnesville	6.0	1.8	3.7	0.53	6.0	1.7	3.8	0.55
Butts	Butts County/ Jackson/Jenkinsburg	5.0	2.3	2.7	0.17	11.0	3.6	7.4	0.52
Peach	Byron	3.3	0.8	2.5	0.69	4.3	0.9	3.3	0.72
Houston	Centerville	2.2	1.0	1.2	0.15	2.2	2.6	-0.5	-
Newton	Covington	NA	NA	NA	NA	NA	NA	NA	NA
Monroe	Forsyth	3.1	1.4	1.6	0.12	4.1	1.5	2.5	0.41
Peach	Fort Valley	7.8	1.4	6.4	0.78	7.8	1.8	6.0	0.69
Jones	Gray	0.3	0.3	0.0	-	0.3	0.8	-0.5	-
Pulaski	Hawkinsville	3.9	1.0	2.9	0.67	3.9	0.5	3.3	0.84
Houston	Houston County-Feagin Mill	27.2(6)	11.8	15.4	0.23	27.2	17.7	9.5	-0.85
Jones	Jones County	3.1	1.5	1.6	0.09	3.9	1.3	2.7	0.52
Bibb	Macon	60.0	22.4	37.6	0.41	60.0	25.3	34.7	0.27
Lamar	Milner	NA	NA	NA	NA	NA	NA	NA	NA
Jasper	Monticello	2.6	0.4	0.7	0.37	2.6	0.3	0.8	0.62
Newton	Newton County Water-Sewerage Auth.	NA	NA	NA	NA	NA	NA	NA	NA
Newton	Newton County	29.5	12.7	16.8	0.24	29.5	26.5	3.0	-7.96
Monroe	North Monroe County	NA	NA	NA	NA	NA	NA	NA	NA
Newton	Oxford	NA	NA	NA	NA	NA	NA	NA	NA
Houston	Perry	6.0	1.8	4.2	0.55	6.0	4.5	1.5	-1.92
Monroe	South Monroe County	NA	NA	NA	NA	NA	NA	NA	NA
Houston	Warner Robins	21.8	7.3	14.4	0.49	27.1	15.4	11.7	-0.31
	Totals	**154.4**	**67.9**	**111.7**	**-**	**195.8**	**104.4**	**89.3**	**-**

Prepared by: GJH 05/20/21

Checked by: LCT 05/28/21

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.
2. Butts County/Jackson/Jenkinsburg indicated increasing a WTP by 6.0 MGD; Byron indicated adding a new 1.0 MGD well; Forsyth indicated increasing a WTP by 1.0 MGD; Jones County indicated adding two new wells summing to 0.874 MGD; Warner Robins indicated adding a new 1.0 MGD well and bringing a 4.32 MGD WTP (and its two wells) back online.
3. Municipal and publicly-supplied industrial demand by county were allocated to each QWS.

Appendix B: Water Supply Deficit Calcuations

Table B-1a
Barnesville Emergency Scenario Evaluation: 2015

				Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD-24-hour maximum)[3]							
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**Barnesville WTP**	**Edie Creek Reservoir**	**Big Towaliga Creek**	**Little Towaliga River**	**Maximum Possible Purchased Water (MGD)[4]**	**Water Storage (MGD)[5]**	**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	6.00	4.00	0.50	1.00	6.11	2.70	14.31	5.50	8.81
	A2. Critical asset failure at largest WTP[2]	0.1	30	6.00	4.00	0.50	1.00	6.11	NA	11.61	0.00	11.61
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	6.00	4.00	0.50	1.00	6.11	2.70	14.31	5.50	8.81
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	6.00	4.00	0.50	1.00	6.11	NA	11.61	0.00	11.61
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	6.00	4.00	0.50	1.00	6.11	6.47	18.08	5.50	12.58
	D2. Chemical contamination of largest raw water source	0.1	1	6.00	4.00	0.50	1.00	6.11	6.47	18.08	5.50	12.58
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	6.00	4.00	0.50	1.00	6.11	NA	11.61	5.50	6.11
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]						Not Applicable					

Notes:

Prepared by: GJH 06/01/21
Checked by: LCT 06/15/21

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

1. The WTP does not have a backup generator, rendering full capacity loss.
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. The interconnections with Butts County are limited by their peak day design capacity and 2015 ADD. The maximum possible purchased water value was calculated as the Spalding County (Griffin) interconnections plus Butts County's 2015 excess capacity.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage. Barnesville WTP has a 6 MGD raw water pond.
6. Barnesville/Edie Creek Reservoir is in Hydrologic Unit Code-10 "Lower Towaliga River," which is more than 100 square miles. Purchased water is still available because Spalding and Butts Counties would not suffer from Risk H.

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

Table B-1b
Barnesville 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	8.81	1.76	1.15	0.62	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	11.61	1.76	1.15	0.62	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	8.81	1.76	1.15	0.62	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	11.61	1.76	1.15	0.62	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	12.58	1.76	1.15	0.62	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	12.58	1.76	1.15	0.62	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	6.11	1.76	1.15	0.62	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: GJH 06/01/21
Checked by: LCT 06/15/21

Table B-1c
Barnesville 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)[4]	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Barnesville WTP	Edie Creek Reservoir	Big Towaliga Creek	Little Towaliga River					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP	0.5	1	6.00	4.00	0.50	1.00	7.05	2.70	15.25	5.50	9.75
	A2. Critical asset failure at largest WTP[2]	0.1	30	6.00	4.00	0.50	1.00	7.05	NA	12.55	0.00	12.55
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	6.00	4.00	0.50	1.00	7.05	2.70	15.25	5.50	9.75
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	6.00	4.00	0.50	1.00	7.05	NA	12.55	0.00	12.55
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	6.00	4.00	0.50	1.00	7.05	6.47	19.02	5.50	13.52
	D2. Chemical contamination of largest raw water source	0.1	1	6.00	4.00	0.50	1.00	7.05	6.47	19.02	5.50	13.52
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	6.00	4.00	0.50	1.00	7.05	NA	12.55	5.50	7.05
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought[6]	Not Applicable										

Notes:

Prepared by: GJH 06/01/21
Checked by: LCT 06/15/21

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

1. The WTP does not have a backup generator, rendering full capacity loss.
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. The interconnections with Spalding and Butts Counties are not limited by their ADDs, permit limits, or peak design capacities.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage. Barnesville WTP has a 6 MGD raw water pond.
6. Barnesville/Edie Creek Reservoir is in Hydrologic Unit Code-10 "Lower Towaliga River," which is more than 100 square miles. Purchased water is still available because Spalding and Butts Counties would not suffer from Risk H.

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

Table B-1d
Barnesville 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	9.75	1.72	1.12	0.60	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	12.55	1.72	1.12	0.60	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	9.75	1.72	1.12	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	12.55	1.72	1.12	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	13.52	1.72	1.12	0.60	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	13.52	1.72	1.12	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	7.05	1.72	1.12	0.60	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: GJH 06/01/21
Checked by: LCT 06/15/21

Table B-1e
Barnesville 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[3] 2015	Individual System Excess Capacity[3] 2050
1	GA0350051-Butts County/ Jackson/Jenkinsburg	Hwy 36 West	12	5	3.927	2.538	0.000	2.538	2.7	7.4
2	GA0350051-Butts County/ Jackson/Jenkinsburg	Truck Stop Way	8	5	1.745	1.128	0.000	1.128		
3	GA2550036-Spalding County[2]	Old Ga-41	8	5	1.745	1.128	0.000	1.128	16.3	13.4
4	GA2550036-Spalding County[2]	McKneely Road	8	5	1.745	1.128	0.000	1.128		
5	GA2550036-Spalding County[2]	Barnesville Road	8	5	1.745	1.128	0.000	1.128		

Prepared by: GJH 06/01/21
Checked by: LCT 06/15/21

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. Spalding County purchases its water from Griffin, which also maintains Spalding County’s water system assets.
3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-2a
Butts County/Jackson/Jenkinsburg Emergency Scenario Evaluation: 2015

				Peak Day Design Capacity (MGD)		Peak Permitted Withdrawal (MGD-24-hour maximum)[3]						
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**Burford WTP**	**Stewart WTP**	**Ocmulgee River (Burford WTP)**	**Towaliga River (Stewart WTP)**	**Maximum Possible Purchased Water (MGD)[4]**	**Water Storage (MGD)[5]**	**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	4.00	1.00	10.50	1.25	3.53	2.42	10.94	0.00	10.94
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.00	1.00	10.50	1.25	3.53	NA	8.53	0.00	8.53
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.00	1.00	10.50	1.25	3.53	2.42	10.94	4.00	6.94
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	4.00	1.00	10.50	1.25	3.53	NA	8.53	0.00	8.53
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.00	1.00	10.50	1.25	3.53	2.69	11.22	4.00	7.22
	D2. Chemical contamination of largest raw water source	0.1	1	4.00	1.00	10.50	1.25	3.53	2.69	11.22	4.00	7.22
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. Burford WTP has backup generators able to supply full capacity, rendering no capacity loss.
2. Burford 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. The interconnections with Henry and Spalding Counties are not limited by their permit withdrawal limits.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
6. They do not have an impoundment.
7. The Ocmulgee River at the withdrawal point is Strahler Stream Order 6 (a major river). Purchased water is assumed to still be available.

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

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-2b
Butts County/Jackson/Jenkinsburg 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	10.94	2.27	1.48	0.80	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	8.53	2.27	1.48	0.80	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	6.94	2.27	1.48	0.80	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	8.53	2.27	1.48	0.80	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	7.22	2.27	1.48	0.80	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	7.22	2.27	1.48	0.80	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-2c
Butts County/Jackson/Jenkinsburg 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)[4]	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Burford WTP	Stewart WTP	Ocmulgee River (Burford WTP)	Towaliga River (Stewart WTP)					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	10.00	1.00	10.50	1.25	3.53	2.42	16.94	6.00	10.94
	A2. Critical asset failure at largest WTP[2]	0.1	30	10.00	1.00	10.50	1.25	3.53	NA	14.53	0.00	14.53
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	10.00	1.00	10.50	1.25	3.53	2.42	16.94	10.00	6.94
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	10.00	1.00	10.50	1.25	3.53	NA	14.53	0.00	14.53
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	10.00	1.00	10.50	1.25	3.53	2.69	17.22	10.00	7.22
	D2. Chemical contamination of largest raw water source	0.1	1	10.00	1.00	10.50	1.25	3.53	2.69	17.22	10.00	7.22
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. Burford WTP has backup generators able to supply 4 MGD, which is the 2015 peak day design capacity. WTP upgrades may include additional backup power supply, but 6 MGD capacity loss was assumed to be conservative.
2. Burford 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. The interconnections with Henry and Spalding Counties are not limited by their permit withdrawal limits.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
6. They do not have an impoundment.
7. The Ocmulgee River at the withdrawal point is Strahler Stream Order 6 (a major river). Purchased water is assumed to still be available.

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

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-2d
Butts County/Jackson/Jenkinsburg 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	10.94	3.55	2.31	1.24	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	14.53	3.55	2.31	1.24	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	6.94	3.55	2.31	1.24	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	14.53	3.55	2.31	1.24	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	7.22	3.55	2.31	1.24	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	7.22	3.55	2.31	1.24	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	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-2e

Butts County/Jackson/Jenkinsburg 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[3] 2015	Individual System Excess Capacity[3] 2050
6	GA1510001-Henry County[2]	Hwy 42 North	6	5	0.982	0.635	0.000	0.635	24.1	36.7
7	GA1510001-Henry County[2]	Keys Ferry Road	6	5	0.982	0.635	0.000	0.635		
8	GA2550036-Spalding County[4]	Chappell Mill Road	8	5	1.745	1.128	0.000	1.128	16.3	13.4
9	GA2550036-Spalding County[4]	Old Jackson Road	8	5	1.745	1.128	0.000	1.128		

Prepared by: GJH 06/01/21

Checked by: LCT 06/23/21

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 excess capacity is estimated utilizing the current (40.5 MGD) and projected (64 MGD) peak day design capacities as well as the current (16.4 MGD) and projected (27.3 MGD) ADD found within the 2017 Ch2M and Black and Veatch *Water Resource Management Plan: Metropolitan North Georgia Water Planning District*.
3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.
4. Spalding County purchases its water from Griffin, which also maintains Spalding County's water system assets.

Table B-3a
Byron Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 101	WTP Well 102	WTP Well 103	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	0.58	0.97	1.73	NA	0.50	3.77	0.00	3.77
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.58	0.97	1.73	NA	NA	3.28	0.00	3.28
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.58	0.97	1.73	NA	0.50	3.77	1.73	2.04
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.58	0.97	1.73	NA	NA	3.28	0.00	3.28
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.58	0.97	1.73	NA	0.50	3.77	1.73	2.04
	D2. Chemical contamination of largest raw water source	0.1	1	0.58	0.97	1.73	NA	0.50	3.77	1.73	2.04
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 Well 103 has a backup generator able to supply full 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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-3b
Byron Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - 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	3.77	0.77	0.50	0.27	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.28	0.77	0.50	0.27	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.04	0.77	0.50	0.27	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	3.28	0.77	0.50	0.27	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.04	0.77	0.50	0.27	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.04	0.77	0.50	0.27	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-3c
Byron Emergency Scenario Evaluation: 2050

				Peak Day Design Capacity (MGD)								
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**WTP Well 101**	**WTP Well 102**	**WTP Well 103**	**New WTP**	**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	0.58	0.97	1.73	1.00	NA	0.68	4.95	0.00	4.95
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.58	0.97	1.73	1.00	NA	NA	4.28	0.00	4.28
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.58	0.97	1.73	1.00	NA	0.68	4.95	1.73	3.22
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.58	0.97	1.73	1.00	NA	NA	4.28	0.00	4.28
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.58	0.97	1.73	1.00	NA	0.68	4.95	1.73	3.22
	D2. Chemical contamination of largest raw water source	0.1	1	0.58	0.97	1.73	1.00	NA	0.68	4.95	1.73	3.22
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: GJH 06/01/21

Checked by: LCT 06/23/21

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

1. WTP Well 103 has a backup generator able to supply full 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. Byron indicated a new 0.3 MG treated water tank.

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

Table B-3d
Byron 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	4.95	0.94	0.61	0.33	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.28	0.94	0.61	0.33	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.22	0.94	0.61	0.33	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	4.28	0.94	0.61	0.33	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.22	0.94	0.61	0.33	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.22	0.94	0.61	0.33	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-4a
Centerville Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Maximum Possible Purchased Water (MGD)[3]	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 101	WTP Wells 102, 103					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.08	1.08	1.90	0.57	4.63	1.08	3.55
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.08	1.08	1.90	NA	4.06	0.00	4.06
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.08	1.08	1.90	0.57	4.63	1.08	3.55
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	1.08	1.08	1.90	NA	4.06	0.00	4.06
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.08	1.08	1.90	0.62	4.69	1.08	3.61
	D2. Chemical contamination of largest raw water source	0.1	1	1.08	1.08	1.90	0.62	4.69	1.08	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	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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. No backup generators are available, rendering full capacity loss of one WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Their interconnections with Houston County-Feagin Mill are not limited by their permit withdrawal limits.
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-4b
Centerville 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	3.55	1.01	0.67	0.36	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.06	1.01	0.67	0.36	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.55	1.01	0.67	0.36	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	1.01	0.67	0.36	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	1.01	0.67	0.36	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.61	1.01	0.67	0.36	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-4c
Centerville Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Maximum Possible Purchased Water (MGD)[3]	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 101	WTP Wells 102, 103					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.08	1.08	1.90	0.57	4.63	1.08	3.55
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.08	1.08	1.90	NA	4.06	0.00	4.06
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.08	1.08	1.90	0.57	4.63	1.08	3.55
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	1.08	1.08	1.90	NA	4.06	0.00	4.06
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.08	1.08	1.90	0.62	4.69	1.08	3.61
	D2. Chemical contamination of largest raw water source	0.1	1	1.08	1.08	1.90	0.62	4.69	1.08	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	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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. No backup generators are available, rendering full capacity loss of one WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Their interconnections with Houston County-Feagin Mill are not limited by their permit withdrawal limits.
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-4d
Centerville 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	3.55	2.64	1.71	0.92	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.06	2.64	1.71	0.92	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.55	2.64	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	4.06	2.64	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	3.61	2.64	1.71	0.92	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.61	2.64	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	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-4e
Centerville Interconnections

Existing Incoming Interconnections

Number	System	Description	Diameter (in)	Maximum Velocity (fps)[1]	Maximum Flow (cfs)[1]	Maximum Flow (MGD)[1]	Capacity Already Purchased (MGD)	Maximum Possible Purchased Water (MGD)	Individual System Excess Capacity[2]	
									2015	2050
10	GA1530021-Houston County-Feagin Mill	Master Meter 1	unknown	5	0.982	0.635	0.008	0.635	15.4	9.5
11	GA1530021-Houston County-Feagin Mill	Master Meter 2	unknown	5	0.982	0.635	0.008	0.635		
12	GA1530021-Houston County-Feagin Mill	Master Meter 3	unknown	5	0.982	0.635	0.008	0.635		

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
1. A 6-inch diameter interconnection was assumed. 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 potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-5a
Covington Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	7.33	2.25	9.58	2.54	7.04
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	7.33	NA	7.33	0.00	7.33
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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Covington's purchased water is all sourced from GA2170097-Newton County, despite having to pass through other purchase-only systems like Oxford and Newton County Water-Sewerage Authority. Purchased water is not limited by Newton County's permit withdrawal limits, peak day design capacity, or 2015 ADD.
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-5b
Covington 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)	7.04	3.06	1.99	1.07	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	7.33	3.06	1.99	1.07	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-5c
Covington Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	7.33	2.25	9.58	2.54	7.04
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	7.33	NA	7.33	0.00	7.33
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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Covington's purchased water is all sourced from GA2170097-Newton County, despite having to pass through other purchase-only systems like Oxford and Newton County Water-Sewerage Authority. Purchased water is not limited by Newton County's permit withdrawal limits, peak day design capacity, or 2050 ADD.
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-5d
Covington 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)	7.04	2.64	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	7.33	2.64	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	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-5e
Covington 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	Individual System Excess Capacity[3] 2050
13	GA2170097-Newton County	Williams Street Water Treatment Plant (Newton County's)	12	5	3.927	2.538	1.000	2.538	16.8	3.0
14	GA2170004-Newton County Water-Sewerage Auth.[4]	Alcovy Road - 1	10	5	2.727	1.763	0.600	1.763	27.0	27.7
15	GA2170004-Newton County Water-Sewerage Auth.[4]	Alcovy Road - 2	10	5	2.727	1.763	0.600	1.763		
16	GA2170004-Newton County Water-Sewerage Auth.[4]	Melody Drive and US Hwy 278	6	5	0.982	0.635	0.430	0.635		
17	GA2170020-Oxford[5]	Cook Road	6	5	0.982	0.635	0.430	0.635	16.8	3.0

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

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. Covington's 2015 purchases (3.06 MGD) were distributed logically among the interconnections.
3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.
4. Newton County Water-Sewerage Authority is a wholesale purchase system which utilizes Newton County and Rockdale County as water sources. Rockdale County excess capacity is estimated utilizing the current (22.1 MGD) and projected (43.7 MGD) peak day design capacities as well as the current (11.9 MGD) and projected (19.0 MGD) ADD found within the 2017 Ch2M and Black and Veatch *Water Resource Management Plan: Metropolitan North Georgia Water Planning District* . The cumulative excess capacity for the systems is listed here. Newton County Water-Sewerage Authority would act as a passthrough system.
5. Oxford is a wholesale purchase system which utilizes Covington and Newton County as water sources. The cumulative excess capacity for the non-Covington systems is listed here. Oxford would act as a passthrough system.

Table B-6a
Forsyth 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)[4]	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Russellville WTP Plant 1	Russellville WTP Plant 2	Tobesofkee Creek Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.04	2.03	4.00	1.13	0.75	4.95	2.03	2.92
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.04	2.03	4.00	1.13	NA	4.20	0.00	4.20
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.04	2.03	4.00	1.13	0.75	4.95	2.03	2.92
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.04	2.03	4.00	1.13	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	1.04	2.03	4.00	1.13	1.11	5.31	3.07	2.24
	D2. Chemical contamination of largest raw water source	0.1	1	1.04	2.03	4.00	1.13	1.11	5.31	3.07	2.24
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	0.05	30	1.04	2.03	4.00	1.13	NA	4.20	3.07	1.13
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable[6]									

Notes:

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. No backup generators are available, rendering full capacity loss of one 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. The interconnection with South Monroe County (purchase-only QWS) is not limited by their supplier, Macon.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
6. Tobesofkee Creek Reservoir is in Hydrologic Unit Code-10 "Tobesofkee Creek," which is more than 100 square miles. Purchased water is still available because South Monroe County and its supplier, Macon, would not suffer from Risk H.

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

Table B-6b
Forsyth 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	2.92	1.43	0.93	0.50	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.20	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)	2.92	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	4.20	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	2.24	1.43	0.93	0.50	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.24	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	1.13	1.43	0.93	0.50	0.31	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-6c
Forsyth 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)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Russellville WTP Plant 1	Russellville WTP Plant 2	Tobesofkee Creek Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.04	3.00	4.00	1.13	0.75	5.88	0.60	5.28
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.04	3.00	4.00	1.13	NA	5.13	0.00	5.13
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.04	3.00	4.00	1.13	0.75	5.88	3.00	2.88
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.04	3.00	4.00	1.13	NA	5.13	0.00	5.13
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.04	3.00	4.00	1.13	1.11	6.24	4.00	2.24
	D2. Chemical contamination of largest raw water source	0.1	1	1.04	3.00	4.00	1.13	1.11	6.24	4.00	2.24
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	0.05	30	1.04	3.00	4.00	1.13	NA	5.13	4.00	1.13
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable[6]									

Notes:

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. Forsyth indicated obtaining a backup generator. 20% capacity loss was assumed.
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. The interconnection with South Monroe County (purchase-only QWS) is not limited by their supplier, Macon.
5. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
6. Tobesofkee Creek Reservoir is in Hydrologic Unit Code-10 "Tobesofkee Creek," which is more than 100 square miles. Purchased water is still available because South Monroe County and its supplier, Macon, would not suffer from Risk H.

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

Table B-6d
Forsyth 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	5.28	1.49	0.97	0.52	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	5.13	1.49	0.97	0.52	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.88	1.49	0.97	0.52	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	5.13	1.49	0.97	0.52	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.24	1.49	0.97	0.52	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.24	1.49	0.97	0.52	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	1.49	0.97	0.52	0.36	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-6e
Forsyth 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
13	GA2070074-South Monroe County[3]	Bunn Road	8	5	1.745	1.128	0.000	1.128	37.6	34.7

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

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 potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.
3. South Monroe County is a wholesale purchase system which utilizes Macon County as a water source.
The cumulative excess capacity for the systems is listed here. South Monroe County would act as a passthrough system.

Table B-7a
Fort Valley 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 103, 104	WTP Wells 105, 106, 107	WTP Well 108					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.45	3.31	2.02	NA	0.78	8.56	0.00	8.56
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.45	3.31	2.02	NA	NA	7.78	0.00	7.78
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.45	3.31	2.02	NA	0.78	8.56	3.31	5.24
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.45	3.31	2.02	NA	NA	7.78	0.00	7.78
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.45	3.31	2.02	NA	1.19	8.96	3.31	5.65
	D2. Chemical contamination of largest raw water source	0.1	1	2.45	3.31	2.02	NA	1.19	8.96	3.31	5.65
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 backup generators able to supply full 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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-7b
Fort Valley 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	8.56	1.39	0.90	0.49	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	7.78	1.39	0.90	0.49	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	5.24	1.39	0.90	0.49	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	7.78	1.39	0.90	0.49	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	5.65	1.39	0.90	0.49	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	5.65	1.39	0.90	0.49	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-7c
Fort Valley 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 103, 104	WTP Wells 105, 106, 107	WTP Well 108					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.45	3.31	2.02	NA	0.78	8.56	0.00	8.56
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.45	3.31	2.02	NA	NA	7.78	0.00	7.78
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.45	3.31	2.02	NA	0.78	8.56	3.31	5.24
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.45	3.31	2.02	NA	NA	7.78	0.00	7.78
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.45	3.31	2.02	NA	1.19	8.96	3.31	5.65
	D2. Chemical contamination of largest raw water source	0.1	1	2.45	3.31	2.02	NA	1.19	8.96	3.31	5.65
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 backup generators able to supply full 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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-7d
Fort Valley 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	8.56	1.82	1.19	0.64	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	7.78	1.82	1.19	0.64	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	5.24	1.82	1.19	0.64	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	7.78	1.82	1.19	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	5.65	1.82	1.19	0.64	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	5.65	1.82	1.19	0.64	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-8a
Gray Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) Gray WTP (all seven wells)	Maximum Possible Purchased Water (MGD)[3]	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	0.33	1.15	0.83	2.30	0.33	1.98
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.33	1.15	NA	1.48	0.00	1.48
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[5]	0.1	1	0.33	1.15	0.83	2.30	0.58	1.73
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.33	1.15	NA	1.48	0.00	1.48
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.33	1.15	0.83	2.31	0.33	1.98
	D2. Chemical contamination of largest raw water source	0.1	1	0.33	1.15	0.83	2.31	0.33	1.98
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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. The WTP does not have a backup generator, rendering full capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Their interconnections with Jones County are not limited by Jones County's permit withdrawal limits.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Gray'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-8b
Gray 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	1.98	0.56	0.37	0.20	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.48	0.56	0.37	0.20	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.73	0.56	0.37	0.20	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	1.48	0.56	0.37	0.20	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.98	0.56	0.37	0.20	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.98	0.56	0.37	0.20	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-8c
Gray Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) Gray WTP (all seven wells)	Maximum Possible Purchased Water (MGD)[3]	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	0.33	1.15	0.83	2.30	0.33	1.98
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.33	1.15	NA	1.48	0.00	1.48
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[5]	0.1	1	0.33	1.15	0.83	2.30	0.58	1.73
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.33	1.15	NA	1.48	0.00	1.48
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.33	1.15	0.83	2.31	0.33	1.98
	D2. Chemical contamination of largest raw water source	0.1	1	0.33	1.15	0.83	2.31	0.33	1.98
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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. The WTP does not have a backup generator, rendering full capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Their interconnections with Jones County are not limited by Jones County's permit withdrawal limits.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Gray'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-8d
Gray 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	1.98	0.84	0.55	0.29	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.48	0.84	0.55	0.29	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.73	0.84	0.55	0.29	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	1.48	0.84	0.55	0.29	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.98	0.84	0.55	0.29	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.98	0.84	0.55	0.29	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-8e
Gray 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
14	GA1690002-Jones County	GA Hwy 129 & Lite-N-Tie Road	8	5	1.745	1.128	0.119	0.576	1.6	2.7
15	GA1690002-Jones County	GA Hwy 11 N & Weidner Drive	8	5	1.745	1.128	0.119	0.576		

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
NA - not applicable
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. Gray's 2015 purchases (0.238 MGD) were distributed logically among the interconnections.
3. Maximum flow values may differ because the QWS reported certain values as the maximum possible purchased water. The more conservative values were chosen.
4. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-9a
Hawkinsville 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 101	WTP Well 102					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.39	2.48	NA	0.36	4.23	2.48	1.75
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.39	2.48	NA	NA	3.87	0.00	3.87
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.39	2.48	NA	0.36	4.23	2.48	1.75
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.39	2.48	NA	NA	3.87	0.00	3.87
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.39	2.48	NA	0.38	4.26	2.48	1.77
	D2. Chemical contamination of largest raw water source	0.1	1	1.39	2.48	NA	0.38	4.26	2.48	1.77
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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. The largest WTP does not have a backup generator, rendering full 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

Table B-9b
Hawkinsville 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	1.75	0.96	0.62	0.34	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.87	0.96	0.62	0.34	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.75	0.96	0.62	0.34	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	3.87	0.96	0.62	0.34	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.77	0.96	0.62	0.34	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.77	0.96	0.62	0.34	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-9c
Hawkinsville 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 101	WTP Well 102					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.39	2.48	NA	0.36	4.23	0.50	3.74
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.39	2.48	NA	NA	3.87	0.00	3.87
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.39	2.48	NA	0.36	4.23	2.48	1.75
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.39	2.48	NA	NA	3.87	0.00	3.87
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.39	2.48	NA	0.38	4.26	2.48	1.77
	D2. Chemical contamination of largest raw water source	0.1	1	1.39	2.48	NA	0.38	4.26	2.48	1.77
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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. Hawkinsville indicated obtaining a backup generator. 20% capacity loss was assumed.
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-9d
Hawkinsville 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	3.74	0.55	0.36	0.19	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.87	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)	1.75	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	3.87	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	1.77	0.55	0.36	0.19	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.77	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-10a
Houston County-Feagin Mill Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Maximum Possible Purchased Water (MGD)[4]	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Wells 110, 111	WTP All Other Wells[3]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.09	23.11	2.26	2.13	31.59	4.09	27.50
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.09	23.11	2.26	NA	29.46	0.00	29.46
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.09	23.11	2.26	2.13	31.59	4.09	27.50
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	4.09	23.11	2.26	NA	29.46	0.00	29.46
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.09	23.11	2.26	2.38	31.84	4.09	27.75
	D2. Chemical contamination of largest raw water source	0.1	1	4.09	23.11	2.26	2.38	31.84	4.09	27.75
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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. The largest WTP does not have a backup generator, rendering full capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Only the capacity of the largest WTP is known. The value of all other wells is assumed based on the current peak permitted withdrawal.
4. Their interconnections with Perry are not limited by Perry's permit withdrawal limits.
5. 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-10b
Houston County-Feagin Mill 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	27.50	11.83	7.69	4.14	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	29.46	11.83	7.69	4.14	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	27.50	11.83	7.69	4.14	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	29.46	11.83	7.69	4.14	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	27.75	11.83	7.69	4.14	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	27.75	11.83	7.69	4.14	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-10c
Houston County-Feagin Mill Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Maximum Possible Purchased Water (MGD)[4]	Water Storage (MGD)[5]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Wells 110, 111	WTP All Other Wells[3]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.09	23.11	1.53	2.13	30.86	4.09	26.77
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.09	23.11	1.53	NA	28.73	0.00	28.73
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.09	23.11	1.53	2.13	30.86	4.09	26.77
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	4.09	23.11	1.53	NA	28.73	0.00	28.73
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.09	23.11	1.53	2.38	31.11	4.09	27.03
	D2. Chemical contamination of largest raw water source	0.1	1	4.09	23.11	1.53	2.38	31.11	4.09	27.03
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: GJH 06/01/21
Checked by: LCT 06/23/21

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

1. The largest WTP does not have a backup generator, rendering full capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Only the capacity of the largest WTP is known. The value of all other wells is assumed based on the current peak permitted withdrawal.
4. Their interconnections with Perry are limited by Perry's 2050 excess capacity.
5. 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-10d
Houston County-Feagin Mill 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	26.77	17.67	11.48	6.18	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	28.73	17.67	11.48	6.18	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	26.77	17.67	11.48	6.18	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	28.73	17.67	11.48	6.18	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	27.03	17.67	11.48	6.18	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	27.03	17.67	11.48	6.18	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: GJH 06/01/21
Checked by: LCT 06/23/21

Table B-10e
Houston County-Feagin Mill 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
16	GA1530006-Perry	Houston Lake Road and Lake Joy Road	8	5	1.745	1.128	0.00	1.128	4.2	1.5
17	GA1530006-Perry	Macon Road and Thompson Road	8	5	1.745	1.128	0.00	1.128		

Prepared by: GJH 06/01/21
Checked by: LCT 06/23/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
NA - not applicable
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 potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-11a
Jones County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)				Maximum Possible Purchased Water (MGD)[3]	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Wells 101-104	WTP Well 108	WTP Well 5	WTP Wells 106, 107, 109					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.91	0.65	0.36	1.14	0.66	2.31	6.03	0.00	6.03
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.91	0.65	0.36	1.14	0.66	NA	3.72	0.00	3.72
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.91	0.65	0.36	1.14	0.66	2.31	6.03	1.14	4.89
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.91	0.65	0.36	1.14	0.66	NA	3.72	0.00	3.72
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.91	0.65	0.36	1.14	0.66	2.35	6.07	1.14	4.93
	D2. Chemical contamination of largest raw water source	0.1	1	0.91	0.65	0.36	1.14	0.66	2.35	6.07	1.14	4.93
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: GJH 06/01/21
Checked by: LCT 06/28/21

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 generator able to supply full capacity, rendering no capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. The interconnections with Gray are limited by their peak day design capacity and 2015 ADD. The maximum possible purchased water value was calculated as the Macon interconnections plus Gray's regular 2015 sales to Jones County.
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-11b
Jones 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	6.03	1.54	1.00	0.54	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	3.72	1.54	1.00	0.54	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	4.89	1.54	1.00	0.54	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	3.72	1.54	1.00	0.54	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.93	1.54	1.00	0.54	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.93	1.54	1.00	0.54	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-11c
Jones County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)				Maximum Possible Purchased Water (MGD)[3]	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Wells 101-104	WTP Well 108 and New Well	WTP Well 5	WTP Wells 106, 107, 109, and New Well					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.91	1.15	0.36	1.51	0.66	2.61	7.20	0.00	7.20
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.91	1.15	0.36	1.51	0.66	NA	4.59	0.00	4.59
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.91	1.15	0.36	1.51	0.66	2.61	7.20	1.51	5.69
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.91	1.15	0.36	1.51	0.66	NA	4.59	0.00	4.59
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.91	1.15	0.36	1.51	0.66	2.65	7.24	1.51	5.74
	D2. Chemical contamination of largest raw water source	0.1	1	0.91	1.15	0.36	1.51	0.66	2.65	7.24	1.51	5.74
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: GJH 06/01/21
Checked by: LCT 06/28/21

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 generator able to supply full capacity, rendering no capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. The interconnections with Gray are limited by their peak day design capacity and 2050 ADD. The maximum possible purchased water value was calculated as the Macon interconnections plus Gray's regular 2015 sales to Jones County.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage. Jones County indicated a new 0.5 MG finished water tank.

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

Table B-11d
Jones 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	7.20	1.27	0.83	0.45	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	4.59	1.27	0.83	0.45	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	5.69	1.27	0.83	0.45	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	4.59	1.27	0.83	0.45	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	5.74	1.27	0.83	0.45	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	5.74	1.27	0.83	0.45	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-11e
Jones 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
14	GA1690000-Gray	Ga Hwy 129 & Lite-N-Tie Road	8	5	1.745	1.128	0.004	0.576	0.0	-0.5
15	GA1690000-Gray	Ga Hwy 11 N & Weidner Drive	8	5	1.745	1.128	0.004	0.576		
18	GA0210001-Macon	Sun Valley Drive	1	5	0.027	0.018	0.011	0.018	37.6	34.7
19	GA0210001-Macon	Towncreek Plant	6	5	0.982	0.635	0.063	0.635		

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

Notes:
in - inches
fps - feet per second
cfs - cubic feet per second
MGD - million gallons per day
NA - not applicable
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. Jones County's 2015 purchases were distributed logically among the interconnections.
3. Maximum flow values may differ because the QWS reported certain values as the maximum possible purchased water. The more conservative values were chosen.
4. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-12a
Macon 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)
				Amerson WTP	Ocmulgee River	Javors Lucas Lake / Town Creek Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	60.00	110.00	63.00	NA	10.16	70.16	0.00	70.16
	A2. Critical asset failure at largest WTP[2]	0.1	30	60.00	110.00	63.00	NA	NA	60.00	0.00	60.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[5]	0.1	1	60.00	110.00	63.00	NA	10.16	70.16	0.00	70.16
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	60.00	110.00	63.00	NA	NA	60.00	0.00	60.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	60.00	110.00	63.00	NA	22.16	82.16	60.00	22.16
	D2. Chemical contamination of largest raw water source	0.1	1	60.00	110.00	63.00	NA	22.16	82.16	60.00	22.16
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	60.00	110.00	63.00	NA	NA	60.00	60.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable[6]									

Notes:

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

1. Backup generators are able to supply full capacity, rendering no capacity loss.
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. The WTP has two outgoing transmission mains, rendering no capacity loss.
6. Javors Lucas Lake is in Hydrologic Unit Code-10 "Walnut Creek-Ocmulgee River," which is more than 100 square miles.

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

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-12b
Macon 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	70.16	22.37	14.54	7.83	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	60.00	22.37	14.54	7.83	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	70.16	22.37	14.54	7.83	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	60.00	22.37	14.54	7.83	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	22.16	22.37	14.54	7.83	0.21	0.00	0.00
	D2. Chemical contamination of largest raw water source	22.16	22.37	14.54	7.83	0.21	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	22.37	14.54	7.83	22.37	14.54	7.83
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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-12c
Macon 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)
				Amerson WTP	Ocmulgee River	Javors Lucas Lake / Town Creek Reservoir					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	60.00	110.00	63.00	NA	11.96	71.96	0.00	71.96
	A2. Critical asset failure at largest WTP[2]	0.1	30	60.00	110.00	63.00	NA	NA	60.00	0.00	60.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)[5]	0.1	1	60.00	110.00	63.00	NA	11.96	71.96	0.00	71.96
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	60.00	110.00	63.00	NA	NA	60.00	0.00	60.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	60.00	110.00	63.00	NA	23.96	83.96	60.00	23.96
	D2. Chemical contamination of largest raw water source	0.1	1	60.00	110.00	63.00	NA	23.96	83.96	60.00	23.96
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	0.05	30	60.00	110.00	63.00	NA	NA	60.00	60.00	0.00
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable[6]									

Notes:

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

1. Backup generators are able to supply full capacity, rendering no capacity loss.
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. Macon indicated a new 3 MG finished water tank.
5. The WTP has two outgoing transmission mains, rendering no capacity loss.
6. Javors Lucas Lake is in Hydrologic Unit Code-10 "Walnut Creek-Ocmulgee River," which is more than 100 square miles.

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

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-12d
Macon 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	71.96	25.27	16.42	8.84	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	60.00	25.27	16.42	8.84	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	71.96	25.27	16.42	8.84	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	60.00	25.27	16.42	8.84	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	23.96	25.27	16.42	8.84	1.31	0.00	0.00
	D2. Chemical contamination of largest raw water source	23.96	25.27	16.42	8.84	1.31	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	25.27	16.42	8.84	25.27	16.42	8.84
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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-13a
Milner Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	1.76	0.15	1.91	1.13	0.78
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	1.76	NA	1.76	0.00	1.76
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: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Milner's interconnections with Barnesville are not limited by Barnesville's permit withdrawal limits.
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-13b
Milner 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)	0.78	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	1.76	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-13c
Milner Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	1.76	0.15	1.91	1.13	0.78
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	1.76	NA	1.76	0.00	1.76
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: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Milner's interconnections with Barnesville are not limited by Barnesville's permit withdrawal limits.
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-13d
Milner 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)	0.78	0.21	0.13	0.07	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	1.76	0.21	0.13	0.07	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-13e
Milner 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
20	GA1710000-Barnesville	Master Meter 1	6	5	0.982	0.635	0.025	0.635	3.7	3.8
21	GA1710000-Barnesville	Master Meter 2	8	5	1.745	1.128	0.025	1.128		

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

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 daily capacity (0.05 MGD) was assumed to be distributed equally between the two interconnections.
3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-14a
Monticello Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Monticello WTP	City Reservoir / Lowry Branch / Pope's Branch (24-hr maximum)	Groundwater Withdrawal (monthly average)					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.56	0.75	0.375	NA	0.45	1.58	1.13	0.45
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.56	0.75	0.375	NA	NA	1.13	0.00	1.13
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.56	0.75	0.375	NA	0.45	1.58	1.13	0.45
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.56	0.75	0.375	NA	NA	1.13	0.00	1.13
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source[5]	0.5	1	2.56	0.75	0.375	NA	0.57	1.70	0.00	1.70
	D2. Chemical contamination of largest raw water source[5]	0.1	1	2.56	0.75	0.375	NA	0.57	1.70	0.00	1.70
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[5]	Not Applicable									
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 does not have a backup generator, rendering full 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. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Monticello can withdraw from three surface water sources (City Reservoir 1.26 MGD; Lowry Branch 0.504 MGD; Pope's Branch 0.36 MGD). If the reservoir is contaminated or if the dam fails, there is no capacity loss.
6. Monticello's surface water sources are in Hydrologic Unit Code-10 "Murder Creek," which is greater than 100 square miles.

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

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-14b
Monticello 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	0.45	0.44	0.28	0.15	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.13	0.44	0.28	0.15	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.45	0.44	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	1.13	0.44	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	1.70	0.44	0.28	0.15	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.70	0.44	0.28	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-14c
Monticello Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)	Peak Permitted Withdrawal (MGD)[3]		Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				Monticello WTP	City Reservoir / Lowry Branch / Pope's Branch (24-hr maximum)	Groundwater Withdrawal (monthly average)					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.56	0.75	0.375	NA	0.45	1.58	1.13	0.45
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.56	0.75	0.375	NA	NA	1.13	0.00	1.13
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.56	0.75	0.375	NA	0.45	1.58	1.13	0.45
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.56	0.75	0.375	NA	NA	1.13	0.00	1.13
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source[5]	0.5	1	2.56	0.75	0.375	NA	0.57	1.70	0.00	1.70
	D2. Chemical contamination of largest raw water source[5]	0.1	1	2.56	0.75	0.375	NA	0.57	1.70	0.00	1.70
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[5]	Not Applicable									
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable[6]									

Notes:

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. The WTP does not have a backup generator, rendering full 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. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.
5. Monticello can withdraw from three surface water sources (City Reservoir 1.26 MGD; Lowry Branch 0.504 MGD; Pope's Branch 0.36 MGD). If the reservoir is contaminated or if the dam fails, there is no capacity loss.
6. Monticello's surface water sources are in Hydrologic Unit Code-10 "Murder Creek," which is greater than 100 square miles.

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

Table B-14d
Monticello 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	0.45	0.31	0.20	0.11	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.13	0.31	0.20	0.11	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.45	0.31	0.20	0.11	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	0.31	0.20	0.11	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.70	0.31	0.20	0.11	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.70	0.31	0.20	0.11	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-15a
Newton County Water-Sewerage Authority Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	13.31	5.10	18.41	6.09	12.32
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	13.31	NA	13.31	0.00	13.31
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 that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Newton County Water-Sewerage Authority's purchased water is all sourced from GA2170097-Newton County, with Rockdale County as an emergency source. Purchased water is not limited by Newton County's permit withdrawal limits, peak day design capacity, or 2015 ADD.
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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-15b
Newton County Water-Sewerage Authority 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)	12.32	4.95	3.22	1.73	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	13.31	4.95	3.22	1.73	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-15c
Newton County Water-Sewerage Authority Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	12.42	6.30	18.72	6.09	12.63
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	12.42	NA	12.42	0.00	12.42
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: GJH 06/01/21

Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Newton County Water-Sewerage Authority's purchased water is all sourced from GA2170097-Newton County, with Rockdale County as an emergency source. Purchased water is not limited by Newton County's permit withdrawal limits, peak day design capacity, or 2050 ADD.
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
Newton County Water-Sewerage Authority 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)	12.63	13.95	9.07	4.88	1.32	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	12.42	13.95	9.07	4.88	1.53	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-15e
Newton County Water-Sewerage Authority 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
22	GA2170097-Newton County	Cornish Creek Plant	24	3	9.425	6.091	3.711	6.091	16.8	3.0
23	GA2170097-Newton County	Williams Street Plant	16	3	4.189	2.707	1.237	2.707		
24	GA2470000-Rockdale County[4]	Salem Road	8	5	1.745	1.128	0.000	1.128	10.2	24.7
25	GA2470000-Rockdale County[4]	Highway 212	8	5	1.745	1.128	0.000	1.128		
26	GA2470000-Rockdale County[4]	Underwood Crossing	8	5	1.745	1.128	0.000	1.128		
27	GA2470000-Rockdale County[4]	Old Covington Road	8	5	1.745	1.128	0.000	1.128		

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

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. Newton County Water-Sewerage Authority's 2015 purchases were distributed logically between the interconnections with Newton County.
3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.
4. Rockdale County excess capacity is estimated utilizing the current (22.1 MGD) and projected (43.7 MGD) peak day design capacities as well as the current (11.9 MGD) and projected (19.0 MGD) ADD found within the 2017 Ch2M and Black and Veatch *Water Resource Management Plan: Metropolitan North Georgia Water Planning District* .

Table B-16a
Newton 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)
				Cornish Creek WTP	Williams Street WTP	Cornish Creek Reservoir (Lake Varner)	Alcovy River to fill Lake Varner	City Pond and Alcovy River to fill City Pond					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	25.00	4.50	35.00	35.00	4.50	NA	1.80	31.30	15.00	16.30
	A2. Critical asset failure at largest WTP[2]	0.1	30	25.00	4.50	35.00	35.00	4.50	NA	NA	29.50	0.00	29.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	25.00	4.50	35.00	35.00	4.50	NA	1.80	31.30	25.00	6.30
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	25.00	4.50	35.00	35.00	4.50	NA	NA	29.50	0.00	29.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	25.00	4.50	35.00	35.00	4.50	NA	3.46	32.96	25.00	7.96
	D2. Chemical contamination of largest raw water source	0.1	1	25.00	4.50	35.00	35.00	4.50	NA	3.46	32.96	25.00	7.96
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	0.05	30	25.00	4.50	35.00	35.00	4.50	NA	NA	29.50	25.00	4.50
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable[5]											

Notes:

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

1. Cornish Creek WTP has a backup generator able to supply 10 MGD capacity, rendering partial capacity loss.
2. Cornish Creek 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. Newton County's surface water sources are in Hydrologic Unit Code-10 "Upper Alcovy River," which is greater than 100 square miles.

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

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-16b
Newton 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	16.30	12.73	8.27	4.45	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	29.50	12.73	8.27	4.45	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	6.30	12.73	8.27	4.45	6.43	1.97	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	29.50	12.73	8.27	4.45	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	7.96	12.73	8.27	4.45	4.76	0.31	0.00
	D2. Chemical contamination of largest raw water source	7.96	12.73	8.27	4.45	4.76	0.31	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	4.50	12.73	8.27	4.45	8.23	3.77	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-16c
Newton 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)
				Cornish Creek WTP	Williams Street WTP	Cornish Creek Reservoir (Lake Varner)	Alcovy River to fill Lake Varner	City Pond and Alcovy River to fill City Pond					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	25.00	4.50	35.00	35.00	4.50	NA	3.60	33.10	15.00	18.10
	A2. Critical asset failure at largest WTP[2]	0.1	30	25.00	4.50	35.00	35.00	4.50	NA	NA	29.50	0.00	29.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	25.00	4.50	35.00	35.00	4.50	NA	3.60	33.10	25.00	8.10
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	25.00	4.50	35.00	35.00	4.50	NA	NA	29.50	0.00	29.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	25.00	4.50	35.00	35.00	4.50	NA	7.66	37.16	25.00	12.16
	D2. Chemical contamination of largest raw water source	0.1	1	25.00	4.50	35.00	35.00	4.50	NA	7.66	37.16	25.00	12.16
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	25.00	4.50	35.00	35.00	4.50	NA	NA	29.50	25.00	4.50
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable[5]											

Notes:

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

1. Cornish Creek WTP has a backup generator able to supply 10 MGD capacity, rendering partial capacity loss.
2. Cornish Creek 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. Newton County indicated a new 3 MG finished water tank and a new 4 MG clearwell.
5. Newton County's surface water sources are in Hydrologic Unit Code-10 "Upper Alcovy River," which is greater than 100 square miles.

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

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-16d
Newton 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	18.10	26.54	17.25	9.29	8.44	0.00	0.00
	A2. Critical asset failure at largest WTP	29.50	26.54	17.25	9.29	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	8.10	26.54	17.25	9.29	18.44	9.15	1.19
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	29.50	26.54	17.25	9.29	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	12.16	26.54	17.25	9.29	14.37	5.09	0.00
	D2. Chemical contamination of largest raw water source	12.16	26.54	17.25	9.29	14.37	5.09	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	4.50	26.54	17.25	9.29	22.04	12.75	4.79
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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-17a
North Monroe County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	3.36	0.30	3.66	1.76	1.90
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	3.36	NA	3.36	0.00	3.36
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: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. North Monroe County's purchased water is all sourced from GA0350051-Butts County/Jackson/Jenkinsburg, with Forsyth as an emergency source. Purchased water may be limited by Forsyth's peak day design capacity, and maximum possible purchased water was estimated as the sum of the Butts County interconnetion plus Forsyth's 2015 excess capacity.
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-17b
North Monroe 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)	1.90	0.15	0.10	0.05	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	3.36	0.15	0.10	0.05	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-17c
North Monroe County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	4.26	0.30	4.56	1.76	2.80
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	4.26	NA	4.26	0.00	4.26
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: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. North Monroe County's purchased water is all sourced from GA0350051-Butts County/Jackson/Jenkinsburg, with Forsyth as an emergency source. Purchased water may be limited by Forsyth's peak day design capacity, and maximum possible purchased water was estimated as the sum of the Butts County interconnetion plus Forsyth's 2050 excess capacity.
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-17d
North Monroe 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	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)	2.80	0.37	0.24	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	4.26	0.37	0.24	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	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-17e
North Monroe 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	Individual System Excess Capacity[2] 2050
28	GA0350051-Butts County/ Jackson/Jenkinsburg	High Falls Road	10	5	2.727	1.763	0.150	1.763	2.7	7.4
29	GA2070001-Forsyth	Johnstonville Road & I-75	10	5	2.727	1.763	0.000	1.763	1.6	2.5
30	GA2070001-Forsyth	Johnstonville Road & Boxankle Road	10	5	2.727	1.763	0.000	1.763		

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

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 potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-18a
Oxford Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	5.57	0.15	5.72	1.76	3.96
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	5.57	NA	5.57	0.00	5.57
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:

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Oxford's purchased water is all sourced from GA2170097-Newton County, despite having to pass through other purchase-only systems like Covington and Newton County Water-Sewerage Authority. Purchased water is not limited by Newton County's permit withdrawal limits, peak day design capacity, or 2015 ADD.
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-18b
Oxford 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)	3.96	0.19	0.12	0.07	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	5.57	0.19	0.12	0.07	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-18c
Oxford Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	3.15	0.15	3.30	1.76	1.54
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	3.15	NA	3.15	0.00	3.15
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: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Oxford's purchased water is all sourced from GA2170097-Newton County, despite having to pass through other purchase-only systems like Covington and Newton County Water-Sewerage Authority. Purchased water is not limited by Newton County's permit withdrawal limits, peak day design capacity, or 2050 ADD.
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-18d
Oxford 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)	1.54	0.44	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	3.15	0.44	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-18e
Oxford 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
31	GA2170001-Covington	Cook Road #1	6	5	0.982	0.635	0.000	0.635		
32	GA2170001-Covington	Cook Road #2	6	5	0.982	0.635	0.000	0.635		
33	GA2170001-Covington	Emory Street	6	5	0.982	0.635	0.000	0.635		
34	GA2170001-Covington	Haygood Street	6	5	0.982	0.635	0.000	0.635	16.8	3.0
35	GA2170001-Covington	Carlton Trail	6	5	0.982	0.635	0.000	0.635		
36	GA2170097-Newton County	Cook Road	10	5	2.727	1.763	0.143	1.763		
37	GA2170097-Newton County	Highway 81	6	5	0.982	0.635	0.048	0.635		

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

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. Oxford's purchased water is all sourced from GA2170097-Newton County and the incoming interconnections with Covington are also all sourced from GA2170097-Newton County.
3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-19a
Perry 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 102, 103, 105	WTP Well 107					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.00	2.00	15.67	1.05	22.72	0.00	22.72
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.00	2.00	15.67	NA	21.67	0.00	21.67
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.00	2.00	15.67	1.05	22.72	4.00	18.72
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	4.00	2.00	15.67	NA	21.67	0.00	21.67
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.00	2.00	15.67	1.88	23.55	4.00	19.55
	D2. Chemical contamination of largest raw water source	0.1	1	4.00	2.00	15.67	1.88	23.55	4.00	19.55
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 full 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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-19b
Perry 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	22.72	2.16	1.40	0.76	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	21.67	2.16	1.40	0.76	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	18.72	2.16	1.40	0.76	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	21.67	2.16	1.40	0.76	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	19.55	2.16	1.40	0.76	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	19.55	2.16	1.40	0.76	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-19c
Perry 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 102, 103, 105	WTP Well 107					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.00	2.00	9.84	1.05	16.89	0.00	16.89
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.00	2.00	9.84	NA	15.84	0.00	15.84
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.00	2.00	9.84	1.05	16.89	4.00	12.89
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	4.00	2.00	9.84	NA	15.84	0.00	15.84
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.00	2.00	9.84	1.88	17.72	4.00	13.72
	D2. Chemical contamination of largest raw water source	0.1	1	4.00	2.00	9.84	1.88	17.72	4.00	13.72
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	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: GJH 06/01/21

Checked by: LCT 06/28/21

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 full 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. Perry indicated a new finished water tank of unknown capacity.

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

Table B-19d
Perry 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	16.89	4.47	2.90	1.56	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	15.84	4.47	2.90	1.56	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	12.89	4.47	2.90	1.56	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	15.84	4.47	2.90	1.56	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	13.72	4.47	2.90	1.56	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	13.72	4.47	2.90	1.56	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-19e
Perry 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	Individual System Excess Capacity[3] 2050
38	GA1530021-Houston County-Feagin Mill[4]	23 independent connections	8	5	0.982	0.635	0.283	14.594	15.367	9.534
16	GA1530021-Houston County-Feagin Mill	Corner of Houston Lake Rd and Lake Joy Rd.	8	5	0.982	0.635	0.012	0.635		
17	GA1530021-Houston County-Feagin Mill	Intersection of Macon Rd and Thompson Rd	8	5	0.982	0.635	0.012	0.635		

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

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. Perry's purchased water is all sourced from GA2170097-Houston County-Feagin Mill and the purchases are logically distributed amongst the listed connections.
3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.
4. The QWS reported 23, one-way independent connections in addition to the others described within the table.

Table B-20a
South Monroe County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	7.54	0.60	8.14	1.76	6.38
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	7.54	NA	7.54	0.00	7.54
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: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Purchased water is not limited by Macon's permit withdrawal limits, peak day design capacity, or 2015 ADD.
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-20b
South Monroe 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)	6.38	0.46	0.30	0.16	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	7.54	0.46	0.30	0.16	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-20c
South Monroe County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Maximum Possible Purchased Water (MGD)[3]	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	7.54	0.60	8.14	1.76	6.38
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice[2]	1	3	7.54	NA	7.54	0.00	7.54
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: GJH 06/01/21
Checked by: LCT 06/28/21

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

1. It was assumed that the largest interconnection fails.
2. It was assumed that the interconnections can supply full capacity.
3. Purchased water is not limited by Macon's permit withdrawal limits, peak day design capacity, or 2050 ADD.
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-20d
South Monroe 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)	6.38	0.84	0.55	0.29	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	7.54	0.84	0.55	0.29	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-20e
South Monroe 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)	Individual System Excess Capacity[3]	
									2015	2050
39	GA0210001-Macon	Rivoli Drive	6	5	0.982	0.635	0.046	0.635	37.6	34.7
40	GA0210001-Macon	Whittle Road	8	5	1.745	1.128	0.070	1.128		
41	GA0210001-Macon	Estes Road & Zebulon Road	10	5	2.727	1.763	0.093	1.763		
42	GA0210001-Macon	New Forsyth Road	8	5	1.745	1.128	0.070	1.128		
43	GA0210001-Macon	Highway 41	8	5	1.745	1.128	0.093	1.128		
44	GA0210001-Macon	Lower Thomaston Road	10	5	2.727	1.763	0.093	1.763		

Prepared by: GJH 06/01/21
Checked by: LCT 06/28/21

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. South Monroe County's 2015 purchases (0.464 MGD) were distributed logically among the interconnections.
3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.

Table B-21a
Warner Robins 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 101-104	WTP Wells 106, 107	WTP Wells 112, 113	WTP Wells 114, 115	WTP Wells 116, 117					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.32	3.74	4.32	4.65	4.73	17.20	1.29	40.25	2.37	37.88
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.32	3.74	4.32	4.65	4.73	17.20	NA	38.96	0.00	38.96
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.32	3.74	4.32	4.65	4.73	17.20	1.29	40.25	4.73	35.52
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	4.32	3.74	4.32	4.65	4.73	17.20	NA	38.96	0.00	38.96
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.32	3.74	4.32	4.65	4.73	17.20	1.44	40.40	4.73	35.67
	D2. Chemical contamination of largest raw water source	0.1	1	4.32	3.74	4.32	4.65	4.73	17.20	1.44	40.40	4.73	35.67
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 for Wells 116-117 has a backup generator able to supply 2.36 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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-21b
Warner Robins 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	37.88	9.15	5.95	3.20	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	38.96	9.15	5.95	3.20	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	35.52	9.15	5.95	3.20	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	38.96	9.15	5.95	3.20	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	35.67	9.15	5.95	3.20	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	35.67	9.15	5.95	3.20	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: GJH 06/01/21
Checked by: LCT 06/28/21

Table B-21c

Warner Robins 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 101-104	WTP Wells 106, 107	WTP Wells 112, 113	WTP Wells 114, 115	WTP Wells 116, 117	New WTP					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.32	3.74	4.32	4.65	4.73	4.32	11.37	2.49	39.94	2.37	37.57
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.32	3.74	4.32	4.65	4.73	4.32	11.37	NA	37.45	0.00	37.45
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.32	3.74	4.32	4.65	4.73	4.32	11.37	2.49	39.94	4.73	35.21
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	4.32	3.74	4.32	4.65	4.73	4.32	11.37	NA	37.45	0.00	37.45
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.32	3.74	4.32	4.65	4.73	4.32	11.37	2.64	40.09	4.73	35.36
	D2. Chemical contamination of largest raw water source	0.1	1	4.32	3.74	4.32	4.65	4.73	4.32	11.37	2.64	40.09	4.73	35.36
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:

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Checked by: LCT 06/28/21

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

1. WTP for Wells 116-117 has a backup generator able to supply 2.36 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. Warner Robins indicated two new finished water tanks, 1 MG each.

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

Table B-21d
Warner Robins 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	37.57	15.36	9.99	5.38	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	37.45	15.36	9.99	5.38	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	35.21	15.36	9.99	5.38	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	37.45	15.36	9.99	5.38	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	35.36	15.36	9.99	5.38	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	35.36	15.36	9.99	5.38	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.

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Checked by: LCT 06/28/21

Table B-21e
Warner Robins 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
45	GA1530021-Houston County-Feagin Mill[4]	41 independent connections	12	5	3.927	2.538	1.838	27.000	15.4	9.5

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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. Maximum flow values may differ because the QWS reported certain values as the maximum possible purchased water. The more conservative values were chosen.

3. The maximum possible purchased water is potentially limited by the provider's ADD, permit limits, and peak design capacity. The provider's excess capacity is listed here, if available, and this region's QWS values can also be found in Table 3-1.
4. The QWS reported 41 independent connections, but did not report additional details on these interconnections. The maximum flow is a sample for one of these connections.

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

   f. Interpretation: this weighting adjustment yielded a noticeable effect. Higher priority is given to projects that aid longer critical scenario durations. Projects adjusted rank according to this interpretation.
4. Added Capacity as a Percent of Total Demand (%) weight = 3; all other criteria weights = 1
   a. Project 2 worsened rank by four ranks.
   b. Project 5 worsened rank by six ranks.
   c. Projects 1, 4, 6, 7, and 8 each improved rank by one rank.
   d. Project 3 improved rank by five ranks.
   e. 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 3 or higher.
5. Cost ($) weight = 3; all other criteria weights = 1
   a. Projects 2 and 5 each worsened rank by one rank.
   b. Project 7 worsened rank by two ranks.
   c. Projects 3 and 4 each improved rank by two ranks.
   d. All other projects maintained rank.
   e. 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. Projects 2 and 5 each worsened rank by one rank.
   b. Project 7 worsened rank by two ranks.
   c. Projects 3 and 4 each improved rank by two ranks.
   d. All other projects maintained rank.
   e. 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. Projects 1 and 5 each worsened rank by one rank.
   b. Projects 3 and 4 each improved 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.
8. Excess Capacity Index weight = 3; all other criteria weights = 1
   a. Projects 1, 2, and 5 each worsened rank by one rank.
   b. Project 7 worsened rank by three ranks.
   c. Projects 3, 4, and 8 each improved rank by two ranks.
   d. Project 6 maintained rank.
   e. Interpretation: this weighting adjustment yielded an overall small effect and is likely driven by other factors.

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