Georgia Water Supply Redundancy Study
Altamaha 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 Gallon(s) 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 Altamaha Water Planning Region, which consists of 16 counties in southcentral Georgia, as shown in Figure 1-1. GEFA identified 13 QWS within the Altamaha Water 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 RSMeans (a construction cost estimating software), manufacturer prices, or the EPD *Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison*. The EPD guidance document was developed to provide a statewide 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 data)
- System interconnection data
- Future 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, 13 QWS in the Altamaha Water Planning Region were surveyed. The primary economic sectors in the Altamaha Region are forestry and agriculture. Others include fishing and hunting, professional and business services, education, healthcare, manufacturing, public administration, and construction. Land cover in the region is composed of approximately 45% forest, 24% row crops/pasture, 18% wetland, 6% urban, 1% water, and 7% other (Altamaha Regional Water Planning Council, 2017).

2.2.1 General System Information

Table 2-1 shows key general information about the 13 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 Claxton QWS serves the smallest population and has two wells while the Jesup QWS serves the largest population and has five wells.

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

- All 13 QWS have groundwater drinking water sources.

- Distribution systems range from approximately 30 years old to more than 100 years old, with 9 systems more than 70 years old. Two QWS are of an unknown system age.
- The largest system customers are typically industries, educational facilities, correctional facilities, and critical care facilities (e.g., hospitals).
- None of the systems purchase water or sell water.
- Eight systems have at least one backup power source/facility.
- One system reportedly has current distribution system flow surplus capabilities.
- The following emergency interconnections were reported:
  - Lyons has one interconnection with Vidalia and one interconnection with Santa Claus.
  - Vidalia has one interconnection with Lyons.
  - Claxton has one interconnection with Claxton-Evans County Industrial Park and one interconnection with Hagan.
  - McRae-Helena has one one-way interconnection with an industry.

Overall, data collected show that the QWS have a 2019 combined average treatment capacity of over 11 million gallons per day (MGD) and a 2019 combined peak treatment capacity of over 19 MGD. The 13 QWS serve a total estimated direct population of approximately 82,800 people and do not serve a consecutive population. For this report, a consecutive population is defined as the population benefited from a system's regular water sales to another water system.

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 13 QWS. Two systems provided GIS data, and one system provided Google Earth data. Hard copy/PDF maps were obtained from nine 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 13QWS. The 13 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 and the Georgia Department of Community Affairs website contained comprehensive plans for all QWS. Based on review of comprehensive plans and survey responses, future (post-2019) planned water infrastructure improvements include:

- A new well for Hazlehurst
- Replacement wells for Baxley and Metter
- New storage tanks for Baxley, Jesup, Metter, and Swainsboro
- New generators for Claxton, Cochran, Metter, and Vidalia

- Hydrant installation, replacement, or repair for Cochran, Eastman, and Metter
- Expanded distribution systems for Jesup, Lyons, and Metter
- Increased treatment capacity for Vidalia
- General water infrastructure upgrades for Cochran and Eastman

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 withdrawal capacity. The ADD values exclude purchased water to portray the true net regional water need although, as noted previously, no QWS in this region regularly purchases water. Appendix A describes and shows the peak day design capacity and ADD calculations.

Excess capacity for a short-term, defined emergency scenario was calculated by subtracting the ADD (water withdrawal only, not including purchased water) from the peak day design capacity. The excess capacity evaluation has a few key assumptions. It relies on readily available interconnections with the appropriate capacities, of which there are few in this region. 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 and 2050 demands for the 13 QWS. For 2015 demands, excess capacity is at least two times a given QWS's 2015 ADD for all QWS except McRae-Helena. The 2015 excess capacity values range from 0.9 MGD (Alamo) to 7.7 MGD (Jesup).

For 2050 demands, excess capacity is at least two times a given QWS's 2050 ADD for all QWS except Alamo (rounding makes it appear that Alamo's excess capacity is two times its ADD; but, it is below the threshold). The 2050 excess capacity values range from 0.8 MGD (Alamo) to 7.7 MGD (Jesup). The QWS' capacities were scaled to have values between 0 and 1 to allow for a comparison of excess capacities. Appendix A describes and shows the excess capacity index calculations and values. McRae-Helena's 2015 and Alamo's 2050 scaled excess capacity sufficiency are the lowest relative to other Altamaha 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). As discussed in Section 3.2.1 and Section 3.2.2, most water withdrawals in Altamaha Region are for industrial, energy, and agricultural use, which are almost exclusively from private sources rather than public water systems.

3.2.1 Groundwater

Currently the Altamaha Region, as reported in their RWP, exclusively obtains its municipal water supply from groundwater. Groundwater sources accounted for 61% of the region's 2010 water supply, whereas surface water sources accounted for 39% of the region's 2010 water supply. The 2010 groundwater withdrawal by category is as follows: 49% industrial, 30% agriculture, 12% municipal, and 9% domestic/self-supply (Altamaha Regional Water Planning Council, 2017). Industrial demand is largely driven by industries located in Wayne County (CDM Smith, 2017). Aquifer systems in the Altamaha Region include the Brunswick, Claiborne, Cretaceous, Dublin, Floridan, Gordon, and surficial. Figure 3-1 shows relevant aquifers in the Altamaha Region.

The RWP noted that a groundwater availability resource assessment was performed by EPD for prioritized aquifers in the Altamaha Region. Aquifer sustainable yield for the purposes of the resource assessment was defined as, "the amount of water that can be withdrawn without reaching specific thresholds that indicate the potential for local or regional impacts." Impacts included local 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. The Floridan aquifer is the primary aquifer in this region and water withdrawal from this aquifer is expected to increase from 2015 to 2050. The estimated sustainable yields for aquifers in the Altamaha Region are greater than the 2015 and forecasted 2050 water demand. Therefore, no regional groundwater resource gaps have been identified. The RWP noted that local gaps may occur if withdrawal rates exceed sustainable yield (Altamaha Regional Water Planning Council, 2017).

Seven counties in the Altamaha Region are part of the Coastal Georgia Water and Wastewater Permitting Plan for Managing Saltwater Intrusion, which applies to 24 Georgia counties. The focus of the management plan is to mitigate saltwater intrusion into the Upper Floridan Aquifer. As the seven Altamaha Region counties are in the "green zone," no pumping restrictions exist. However, conservation requirements do apply (Altamaha Regional Water Planning Council, 2017).

Municipal groundwater withdrawals are almost entirely from the Floridan Aquifer, with much less withdrawal from the Cretaceous and Brunswick Aquifers (CDM Smith, 2017). Most of the regional groundwater demand is driven by industrial and agricultural activities, and these withdrawals are also almost entirely from the Floridan Aquifer (CDM Smith, 2017). Based on municipal water demand projections remaining relatively constant from 2015 (27.5 MGD) to 2050 (28.0 MGD), it is unlikely that additional municipal supply wells, other than replacement wells, are needed in the Altamaha Region.

The RWP indicated that at this time, no regional groundwater resource gaps are expected to occur in the Altamaha Region over the planning horizon. However, localized gaps could occur if well densities and/or withdrawal rates result in exceedance of sustainable yield metrics. The RWP further identified four counties, all of which contain QWS, that may need additional municipal annual average withdrawal capacity if demand exceeds current permit limits. The four counties and their potential additional municipal capacity needed are as follows: Emanuel, 0.36 MGD; Evans, 0.04 MGD; Jeff Davis, 0.66 MGD; and Wheeler, 0.08 MGD (Altamaha Water Planning Regional Council, 2017). Management practice MGWPC-1 is to increase municipal groundwater permit capacity to meet forecasted needs (Altamaha Water Planning Regional Council, 2017).

3.2.2 Surface Water

The 2010 surface water withdrawal by category is as follows: 72% energy and 28% agriculture (Altamaha Water Planning Regional Council, 2017). Energy demand is largely driven by power generation facilities in Appling County (CDM Smith, 2017). The Altamaha Region contains portions of the following major river basins: Ocmulgee River Basin in the western part of the region; Oconee River Basin in the central part of the region; Altamaha River Basin in the central and eastern part of the region; Ogeechee River Basin in the northeastern part of the region; Satilla River Basin in southeastern part of the region; and a small portion of the Suwannee River Basin in the far western part of the region. Figure 3-2 shows relevant river basins in the Altamaha Region. Major rivers within the region include the Ocmulgee, Oconee, and Altamaha, which is the confluence of the Ocmulgee and Oconee Rivers. No major reservoirs exist in this region.

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 indicated no potential surface water gaps at the Doctortown node (Altamaha River), Lumber City node (Ocmulgee River), and Mount Vernon node (Oconee River). Model results for 2015 and 2050 in the Ogeechee River Basin indicated that a potential gap exists at the Claxton node. For context, Claxton is a QWS approximately 1.5 miles south of the Canoochee River. This is the only gap within the Altamaha Region, but the RWP noted that surface water gaps outside the region may be associated with water use within the region. Eight Altamaha Region counties are fully or partially within areas that contribute to potential gaps. The RWP noted that an increase in surface water demand to meet projected needs should not increase potential gaps. The Council identified management practices to address potential gaps, including data collection/additional research, water conservation, and additional/alternate surface water supply sources (Altamaha Regional Water Planning Council, 2017). Future municipal water supply is not expected to be obtained from surface water sources.

3.2.3 New Reservoirs

Of all the potential water source and storage options, new reservoirs are the most environmentally sensitive, costly, and time-consuming (MACTEC, 2008). Specific new reservoirs were not identified by the Altamaha Water Planning Council.

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, which separates the Piedmont geologic region from the Coastal Plain geologic region. Therefore, the MACTEC report does not identify drinking water supply reservoirs for the Altamaha Region.

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 Altamaha Region has nine watershed dams. Two of these watershed dams were part of the 166 prioritized watershed dams: Bishop Creek 7 and Little Satilla Creek 07. These two, however, were not part of the 28 high-potential water supply reservoirs identified by GSWCC. Therefore, there were no suitable watershed dams in this region that could serve as potential water supply reservoirs.

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. As this Water Planning Region is in the Coastal Plain geologic region, bedrock and soils are generally sedimentary in origin and permeable. Therefore, sand and gravel quarries are present, as opposed to hard-rock (igneous or metamorphic) or mineral quarries.

A GIS investigation was performed to assess the availability of quarries as potential reservoirs. A 5-mile radius was drawn around QWS municipal boundaries. Aerial imagery was visually inspected to identify quarries. In addition, publicly available, online quarry inventories were checked. In the Altamaha Region, no potential quarries were identified. Small-scale surface mining operations may exist; however, they are unlikely future water storage reservoirs.

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. The Altamaha Water Planning Council's Management Practice GW-2 includes using best available science to evaluate the use of ASR (Altamaha Water Planning Council, 2017).

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. As all QWS in this region are currently groundwater systems, indirect potable reuse was not evaluated as a redundant water supply.

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 system should individually consider the feasibility of direct potable reuse.

3.4 Current Interconnections Between Systems

As noted in Section 2.2.1, interconnections in the Altamaha Region are rare. Three QWS indicated an emergency interconnection with a public water system. Claxton's interconnections with Claxton-Evans County Industrial Park and Hagan have the potential to provide excess capacity during emergencies. Lyons and Vidalia are interconnected and, given their sufficient excess capacity (Table 3-1), there is a high potential for them to supply water to each other during an emergency. Details of the Lyons and Santa Claus interconnection are unknown. However, it is unlikely that Santa Claus, with a 2020 census population of 204 people, can provide excess capacity to supplement Lyons's ADD, which supplies potable water to a population of 4,400 people.

McRae-Helena has a one-way interconnection with an industry. As this is an outgoing interconnection, the infrastructure and potentially the water chemistry would have to be adjusted such that McRae-Helena (permitted capacity 1.700 MGD-monthly average) would be able to receive water. Even if this were to occur, the industry can only withdraw a limited amount of water for its purposes (permitted capacity 0.300 MGD-monthly average) as compared to the municipal water supply need. The permitted capacity of the industry is 18% of the McRae-Helena permitted capacity. Therefore, this facility could only supply a limited amount of water during an emergency.

Figure 3-3 displays the available mapping data for the water region. As Figure 3-3 shows, 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 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.

Municipal water systems are generally not interconnected in the Altamaha Region due to the geographic distance between QWS. Further, as discussed in Section 3.2, based on municipal water demand projections remaining relatively constant from 2015 to 2050, it is unlikely that additional municipal wells, other than replacement wells, are needed in the Altamaha Region. Therefore, municipalities historically have not had reasons to interconnect. Although Table 3-1 shows that each QWS has excess capacity, conveyance of the excess capacity is currently hindered by lack of interconnections.

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. 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 monthly average 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

Factors that may affect surface water source quality include land use, potential pollutant sources, nutrient loading, and storm events within the water supply basin. Because this region does not currently have surface water reservoirs, these factors are not applicable.

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

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. Total demand for each QWS equalled withdrawal-only ADD for this region because no QWS regularly purchase water. Section 3.1 describes the methodology for obtaining 2015 and 2050 ADD, which is presented in Table 3-1.

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 industry needs, 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 4-1 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 Altamaha 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. Many of the QWS in the Altamaha Region treat groundwater at each withdrawal well. For the purposes of this study, an individual well that receives water treatment is classified as a water treatment plant (WTP). Alternately, a groundwater QWS can be designed with two or more wells in parallel supplying raw water to one WTP, although this is not the case for QWS in the Altamaha Region. 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.

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. Because the QWS in this region utilize groundwater sources, Risk G did not apply to QWS in the Altamaha Region.

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. Because the QWS in this region have groundwater sources and Risk H is a short-term, defined scenario, Risk H did not apply to QWS in this region.

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 Section 3.1.1. 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 total demand 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 Jesup and Baxley do not experience an emergency) except for Risk H (drought).
- The 2050 available water supply accounts for additional capacity due to planned capital improvements. (Hazlehurst and Vidalia each provided an estimated increase in water capacity due to a proposed capital improvement.)
- 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.
- 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, only Risks A, B, C, and D apply to the Altamaha Region. None of the QWS have a total demand deficit (i.e., 100% ADD). Therefore, none have 65% ADD or 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.

QWS in the Altamaha Region perform well when faced with the emergency scenarios because their multi-well, multi-WTP design offers inherent redundancy. The overall flat topography of the region also allows for the QWS to have a systemwide distribution system positioned mainly within the city limits rather than across multiple pressure zones. This means that if one WTP fails, large portions of the system will not be without water. Another reason that QWS do not have deficits is because their ADD is relatively low compared to their available water supply, which is primarily driven by peak day design capacities.

For QWS experiencing more than one deficit, the highest deficit with the longest duration and/or highest relative likelihood, or the Critical Scenario Deficit, was selected for further evaluation. Because no QWS in this region have a Critical Scenario Deficit, the scenario rendering a given QWS with the least available water supply was selected for further evaluation.

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 Altamaha Region. As described in Section 5.4 and Table 5-2, no Altamaha QWS have a deficit, and, by definition, no Critical Scenario Deficit. Therefore, 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. None of the Altamaha QWS have a total demand deficit (i.e., 100% ADD), and therefore, none have 65% ADD or 35% ADD deficits. Thus, not all QWS have recommended projects. Logical, implementable projects were retained 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 Altamaha Region, three types of projects are recommended: 1) new interconnection, 2) new well and WTP, and 3) backup generator to supply internal infrastructure redundancy. New well and WTP projects support the Altamaha Water Planning Council's Management Practice GW-1: sustainable groundwater uses from prioritized aquifers to meet regional needs (Altamaha 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. As this region has all groundwater QWS, surface water environmental impacts were not considered. Recall that the RWP indicated that at this time, no regional groundwater resource gaps are expected to occur in the Altamaha Region over the planning horizon (Altamaha Regional Water Planning Council, 2017). Local gaps may occur if withdrawal rates exceed aquifer or surface water sustainable yield. Therefore, stream-aquifer impacts due to short-term municipal withdrawal increases during emergencies are not considered to be significant environmental impacts for this region. Designations 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 new well and WTP projects, impacts due to drilling, regional groundwater resource gaps, and excavation (for pipelines) were considered, as applicable. A "medium-low" designation was applied as the baseline due to drilling/excavation-related activities. Designations were applied for regional resource gaps by aquifer: "medium-low" was applied if no gaps were identified; "medium-high" was applied if aquifer withdrawals are within the aquifer's estimated sustainable yield; "high" was applied if aquifer withdrawals are above the aquifer's estimated sustainable yield. Designations were applied for excavation in the same way as interconnection projects.

- 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.

Water withdrawal permit factors are described in Section 3.5.2. The QWS' 2050 ADD was compared to current monthly average permitted withdrawal limits (Table 3-1) to understand their ability to supply water to another QWS experiencing an emergency. Note that monthly average permitted withdrawal is higher than annual average permitted withdrawal for groundwater systems. Using monthly average values is appropriate because of the short-term, defined duration scenarios considered. A "low" designation was applied to a potential project if permit withdrawal limits would not limit the maximum capacity added. A "medium-low" designation was applied if permit withdrawal limits would limit the maximum capacity added by 1-49%, and a "medium-high" designation was applied if permit withdrawal limits would limit the maximum capacity added by 50-99%. A "high" designation was applied if permit withdrawal limits 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

One interconnection project was evaluated. Some existing interconnections already have the potential to provide excess capacity during emergencies and do not appear to need upgrades. Interconnections in this category include Vidalia's interconnection with Lyons and Claxton's interconnections with Claxton-Evans County Industrial Park and Hagan. Note that Lyons's and McRae-Helena's emergency outgoing interconnection to a small water system and an industry, respectively, were not evaluated because of limited incoming supply potential, as discussed in Section 3.4. 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 – Alamo and McRae-Helena QWS water mains are within 8 linear miles and one interconnection option exists along U.S. Highway 280. Figure 6-1 shows large-scale available mapping data for these QWS. Alamo's existing pipe diameters in the area of interest typically range from 1 inch to 6 inches. McRae-Helena's existing pipe diameters in the area of interest typically range from 1 inch to 10 inches. Approximately 8 miles of 6-inch diameter ductile iron pipe (DIP) is estimated for this project. Water head loss due to pipe friction, pipe bends, and elevation changes becomes a more important factor when pipelines extend for longer distances. Booster pump stations are needed to overcome head losses. A 150-horsepower pump was estimated to convey water from Alamo to McRae-Helena and from McRae-Helena to Alamo.

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

6.1.2 Internal Infrastructure Redundancy

As shown in Table 6-2, one of the recommended potential projects is a new well and WTP for Alamo to supply internal infrastructure redundancy. This project type can address emergency scenarios A1, A2, B, D1, D2, G, and H. QWS modifications for new well and WTP projects include the ability to site and manage a new well/WTP, connect treated water to the distribution system, and potentially increase permit limits. The maximum capacity added (in MGD) was estimated based on QWS-specific information. Alamo's current permitted monthly average withdrawal is 0.5 MGD. Alamo may need to request an increased permit limit, specifically because Alamo's total demand for both 2015 (0.41 MGD) and 2050 (0.44 MGD) are near this withdrawal limit and Alamo's 2050 scaled excess capacity sufficiency is the lowest relative to other Altamaha QWS. Because Alamo does not have a portable generator capable of powering the proposed new well/WTP, a generator was included in this potential project.

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. For Eastman and Lyons, this would be their first generator. For McRae-Helena, the new generator would supplement an existing generator at a smaller WTP. In the latter case, a generator was still proposed because it would mitigate a power supply failure at 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 well/WTP receiving the generator.

6.2 Planning-Level Costs

Planning-level costs were estimated for potential redundancy projects in one of three ways: RSMeans (a construction cost estimating software), manufacturer prices, or the EPD *Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison*. 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 projects, it was assumed that multijurisdictional agreements and procurement would take approximately 6 months, engineering design and hydraulic modeling would take approximately 4 months, and procurement of materials and construction would take a minimum of 2 months. If a project requires a booster pump station, an extra 4 months was added to the materials procurement and construction time. For new well and WTP projects, it was assumed that procurement and permitting would take approximately 6 months, engineering design and hydraulic modeling would take approximately 4 months, and drilling and construction would take a minimum of 2 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.

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

In addition to water head loss, operational pressure differences between potential new 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

New well and WTP costs were estimated from the EPD supplemental guidance document. The document provides unit costs for anticipated water management practices, of which “WS-3 New Groundwater Sources” and “WT-1 Water Treatment Plant (New)” were applicable (EPD, 2011). The middle-range cost was assumed to be representative for Alamo’s proposed new well and the low-range cost was assumed to be representative for Alamo’s proposed new WTP because of the relatively fewer treatment components for groundwater QWS. The 2011 costs were brought to 2021 dollars using the Engineering News-Record’s Construction Cost Index. The unit costs were multiplied by the number of units (0.50 MGD for the Project 2 maximum capacity added) and the sum appears as the additional cost in Table 6-4. Applicable pipeline and generator costs were also estimated for this project type.

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 project. 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.

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 Altamaha 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 have the capacity to benefit multiple water systems, select criteria were assigned the average of the two interconnecting system scores. 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 1 (Alamo - McRae-Helena interconnection) received a Criterion 4 score of 4 for Alamo and 3 for McRae-Helena. 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. In the case of a tie, such as Projects 3 and 5, the absolute score was considered, and in the case of a further tie, the lower cost per individual supplied broke the tie.

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). The effects of these weighting variations are described in Appendix C. The sensitivity analysis results demonstrate that each criterion is generally insensitive to weighting. Therefore, retaining their initial assigned weights is appropriate.

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 the interconnection project, 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.

Thirteen QWS in the Altamaha 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 Altamaha Water Planning Region.

References

Altamaha Regional Water Planning Council, 2017. *Altamaha Regional Water Plan*. June 2017.

CDM Smith, 2017. *Water and Wastewater Forecasting Technical Memorandum*. Supplemental Material, Altamaha Regional Water Plan. March 2017.

CH2MHill, Jacobs, Lowe Engineers, 2011. *GEFA Water System Interconnection, Redundancy, and Reliability Act Emergency Supply Plan*. September 2011.

EPD, 2011. *Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison*. April 2011.

EPD, 2021a. "Regulation of Aquifer Storage and Recovery." https://epd.georgia.gov/rules-laws-enforcement/existing-rules-and-corresponding-laws/regulation-aquifer-storage-and

EPD, 2021b. *Indirect Potable Reuse Guidance Document*. March 2021.

GSWCC, 2007. *Inventory and Assessment of USDA/Soil and Water Conservation District Watershed Dams: Finding Report*. Georgia Soil and Water Conservation Commission. December 27, 2007.

GSWCC, 2009. *Inventory and Assessment of USDA/Soil and Water Conservation District Watershed Dams: Summary Executive Report*. Georgia Soil and Water Conservation Commission. March 16, 2009.

MACTEC, 2008. *GEFA Georgia Inventory and Survey of Feasible Sites for Water Supply Reservoirs*. October 31, 2008.

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.

Senate Bill 380, Regular Session, Georgia, May 5, 2010.

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]
Wheeler	Alamo	GA3090000	3,700	0	Groundwater Wells (2)	-	-	-	-
Appling	Baxley	GA0010000	4,800	0	Groundwater Wells (3)	-	-	-	-
Evans	Claxton	GA1090001	3,500	0	Groundwater Wells (2)	-	-	-	-
Bleckley	Cochran	GA0230000	8,000	0	Groundwater Wells (4)	-	-	-	-
Dodge	Eastman	GA0910002	5,500	0	Groundwater Wells (4)	-	-	-	-
Tattnall	Glennville	GA2670002	5,200	0	Groundwater Wells (3)	-	-	-	-
Jeff Davis	Hazlehurst	GA1610001	6,300	0	Groundwater Wells (3)	-	-	-	-
Wayne	Jesup	GA3050000	10,200	0	Groundwater Wells (5)	-	-	-	-
Toombs	Lyons	GA2790000	4,400	0	Groundwater Wells (4)	-	-	-	-
Telfair	McRae-Helena	GA2710003 & GA2710000	8,600	0	Groundwater Wells (4)	-	-	-	-
Candler	Metter	GA0430000	3,900	0	Groundwater Wells (2)	-	-	-	-
Emanuel	Swainsboro	GA1070005	8,500	0	Groundwater Wells (6)	-	-	-	-
Toombs	Vidalia	GA2790002	10,200	0	Groundwater Wells (4)	-	-	-	-

Prepared by: GJH 09/09/20
Checked by: KMD 09/28/2020

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.

Table 2-2

Mapping Data Received

			Level of Mapping Data Received					
County	**Public 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**
Wheeler	Alamo	3,700		◊				
Appling	Baxley	4,800		◊				
Evans	Claxton	3,500	◊					
Bleckley	Cochran	8,000		◊				
Dodge	Eastman	5,500		◊	◊			
Tattnall	Glennville	5,200	◊					
Jeff Davis	Hazlehurst	6,300		◊				
Wayne	Jesup	10,200			◊			
Toombs	Lyons	4,400		◊				
Telfair	McRae-Helena	8,600		◊			◊	
Candler	Metter	3,900	◊					
Emanuel	Swainsboro	8,500		◊				
Toombs	Vidalia	10,200		◊				

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Notes:

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

Table 2-3

Reports and Documents Received

			Reports and Documents Received[3]								
County	**Public 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**
Wheeler	Alamo	3,700	◊	◊	◊						
Appling	Baxley	4,800	◊	◊	◊					◊	◊
Evans	Claxton	3,500	◊	◊	◊						
Bleckley	Cochran	8,000	◊	◊	◊					◊	
Dodge	Eastman	5,500	◊	◊	◊		◊			◊	
Tattnall	Glennville	5,200	◊	◊	◊					◊	
Jeff Davis	Hazlehurst	6,300	◊	◊	◊					◊	
Wayne	Jesup	10,200	◊	◊	◊		◊	◊		◊	◊
Toombs	Lyons	4,400	◊	◊	◊		◊			◊	
Telfair	McRae-Helena	8,600	◊	◊	◊			◊		◊	
Candler	Metter	3,900	◊	◊	◊		◊			◊	◊
Emanuel	Swainsboro	8,500	◊	◊	◊		◊	◊		◊	◊
Toombs	Vidalia	10,200	◊	◊	◊		◊			◊	

Prepared by: GJH 09/09/20

Checked by: KMD 09/28/2020

Notes:

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

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)[1]	2015 Excess Capacity (MGD)	Current Permitted Withdrawal (MGD-Monthly Average)	2050 Peak Day Design Capacity (MGD)[2]	2050 ADD (MGD) (Water Withdrawal Only)[3]	2050 Excess Capacity (MGD)
Wheeler	Alamo	Groundwater Wells (2)	1.3	0.4	0.9	0.5	1.3	0.4	0.8
Appling	Baxley	Groundwater Wells (3)	2.2	0.7	1.5	1.4	2.2	0.5	1.7
Evans	Claxton	Groundwater Wells (2)	2.0	0.4	1.6	0.5(4)	2.0	0.3	1.7
Bleckley	Cochran	Groundwater Wells (4)	2.7	0.7	2.0	2.0	2.7	0.7	1.9
Dodge	Eastman	Groundwater Wells (4)	4.5	1.0	3.5	3.0	4.5	0.6	3.8
Tattnall	Glennville	Groundwater Wells (3)	4.2	0.8	3.4	1.2	4.2	0.7	3.5
Jeff Davis	Hazlehurst	Groundwater Wells (3)	3.3	0.9	2.5	1.01	4.8	0.9	3.8
Wayne	Jesup	Groundwater Wells (5)	8.9	1.2	7.7	3.0	8.9	1.3	7.7
Toombs	Lyons	Groundwater Wells (4)	6.6	1.2	5.3	1.5	6.6	0.8	5.8
Telfair	McRae-Helena	Groundwater Wells (4)	2.7	1.0(5)	1.6	1.7	2.7	0.9	1.8
Candler	Metter	Groundwater Wells (2)	2.4	0.4	2.0	1.2	2.4	0.3	2.1
Emanuel	Swainsboro	Groundwater Wells (6)	8.3	1.1	7.1	1.8	8.3	1.2	7.0
Toombs	Vidalia	Groundwater Wells (4)	7.7	1.6	6.2	5.0	9.2	1.6	7.6
	Totals		**56.6**	**11.3**	**45.3**	**23.8**	**59.6**	**10.3**	**49.2**

Prepared by: GJH 12/04/20
Checked by: LCT 12/22/20

Notes:
ADD - average daily demand
MGD - million gallons per day
1. 2015 EPD-validated water 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, if available.
2. Hazlehurst indicated one potential new well, 1.44 MGD. Vidalia indicated a pump capacity increase of approximately 1.5 MGD.
3. Municipal and publicly supplied industrial demand by county were allocated to each QWS.
4. This value includes GA1090007 because Claxton operates two permitted water systems. GA1090007 is not part of this study.
5. 2015 EPD-validated water audit values include McRae, but not Helena. The value reported is from the QWS.

Table 4-1

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)**
Wheeler	Alamo	GA3090000	0.4	0.3	0.1	0.4	0.3	0.2
Appling	Baxley	GA0010000	0.7	0.4	0.2	0.5	0.4	0.2
Evans	Claxton	GA1090001	0.4	0.3	0.2	0.3	0.2	0.1
Bleckley	Cochran	GA0230000	0.7	0.4	0.2	0.7	0.5	0.3
Dodge	Eastman	GA0910002	1.0	0.7	0.4	0.6	0.4	0.2
Tattnall	Glennville	GA2670002	0.8	0.5	0.3	0.7	0.4	0.2
Jeff Davis	Hazlehurst	GA1610001	0.9	0.6	0.3	0.9	0.6	0.3
Wayne	Jesup	GA3050000	1.2	0.8	0.4	1.3	0.8	0.4
Toombs	Lyons	GA2790000	1.2	0.8	0.4	0.8	0.5	0.3
Telfair	McRae-Helena	GA2710003 & GA2710000	1.0	0.7	0.4	0.9	0.6	0.3
Candler	Metter	GA0430000	0.4	0.2	0.1	0.3	0.2	0.1
Emanuel	Swainsboro	GA1070005	1.1	0.7	0.4	1.2	0.8	0.4
Toombs	Vidalia	GA2790002	1.6	1.0	0.5	1.6	1.0	0.6
	Totals		**11.3**	**7.4**	**4.0**	**10.3**	**6.7**	**3.6**

Prepared by: GJH 12/04/20

Checked by: LCT 12/22/20

Notes:

ADD - average daily demand

MGD - million gallons per day

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

Table 5-1
Water Supply Risks and Emergency Scenarios

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

Table 5-1
Water Supply Risks and Emergency Scenarios

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

Prepared by: GJH 11/10/20
Checked by: LCT 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)**
Wheeler	Alamo	A1	1.4	0.4	0.3	0.1	0.0	0.0	0.0	1.4	0.4	0.3	0.2	0.0	0.0	0.0
		A2	1.3	0.4	0.3	0.1	0.0	0.0	0.0	1.3	0.4	0.3	0.2	0.0	0.0	0.0
		B	0.8	0.4	0.3	0.1	0.0	0.0	0.0	0.8	0.4	0.3	0.2	0.0	0.0	0.0
		C	1.3	0.4	0.3	0.1	0.0	0.0	0.0	1.3	0.4	0.3	0.2	0.0	0.0	0.0
		D1	0.8	0.4	0.3	0.1	0.0	0.0	0.0	0.8	0.4	0.3	0.2	0.0	0.0	0.0
		D2	0.8	0.4	0.3	0.1	0.0	0.0	0.0	0.8	0.4	0.3	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Appling	Baxley	A1	2.6	0.7	0.4	0.2	0.0	0.0	0.0	2.7	0.5	0.4	0.2	0.0	0.0	0.0
		A2	2.2	0.7	0.4	0.2	0.0	0.0	0.0	2.2	0.5	0.4	0.2	0.0	0.0	0.0
		B	1.9	0.7	0.4	0.2	0.0	0.0	0.0	2.0	0.5	0.4	0.2	0.0	0.0	0.0
		C	2.2	0.7	0.4	0.2	0.0	0.0	0.0	2.2	0.5	0.4	0.2	0.0	0.0	0.0
		D1	1.9	0.7	0.4	0.2	0.0	0.0	0.0	2.0	0.5	0.4	0.2	0.0	0.0	0.0
		D2	1.9	0.7	0.4	0.2	0.0	0.0	0.0	2.0	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
Evans	Claxton	A1	1.2	0.4	0.3	0.2	0.0	0.0	0.0	2.1	0.3	0.2	0.1	0.0	0.0	0.0
		A2	2.2	0.4	0.3	0.2	0.0	0.0	0.0	2.2	0.3	0.2	0.1	0.0	0.0	0.0
		B	1.2	0.4	0.3	0.2	0.0	0.0	0.0	1.2	0.3	0.2	0.1	0.0	0.0	0.0
		C	2.2	0.4	0.3	0.2	0.0	0.0	0.0	2.2	0.3	0.2	0.1	0.0	0.0	0.0
		D1	1.2	0.4	0.3	0.2	0.0	0.0	0.0	1.2	0.3	0.2	0.1	0.0	0.0	0.0
		D2	1.2	0.4	0.3	0.2	0.0	0.0	0.0	1.2	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

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)
Bleckley	Cochran	A1	2.3	0.7	0.4	0.2	0.0	0.0	0.0	3.1	0.7	0.5	0.3	0.0	0.0	0.0
		A2	2.7	0.7	0.4	0.2	0.0	0.0	0.0	2.7	0.7	0.5	0.3	0.0	0.0	0.0
		B	2.3	0.7	0.4	0.2	0.0	0.0	0.0	2.3	0.7	0.5	0.3	0.0	0.0	0.0
		C	2.7	0.7	0.4	0.2	0.0	0.0	0.0	2.7	0.7	0.5	0.3	0.0	0.0	0.0
		D1	2.3	0.7	0.4	0.2	0.0	0.0	0.0	2.3	0.7	0.5	0.3	0.0	0.0	0.0
		D2	2.3	0.7	0.4	0.2	0.0	0.0	0.0	2.3	0.7	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
Dodge	Eastman	A1	3.6	1.0	0.7	0.4	0.0	0.0	0.0	3.6	0.6	0.4	0.2	0.0	0.0	0.0
		A2	4.5	1.0	0.7	0.4	0.0	0.0	0.0	4.5	0.6	0.4	0.2	0.0	0.0	0.0
		B	3.6	1.0	0.7	0.4	0.0	0.0	0.0	3.6	0.6	0.4	0.2	0.0	0.0	0.0
		C	4.5	1.0	0.7	0.4	0.0	0.0	0.0	4.5	0.6	0.4	0.2	0.0	0.0	0.0
		D1	3.6	1.0	0.7	0.4	0.0	0.0	0.0	3.6	0.6	0.4	0.2	0.0	0.0	0.0
		D2	3.6	1.0	0.7	0.4	0.0	0.0	0.0	3.6	0.6	0.4	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tattnall	Glennville	A1	3.3	0.8	0.5	0.3	0.0	0.0	0.0	3.3	0.7	0.4	0.2	0.0	0.0	0.0
		A2	4.2	0.8	0.5	0.3	0.0	0.0	0.0	4.2	0.7	0.4	0.2	0.0	0.0	0.0
		B	3.0	0.8	0.5	0.3	0.0	0.0	0.0	3.0	0.7	0.4	0.2	0.0	0.0	0.0
		C	4.2	0.8	0.5	0.3	0.0	0.0	0.0	4.2	0.7	0.4	0.2	0.0	0.0	0.0
		D1	3.0	0.8	0.5	0.3	0.0	0.0	0.0	3.0	0.7	0.4	0.2	0.0	0.0	0.0
		D2	3.0	0.8	0.5	0.3	0.0	0.0	0.0	3.0	0.7	0.4	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	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)
Jeff Davis	Hazlehurst	A1	2.3	0.9	0.6	0.3	0.0	0.0	0.0	5.4	0.9	0.6	0.3	0.0	0.0	0.0
		A2	3.3	0.9	0.6	0.3	0.0	0.0	0.0	4.8	0.9	0.6	0.3	0.0	0.0	0.0
		B	2.3	0.9	0.6	0.3	0.0	0.0	0.0	3.8	0.9	0.6	0.3	0.0	0.0	0.0
		C	3.3	0.9	0.6	0.3	0.0	0.0	0.0	4.8	0.9	0.6	0.3	0.0	0.0	0.0
		D1	2.3	0.9	0.6	0.3	0.0	0.0	0.0	3.8	0.9	0.6	0.3	0.0	0.0	0.0
		D2	2.3	0.9	0.6	0.3	0.0	0.0	0.0	3.8	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
Wayne	Jesup	A1	9.6	1.2	0.8	0.4	0.0	0.0	0.0	9.8	1.3	0.8	0.4	0.0	0.0	0.0
		A2	8.9	1.2	0.8	0.4	0.0	0.0	0.0	8.9	1.3	0.8	0.4	0.0	0.0	0.0
		B	7.0	1.2	0.8	0.4	0.0	0.0	0.0	7.2	1.3	0.8	0.4	0.0	0.0	0.0
		C	8.9	1.2	0.8	0.4	0.0	0.0	0.0	8.9	1.3	0.8	0.4	0.0	0.0	0.0
		D1	7.0	1.2	0.8	0.4	0.0	0.0	0.0	7.2	1.3	0.8	0.4	0.0	0.0	0.0
		D2	7.0	1.2	0.8	0.4	0.0	0.0	0.0	7.2	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
Toombs	Lyons	A1	5.8	1.2	0.8	0.4	0.0	0.0	0.0	5.8	0.8	0.5	0.3	0.0	0.0	0.0
		A2	7.2	1.2	0.8	0.4	0.0	0.0	0.0	7.2	0.8	0.5	0.3	0.0	0.0	0.0
		B	5.8	1.2	0.8	0.4	0.0	0.0	0.0	5.8	0.8	0.5	0.3	0.0	0.0	0.0
		C	7.2	1.2	0.8	0.4	0.0	0.0	0.0	7.2	0.8	0.5	0.3	0.0	0.0	0.0
		D1	5.8	1.2	0.8	0.4	0.0	0.0	0.0	5.8	0.8	0.5	0.3	0.0	0.0	0.0
		D2	5.8	1.2	0.8	0.4	0.0	0.0	0.0	5.8	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

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)
Telfair	McRae-Helena	A1	1.6	1.0	0.7	0.4	0.0	0.0	0.0	1.6	0.9	0.6	0.3	0.0	0.0	0.0
		A2	2.7	1.0	0.7	0.4	0.0	0.0	0.0	2.7	0.9	0.6	0.3	0.0	0.0	0.0
		B	1.6	1.0	0.7	0.4	0.0	0.0	0.0	1.6	0.9	0.6	0.3	0.0	0.0	0.0
		C	2.7	1.0	0.7	0.4	0.0	0.0	0.0	2.7	0.9	0.6	0.3	0.0	0.0	0.0
		D1	1.6	1.0	0.7	0.4	0.0	0.0	0.0	1.6	0.9	0.6	0.3	0.0	0.0	0.0
		D2	1.6	1.0	0.7	0.4	0.0	0.0	0.0	1.6	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
Candler	Metter	A1	2.9	0.4	0.2	0.1	0.0	0.0	0.0	3.2	0.3	0.2	0.1	0.0	0.0	0.0
		A2	2.4	0.4	0.2	0.1	0.0	0.0	0.0	2.4	0.3	0.2	0.1	0.0	0.0	0.0
		B	1.4	0.4	0.2	0.1	0.0	0.0	0.0	1.7	0.3	0.2	0.1	0.0	0.0	0.0
		C	2.4	0.4	0.2	0.1	0.0	0.0	0.0	2.4	0.3	0.2	0.1	0.0	0.0	0.0
		D1	1.4	0.4	0.2	0.1	0.0	0.0	0.0	1.7	0.3	0.2	0.1	0.0	0.0	0.0
		D2	1.4	0.4	0.2	0.1	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
Emanuel	Swainsboro	A1	6.7	1.1	0.7	0.4	0.0	0.0	0.0	6.9	1.2	0.8	0.4	0.0	0.0	0.0
		A2	8.3	1.1	0.7	0.4	0.0	0.0	0.0	8.3	1.2	0.8	0.4	0.0	0.0	0.0
		B	6.7	1.1	0.7	0.4	0.0	0.0	0.0	6.9	1.2	0.8	0.4	0.0	0.0	0.0
		C	8.3	1.1	0.7	0.4	0.0	0.0	0.0	8.3	1.2	0.8	0.4	0.0	0.0	0.0
		D1	6.7	1.1	0.7	0.4	0.0	0.0	0.0	6.9	1.2	0.8	0.4	0.0	0.0	0.0
		D2	6.7	1.1	0.7	0.4	0.0	0.0	0.0	6.9	1.2	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

Table 5-2
Deficit Summary

County	Qualified Water System	Scenario	2015 Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 35% ADD (MGD)	2015 - Deficits: Total Demand Deficit (MGD)	2015 - Deficits: 65% ADD Deficit (MGD)	2015 - Deficits: 35% ADD Deficit (MGD)	2050 Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 35% ADD (MGD)	2050 - Deficits: Total Demand Deficit (MGD)	2050 - Deficits: 65% ADD Deficit (MGD)	2050 - Deficits: 35% ADD Deficit (MGD)
Toombs	Vidalia	A1	5.9	1.6	1.0	0.5	0.0	0.0	0.0	10.0	1.6	1.0	0.6	0.0	0.0	0.0
		A2	8.0	1.6	1.0	0.5	0.0	0.0	0.0	9.9	1.6	1.0	0.6	0.0	0.0	0.0
		B	5.9	1.6	1.0	0.5	0.0	0.0	0.0	7.4	1.6	1.0	0.6	0.0	0.0	0.0
		C	8.0	1.6	1.0	0.5	0.0	0.0	0.0	9.9	1.6	1.0	0.6	0.0	0.0	0.0
		D1	5.9	1.6	1.0	0.5	0.0	0.0	0.0	7.4	1.6	1.0	0.6	0.0	0.0	0.0
		D2	5.9	1.6	1.0	0.5	0.0	0.0	0.0	7.4	1.6	1.0	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

Prepared by: GJH 12/18/20

Checked by: LCT 12/22/20

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.

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 New WTP New Surface Water Source	◊	◊	◊	◊
	D2. Chemical contamination of largest raw water source	New Well New WTP New Surface Water Source	◊	◊	◊	◊
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	New Well New WTP New Surface Water Source	◊	◊	◊	◊
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	-	-	-	-	-

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

County	Qualified Water System	Project Number	Potential Project Description	Emergency Scenario(s) Addressed	Maximum Capacity Added (MGD)	Potential Environmental Impacts	System Impacts: Withdrawal Permit Impacts	System Impacts: Water Quality Impacts	Community Impacts
Wheeler	Alamo	1	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	A1, A2, B, D1, D2	0.63	High: more than 5000 ft excavation; five potential stream/wetlands crossings	Alamo: medium-high McRae-Helena: low	Medium-high	High: more than 5000 ft excavation; multijurisdictional agreement.
		2	New Well and WTP	A1, A2, B, D1, D2	0.50[1]	Medium-low: less than 200 ft excavation; no regional groundwater resource gaps for Floridan Aquifer.	Medium-high	Low	Medium-low: offsite excavation less than 200 feet
Appling	Baxley	-	No recommended project	-	-	-	-	-	-
Evans	Claxton	-	No recommended project	-	-	-	-	-	-
Bleckley	Cochran	-	No recommended project	-	-	-	-	-	-
Dodge	Eastman	3	New generator: WTP/Well 104	A1	1.49	Low	NA	NA	Low
Tattnall	Glennville	-	No recommended project	-	-	-	-	-	-
Jeff Davis	Hazlehurst	-	No recommended project	-	-	-	-	-	-
Wayne	Jesup	-	No recommended project	-	-	-	-	-	-
Toombs	Lyons	4	New generator: WTP/Well 101	A1	1.81	Low	NA	NA	Low
Telfair	McRae-Helena	1	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	A1, A2, B, D1, D2	0.63	High: more than 5000 ft excavation; five potential stream/wetlands crossings	Alamo: medium-high McRae-Helena: low	Medium-high	High: more than 5000 ft excavation; multijurisdictional agreement.
		5	New generator: WTP/Well 104	A1	1.91	Low	NA	NA	Low
Candler	Metter	-	No recommended project	-	-	-	-	-	-
Emanuel	Swainsboro	-	No recommended project	-	-	-	-	-	-
Toombs	Vidalia	-	No recommended project	-	-	-	-	-	-

Prepared by: GJH 03/24/21
Checked by: LCT 04/9/21

Notes:
ft - feet
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. This value was estimated based on QWS-specific information.

Table 6-3
Interconnection Project Capacity Added

Project ID	Potential Project Description	Water System Benefitted	Pipe Diameter (inches)	Average Pressure (psi)	2050 Excess Capacity (MGD)	Maximum Capacity Added (MGD)
1	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	Alamo	6	55	0.82	0.63
		McRae-Helena	6	55	1.81	0.63

Prepared by: GJH 03/24/21
Checked by: LCT 04/09/21

Notes:
MGD - million gallons per day
psi - pound-force per square inch

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	Alamo McRae-Helena	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	0.63	42240	6-inch diameter DIP	$ 140	(1) control valve station (1) 150 HP booster pump	$ 2,254,500	$ 8,168,100	16 months
2	Alamo	New Well and WTP	0.50	175	6-inch diameter DIP	$ 140	(1) new groundwater source (1) new WTP (1) 200 KW generator	$ 2,106,300	$ 2,130,800	12 months
3	Eastman	New generator: WTP/Well 104	1.49	-	200 KW	$ 61,500	-	-	$ 61,500	6 months
4	Lyons	New generator: WTP/Well 101	1.81	-	300 KW	$ 93,500	-	-	$ 93,500	6 months
5	McRae-Helena	New generator: WTP/Well 104	1.91	-	300 KW	$ 93,500	-	-	$ 93,500	6 months

Prepared by: GJH 03/26/21
Checked by: LCT 04/09/21

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

Table 7-1
Potential Project Scoring Criteria Matrix

	Criterion	Assigned Score 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	<5,000	5,000 - 10,000	10,000 - 15,000	>15,000	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 02/04/21
Checked by: LCT 03/25/21

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	Alamo McRae-Helena	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	Alamo McRae-Helena	4	12,300	3	A1, A2, B, D1, D2	3
2	Alamo	New Well and WTP	Alamo	1	3,700	1	A1, A2, B, D1, D2	3
3	Eastman	New generator: WTP/Well 104	Eastman	1	5,500	2	A1	1
4	Lyons	New generator: WTP/Well 101	Lyons	1	4,400	1	A1	1
5	McRae-Helena	New generator: WTP/Well 104	McRae-Helena	1	8,600	2	A1	1

Notes:
MGD - million gallons per day
NA - not applicable
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	Alamo McRae-Helena	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	0.63	Alamo: 0.4 McRae-Helena: 0.9	Alamo: 144% McRae-Helena: 73%	Alamo: 4 McRae-Helena: 3	3.5	$ 8,168,100	1
2	Alamo	New Well and WTP	0.50	0.4	114.5%	-	4	$ 2,130,800	1
3	Eastman	New generator: WTP/Well 104	1.49	0.6	233%	-	4	$ 61,500	4
4	Lyons	New generator: WTP/Well 101	1.81	0.8	227%	-	4	$ 93,500	4
5	McRae-Helena	New generator: WTP/Well 104	1.91	0.9	220%	-	4	$ 93,500	4

Notes:
MGD - million gallons per day
NA - not applicable
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 Impacts**	**Water Quality Impacts**	**Community Impacts**	**Individual Scores**	**Score: Community Impacts**
1	Alamo McRae-Helena	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	High	1	Alamo: medium-high McRae-Helena: low	Medium-high	High	Withdrawal: (2+4)/2 = 3 Water Quality: 2 Community: 1	2
2	Alamo	New Well and WTP	Medium-low	3	Medium-high	Low	Medium-low	Withdrawal: 2 Water Quality: 4 Community: 3	3
3	Eastman	New generator: WTP/Well 104	Low	4	NA	NA	Low	-	4
4	Lyons	New generator: WTP/Well 101	Low	4	NA	NA	Low	-	4
5	McRae-Helena	New generator: WTP/Well 104	Low	4	NA	NA	Low	-	4

Notes:
MGD - million gallons per day
NA - not applicable
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	Alamo McRae-Helena	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	Alamo: (+) <0.5 McRae-Helena: (+) >0.5	Alamo: 2 McRae-Helena: 1	1.5	2.38	4	9	3	7	3	3	6	3	4.75
2	Alamo	New Well and WTP	(+) <0.5	-	2	2.25	1	3	3	8	3	9	9	4	5.00
3	Eastman	New generator: WTP/Well 104	(+) >0.5	-	1	2.63	1	6	1	8	12	12	12	2	6.75
4	Lyons	New generator: WTP/Well 101	(+) >0.5	-	1	2.50	1	3	1	8	12	12	12	2	6.38
5	McRae-Helena	New generator: WTP/Well 104	(+) >0.5	-	1	2.63	1	6	1	8	12	12	12	2	6.75

Prepared by: GJH 04/06/21
Checked by: LCT 04/09/21

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

Table 7-3
Potential Project Decision-Making Summary

Project Number	Qualified 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	Alamo McRae-Helena	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	$ 12,872,878	$ 664.07	2.38	4.75	5
2	Alamo	New Well and WTP	$ 4,227,778	$ 575.89	2.25	5.00	4
3	Eastman	New generator: WTP/Well 104	$ 41,331	$ 11.18	2.63	6.75	2
4	Lyons	New generator: WTP/Well 101	$ 51,657	$ 21.25	2.50	6.38	3
5	McRae-Helena	New generator: WTP/Well 104	$ 48,953	$ 10.87	2.63	6.75	1

Prepared by: GJH 04/06/21
Checked by: LCT 04/09/21

Notes:
WTP - water treatment plant

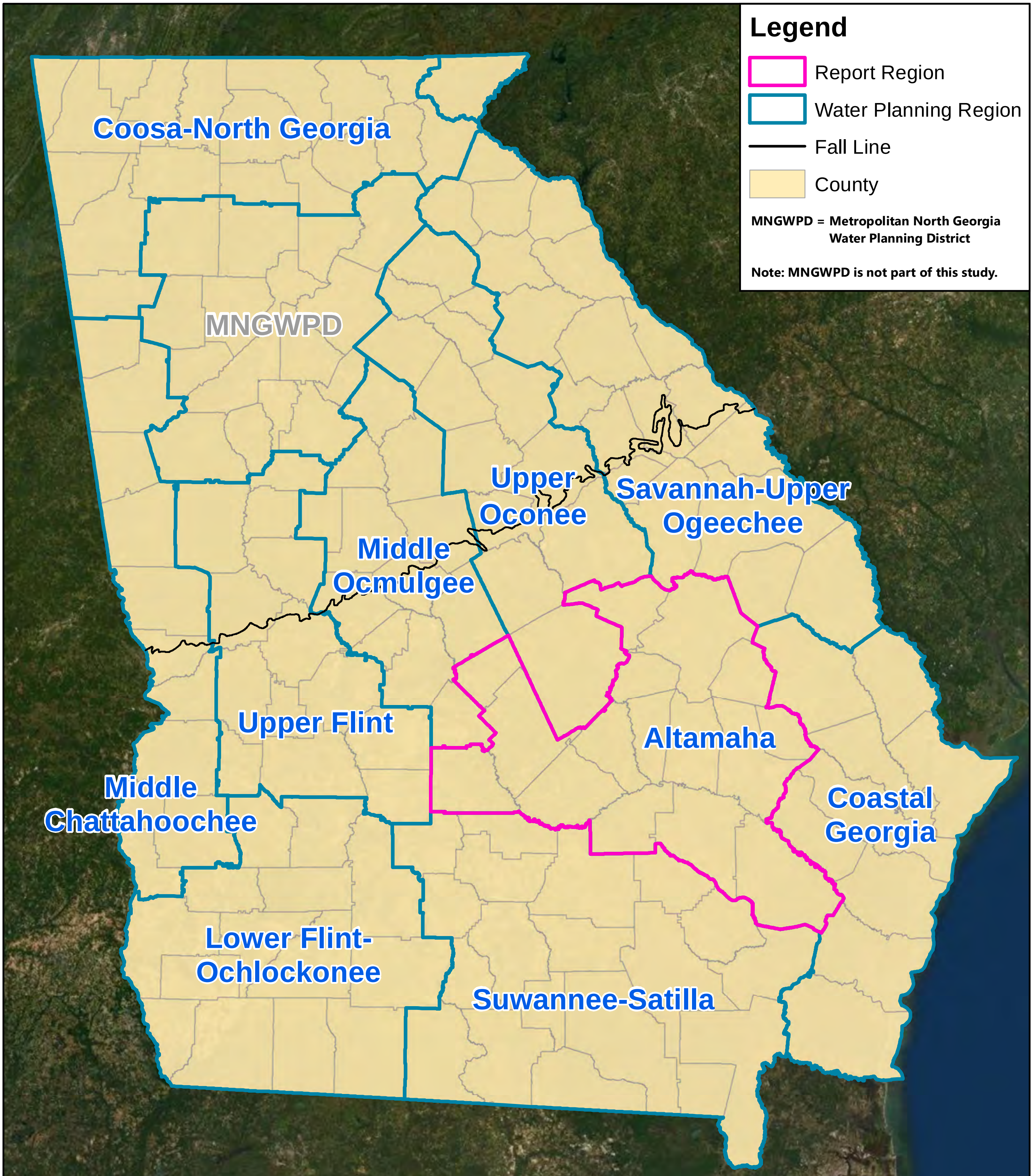
Table 7-4
Potential Projects Sorted by Final Rank Order

Project Number	Qualified Water System(s) Benefitted	Potential Project Description	Cost ($)	Final Rank
5	McRae-Helena	New generator: WTP/Well 104	$ 93,500	1
3	Eastman	New generator: WTP/Well 104	$ 61,500	2
4	Lyons	New generator: WTP/Well 101	$ 93,500	3
2	Alamo	New Well and WTP	$ 2,130,800	4
1	Alamo McRae-Helena	Interconnection: Alamo-McRae-Helena 8 miles along US Hwy 280	$ 8,168,100	5

Prepared by: GJH 04/06/21
Checked by: LCT 04/09/21

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: 1-2
Checked by/Date: GJH 2/8/2022		
Project Number: 6123201339		

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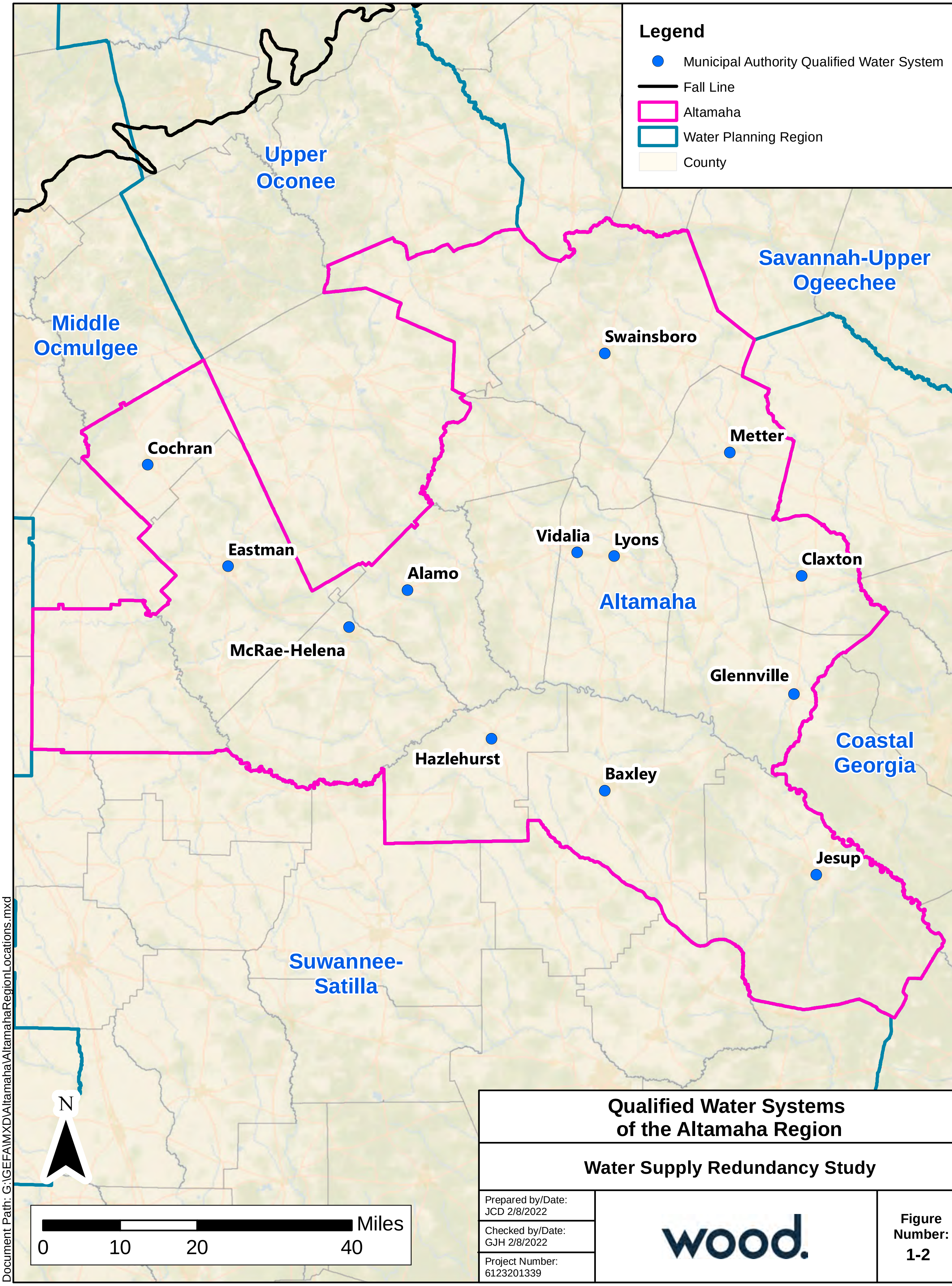

Qualified Water Systems of the Altamaha Region

Water Supply Redundancy Study

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

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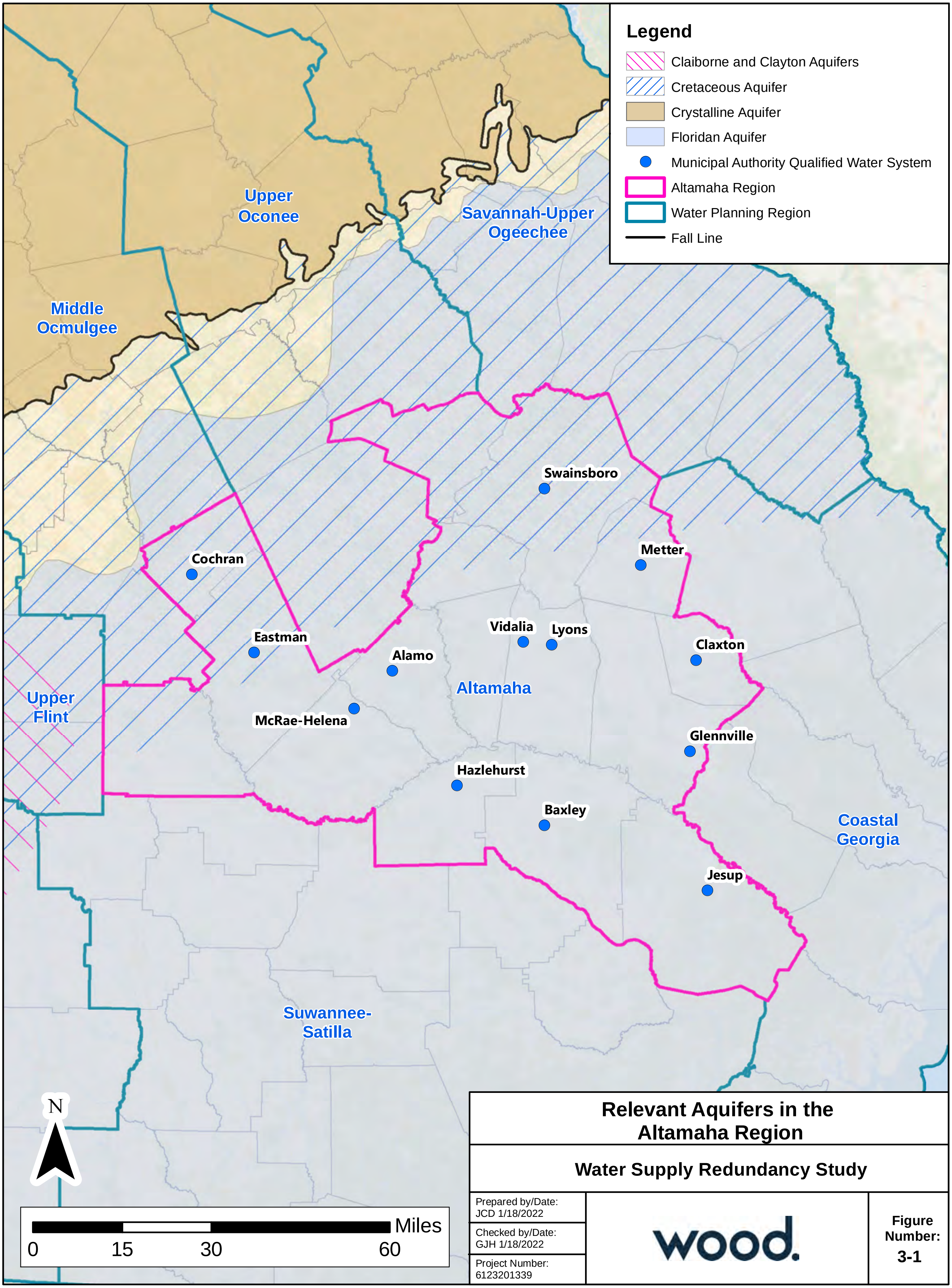

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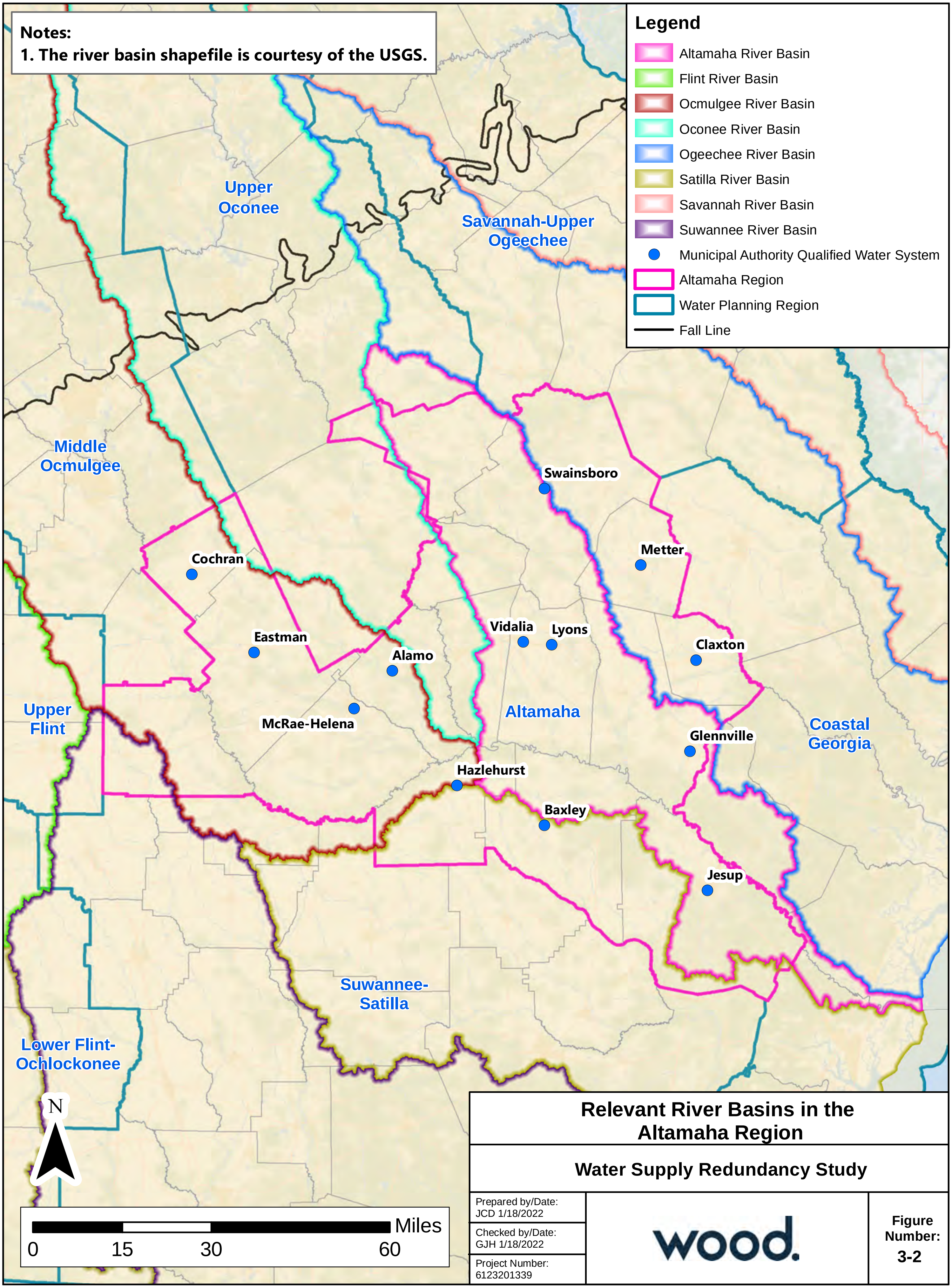
Relevant Aquifers in the Altamaha Region

Water Supply Redundancy Study

Prepared by/Date: JCD 1/18/2022	wood.	Figure Number: 3-1
Checked by/Date: GJH 1/18/2022		
Project Number: 6123201339		



Relevant River Basins in the Altamaha Region

Water Supply Redundancy Study

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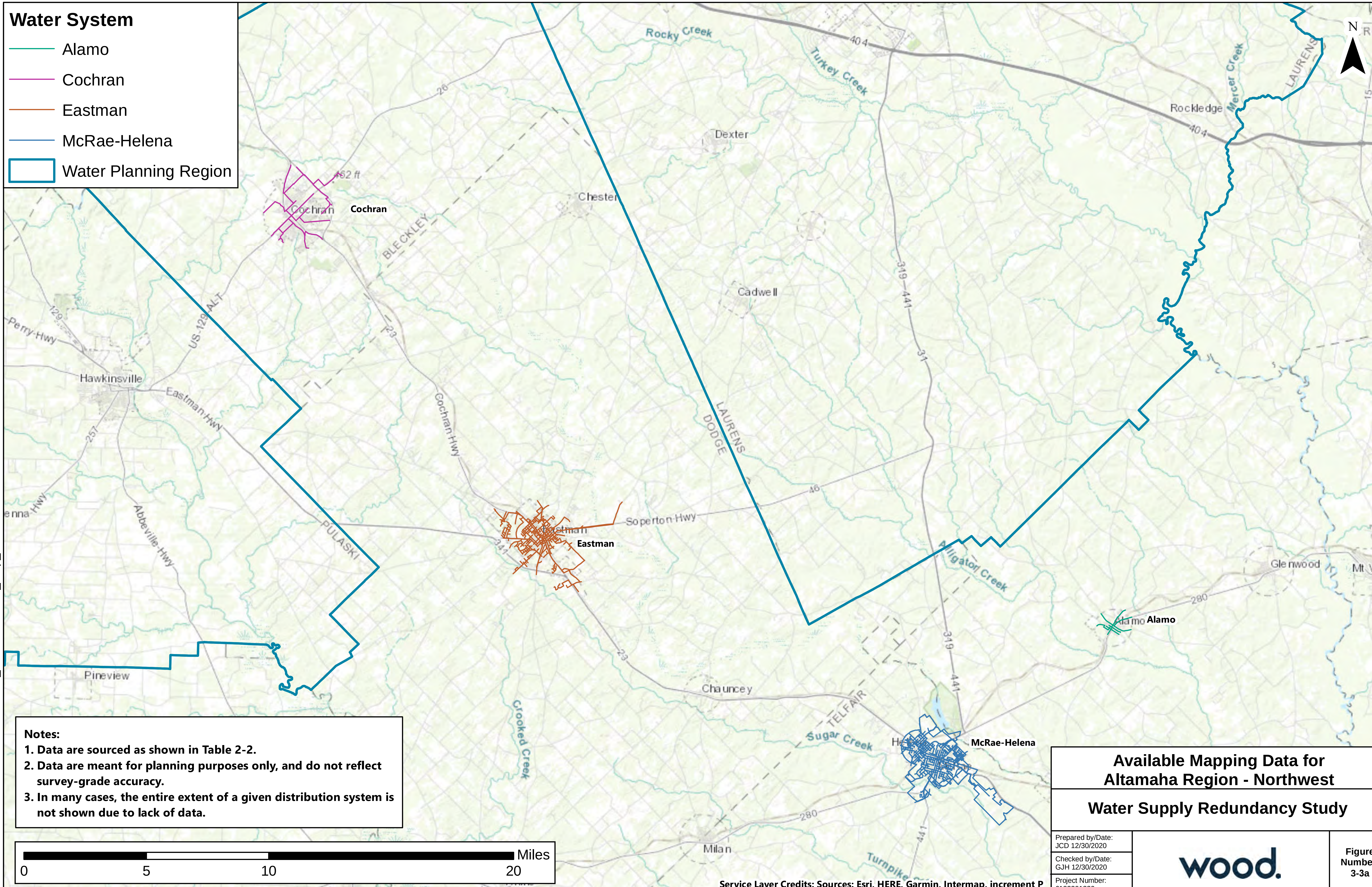

Notes:

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.

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P

Available Mapping Data for Altamaha Region - Northwest

Water Supply Redundancy Study

Prepared by/Date: JCD 12/30/2020	wood.	Figure Number: 3-3a
Checked by/Date: GJH 12/30/2020		
Project Number: 6123201339		

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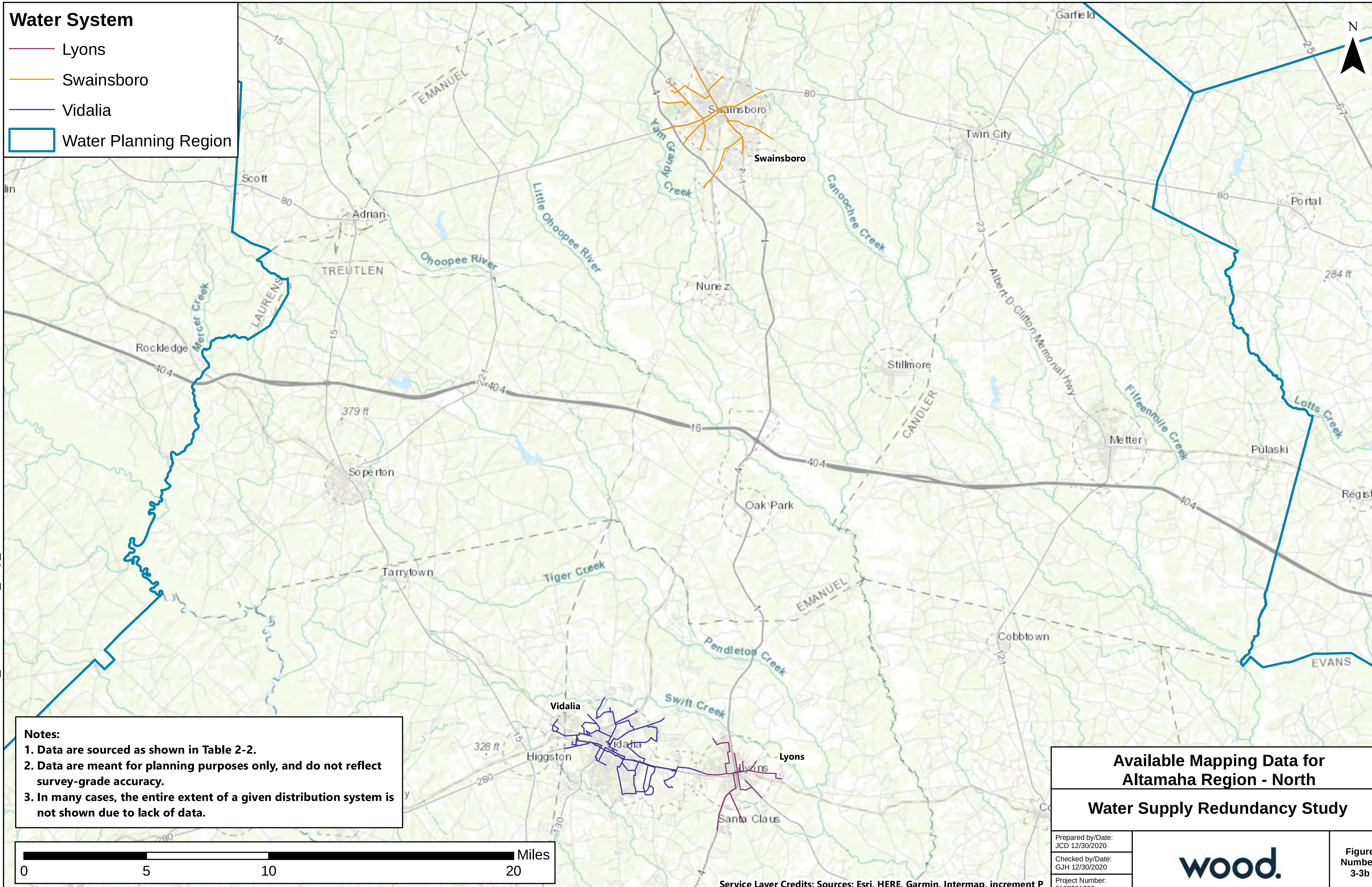

Notes:

1. Data are sourced as shown in Table 2-2.
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3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

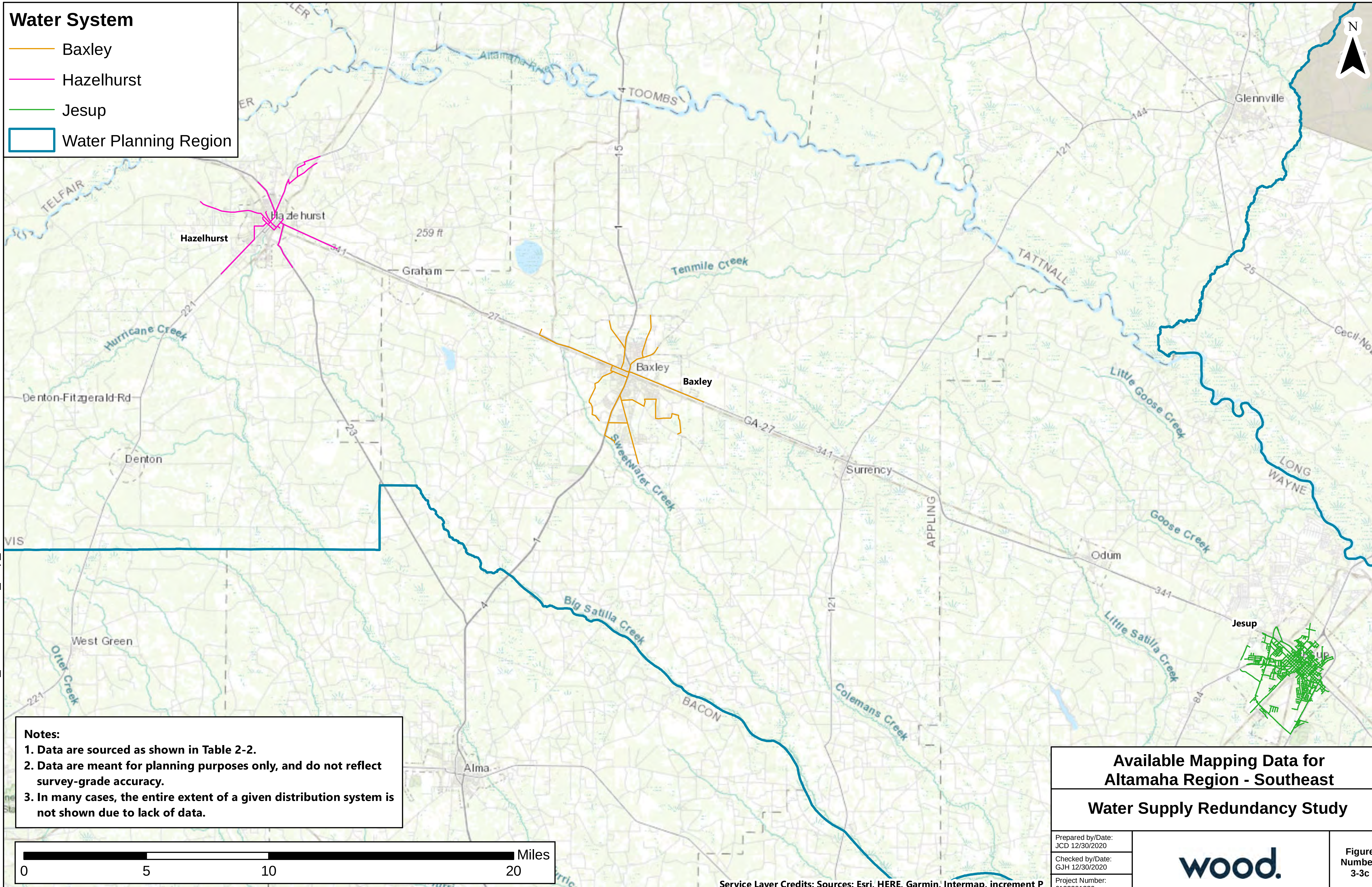
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P

Available Mapping Data for Altamaha Region - North

Water Supply Redundancy Study

Prepared by/Date: JCD 12/30/2020	wood.	Figure Number: 3-3b
Checked by/Date: GJH 12/30/2020		
Project Number: 6123201339		

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

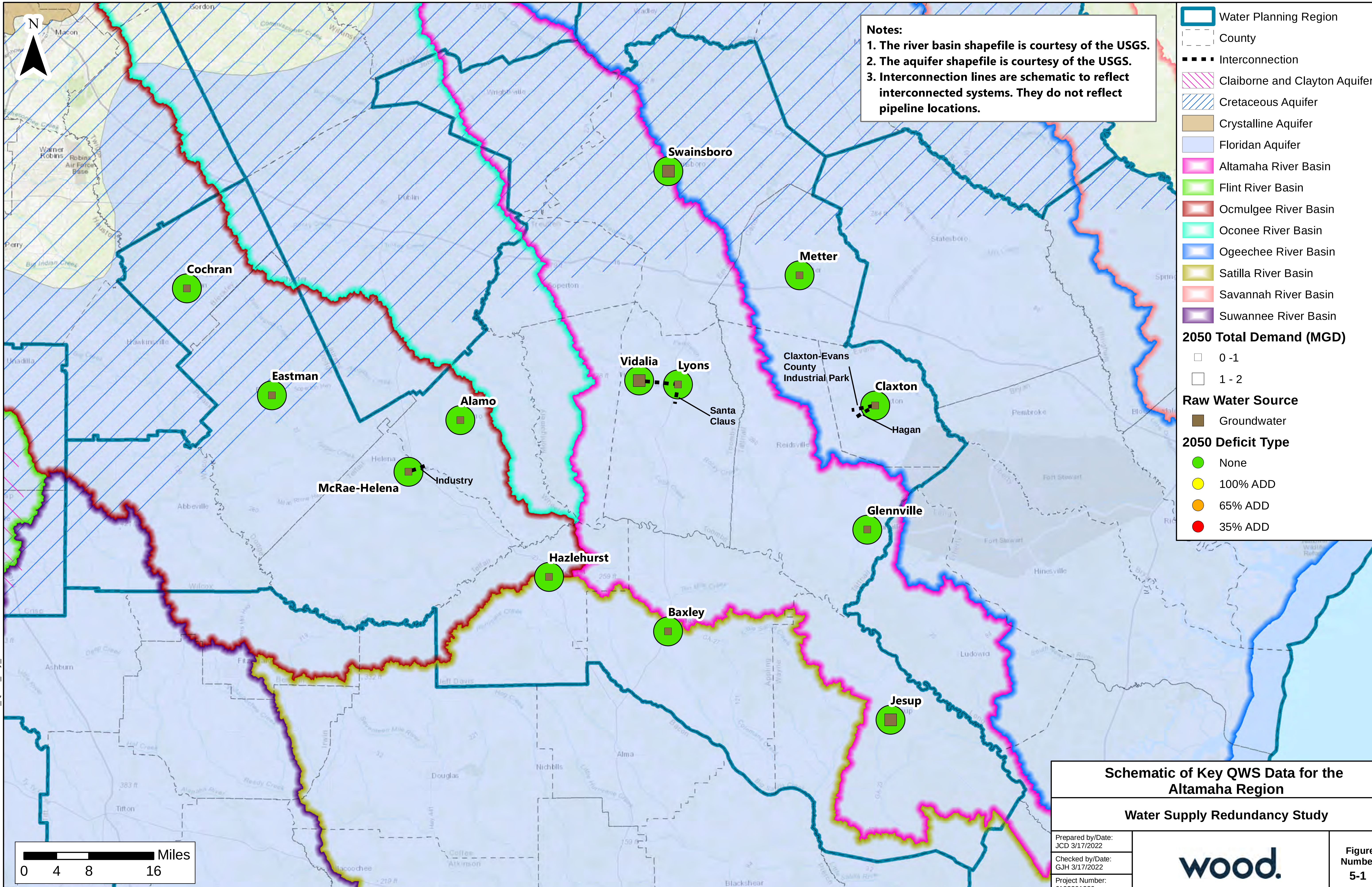
Available Mapping Data for Altamaha Region - Southeast

Water Supply Redundancy Study

Prepared by/Date: JCD 12/30/2020
Checked by/Date: GJH 12/30/2020
Project Number: 6123201339

wood.

Figure Number: 3-3c



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.

Schematic of Key QWS Data for the Altamaha Region

Water Supply Redundancy Study

Prepared by/Date: JCD 3/17/2022

Checked by/Date: GJH 3/17/2022

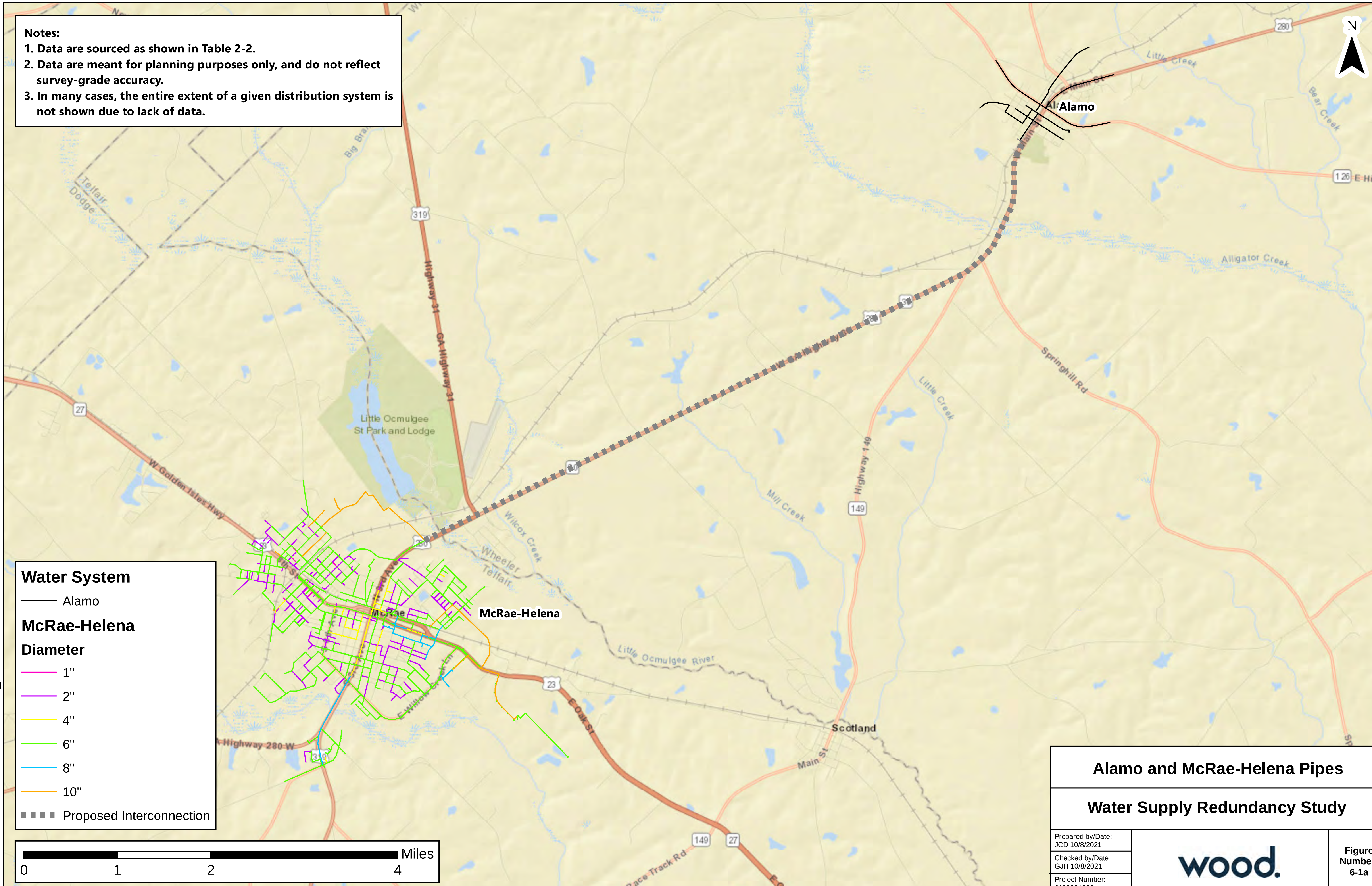
Project Number: 6123201339

wood.

Figure Number: 5-1

Document Path: G:\GEFA\MXD\Altamaha\Altamaha_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.



Alamo and McRae-Helena Pipes

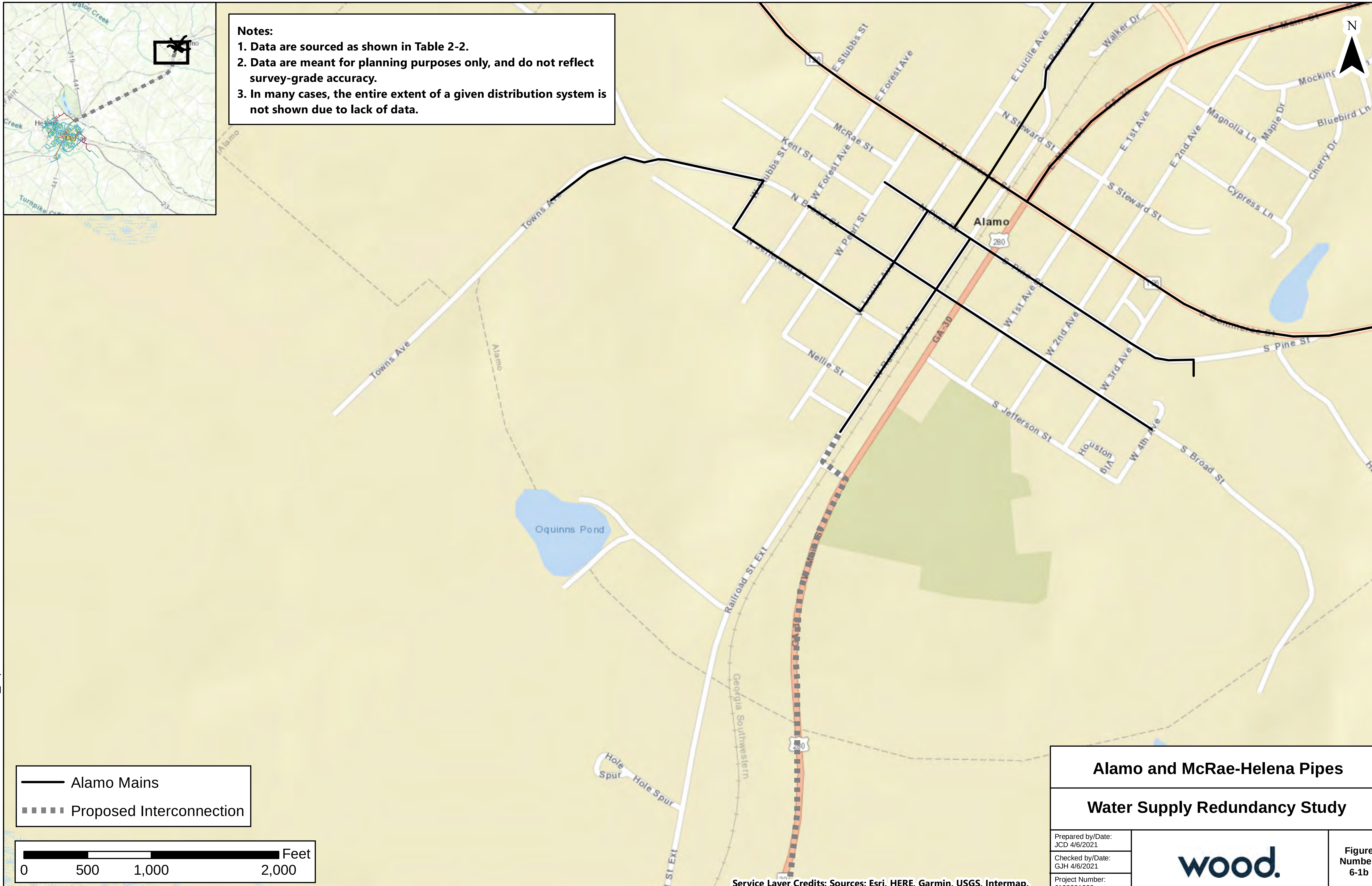
Water Supply Redundancy Study

Prepared by/Date: JCD 10/8/2021
Checked by/Date: GJH 10/8/2021
Project Number: 6123201339

wood.

Figure Number: 6-1a

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

Alamo Mains
Proposed Interconnection

0 500 1,000 2,000 Feet

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap,

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

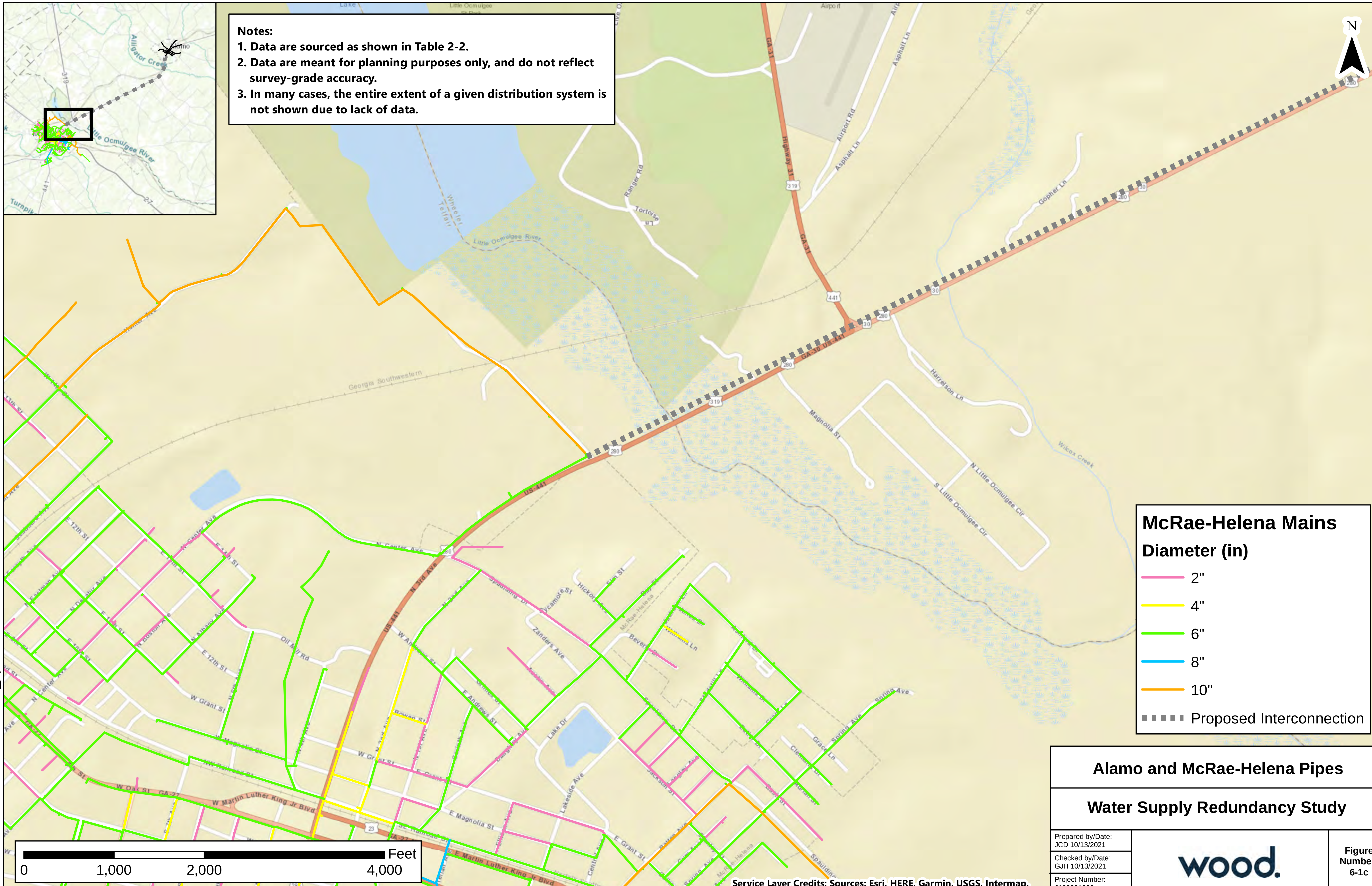
Alamo and McRae-Helena Pipes

Water Supply Redundancy Study

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

wood.

Figure Number: 6-1b



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.

Alamo and McRae-Helena Pipes

Water Supply Redundancy Study

Prepared by/Date: JCD 10/13/2021

Checked by/Date: GJH 10/13/2021

Project Number: 6123201339

wood.

Figure Number: 6-1c

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

Appendix A: Excess Capacity Calculations

Contents

List of Tables

Acronyms

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

1.0 Introduction

This appendix describes and shows 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, Hazlehurst indicated one potential new supply well and Vidalia indicated pump upgrades.

2.2 Average Daily Demand – Water Withdrawal Only

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. Two QWS did not have 2015 water loss audit data: Alamo and Claxton. The Alamo and Claxton values were self-reported via the survey-based questionnaire.

The 2050 ADD 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 Altamaha Water Planning Council, the municipal sector includes public and private water withdrawal data for residential, commercial, and small industrial use. 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 12 of 13 QWS (lacking Alamo) were included in the report. Wheeler County, which contains Alamo, did not have industrial demand, so this calculation did not apply to Alamo. 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 (65 MGD) to obtain a QWS-specific percent. This percent was then applied to the

2050 RWP regional industrial projection (73 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 for each QWS for 2015 and 2050 capacities using the following equation:

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

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 the most meaningful to the Altamaha QWS because each QWS' ADD is less than 50% of their peak day design capacity. Regime (c), while possible for other water systems, does not occur for Altamaha QWS because each QWS' ADD does not exceed 50% of their peak day design capacity. Regime (d) does not apply to this region.

Table A-4 shows the 2015 and 2050 peak day design capacity, ADD, resultant excess capacity, and calculated excess capacity index for each QWS. The Altamaha QWS are in index regime (b). McRae-Helena's 2015 and Alamo's 2050 scaled excess capacity sufficiency are the lowest relative to other Altamaha QWS.

References

CDM Smith, 2017. *Water and Wastewater Forecasting Technical Memorandum. Supplemental Material, Altamaha 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]
Appling	18,693	22,405	1.97
Bleckley	12,817	13,823	1.15
Candler	11,039	11,931	0.91
Dodge	21,257	20,730	2.15
Emanuel	23,245	28,161	3.15
Evans	10,930	12,557	0.94
Jeff Davis	15,201	17,229	2.11
Johnson	9,748	9,072	0.77
Montgomery	9,023	8,774	0.78
Tattnall	25,896	31,940	2.65
Telfair	16,497	14,469	1.59
Toombs	27,723	32,497	3.67
Treutlen	6,728	6,330	0.57
Wayne	30,535	35,917	3.75
Wheeler	8,050	10,863	0.96
Wilcox	8,923	8,549	0.84
Totals	**256,305**	**285,247**	**27.96**

Prepared by: GJH 12/31/20
Checked by: LCT 1/20/21

Notes:
MGD - million gallons per day
1. Values are from the 2017 CDM Smith *Water and Wastewater Forecasting Technical Memorandum. Supplemental Material, Altamaha 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	QWS Percent of County Population (%)[3]	QWS 2050 Municipal Demand Estimate (MGD)[3]
Wheeler	Alamo	3,700	0	3,700	46%	0.44
Appling	Baxley	4,800	0	4,800	26%	0.51
Evans	Claxton	3,500	0	3,500	32%	0.30
Bleckley	Cochran	8,000	0	8,000	62%	0.72
Dodge	Eastman	5,500	0	5,500	26%	0.56
Tattnall	Glennville	5,200	0	5,200	20%	0.53
Jeff Davis	Hazlehurst	6,300	0	6,300	41%	0.87
Wayne	Jesup	10,200	0	10,200	33%	1.25
Toombs	Lyons	4,400	0	4,400	16%	0.58
Telfair	McRae-Helena	8,600	0	8,600	52%	0.83
Candler	Metter	3,900	0	3,900	35%	0.32
Emanuel	Swainsboro	8,500	0	8,500	37%	1.15
Toombs	Vidalia	10,200	0	10,200	37%	1.35
	Totals	**82,800**	**0**	**82,800**	**-**	**9.42**

Prepared by: GJH 12/31/20
Checked by: LCT 1/20/21

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]	65	MGD
Regional Water Plan - 2050 Regional Industrial Projection[1]	73	MGD

Alamo

Wheeler County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.26	0.38	0.12
Commercial	0.00	0.03	0.03
Industrial	0.00	0.00	0.00
Water Loss	-	-	0.03
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.18
		Alamo Public Supply (MGD)	not reported
		QWS's Percent of County's Public Supply (%)	unkown
		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

Baxley

Appling County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.92	1.45	0.53
Commercial	0.00	0.03	0.03
Industrial	0.00	0.04	0.04
Water Loss	-	-	0.16
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.76
		Baxley Public Supply (MGD)	0.69
		QWS's Percent of County's Public Supply (%)	91%
		QWS's Supplied Industrial Demand (MGD)	0.04
		2015 QWS Percent of Regional Industrial Demand (%)	0.06%
		2050 QWS Industrial Demand Estimate (MGD)	0.04

Claxton

Evans County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.32	0.69	0.37
Commercial	0.00	0.09	0.09
Industrial	1.73	1.75	0.02
Water Loss	-	-	0.06
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.54
		Claxton Public Supply (MGD)	0.42
		QWS's Percent of County's Public Supply (%)	78%
		QWS's Supplied Industrial Demand (MGD)	0.02
		2015 QWS Percent of Regional Industrial Demand (%)	0.02%
		2050 QWS Industrial Demand Estimate (MGD)	0.02

Cochran

Bleckley County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.53	0.62	0.09
Commercial	0.08	0.12	0.04
Industrial	0.00	0.00	0.00
Water Loss	-	-	0.07
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.20
		Cochran Public Supply (MGD)	0.20
		QWS's Percent of County's Public Supply (%)	100%
		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

Eastman

Dodge County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.82	1.57	0.75
Commercial	0.00	0.35	0.35
Industrial	0.02	0.13	0.11
Water Loss	-	-	0.18
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.39
		Eastman Public Supply	0.94
		QWS's Percent of County's Public Supply (%)	68%
		QWS's Supplied Industrial Demand (MGD)	0.07
		2015 QWS Percent of Regional Industrial Demand (%)	0.11%
		2050 QWS Industrial Demand Estimate (MGD)	0.08

Glennville

Tattnall County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.17	1.80	0.63
Commercial	0.77	0.95	0.18
Industrial	0.03	0.25	0.22
Water Loss	-	-	0.19
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.22
		Glennville Public Supply (MGD)	0.74
		QWS's Percent of County's Public Supply (%)	61%
		QWS's Supplied Industrial Demand (MGD)	0.13
		2015 QWS Percent of Regional Industrial Demand (%)	0.21%
		2050 QWS Industrial Demand Estimate (MGD)	0.15

Hazlehurst

Jeff Davis County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.64	1.20	0.56
Commercial	0.00	0.07	0.07
Industrial	0.10	0.15	0.05
Water Loss	-	-	0.22
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.90
		Hazlehurst Public Supply (MGD)	0.86
		QWS's Percent of County's Public Supply (%)	96%
		QWS's Supplied Industrial Demand (MGD)	0.05
		2015 QWS Percent of Regional Industrial Demand (%)	0.07%
		2050 QWS Industrial Demand Estimate (MGD)	0.05

Jesup

Wayne County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.18	2.07	0.89
Commercial	0.12	0.54	0.42
Industrial	57.05	57.05	0.00
Water Loss	-	-	0.19
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.50
		Jesup Public Supply (MGD)	1.21
		QWS's Percent of County's Public Supply (%)	81%
		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

Lyons

Toombs County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.66	2.07	1.41
Commercial	0.00	0.51	0.51
Industrial	0.00	0.43	0.43
Water Loss	-	-	0.49
Inter-County Delivery	-	-	0.00
		Total (MGD)	2.84
		Lyons Public Supply	1.27
		QWS's Percent of County's Public Supply (%)	45%
		QWS's Supplied Industrial Demand (MGD)	0.19
		2015 QWS Percent of Regional Industrial Demand (%)	0.30%
		2050 QWS Industrial Demand Estimate (MGD)	0.22

McRae-Helena

Telfair County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.53	1.15	0.62
Commercial	0.00	0.32	0.32
Industrial	0.06	0.11	0.05
Water Loss	-	-	0.23
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.22
		McRae-Helena Public Supply (MGD)	0.84
		QWS's Percent of County's Public Supply (%)	69%
		QWS's Supplied Industrial Demand (MGD)	0.03
		2015 QWS Percent of Regional Industrial Demand (%)	0.05%
		2050 QWS Industrial Demand Estimate (MGD)	0.04

Metter

Candler County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.32	0.64	0.32
Commercial	0.00	0.04	0.04
Industrial	0.00	0.00	0.00
Water Loss	-	-	0.05
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.41
		Metter Public Supply (MGD)	0.36
		QWS's Percent of County's Public Supply (%)	88%
		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

Swainsboro

Emanuel County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.71	1.78	1.07
Commercial	0.00	0.26	0.26
Industrial	0.74	0.83	0.09
Water Loss	-	-	0.17
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.59
		Swainsboro Public Supply (MGD)	1.13
		QWS's Percent of County's Public Supply (%)	71%
		QWS's Supplied Industrial Demand (MGD)	0.06
		2015 QWS Percent of Regional Industrial Demand (%)	0.10%
		2050 QWS Industrial Demand Estimate (MGD)	0.07

Table A-3

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

Vidalia

Toombs County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.66	2.07	1.41
Commercial	0.00	0.51	0.51
Industrial	0.00	0.43	0.43
Water Loss	-	-	0.49
Inter-County Delivery	-	-	0.00
		Total (MGD)	2.84
		Vidalia Public Supply (MGD)	1.48
		QWS's Percent of County's Public Supply (%)	52%
		QWS's Supplied Industrial Demand (MGD)	0.22
		2015 QWS Percent of Regional Industrial Demand (%)	0.34%
		2050 QWS Industrial Demand Estimate (MGD)	0.25

Prepared by: GJH 12/31/20
Checked by: LCT 1/20/21

Notes:

MGD - million gallons per day

QWS - qualified water system

1. Values are from the 2017 Altamaha Water Planning Council *Altamaha 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.*

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
Wheeler	Alamo	1.3	0.4	0.9	0.52	1.3	0.4	0.8	0.46
Appling	Baxley	2.2	0.7	1.5	0.54	2.2	0.5	1.7	0.67
Evans	Claxton	2.0	0.4	1.6	0.73	2.0	0.3	1.7	0.81
Bleckley	Cochran	2.7	0.7	2.0	0.66	2.7	0.7	1.9	0.63
Dodge	Eastman	4.5	1.0	3.5	0.71	4.5	0.6	3.8	0.83
Tattnall	Glennville	4.2	0.8	3.4	0.78	4.2	0.7	3.5	0.80
Jeff Davis	Hazlehurst	3.3	0.9	2.5	0.65	4.8	0.9	3.8	0.76
Wayne	Jesup	8.9	1.2	7.7	0.84	8.9	1.3	7.7	0.84
Toombs	Lyons	6.6	1.2	5.3	0.77	6.6	0.8	5.8	0.86
Telfair	McRae-Helena	2.7	1.0	1.6	0.36	2.7	0.9	1.8	0.52
Candler	Metter	2.4	0.4	2.0	0.83	2.4	0.3	2.1	0.85
Emanuel	Swainsboro	8.3	1.1	7.1	0.84	8.3	1.2	7.0	0.83
Toombs	Vidalia	7.7	1.6	6.2	0.75	9.2	1.6	7.6	0.79
	Totals	**56.6**	**11.3**	**45.3**	**-**	**59.6**	**10.3**	**49.2**	**-**

Prepared by: GJH 12/31/20
Checked by: LCT 1/20/21

Notes:
ADD - average daily demand
MGD - million gallons per day
1. 2015 EPD-validated water 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, if available.
2. Hazlehurst indicated one potential new well, 1.44 MGD. Vidalia indicated a pump capacity increase of approximately 1.5 MGD.
3. Municipal and publicly supplied industrial demand by county were allocated to each QWS.

Appendix B: Water Supply and Deficit Calculations

Table B-1a
Alamo Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 101	Peak Day Design Capacity (MGD): WTP Well 102	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	0.54	0.72	NA	0.24	1.50	0.14	1.36
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.54	0.72	NA	NA	1.26	0.00	1.26
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.54	0.72	NA	0.24	1.50	0.72	0.78
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.54	0.72	NA	NA	1.26	0.00	1.26
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.54	0.72	NA	0.24	1.50	0.72	0.78
	D2. Chemical contamination of largest raw water source	0.1	1	0.54	0.72	NA	0.24	1.50	0.72	0.78
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
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. WTP 102 has a backup generator of unknown capacity. 80% capacity was assumed; therefore 20% 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.

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-1b

Alamo Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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	1.36	0.41	0.27	0.14	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.26	0.41	0.27	0.14	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.78	0.41	0.27	0.14	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	1.26	0.41	0.27	0.14	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.78	0.41	0.27	0.14	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	0.78	0.41	0.27	0.14	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 12/18/20
Checked by: LCT 12/22/20

Table B-1c

Alamo Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 101	Peak Day Design Capacity (MGD): WTP Well 102	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	0.54	0.72	NA	0.24	1.50	0.14	1.36
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.54	0.72	NA	NA	1.26	0.00	1.26
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.54	0.72	NA	0.24	1.50	0.72	0.78
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.54	0.72	NA	NA	1.26	0.00	1.26
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.54	0.72	NA	0.24	1.50	0.72	0.78
	D2. Chemical contamination of largest raw water source	0.1	1	0.54	0.72	NA	0.24	1.50	0.72	0.78
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 12/18/20
Checked by: LCT 12/22/20

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

1. WTP 102 has a backup generator of unknown capacity. 80% capacity was assumed; therefore 20% 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-1d
Alamo Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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	1.36	0.44	0.29	0.15	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP	1.26	0.44	0.29	0.15	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.78	0.44	0.29	0.15	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.26	0.44	0.29	0.15	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.78	0.44	0.29	0.15	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	0.78	0.44	0.29	0.15	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

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

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

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-2a

Baxley 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 303	WTP Well 304	WTP Well 305					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.70	0.80	0.70	NA	0.49	2.69	0.10	2.59
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.70	0.80	0.70	NA	NA	2.20	0.00	2.20
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.70	0.80	0.70	NA	0.49	2.69	0.80	1.89
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	0.70	0.80	0.70	NA	NA	2.20	0.00	2.20
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.70	0.80	0.70	NA	0.49	2.69	0.80	1.89
	D2. Chemical contamination of largest raw water source	0.1	1	0.70	0.80	0.70	NA	0.49	2.69	0.80	1.89
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 12/18/20
Checked by: LCT 12/22/20

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

1. WTP 304 has a backup generators able to supply 0.7 MGD treatment capacity.
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-2b
Baxley Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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]	2.59	0.69	0.45	0.24	0.0	0.0	0.0
	A2. Critical asset failure at largest WTP[2]	2.20	0.69	0.45	0.24	0.0	0.0	0.0
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.89	0.69	0.45	0.24	0.0	0.0	0.0
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.20	0.69	0.45	0.24	0.0	0.0	0.0
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.89	0.69	0.45	0.24	0.0	0.0	0.0
	D2. Chemical contamination of largest raw water source	1.89	0.69	0.45	0.24	0.0	0.0	0.0
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 12/18/20
Checked by: LCT 12/22/20

Table B-2c

Baxley Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 303	WTP Well 304	WTP Well 305	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	0.70	0.80	0.70	NA	0.60	2.80	0.10	2.70
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.70	0.80	0.70	NA	NA	2.20	0.00	2.20
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.70	0.80	0.70	NA	0.60	2.80	0.80	2.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	0.70	0.80	0.70	NA	NA	2.20	0.00	2.20
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.70	0.80	0.70	NA	0.60	2.80	0.80	2.00
	D2. Chemical contamination of largest raw water source	0.1	1	0.70	0.80	0.70	NA	0.60	2.80	0.80	2.00
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:

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

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

1. WTP 304 has a backup generators able to supply 0.7 MGD treatment capacity.
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. Baxley indicated a new 0.3 MG tank to repace the 0.118 MG tank.

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

Table B-2d

Baxley Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	2.70	0.55	0.36	0.19	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.20	0.55	0.36	0.19	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.00	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	2.20	0.55	0.36	0.19	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.00	0.55	0.36	0.19	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.00	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 12/18/20
Checked by: LCT 12/22/20

Table B-3a

Claxton Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 103	Peak Day Design Capacity (MGD): WTP Well 107	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	0.86	1.15	0.17	0.18	2.36	1.15	1.21
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.86	1.15	0.17	NA	2.18	0.00	2.18
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.86	1.15	0.17	0.18	2.36	1.15	1.21
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.86	1.15	0.17	NA	2.18	0.00	2.18
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.86	1.15	0.17	0.18	2.36	1.15	1.21
	D2. Chemical contamination of largest raw water source	0.1	1	0.86	1.15	0.17	0.18	2.36	1.15	1.21
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. No backup generators are available, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The interconnections are limited by the suppliers' permit limits and 2015 ADD. The maximum possible purchased water value was calculated as the minimum of 1) the sum of existing interconnections (Table B-3e); or 2) the supplier's 2015 ADD subtracted from the supplier's permit 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

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-3b

Claxton Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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]	1.21	0.43	0.28	0.15	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.18	0.43	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)	1.21	0.43	0.28	0.15	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.18	0.43	0.28	0.15	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.21	0.43	0.28	0.15	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.21	0.43	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 12/18/20
Checked by: LCT 12/22/20

Table B-3c
Claxton Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 103	Peak Day Design Capacity (MGD): WTP Well 107	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	0.86	1.15	0.17	0.18	2.36	0.23	2.13
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.86	1.15	0.17	NA	2.18	0.00	2.18
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.86	1.15	0.17	0.18	2.36	1.15	1.21
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.86	1.15	0.17	NA	2.18	0.00	2.18
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.86	1.15	0.17	0.18	2.36	1.15	1.21
	D2. Chemical contamination of largest raw water source	0.1	1	0.86	1.15	0.17	0.18	2.36	1.15	1.21
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 12/18/20
Checked by: LCT 12/22/20

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

1. Claxton plans to obtain a backup generator; 20% capacity loss at the largest WTP was assumed.
2. Backup equipment is available, rendering no capacity loss.
3. The interconnections are limited by the suppliers' permit limits and 2050 ADD. The maximum possible purchased water value was calculated as the minimum of 1) the sum of existing interconnections (Table B-3e); or 2) the supplier's 2050 ADD subtracted from the supplier's permit 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-3d

Claxton Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	2.13	0.32	0.21	0.11	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.18	0.32	0.21	0.11	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.21	0.32	0.21	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	2.18	0.32	0.21	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	1.21	0.32	0.21	0.11	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.21	0.32	0.21	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 12/18/20
Checked by: LCT 12/22/20

Table B-3e

Claxton Interconnections

Existing 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)
1	GA1090007-Claxton - Evans County Industrial Park	Evans County Industrial Park	6	5	1	0.635	0.000	0.635
2	GA1090003-Hagan	West side of Claxton	6	5	1	0.635	0.000	0.635

Prepared by: GJH 12/18/20

Checked by: LCT 12/22/20

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

Table B-4a

Cochran 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 Ash St. Well	WTP Dykes St. Well	WTP Vernon Rd. Well	WTP Ann St. Well					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.76	0.47	0.79	0.65	NA	0.42	3.09	0.79	2.30
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.76	0.47	0.79	0.65	NA	NA	2.66	0.00	2.66
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.76	0.47	0.79	0.65	NA	0.42	3.09	0.79	2.30
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	0.76	0.47	0.79	0.65	NA	NA	2.66	0.00	2.66
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.76	0.47	0.79	0.65	NA	0.42	3.09	0.79	2.30
	D2. Chemical contamination of largest raw water source	0.1	1	0.76	0.47	0.79	0.65	NA	0.42	3.09	0.79	2.30
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
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. No backup generators are available, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-4b
Cochran Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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]	2.30	0.67	0.43	0.23	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.66	0.67	0.43	0.23	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.30	0.67	0.43	0.23	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.66	0.67	0.43	0.23	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.30	0.67	0.43	0.23	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.30	0.67	0.43	0.23	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	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 12/18/20
Checked by: LCT 12/22/20

Table B-4c

Cochran Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Ash St. Well	Peak Day Design Capacity (MGD): WTP Dykes St. Well	Peak Day Design Capacity (MGD): WTP Vernon Rd. Well	Peak Day Design Capacity (MGD): WTP Ann St. Well	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	0.76	0.47	0.79	0.65	NA	0.42	3.09	0.00	3.09
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.76	0.47	0.79	0.65	NA	NA	2.66	0.00	2.66
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.76	0.47	0.79	0.65	NA	0.42	3.09	0.79	2.30
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	0.76	0.47	0.79	0.65	NA	NA	2.66	0.00	2.66
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.76	0.47	0.79	0.65	NA	0.42	3.09	0.79	2.30
	D2. Chemical contamination of largest raw water source	0.1	1	0.76	0.47	0.79	0.65	NA	0.42	3.09	0.79	2.30
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 12/18/20
Checked by: LCT 12/22/20

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. Cochran plans to obtain backup generators for each well, 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.

Table B-4d

Cochran Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	3.09	0.72	0.47	0.25	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.66	0.72	0.47	0.25	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.30	0.72	0.47	0.25	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.66	0.72	0.47	0.25	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.30	0.72	0.47	0.25	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.30	0.72	0.47	0.25	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	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 12/18/20
Checked by: LCT 12/22/20

Table B-5a

Eastman Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 104	WTP Well 105	WTP Well 106	WTP Well 107	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.49	1.24	0.74	0.99	NA	0.62	5.08	1.49	3.59
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.49	1.24	0.74	0.99	NA	NA	4.46	0.00	4.46
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.49	1.24	0.74	0.99	NA	0.62	5.08	1.49	3.59
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.49	1.24	0.74	0.99	NA	NA	4.46	0.00	4.46
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.49	1.24	0.74	0.99	NA	0.62	5.08	1.49	3.59
	D2. Chemical contamination of largest raw water source	0.1	1	1.49	1.24	0.74	0.99	NA	0.62	5.08	1.49	3.59
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 12/18/20
Checked by: LCT 12/22/20

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. No backup generators are available, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Table B-5b
Eastman 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[1]	3.59	1.01	0.66	0.35	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	4.46	1.01	0.66	0.35	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.59	1.01	0.66	0.35	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.46	1.01	0.66	0.35	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.59	1.01	0.66	0.35	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.59	1.01	0.66	0.35	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 12/18/20
Checked by: LCT 12/22/20

Table B-5c

Eastman Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 104	WTP Well 105	WTP Well 106	WTP Well 107	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.49	1.24	0.74	0.99	NA	0.62	5.08	1.49	3.59
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.49	1.24	0.74	0.99	NA	NA	4.46	0.00	4.46
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.49	1.24	0.74	0.99	NA	0.62	5.08	1.49	3.59
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.49	1.24	0.74	0.99	NA	NA	4.46	0.00	4.46
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.49	1.24	0.74	0.99	NA	0.62	5.08	1.49	3.59
	D2. Chemical contamination of largest raw water source	0.1	1	1.49	1.24	0.74	0.99	NA	0.62	5.08	1.49	3.59
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 12/18/20
Checked by: LCT 12/22/20

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. No backup generators are available, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Table B-5d

Eastman Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	3.59	0.64	0.42	0.22	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	4.46	0.64	0.42	0.22	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.59	0.64	0.42	0.22	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.46	0.64	0.42	0.22	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.59	0.64	0.42	0.22	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.59	0.64	0.42	0.22	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

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

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

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-6a
Glennville 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 103	WTP Well 104	WTP Well 105					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.72	1.73	1.73	NA	0.60	4.78	1.48	3.30
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.72	1.73	1.73	NA	NA	4.18	0.00	4.18
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.72	1.73	1.73	NA	0.60	4.78	1.73	3.05
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.72	1.73	1.73	NA	NA	4.18	0.00	4.18
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.72	1.73	1.73	NA	0.60	4.78	1.73	3.05
	D2. Chemical contamination of largest raw water source	0.1	1	0.72	1.73	1.73	NA	0.60	4.78	1.73	3.05
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 12/18/20
Checked by: LCT 12/22/20

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

1. WTP 105 has a backup generator able to supply 0.25 MGD capacity. The other two WTP have backup generators, but the capacity loss at WTP 105 was the most severe.
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-6b
Glennville Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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]	3.30	0.76	0.49	0.26	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	4.18	0.76	0.49	0.26	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.05	0.76	0.49	0.26	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	4.18	0.76	0.49	0.26	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.05	0.76	0.49	0.26	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.05	0.76	0.49	0.26	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 12/18/20
Checked by: LCT 12/22/20

Table B-6c
Glennville Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 103	WTP Well 104	WTP Well 105	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	0.72	1.73	1.73	NA	0.60	4.78	1.48	3.30
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.72	1.73	1.73	NA	NA	4.18	0.00	4.18
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.72	1.73	1.73	NA	0.60	4.78	1.73	3.05
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.72	1.73	1.73	NA	NA	4.18	0.00	4.18
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.72	1.73	1.73	NA	0.60	4.78	1.73	3.05
	D2. Chemical contamination of largest raw water source	0.1	1	0.72	1.73	1.73	NA	0.60	4.78	1.73	3.05
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 105 has a backup generator able to supply 0.25 MGD capacity. The other two WTP have backup generators, but the capacity loss at WTP 105 was the most severe.
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 12/18/20
Checked by: LCT 12/22/20

Table B-6d
Glennville Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	3.30	0.68	0.44	0.24	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	4.18	0.68	0.44	0.24	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.05	0.68	0.44	0.24	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	4.18	0.68	0.44	0.24	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.05	0.68	0.44	0.24	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.05	0.68	0.44	0.24	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	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 12/18/20
Checked by: LCT 12/22/20

Table B-7a

Hazlehurst 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 102	WTP Well 103	WTP Well 104					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.72	0.94	1.66	NA	0.66	3.97	1.66	2.32
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.72	0.94	1.66	NA	NA	3.31	0.00	3.31
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.72	0.94	1.66	NA	0.66	3.97	1.66	2.32
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.72	0.94	1.66	NA	NA	3.31	0.00	3.31
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.72	0.94	1.66	NA	0.66	3.97	1.66	2.32
	D2. Chemical contamination of largest raw water source	0.1	1	0.72	0.94	1.66	NA	0.66	3.97	1.66	2.32
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	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 12/18/20
Checked by: LCT 12/22/20

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

1. WTPs 102 and 103 have backup generators, but WTP 104 does not, 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-7b
Hazlehurst Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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]	2.32	0.86	0.56	0.30	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	3.31	0.86	0.56	0.30	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.32	0.86	0.56	0.30	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.31	0.86	0.56	0.30	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.32	0.86	0.56	0.30	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.32	0.86	0.56	0.30	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	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 12/18/20
Checked by: LCT 12/22/20

Table B-7c
Hazlehurst Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 102	WTP Well 103	WTP Well 104	WTP New Well	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	0.72	0.94	1.66	1.44	NA	0.66	5.41	0.00	5.41
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.72	0.94	1.66	1.44	NA	NA	4.75	0.00	4.75
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.72	0.94	1.66	1.44	NA	0.66	5.41	1.66	3.76
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.72	0.94	1.66	1.44	NA	NA	4.75	0.00	4.75
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.72	0.94	1.66	1.44	NA	0.66	5.41	1.66	3.76
	D2. Chemical contamination of largest raw water source	0.1	1	0.72	0.94	1.66	1.44	NA	0.66	5.41	1.66	3.76
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 12/18/20
Checked by: LCT 12/22/20

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

1. The QWS is in the process of obtaining a backup generator able to supply full treatment capacity at WTP 104, 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

Table B-7d
Hazlehurst Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	5.41	0.93	0.60	0.32	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	4.75	0.93	0.60	0.32	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	3.76	0.93	0.60	0.32	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	4.75	0.93	0.60	0.32	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	3.76	0.93	0.60	0.32	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.76	0.93	0.60	0.32	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 12/18/20
Checked by: LCT 12/22/20

Table B-8a

Jesup Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 101	WTP Well 103	WTP Well 104	WTP Well 105	WTP Well 106	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	0.72	0.86	2.16	2.59	2.59	NA	0.66	9.59	0.00	9.59
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.72	0.86	2.16	2.59	2.59	NA	NA	8.93	0.00	8.93
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.72	0.86	2.16	2.59	2.59	NA	0.66	9.59	2.59	7.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.72	0.86	2.16	2.59	2.59	NA	NA	8.93	0.00	8.93
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.72	0.86	2.16	2.59	2.59	NA	0.66	9.59	2.59	7.00
	D2. Chemical contamination of largest raw water source	0.1	1	0.72	0.86	2.16	2.59	2.59	NA	0.66	9.59	2.59	7.00
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:

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. Both WTPs 105 and 106, the largest two, have 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.

Table B-8b
Jesup 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[1]	9.59	1.21	0.79	0.42	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	8.93	1.21	0.79	0.42	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	7.00	1.21	0.79	0.42	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	8.93	1.21	0.79	0.42	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	7.00	1.21	0.79	0.42	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	7.00	1.21	0.79	0.42	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 12/18/20
Checked by: LCT 12/22/20

Table B-8c
Jesup Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 101	WTP Well 103	WTP Well 104	WTP Well 105	WTP Well 106	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	0.72	0.86	2.16	2.59	2.59	NA	0.84	9.77	0.00	9.77
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.72	0.86	2.16	2.59	2.59	NA	NA	8.93	0.00	8.93
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.72	0.86	2.16	2.59	2.59	NA	0.84	9.77	2.59	7.18
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.72	0.86	2.16	2.59	2.59	NA	NA	8.93	0.00	8.93
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.72	0.86	2.16	2.59	2.59	NA	0.84	9.77	2.59	7.18
	D2. Chemical contamination of largest raw water source	0.1	1	0.72	0.86	2.16	2.59	2.59	NA	0.84	9.77	2.59	7.18
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
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. Both WTPs 105 and 106, the largest two, have 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. Jesup indicated a new 0.3 MG tank.

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-8d
Jesup Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	9.77	1.25	0.81	0.44	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	8.93	1.25	0.81	0.44	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	7.18	1.25	0.81	0.44	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	8.93	1.25	0.81	0.44	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	7.18	1.25	0.81	0.44	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	7.18	1.25	0.81	0.44	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 12/18/20
Checked by: LCT 12/22/20

Table B-9a

Lyons Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 101	WTP Well 103	WTP Well 104	WTP Well 105	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	1.81	1.55	1.58	1.62	0.64	0.45	7.64	1.81	5.83
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.81	1.55	1.58	1.62	0.64	NA	7.19	0.00	7.19
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.81	1.55	1.58	1.62	0.64	0.45	7.64	1.81	5.83
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.81	1.55	1.58	1.62	0.64	NA	7.19	0.00	7.19
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.81	1.55	1.58	1.62	0.64	0.45	7.64	1.81	5.83
	D2. Chemical contamination of largest raw water source	0.1	1	1.81	1.55	1.58	1.62	0.64	0.45	7.64	1.81	5.83
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable										
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable										

Notes:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. No backup generators are available, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The interconnection with Vidalia is 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.

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-9b

Lyons Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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]	5.83	1.24	0.80	0.43	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	7.19	1.24	0.80	0.43	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	5.83	1.24	0.80	0.43	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	7.19	1.24	0.80	0.43	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	5.83	1.24	0.80	0.43	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	5.83	1.24	0.80	0.43	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 12/18/20
Checked by: LCT 12/22/20

Table B-9c

Lyons 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 Well 103	WTP Well 104	WTP Well 105					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.81	1.55	1.58	1.62	0.64	0.45	7.64	1.81	5.83
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.81	1.55	1.58	1.62	0.64	NA	7.19	0.00	7.19
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.81	1.55	1.58	1.62	0.64	0.45	7.64	1.81	5.83
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.81	1.55	1.58	1.62	0.64	NA	7.19	0.00	7.19
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.81	1.55	1.58	1.62	0.64	0.45	7.64	1.81	5.83
	D2. Chemical contamination of largest raw water source	0.1	1	1.81	1.55	1.58	1.62	0.64	0.45	7.64	1.81	5.83
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable										
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable										

Notes:

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. No backup generators are available, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The interconnection with Vidalia is 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.

Table B-9d
Lyons Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	5.83	0.80	0.52	0.28	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	7.19	0.80	0.52	0.28	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	5.83	0.80	0.52	0.28	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	7.19	0.80	0.52	0.28	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	5.83	0.80	0.52	0.28	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	5.83	0.80	0.52	0.28	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 12/18/20
Checked by: LCT 12/22/20

Table B-9e
Lyons Interconnections

Existing 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)
3	GA2790002-Vidalia	West side of Lyons	6	5	0.982	0.635	0.000	0.635
4	GA2790001-Santa Claus[2]	South side of Lyons	unknown	unknown	unknown	unknown	0.000	unknown

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

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. It is unlikely that Santa Claus, with a 2010 census population of 165, can provide excess capacity to Lyons.

Table B-10a

McRae-Helena Emergency Scenario Evaluation: 2015

				Peak Day Design Capacity (MGD)								
Risk	**Scenario**	**Relative Liklihood**	**Duration (Days)**	**WTP Well 101**	**WTP Well 102**	**WTP Well 103(3)**	**WTP Well 104(3)**	**Maximum Possible Purchased Water (MGD)**	**Water Storage (MGD)[4]**	**Total Possible Water Supply (MGD)**	**Capacity Loss (MGD)**	**Available Water Supply (MGD)**
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.24	0.53	2.45	1.91	NA	0.78	3.46	1.91	1.55
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.24	0.53	2.45	1.91	NA	NA	2.68	0.00	2.68
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.24	0.53	2.45	1.91	NA	0.78	3.46	1.91	1.55
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.24	0.53	2.45	1.91	NA	NA	2.68	0.00	2.68
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.24	0.53	2.45	1.91	NA	0.78	3.46	1.91	1.55
	D2. Chemical contamination of largest raw water source	0.1	1	0.24	0.53	2.45	1.91	NA	0.78	3.46	1.91	1.55
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:

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

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

1. WTP 104 does not have a backup generator, rendering full capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Wells 3 and 4 have had issues running simultaneously. Only Well 4 is included as a conservative assumption.
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-10b
McRae-Helena 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[1]	1.55	1.04	0.68	0.37	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.68	1.04	0.68	0.37	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.55	1.04	0.68	0.37	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.68	1.04	0.68	0.37	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.55	1.04	0.68	0.37	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.55	1.04	0.68	0.37	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 12/18/20
Checked by: LCT 12/22/20

Table B-10c

McRae-Helena Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)				Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 101	WTP Well 102	WTP Well 103[(3)]	WTP Well 104[(3)]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.24	0.53	2.45	1.91	NA	0.78	3.46	1.91	1.55
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.24	0.53	2.45	1.91	NA	NA	2.68	0.00	2.68
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.24	0.53	2.45	1.91	NA	0.78	3.46	1.91	1.55
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.24	0.53	2.45	1.91	NA	NA	2.68	0.00	2.68
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.24	0.53	2.45	1.91	NA	0.78	3.46	1.91	1.55
	D2. Chemical contamination of largest raw water source	0.1	1	0.24	0.53	2.45	1.91	NA	0.78	3.46	1.91	1.55
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:

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

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

1. WTP 104 does not have a backup generator, rendering full capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Wells 3 and 4 have had issues running simultaneously. Only Well 4 is included as a conservative assumption.
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-10d
McRae-Helena Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	1.55	0.87	0.56	0.30	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.68	0.87	0.56	0.30	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.55	0.87	0.56	0.30	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.68	0.87	0.56	0.30	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.55	0.87	0.56	0.30	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.55	0.87	0.56	0.30	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	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 12/18/20
Checked by: LCT 12/22/20

Table B-11a

Metter 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	0.96	1.44	NA	0.45	2.85	0.00	2.85
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.96	1.44	NA	NA	2.40	0.00	2.40
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.96	1.44	NA	0.45	2.85	1.44	1.41
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.96	1.44	NA	NA	2.40	0.00	2.40
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.96	1.44	NA	0.45	2.85	1.44	1.41
	D2. Chemical contamination of largest raw water source	0.1	1	0.96	1.44	NA	0.45	2.85	1.44	1.41
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 12/18/20
Checked by: LCT 12/22/20

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

1. WTP 102 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

Table B-11b
Metter Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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]	2.85	0.36	0.23	0.12	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.40	0.36	0.23	0.12	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.41	0.36	0.23	0.12	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	2.40	0.36	0.23	0.12	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	1.41	0.36	0.23	0.12	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.41	0.36	0.23	0.12	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 12/18/20
Checked by: LCT 12/22/20

Table B-11c
Metter Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 101	Peak Day Design Capacity (MGD): WTP Well 102	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	0.96	1.44	NA	0.75	3.15	0.00	3.15
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.96	1.44	NA	NA	2.40	0.00	2.40
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.96	1.44	NA	0.75	3.15	1.44	1.71
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.96	1.44	NA	NA	2.40	0.00	2.40
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.96	1.44	NA	0.75	3.15	1.44	1.71
	D2. Chemical contamination of largest raw water source	0.1	1	0.96	1.44	NA	0.75	3.15	1.44	1.71
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 12/18/20
Checked by: LCT 12/22/20

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

1. WTP 102 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. Metter indicated a new 0.5 MG tank.

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

Table B-11d

Metter Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	3.15	0.32	0.21	0.11	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.40	0.32	0.21	0.11	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	1.71	0.32	0.21	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	2.40	0.32	0.21	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	1.71	0.32	0.21	0.11	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	1.71	0.32	0.21	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 12/18/20
Checked by: LCT 12/22/20

Table B-12a
Swainsboro Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 104	WTP Well 105	WTP Well 106	WTP Well 107	WTPs Wells 108 & 109[3]	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.16	0.85	1.32	1.22	2.70	NA	0.60	8.85	2.16	6.69
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.16	0.85	1.32	1.22	2.70	NA	NA	8.25	0.00	8.25
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.16	0.85	1.32	1.22	2.70	NA	0.60	8.85	2.16	6.69
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.16	0.85	1.32	1.22	2.70	NA	NA	8.25	0.00	8.25
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.16	0.85	1.32	1.22	2.70	NA	0.60	8.85	2.16	6.69
	D2. Chemical contamination of largest raw water source	0.1	1	2.16	0.85	1.32	1.22	2.70	NA	0.60	8.85	2.16	6.69
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
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. WTP 104 does not have a backup generator, rendering full capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. WTPs 108 and 109 are 1.188 MGD and 1.512 MGD, respectively. They are combined in this table.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-12b
Swainsboro Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target: Total Demand (MGD)[1]	2015 - Immediate Reliability Target: 65% ADD (MGD)	2015 - Immediate Reliability Target: 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]	6.69	1.11	0.72	0.39	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	8.25	1.11	0.72	0.39	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	6.69	1.11	0.72	0.39	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	8.25	1.11	0.72	0.39	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	6.69	1.11	0.72	0.39	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	6.69	1.11	0.72	0.39	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 12/18/20
Checked by: LCT 12/22/20

Table B-12c

Swainsboro Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 104	Peak Day Design Capacity (MGD): WTP Well 105	Peak Day Design Capacity (MGD): WTP Well 106	Peak Day Design Capacity (MGD): WTP Well 107	Peak Day Design Capacity (MGD): WTPs Wells 108 & 109[(3)]	Maximum Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	2.16	0.85	1.32	1.22	2.70	NA	0.84	9.09	2.16	6.93
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.16	0.85	1.32	1.22	2.70	NA	NA	8.25	0.00	8.25
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.16	0.85	1.32	1.22	2.70	NA	0.84	9.09	2.16	6.93
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.16	0.85	1.32	1.22	2.70	NA	NA	8.25	0.00	8.25
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.16	0.85	1.32	1.22	2.70	NA	0.84	9.09	2.16	6.93
	D2. Chemical contamination of largest raw water source	0.1	1	2.16	0.85	1.32	1.22	2.70	NA	0.84	9.09	2.16	6.93
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:

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. WTP 104 does not have a backup generator, rendering full capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. WTPs 108 and 109are 1.188 MGD and 1.512 MGD, respectively. They are combined in this table.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

Table B-12d

Swainsboro Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range 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[1]	6.93	1.22	0.80	0.43	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	8.25	1.22	0.80	0.43	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	6.93	1.22	0.80	0.43	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	8.25	1.22	0.80	0.43	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	6.93	1.22	0.80	0.43	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	6.93	1.22	0.80	0.43	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 12/18/20
Checked by: LCT 12/22/20

Table B-13a

Vidalia Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 101	WTP Well 102	WTP Well 103	WTP Well 104	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	1.73	1.73	1.44	2.88	0.26	0.75	8.79	2.88	5.91
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.73	1.73	1.44	2.88	0.26	NA	8.04	0.00	8.04
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.73	1.73	1.44	2.88	0.26	0.75	8.79	2.88	5.91
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.73	1.73	1.44	2.88	0.26	NA	8.04	0.00	8.04
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.73	1.73	1.44	2.88	0.26	0.75	8.79	2.88	5.91
	D2. Chemical contamination of largest raw water source	0.1	1	1.73	1.73	1.44	2.88	0.26	0.75	8.79	2.88	5.91
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable										
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable										

Notes:

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. No backup generators are available, rendering full capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. The interconnections with Lyons are limited by their permit withdrawal limits and 2015 ADD. The maximum possible purchased water value was calculated as the minimum of 1) the sum of existing interconnections (Table B-13e); or 2) the supplier's 2015 ADD subtracted from the supplier's permitted withdrawal limit.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Table B-13b
Vidalia 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[1]	5.91	1.56	1.01	0.55	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	8.04	1.56	1.01	0.55	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	5.91	1.56	1.01	0.55	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	8.04	1.56	1.01	0.55	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	5.91	1.56	1.01	0.55	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	5.91	1.56	1.01	0.55	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 12/18/20
Checked by: LCT 12/22/20

Table B-13c

Vidalia Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)[3] WTP Well 101	WTP Well 102	WTP Well 103	WTP Well 104	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	2.10	2.10	1.82	3.26	0.64	0.75	10.66	0.65	10.01
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.10	2.10	1.82	3.26	0.64	NA	9.91	0.00	9.91
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.10	2.10	1.82	3.26	0.64	0.75	10.66	3.26	7.41
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.10	2.10	1.82	3.26	0.64	NA	9.91	0.00	9.91
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.10	2.10	1.82	3.26	0.64	0.75	10.66	3.26	7.41
	D2. Chemical contamination of largest raw water source	0.1	1	2.10	2.10	1.82	3.26	0.64	0.75	10.66	3.26	7.41
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 12/18/20
Checked by: LCT 12/22/20

ADD - average daily demand
MGD - million gallons per day
NA - not applicable
QWS - qualified water system
WTP - water treatment plant
Relative liklihood scale: 1 = high; 0.5 = medium; 0.1 = low; 0.05 = negligible

1. Vidalia plans to obtain a backup generator; 20% capacity loss at the largest WTP was assumed.
2. Backup equipment is available, rendering no capacity loss.
3. Vidalia plans to increase system-wide capacity by 1.5 MGD, which was distributed equally among the four wells (0.375 MGD added to each well).
4. The interconnection with Lyons is 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.

Table B-13d
Vidalia Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target: Total Demand (MGD)[1]	2050 - Long-Range Reliability Target: 65% ADD (MGD)	2050 - Long-Range Reliability Target: 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]	10.01	1.60	1.04	0.56	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	9.91	1.60	1.04	0.56	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	7.41	1.60	1.04	0.56	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	9.91	1.60	1.04	0.56	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	7.41	1.60	1.04	0.56	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	7.41	1.60	1.04	0.56	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 12/18/20
Checked by: LCT 12/22/20

Table B-13e
Vidalia Interconnections

Existing 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)
3	GA2790000-Lyons	East side of Vidalia	6	5	0.982	0.635	0.000	0.635

Prepared by: GJH 12/18/20
Checked by: LCT 12/22/20

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

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. 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. The interconnection project improved rank by four ranks
    b. The new well/WTP project worsened rank by one rank
    c. Generator projects worsened rank by one rank
    d. Interpretation: it is expected that the interconnection project improved rank because in this weighting adjustment, higher priority is given to projects that benefit multiple systems.
2. Population Benefitted weight = 3; all other criteria weights = 1
    a. The interconnection project improved rank by two ranks
    b. The new well/WTP project worsened rank by one rank
    c. One generator project worsened rank by one rank while the other two maintained rank
    d. Interpretation: it is expected that the interconnection project improved rank because in this weighting adjustment, higher priority is given to projects that benefit larger populations.
3. Critical Scenario Duration (days) weight = 3; all other criteria weights = 1
    a. The interconnection project improved rank by four ranks
    b. The new well/WTP project improved rank by two ranks
    c. Generator projects worsened rank by two ranks
    d. Interpretation: it is expected that the interconnection project and new well/WTP project improved rank because in this weighting adjustment, higher priority is given to projects that aid QWS for longer durations.
4. Added Capacity as a Percent of Total Demand (%) weight = 3; all other criteria weights = 1
    a. The interconnection project maintained rank
    b. The new well/WTP project maintained rank
    c. Generator projects maintained rank
    d. Interpretation: this weighting adjustment had no effect on rank order. This criterion is especially project-specific.
5. Cost ($) weight = 3; all other criteria weights = 1

   a. The interconnection project improved rank by one rank
   b. The new well/WTP project worsened rank by one rank
   c. Generator projects maintained rank
   d. Interpretation: this weighting adjustment had an overall minor effect on rank outcome. Although the interconnection project and new well/WTP project have noticeably different total estimated costs, the other scoring criteria have a higher influence on the rank outcome.

6. Potential Environmental Impacts weight = 3; all other criteria weights = 1
   a. The interconnection project maintained rank
   b. The new well/WTP project maintained rank
   c. Generator projects maintained rank
   d. Interpretation: this weighting adjustment had no effect on rank order.
7. Potential System and Community Impacts weight = 3; all other criteria weights = 1
   a. The interconnection project maintained rank
   b. The new well/WTP project maintained rank
   c. Generator projects maintained rank
   d. Interpretation: this weighting adjustment had no effect on rank order.
8. Excess Capacity Index weight = 3; all other criteria weights = 1
   a. The interconnection project maintained rank
   b. The new well/WTP project maintained rank
   c. Generator projects maintained rank
   d. Interpretation: this weighting adjustment had no effect on rank order.

The sensitivity analysis results demonstrate that each criterion is generally insensitive to weighting. Because the interconnection project ranked higher based on higher Criterion 1, 2, and 3 weights, retaining initial assigned weights of 1, 3, and 1, respectively, is appropriate. Except for Criterion 5, the Criterion 4 through 8 weighting adjustments had no effect on rank order. The Criterion 5 weighting adjustment had an overall minor effect on rank order. Therefore, retaining their initial assigned weights is appropriate.