Georgia Water Supply Redundancy Study
Lower Flint-Ochlockonee 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
GPM	Gallons Per Minute
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 Lower Flint-Ochlockonee Water Planning Region, which consists of 14 counties in southwest Georgia, as shown in Figure 1-1. GEFA identified 12 QWS within the Lower Flint-Ochlockonee 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) for 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 future hydrographs, low-flow conditions, stream capacity, downstream non-depletable flow requirements, water quality, pumping and transmission requirements, permitting requirements, treatment requirements, and cost.

1.2.3 Emergency Planning Benchmarks

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

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

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

1.2.4 Water Supply Risk Evaluations

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

1.2.5 Evaluation of Potential Projects

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

1.2.6 Recommended Projects

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

2.0 QWS Data Collection

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

2.1 Data Request

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

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

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

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

2.2 Current and Future Conditions

For this study, 12 QWS in the Lower Flint-Ochlockonee Water Planning Region were surveyed. Agriculture is the primary economic sector in the Lower Flint-Ochlockonee Region. Land cover in the region is composed of approximately 35% row crops/pasture, 34% forest, 15% wetland, 6% urban, 1% water, and 9% other (Lower Flint-Ochlockonee Water Planning Council, 2017).

2.2.1 General System Information

Table 2-1 shows key general information about the 12 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 Donalsonville QWS serves the smallest population and has two supply wells, while the Albany QWS serves the largest population and has 28 supply wells.

Findings from data collection include the following general information about the Lower Flint-Ochlockonee Region:

- All 12 QWS use groundwater as their drinking water source.

- Distribution systems range from approximately 3 years old to more than 100 years old, with 7 systems more than 70 years old. Two QWS are of an unknown system age.
- The largest system customers are typically industries or critical care facilities (e.g., hospitals).
- None of the systems purchase water and only one system sells water.
- Eight systems have at least one backup power source/facility.
- Four systems reported current distribution system flow surplus capabilities.
- The following one-way system emergency interconnections were reported:
    - Albany is interconnected with a government facility.
    - Camilla is interconnected with an industry.
    - Pelham is interconnected with Mitchell County and a correctional facility.

Overall, data collected show that the QWS have a 2019 combined average treatment capacity of over 35 million gallons per day (MGD) and a 2019 combined peak operational capacity of over 52 MGD. The 12 QWS serve a total estimated direct population of approximately 181,100 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 received from the 12 QWS. One system provided GIS data. Hard copy/PDF maps were obtained from eight 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 12 QWS. The 12 QWS had available documents, with comprehensive plans, sanitary surveys, water loss audits, and permits 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:

- New supply wells for Bainbridge and Blakely
- New elevated storage tanks for Bainbridge and Blakely
- An expanded distribution system for Sylvester
- General water infrastructure upgrades for Albany, Cairo, Dawson, Lee County Utilities Authority, Moultrie, and Thomasville

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 in order 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 duration 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 duration emergency scenarios for 2015 and 2050 demands for the 12 QWS. For 2015 demands, excess capacity is at least two times a given QWS's 2015 ADD for all QWS except Albany, Blakely, and Dawson. The 2015 excess capacity values range from 2.0 MGD (Blakely) to 20.0 MGD (Albany).

For 2050 demands, excess capacity is at least two times a given QWS's 2050 ADD for all QWS except Albany and Lee County. The 2050 excess capacity values range from 2.1 MGD (Pelham) to 19.7 MGD (Albany). 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. Albany's 2015 and 2050 scaled excess capacity sufficiency is the lowest relative to other Lower Flint-Ochlockonee 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). Water withdrawals in the Flint River Basin have received special attention over the past several decades. Certain conservation measures have been implemented due to growing concern of water use decreasing streamflow, especially during severe droughts. As discussed in Section 3.2.1, most total water withdrawals in the Flint River Basin are for agricultural use, which is almost exclusively from private sources rather than public water systems. The Lower Flint-Ochlockonee Water Planning Council identified six water demand management practices that focus on improved water use efficiency, conservation practices, and management of agricultural withdrawal permits. Five of the six demand management practices (DM1, DM3, DM4, DM5, and DM6) specifically address agricultural water uses. However, it is important to note that according to the *Flint River Basin Regional Water Development and Conservation Plan*, the cumulative impact of municipal and industrial groundwater withdrawals "on stream-aquifer flux and the regional groundwater budget is negligible" (EPD, 2006).

3.2.1 Groundwater

Currently, the Lower Flint-Ochlockonee Region, as reported in their RWP, exclusively obtains its municipal water supply from groundwater. Groundwater sources accounted for 66% of the region's 2010 water supply, whereas surface water sources accounted for 34% of the region's 2010 water supply. The 2010 groundwater withdrawal by category is as follows: 86% agriculture, 9% municipal, 3% industrial, and 2% domestic/self-supply (Lower Flint-Ochlockonee Water Planning Council, 2017). Aquifer systems in the Lower Flint-Ochlockonee Region include the Claiborne, Clayton, Cretaceous, and Floridan. Figure 3-1 shows relevant aquifers in the Lower Flint-Ochlockonee Region.

The RWP included groundwater resource assessments of the Claiborne Aquifer, the Upper Floridan Aquifer in the Dougherty Plain, and the South-Central Georgia Upper Floridan Aquifer. The RWP defined the sustainable yield of an aquifer as, "the amount of water that can be withdrawn without reaching specific thresholds that indicate the potential for local or regional impacts." Impacts included localized aquifer drawdown, reduced stream baseflow, and long-term aquifer drawdown. Estimated sustainable yield for each aquifer was reported as a range, which reflects several computer model simulations with different assumptions. The total regional 2050 groundwater withdrawal from the three principal supply aquifers is estimated to increase compared to 2015 withdrawals. According to the RWP, total regional 2015 and estimated 2050 withdrawals from the Upper Floridan Aquifer in the Dougherty Plain exceed the aquifer's estimated sustainable yield (both low and high ends of the range). This aquifer's sustainable yield exceedance was driven by the reduced stream baseflow impact threshold. This potential gap in groundwater availability does not reflect an adverse impact of groundwater use on aquifer levels. Further, "the model predicted drawdown in the aquifer of less than five feet… [and] the Upper Floridan Aquifer in this area is known to recover quickly as a result of recharge." (Lower Flint-Ochlockonee Water Planning Council, 2017)

Municipal groundwater withdrawals are nearly split evenly between the Floridan and Claiborne Aquifers, with much less withdrawal from the Clayton Aquifer (Black & Veatch, 2017). Most of the regional water demand is driven by agriculture, especially agricultural withdrawals from the Floridan Aquifer (Black & Veatch, 2017). The Clayton Aquifer is not recommended as a potential water source due to the current water withdrawal permit moratorium. Therefore, new municipal wells should target the Claiborne, Cretaceous, and South-Central Georgia Upper Floridan Aquifer, where feasible. Even so, based on municipal water demand projections remaining relatively constant from 2015 to 2050, it is unlikely that additional municipal supply wells, other than replacement wells, are needed in the Lower Flint-Ochlockonee Region.

3.2.2 Surface Water

The 2010 surface water withdrawal by category is as follows: 48% industrial, 30% agriculture, and 22% energy (Lower Flint-Ochlockonee Water Planning Council, 2017). The Lower Flint-Ochlockonee Region contains portions of the following major river basins: Flint River Basin in the northern and central part of the region; Ochlockonee River Basin in the southern and eastern part of the region; Suwannee River Basin in the far eastern part of the region; and Chattahoochee River Basin in the far western part of the region. Figure 3-2 shows relevant river basins in this region. Major rivers within the region include the Flint, Ochlockonee, and Chattahoochee Rivers. Major reservoirs include Lake Seminole, Lake Blackshear, and Lake Chehaw.

Surface water availability resource assessment models were conducted by EPD to evaluate consumptive demand and dry conditions on stream flows and lake storage. Potential gaps in terms of magnitude and duration were identified when a model fell below a threshold. Model results for 2015 and 2050 in the Flint River Basin indicated that no potential gaps exist at Carsonville or Montezuma nodes, while potential gaps exist at the Bainbridge node. For context, the Carsonville node is approximately nine miles south of Thomaston. Montezuma is an Upper Flint QWS and Bainbridge is a QWS located near the Bainbridge node. The Lower Flint-Ochlockonee Water Planning Council noted that potential gaps at the Bainbridge node are affected in part by groundwater within the Upper Floridan Aquifer in the Dougherty Plain because of the high groundwater-surface water connection in this area. Model results for 2015 and 2050 in the Ochlockonee River Basin indicated potential gaps at the Quincy and Concord nodes. For context, the Concord node is just south of the Georgia-Florida state line and the Quincy node is in Florida further downstream. Model results for 2015 and 2050 in the Chattahoochee River Basin indicated no potential gaps. However, the Lower Flint-Ochlockonee Water Planning Council noted concerns about 2050 conservation storage levels in some reservoirs.

The Council identified supply management and flow augmentation practices to address potential gaps, including Management Practice SF1 to "evaluate reservoir storage options in the Flint River Basin, including better utilization of existing storage, that can provide for flow augmentation in dry periods" (Lower Flint-Ochlockonee Water Planning Council, 2017). Future municipal water supply is not expected to be obtained from surface water sources in this water planning region.

3.2.3 New Reservoirs

Of all the potential water source and storage options, new reservoirs are the most environmentally sensitive, costly, and time-consuming (MACTEC, 2008). Specific new reservoirs were not identified by the Lower Flint-Ochlockonee Water Planning Council. Additional resource assessment modeling was performed to better understand the cause and magnitude of potential baseflow gaps identified during initial surface water availability modeling. Modeling indicated that "a reservoir, or reservoirs, of significant size would be needed to fully offset the potential baseflow gap identified by the resource assessment model at Bainbridge" (Lower Flint-Ochlockonee Water Planning Council, 2017). The Council identified Management Practice SF1 to "evaluate reservoir storage options in the Flint River Basin, including better utilization of existing storage, that can provide for flow augmentation in dry periods" (Lower Flint-Ochlockonee Water Planning Council, 2017).

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 potential drinking water supply reservoirs for the Lower Flint-Ochlockonee 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 Lower Flint-Ochlockonee Region has three watershed dams, all of which are in Colquitt County and listed as Bridge Creek-Ochlockonee. These three watershed dams were not part of the 166 prioritized watershed dams, nor 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 supply 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. The City of Leesburg was used as the radius origin for Lee County. Aerial imagery was visually inspected to identify quarries. In addition, publicly available online quarry inventories were checked. USGS GIS data from *The State Geologic Map Compilation (SGMC) Geodatabase of the Conterminous United States* was used to identify quarry bedrock (Horton et al., 2017).

In the Lower Flint-Ochlockonee Region, one potential quarry was identified. This potential quarry is approximately 3.5 miles south of downtown Albany and immediately west of the Flint River. The quarry's bedrock is fine-detrital (silt-sized) stream alluvium (Horton et al., 2017). Visual imagery suggests that this is a small-scale surface mining operation. Therefore, this potential quarry is an unlikely future water storage reservoir.

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 Lower Flint-Ochlockonee Water Planning Council's Management Practice SF4 is to continue to evaluate the use of ASR to enhance water supply (Lower Flint-Ochlockonee 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 should individually consider the feasibility of direct potable reuse.

Management Practice SF6 demonstrates the Lower Flint-Ochlockonee Water Planning Council's preference for return flows via discharge to surface water rather than land application for new/modified permits for wastewater treatment facilities (Lower Flint-Ochlockonee Water Planning Council, 2017).

3.4 Current Interconnections Between Systems

As noted in Section 2.2.1, interconnections in the Lower Flint-Ochlockonee Region are rare. Three QWS indicated an emergency outgoing interconnection with either an industry or a government facility. Pelham indicated an emergency outgoing interconnection with Mitchell County, another public water system. As these are outgoing interconnections, the infrastructure and potentially the water chemistry would have to be adjusted such that a QWS would be able to receive water through the interconnections. Further, even if this were to occur, these specific facilities can only withdraw a limited amount of water for their purposes as compared to the municipal water supply need. For example, Pelham (permitted capacity 1.000 MGD-monthly average) is interconnected with Mitchell County (permitted capacity 0.300 MGD-monthly average). The permitted capacity of Mitchell County is 30% of the Pelham permitted capacity. Therefore, these facilities 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, no QWS is currently interconnected with another QWS, although several QWS have the potential to interconnect, which will be further discussed in Section 6.

3.5 Factors Affecting Availability of Water Supply

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

3.5.1 Conveyance Factors

The feasibility of conveying water is a major consideration when assessing the practicality of using unused water sources to supply emergency water. Conveyance of water between two QWS or from new water sources would require construction of new pumping and piping infrastructure. The associated costs are key concerns and depend heavily on the proximity of the water source(s) to the QWS to be supplied. In addition, interconnections may be limited by natural obstructions, such as topography and surface water bodies, as well as man-made obstructions, such as roads, railroads, and buildings.

Municipal water systems are generally not interconnected in the Lower Flint-Ochlockonee 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 Lower Flint-Ochlockonee 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 permit 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 requirements 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 generally 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 four principal aquifer systems, which may differ in water quality compared to the other aquifers. Within an individual aquifer, localized water chemistry and heterogeneity can be further responsible for raw water quality differences and, therefore, treatment differences.

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

Table 4-1 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 on a state-wide basis. Therefore, not every risk and emergency scenario apply to the Lower Flint-Ochlockonee 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 state-wide water supply risks and emergency scenarios. Scenarios were assigned a duration and an evaluation selection criterion. Many of the QWS in the Lower Flint-Ochlockonee 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, as is the case for Cairo and Thomasville. 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.

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 any QWS in the Lower Flint-Ochlockonee 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 duration scenario, Risk H did not apply to any QWS within the 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 Albany and Bainbridge do not experience concurrent emergencies) except for Risk H (drought).
- The 2050 available water supply accounts for additional capacity due to planned capital improvements. (Bainbridge and Blakely each provided an estimated increase in water capacity due to a proposed new well at each of those QWS.)
- 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 Lower Flint-Ochlockonee 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 Lower Flint-Ochlockonee 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 relative likelihood, or the Critical Scenario Deficit, was selected for further evaluation. Because no QWS in this region has a Critical Scenario Deficit, the scenario(s) rendering a given QWS with the least available water supply was/were 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 Lower Flint-Ochlockonee Region. As described in Section 5.4 and Table 5-2, no Lower Flint-Ochlockonee 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 Lower Flint-Ochlockonee 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:

- Withdrawal permit impacts
- Water quality impacts
- Potential environmental 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 Lower Flint-Ochlockonee Region, two types of projects are recommended: 1) new interconnections and 2) backup generators to supply internal infrastructure redundancy. Internal infrastructure redundancy projects highlight the potential for a future management practice: encourage public water systems to enhance their water supply redundancy and treatment/unit process redundancy. Table 6-2 shows the potential projects and provides the emergency scenarios addressed, maximum capacity added, and impact considerations.

Potential environmental impacts vary widely across project types. As this region has all groundwater QWS, surface water environmental impacts were not considered. Recall that the cumulative impact of Flint River Basin municipal and industrial groundwater withdrawals “on stream-aquifer flux and the regional groundwater budget is negligible” (EPD, 2006). 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. For interconnection projects, impacts due to excavation (for pipelines), stream crossings, and wetlands disturbance were considered, as applicable. The relative difficulty of permitting steps is implied for the following designations. A “low” designation was applied to a potential project if known streams/wetlands are not likely affected and if offsite excavation is less than 200 feet. A “medium-low” designation was applied if known streams/wetlands are not likely affected and if offsite excavation is greater than 200 but less than 5,000 feet. A "medium-high" designation was applied if known streams/wetlands may be affected and/or if offsite excavation is greater than 200 but less than 5,000 feet. A "high" designation was applied if more than 5,000 feet of offsite excavation is needed and/or wetlands are likely affected and/or a stream crossing is likely needed. A list of threatened/endangered species was not compiled for each potential project. Prior to construction, a review of site-specific threatened/endangered species should be conducted. Cost and permitting requirements may increase if species or critical habitats are impacted. For backup generator projects, a "low" designation was applied; however, fuel storage, stormwater runoff control, and air permitting requirements should be considered. Cost and permitting requirements may increase depending on QWS-specific site conditions, electrical loading requirements, and electrical infrastructure layout.

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

Four interconnection projects were evaluated. Note that the four QWS with an emergency outgoing interconnection to an industry, government facility, or small water system were not evaluated because of limited 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.

- Projects 1 and 2 – Albany and Lee County QWS water mains are within 0.2 linear miles and several interconnection options exist along the Lee-Dougherty County line. Figure 6-1 shows large-scale available mapping data for these QWS. Project 1 represents the low range distance and cost option, assuming approximately 50 feet of added pipelines. These options exist on the western side of the interface between the QWS, west of Palmyra Road (Figures 6-1a, 6-1b, and 6-1c). Project 2 represents the high range distance and cost option, assuming approximately 600 feet of added pipelines. These options exist on the eastern side of the interface between the QWS, east of Palmyra Road (Figures 6-1c and 6-1d). Albany's existing pipe diameters in these areas typically range from 6 inches to 12 inches. Lee County's existing pipe diameters are unknown. Eight-inch diameter ductile iron pipe (DIP) was estimated for the two potential interconnections.
- Project 3 – Albany and Sylvester QWS are within 8 linear miles and one relatively close interconnection option exists along Red Rock Road. Figure 6-2 shows large-scale available mapping data for these QWS. Albany's existing pipe diameters in the area of interest typically range from 6 inches to 12 inches. Sylvester's existing pipe diameters in the area of interest typically range from 8 inches to 10 inches. Approximately 8.5 miles of 10-inch diameter 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 250-horsepower pump was estimated to convey water from Albany to Sylvester and from Sylvester to Albany.
- Project 7 – Moultrie (QWS) and Moultrie-Spence Field (GA0710021) are within 2 linear miles and one relatively close interconnection option exists along GA Highway 133-South. Figure 6-3 shows large-scale available mapping data for these QWS. Moultrie's existing pipe diameters in the area of interest typically range from 6 inches to 8 inches. Moultrie-Spence Field's existing pipe diameters in the area of interest typically range from 2 inches to 10 inches. Approximately 2.8 miles of 8-inch diameter DIP is estimated for this project. A 50-horsepower pump was estimated to convey water from Moultrie-Spence Field to Moultrie and from Moultrie to Moultrie-Spence Field.

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

6.1.2 Internal Infrastructure Redundancy

As shown in Table 6-2, six 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 some QWS (Dawson, Lee County, and Sylvester), this would be their first generator. For other QWS (Bainbridge, Moultrie, and Pelham), the new generator would supplement a generator they already have at smaller WTPs. In the latter case, generators were still proposed because they 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. RSMeans (a construction cost estimating software) or manufacturer prices were used for estimating costs. 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 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

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 Lower Flint-Ochlockonee 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 (low range Albany-Lee County interconnection) received a Criterion 4 score of 1 for Albany and 2 for Lee County. The assigned score was the average of these individual scores, resulting in a score of 1.5. For Criterion 3 (Critical Scenario Duration), if no Critical Scenario Deficit exists and if multiple scenarios are addressed, the highest day duration of the scenarios addressed was used to assign a score. 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 4 and 8, 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 interconnection projects, fair and equitable project cost allocation to each beneficiary can be achieved in several ways. First, if an interconnection primarily benefits one QWS (purchaser), that QWS will likely bear the majority of costs. The provider QWS will financially benefit if water is sold to the purchaser; thus, the provider may bear some of the costs. Second, if an interconnection primarily benefits one QWS but also adds redundancy for the provider QWS, the provider QWS may bear further costs, such as assisting with immediate costs and/or operation and maintenance costs. Third, if an interconnection mutually benefits both QWS, a cost allocation strategy would be appropriate. Such strategies can be based on QWS population served, ADD, added capacity as a percent of total demand, or other creative approaches.

7.4 Conclusion

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

Twelve QWS in the Lower Flint-Ochlockonee 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 Lower Flint-Ochlockonee Water Planning Region.

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TABLES

Table 2-1
Key General Information

County	Qualified Water System	Public Water System Identification Number	Estimated Population Directly Served[1]	Estimated Consecutive Population Served[2]	Raw Water Source(s)[3]	Regular Purchases 2015-2019[4]	Irregular / Emergency Purchases 2015-2019[4]	Regular Sales 2015-2019[4]	Irregular / Emergency Sales 2015-2019[4]
Dougherty	Albany	GA0950000	75,200	0	Groundwater Wells (28)	-	-	-	-
Decatur	Bainbridge	GA0870001	12,600	0	Groundwater Wells (4)	-	-	-	-
Early	Blakely	GA0990000	5,600	0	Groundwater Wells (3)	-	-	-	-
Grady	Cairo	GA1310000	10,000	0	Groundwater Wells (5)	-	-	-	-
Mitchell	Camilla	GA2050001	5,000	0	Groundwater Wells (5)	-	-	-	-
Terrell	Dawson	GA2730001	4,100	0	Groundwater Wells (3)	-	-	-	-
Seminole	Donalsonville	GA2530000	2,700	0	Groundwater Wells (2)	-	-	-	-
Lee	Lee County	GA1770068	16,300	0	Groundwater Wells (10)	-	-	-	-
Colquitt	Moultrie	GA0710004	14,400	0	Groundwater Wells (6)	-	-	-	-
Mitchell	Pelham	GA2050003	3,300	0	Groundwater Wells (3)	-	-	-	Mitchell County
Worth	Sylvester	GA3210003	6,900	0	Groundwater Wells (4)	-	-	-	-
Thomas	Thomasville	GA2750005	25,000	0	Groundwater Wells (7)	-	-	-	-

Prepared by: GJH 07/30/20
Checked by: KMD 08/18/20

Notes:
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. 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	**Qualified Water System**	**Estimated Population Directly Served[1]**	**No Mapping Data**	**Hard Copy / PDF Maps**	**Digital Mapping Data - GIS**	**Digital Mapping Data - CAD**	**Digital Mapping Data - Google Earth**	**Hydraulic Computer Model**
Dougherty	Albany	75,200		◊				
Decatur	Bainbridge	12,600	◊					
Early	Blakely	5,600		◊				
Grady	Cairo	10,000		◊				
Mitchell	Camilla	5,000	◊					
Terrell	Dawson	4,100		◊				
Seminole	Donalsonville	2,700		◊				
Lee	Lee County	16,300		◊	◊			
Colquitt	Moultrie	14,400		◊				
Mitchell	Pelham	3,300	◊					
Worth	Sylvester	6,900		◊				
Thomas	Thomasville	25,000	◊					

Prepared by: GJH 07/30/20
Checked by: KMD 08/26/20

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

Table 2-3
Reports and Documents Received

County	Qualified Water System	Estimated Population Directly Served[1]	Reports and Documents Received[3]								
			Comprehensive / Capital Improvement Plan[2]	Permits	Sanitary Surveys[4]	Water Sale / Purchase Agreements	Water Conservation Plans	Consumption / Withdrawal Reports	Insurance Services Office Report	2015 Water Loss Audit[4]	Emergency Response Plan
Dougherty	Albany	75,200	◊	◊	◊					◊	
Decatur	Bainbridge	12,600	◊	◊	◊					◊	
Early	Blakely	5,600	◊	◊	◊		◊	◊		◊	
Grady	Cairo	10,000	◊	◊	◊					◊	
Mitchell	Camilla	5,000	◊	◊	◊					◊	
Terrell	Dawson	4,100	◊	◊	◊					◊	
Seminole	Donalsonville	2,700	◊	◊	◊	◊	◊				
Lee	Lee County	16,300	◊	◊	◊				◊	◊	
Colquitt	Moultrie	14,400	◊	◊	◊					◊	
Mitchell	Pelham	3,300	◊	◊	◊					◊	
Worth	Sylvester	6,900	◊	◊	◊					◊	
Thomas	Thomasville	25,000	◊	◊	◊		◊			◊	

Prepared by: GJH 07/30/20
Checked by: KMD 08/26/20

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)	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)[3]	2050 ADD (MGD) (Water Withdrawal Only)[4]	2050 Excess Capacity (MGD)
Dougherty	Albany	Groundwater Wells (28)	31.6	11.6	20.0	36.0	31.6	12.0	19.7
Decatur	Bainbridge	Groundwater Wells (4)	11.5	2.3	9.2	5.0	14.4	1.6	12.8
Early	Blakely	Groundwater Wells (3)	3.0	1.1	2.0	2.7	3.8	0.7	3.0
Grady	Cairo	Groundwater Wells (5)	8.0	1.3	6.7	3.5	8.0	1.3	6.7
Mitchell	Camilla	Groundwater Wells (5)	13.3	3.4	9.9	5.5	13.3	1.9	11.4
Terrell	Dawson	Groundwater Wells (3)	3.8	1.3	2.5	1.93	3.8	0.6	3.2
Seminole	Donalsonville	Groundwater Wells (2)	4.0	0.4	3.6	1.0	4.0	0.3	3.8
Lee	Lee County	Groundwater Wells (10)	6.9	1.4	5.5	3.0	6.9	2.4	4.5
Colquitt	Moultrie	Groundwater Wells (6)	10.1	2.5	7.6	5.2[(2)]	10.1	2.2	7.9
Mitchell	Pelham	Groundwater Wells (3)	2.9	0.7	2.2	1.0	2.9	0.7	2.3
Worth	Sylvester	Groundwater Wells (4)	6.2	0.8	5.4	2.0	6.2	0.6	5.6
Thomas	Thomasville	Groundwater Wells (7)	15.5	4.6	10.9	8.0	15.5	4.2	11.3
	Totals		**116.9**	**31.5**	**85.4**	**74.8**	**120.6**	**28.4**	**92.1**

Prepared by: GJH 10/14/20
Checked by: LCT 11/16/20

Notes:
ADD - average daily demand
MGD - million gallons per day
1. 2015 EPD-validated water loss audit values are reported. In the event a QWS is not in that dataset, as identified in Table 2-3, QWS-provided values are reported.
2. This value includes GA0710021 and GA0710004 because Moultrie operates two permitted water systems. GA0710021-Moultrie-Spence Field is not part of this study.
3. Bainbridge and Blakely each indicated one potential new well, 2.88 MGD and 0.75 MGD, respectively.
4. Municipal and publicly-supplied industrial demand by county were allocated to each 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)**
Dougherty	Albany	GA0950000	11.6	7.5	4.1	12.0	7.8	4.2
Decatur	Bainbridge	GA0870001	2.3	1.5	0.8	1.6	1.0	0.5
Early	Blakely	GA0990000	1.1	0.7	0.4	0.7	0.5	0.3
Grady	Cairo	GA1310000	1.3	0.9	0.5	1.3	0.8	0.4
Mitchell	Camilla	GA2050001	3.4	2.2	1.2	1.9	1.3	0.7
Terrell	Dawson	GA2730001	1.3	0.9	0.5	0.6	0.4	0.2
Seminole	Donalsonville	GA2530000	0.4	0.3	0.1	0.3	0.2	0.1
Lee	Lee County	GA1770068	1.4	0.9	0.5	2.4	1.6	0.9
Colquitt	Moultrie	GA0710004	2.5	1.6	0.9	2.2	1.4	0.8
Mitchell	Pelham	GA2050003	0.7	0.5	0.2	0.7	0.4	0.2
Worth	Sylvester	GA3210003	0.8	0.5	0.3	0.6	0.4	0.2
Thomas	Thomasville	GA2750005	4.6	3.0	1.6	4.2	2.7	1.5
	Totals		**31.5**	**20.5**	**11.0**	**28.4**	**18.5**	**9.9**

Prepared by: GJH 10/26/20
Checked by: LCT 11/16/20

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 11/19/20

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

Table 5-2
Deficit Summary

				2015 - Immediate Reliability Target			2015 - Deficits				2050 - Long-Range Reliability Target			2050 - Deficits		
County	Qualified Water System	Scenario	2015 Available Water Supply (MGD)	Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)	Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)	2050 Available Water Supply (MGD)	Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)	Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
Dougherty	Albany	A1	35.4	11.6	7.5	4.1	0.0	0.0	0.0	35.4	12.0	7.8	4.2	0.0	0.0	0.0
		A2	31.6	11.6	7.5	4.1	0.0	0.0	0.0	31.6	12.0	7.8	4.2	0.0	0.0	0.0
		B	35.4	11.6	7.5	4.1	0.0	0.0	0.0	35.4	12.0	7.8	4.2	0.0	0.0	0.0
		C	31.6	11.6	7.5	4.1	0.0	0.0	0.0	31.6	12.0	7.8	4.2	0.0	0.0	0.0
		D1	35.4	11.6	7.5	4.1	0.0	0.0	0.0	35.4	12.0	7.8	4.2	0.0	0.0	0.0
		D2	35.4	11.6	7.5	4.1	0.0	0.0	0.0	35.4	12.0	7.8	4.2	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
Decatur	Bainbridge	A1	9.8	2.3	1.5	0.8	0.0	0.0	0.0	13.0	1.6	1.0	0.5	0.0	0.0	0.0
		A2	11.5	2.3	1.5	0.8	0.0	0.0	0.0	14.4	1.6	1.0	0.5	0.0	0.0	0.0
		B	9.8	2.3	1.5	0.8	0.0	0.0	0.0	13.0	1.6	1.0	0.5	0.0	0.0	0.0
		C	11.5	2.3	1.5	0.8	0.0	0.0	0.0	14.4	1.6	1.0	0.5	0.0	0.0	0.0
		D1	9.8	2.3	1.5	0.8	0.0	0.0	0.0	13.0	1.6	1.0	0.5	0.0	0.0	0.0
		D2	9.8	2.3	1.5	0.8	0.0	0.0	0.0	13.0	1.6	1.0	0.5	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	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
Early	Blakely	A1	3.8	1.1	0.7	0.4	0.0	0.0	0.0	4.7	0.7	0.5	0.3	0.0	0.0	0.0
		A2	3.0	1.1	0.7	0.4	0.0	0.0	0.0	3.8	0.7	0.5	0.3	0.0	0.0	0.0
		B	2.5	1.1	0.7	0.4	0.0	0.0	0.0	3.4	0.7	0.5	0.3	0.0	0.0	0.0
		C	3.0	1.1	0.7	0.4	0.0	0.0	0.0	3.8	0.7	0.5	0.3	0.0	0.0	0.0
		D1	2.5	1.1	0.7	0.4	0.0	0.0	0.0	3.4	0.7	0.5	0.3	0.0	0.0	0.0
		D2	2.5	1.1	0.7	0.4	0.0	0.0	0.0	3.4	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

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)**
Grady	Cairo	A1	8.8	1.3	0.9	0.5	0.0	0.0	0.0	8.8	1.3	0.8	0.4	0.0	0.0	0.0
		A2	8.0	1.3	0.9	0.5	0.0	0.0	0.0	8.0	1.3	0.8	0.4	0.0	0.0	0.0
		B	4.8	1.3	0.9	0.5	0.0	0.0	0.0	4.8	1.3	0.8	0.4	0.0	0.0	0.0
		C	8.0	1.3	0.9	0.5	0.0	0.0	0.0	8.0	1.3	0.8	0.4	0.0	0.0	0.0
		D1	4.8	1.3	0.9	0.5	0.0	0.0	0.0	4.8	1.3	0.8	0.4	0.0	0.0	0.0
		D2	4.8	1.3	0.9	0.5	0.0	0.0	0.0	4.8	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
Mitchell	Camilla	A1	14.8	3.4	2.2	1.2	0.0	0.0	0.0	14.8	1.9	1.3	0.7	0.0	0.0	0.0
		A2	13.3	3.4	2.2	1.2	0.0	0.0	0.0	13.3	1.9	1.3	0.7	0.0	0.0	0.0
		B	11.2	3.4	2.2	1.2	0.0	0.0	0.0	11.2	1.9	1.3	0.7	0.0	0.0	0.0
		C	13.3	3.4	2.2	1.2	0.0	0.0	0.0	13.3	1.9	1.3	0.7	0.0	0.0	0.0
		D1	11.2	3.4	2.2	1.2	0.0	0.0	0.0	11.2	1.9	1.3	0.7	0.0	0.0	0.0
		D2	11.2	3.4	2.2	1.2	0.0	0.0	0.0	11.2	1.9	1.3	0.7	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	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
Terrell	Dawson	A1	2.9	1.3	0.9	0.5	0.0	0.0	0.0	2.9	0.6	0.4	0.2	0.0	0.0	0.0
		A2	3.8	1.3	0.9	0.5	0.0	0.0	0.0	3.8	0.6	0.4	0.2	0.0	0.0	0.0
		B	2.9	1.3	0.9	0.5	0.0	0.0	0.0	2.9	0.6	0.4	0.2	0.0	0.0	0.0
		C	3.8	1.3	0.9	0.5	0.0	0.0	0.0	3.8	0.6	0.4	0.2	0.0	0.0	0.0
		D1	2.9	1.3	0.9	0.5	0.0	0.0	0.0	2.9	0.6	0.4	0.2	0.0	0.0	0.0
		D2	2.9	1.3	0.9	0.5	0.0	0.0	0.0	2.9	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

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)
Seminole	Donalsonville	A1	4.4	0.4	0.3	0.1	0.0	0.0	0.0	4.4	0.3	0.2	0.1	0.0	0.0	0.0
		A2	4.0	0.4	0.3	0.1	0.0	0.0	0.0	4.0	0.3	0.2	0.1	0.0	0.0	0.0
		B	2.3	0.4	0.3	0.1	0.0	0.0	0.0	2.3	0.3	0.2	0.1	0.0	0.0	0.0
		C	4.0	0.4	0.3	0.1	0.0	0.0	0.0	4.0	0.3	0.2	0.1	0.0	0.0	0.0
		D1	2.3	0.4	0.3	0.1	0.0	0.0	0.0	2.3	0.3	0.2	0.1	0.0	0.0	0.0
		D2	2.3	0.4	0.3	0.1	0.0	0.0	0.0	2.3	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
Lee	Lee County	A1	6.6	1.4	0.9	0.5	0.0	0.0	0.0	6.6	2.4	1.6	0.9	0.0	0.0	0.0
		A2	6.9	1.4	0.9	0.5	0.0	0.0	0.0	6.9	2.4	1.6	0.9	0.0	0.0	0.0
		B	6.6	1.4	0.9	0.5	0.0	0.0	0.0	6.6	2.4	1.6	0.9	0.0	0.0	0.0
		C	6.9	1.4	0.9	0.5	0.0	0.0	0.0	6.9	2.4	1.6	0.9	0.0	0.0	0.0
		D1	6.6	1.4	0.9	0.5	0.0	0.0	0.0	6.6	2.4	1.6	0.9	0.0	0.0	0.0
		D2	6.6	1.4	0.9	0.5	0.0	0.0	0.0	6.6	2.4	1.6	0.9	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Colquitt	Moultrie	A1	8.2	2.5	1.6	0.9	0.0	0.0	0.0	8.2	2.2	1.4	0.8	0.0	0.0	0.0
		A2	10.1	2.5	1.6	0.9	0.0	0.0	0.0	10.1	2.2	1.4	0.8	0.0	0.0	0.0
		B	8.2	2.5	1.6	0.9	0.0	0.0	0.0	8.2	2.2	1.4	0.8	0.0	0.0	0.0
		C	10.1	2.5	1.6	0.9	0.0	0.0	0.0	10.1	2.2	1.4	0.8	0.0	0.0	0.0
		D1	8.2	2.5	1.6	0.9	0.0	0.0	0.0	8.2	2.2	1.4	0.8	0.0	0.0	0.0
		D2	8.2	2.5	1.6	0.9	0.0	0.0	0.0	8.2	2.2	1.4	0.8	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)
Mitchell	Pelham	A1	2.4	0.7	0.5	0.2	0.0	0.0	0.0	2.4	0.8	0.5	0.3	0.0	0.0	0.0
		A2	2.9	0.7	0.5	0.2	0.0	0.0	0.0	2.9	0.8	0.5	0.3	0.0	0.0	0.0
		B	2.4	0.7	0.5	0.2	0.0	0.0	0.0	2.4	0.8	0.5	0.3	0.0	0.0	0.0
		C	2.9	0.7	0.5	0.2	0.0	0.0	0.0	2.9	0.8	0.5	0.3	0.0	0.0	0.0
		D1	2.4	0.7	0.5	0.2	0.0	0.0	0.0	2.4	0.8	0.5	0.3	0.0	0.0	0.0
		D2	2.4	0.7	0.5	0.2	0.0	0.0	0.0	2.4	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
Worth	Sylvester	A1	4.4	0.8	0.5	0.3	0.0	0.0	0.0	4.4	0.6	0.4	0.2	0.0	0.0	0.0
		A2	6.2	0.8	0.5	0.3	0.0	0.0	0.0	6.2	0.6	0.4	0.2	0.0	0.0	0.0
		B	4.4	0.8	0.5	0.3	0.0	0.0	0.0	4.4	0.6	0.4	0.2	0.0	0.0	0.0
		C	6.2	0.8	0.5	0.3	0.0	0.0	0.0	6.2	0.6	0.4	0.2	0.0	0.0	0.0
		D1	4.4	0.8	0.5	0.3	0.0	0.0	0.0	4.4	0.6	0.4	0.2	0.0	0.0	0.0
		D2	4.4	0.8	0.5	0.3	0.0	0.0	0.0	4.4	0.6	0.4	0.2	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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)
Thomas	Thomasville	A1	12.9	4.6	3.0	1.6	0.0	0.0	0.0	12.9	4.2	2.7	1.5	0.0	0.0	0.0
		A2	15.5	4.6	3.0	1.6	0.0	0.0	0.0	15.5	4.2	2.7	1.5	0.0	0.0	0.0
		B	8.9	4.6	3.0	1.6	0.0	0.0	0.0	8.9	4.2	2.7	1.5	0.0	0.0	0.0
		C	15.5	4.6	3.0	1.6	0.0	0.0	0.0	15.5	4.2	2.7	1.5	0.0	0.0	0.0
		D1	8.9	4.6	3.0	1.6	0.0	0.0	0.0	8.9	4.2	2.7	1.5	0.0	0.0	0.0
		D2	8.9	4.6	3.0	1.6	0.0	0.0	0.0	8.9	4.2	2.7	1.5	0.0	0.0	0.0
		E	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		F	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		G	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		H	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Prepared by: GJH 11/12/20
Checked by: LCT 11/19/20

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	Relevant Considerations: Withdrawal Permit Impacts	Relevant Considerations: Water Quality Impacts	Relevant Considerations: 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
Dougherty	Albany	1	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	A1, A2, B, D1, D2	1.13	Low: <200 ft excavation near the West side of Ledo Road	Albany: low Lee County: medium-high	Medium-low	Medium-low: <200 ft excavation; multijurisdictional agreement.
		2	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	A1, A2, B, D1, D2	1.13	Medium-high: 200-5000 ft excavation; east options are near Kinchafoonee Creek	Albany: low Lee County: medium-high	Medium-low	Medium-high: 200-5000 ft; multijurisdictional agreement.
		3	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	A1, A2, B, D1, D2	1.76	High: more than 5000 ft excavation	Albany: low Sylvester: medium-low	Medium-low	High: more than 5000 ft excavation; multijurisdictional agreement.
Decatur	Bainbridge	4	New generator: WTP/Well 306 or WTP/Well 307	A1	2.88	Low	NA	NA	Low
Early	Blakely	-	No recommended project	-	-	-	-	-	-
Grady	Cairo	-	No recommended project	-	-	-	-	-	-
Mitchell	Camilla	-	No recommended project	-	-	-	-	-	-
Terrell	Dawson	5	New generator: WTP/Well 302	A1	1.49	Low	NA	NA	Low
Seminole	Donalsonville	-	No recommended project	-	-	-	-	-	-
Lee	Lee County	1	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	A1, A2, B, D1, D2	1.13	Low: <200 ft excavation near the West side of Ledo Road	Albany: low Lee County: medium-high	Medium-low	Medium-low: <200 ft excavation; multijurisdictional agreement.
		2	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	A1, A2, B, D1, D2	1.13	Medium-high: 200-5000 ft excavation; east options are near Kinchafoonee Creek	Albany: low Lee County: medium-high	Medium-low	Medium-high: 200-5000 ft; multijurisdictional agreement.
		6	New generator: WTP/Well 101 or WTP/Well 103 or WTP/Well 108	A1	1.22	Low	NA	NA	Low
Colquitt	Moultrie	7	Interconnection: Moultrie-Moultrie Spence Field 2.8 miles along GA-133 South	A1, A2, B, D1, D2	1.13	High: more than 5000 ft excavation	Moultrie: low Moultrie Spence Field: low	Low	High: more than 5000 ft excavation
		8	New generator: WTP/Well 105	A1	2.88	Low	NA	NA	Low
Mitchell	Pelham	9	New generator: WTP/Well 101 or WTP/Well 103	A1	0.98	Low	NA	NA	Low
Worth	Sylvester	3	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	A1, A2, B, D1, D2	1.76	High: more than 5000 ft excavation	Albany: low Sylvester: medium-low	Medium-low	High: more than 5000 ft excavation; multijurisdictional agreement.
		10	New generator: WTP/Well 104	A1	2.59	Low	NA	NA	Low
Thomas	Thomasville	-	No recommended project	-	-	-	-	-	-

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

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

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	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	Albany	8	58	19.7	1.13
		Lee County	8	69	4.5	1.13
2	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	Albany	8	58	19.7	1.13
		Lee County	8	69	4.5	1.13
3	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	Albany	10	65	19.7	1.76
		Sylvester	10	80	5.6	1.76
7	Interconnection: Moultrie-Moultrie Spence Field 1.5 miles along GA-133 South	Moultrie	8	60	7.9	1.13
		Moultrie Spence Field	8	unknown	unknown	1.13

Prepared by: GJH 02/16/21
Checked by: LCT 03/25/21

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	Albany Lee County	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	1.13	50	8-inch diameter DIP	$ 170	(1) control valve station	$ 39,050	$ 47,600	12 months
2	Albany Lee County	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	1.13	600	8-inch diameter DIP	$ 170	(1) control valve station	$ 39,050	$ 141,100	12 months
3	Albany Sylvester	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	1.76	44,880	10-inch diameter DIP	$ 200	(1) control valve station (1) 250 HP booster pump	$ 3,187,250	$ 12,163,300	16 months
4	Bainbridge	New generator: WTP/Well 306 or WTP/Well 307	2.88	-	400 KW	$ 137,000	-	-	$ 137,000	6 months
5	Dawson	New generator: WTP/Well 302	1.49	-	300 KW	$ 93,500	-	-	$ 93,500	6 months
6	Lee County	New generator: WTP/Well 101 or WTP/Well 103 or WTP/Well 108	1.22	-	200 KW	$ 61,500	-	-	$ 61,500	6 months
7	Moultrie	Interconnection: Moultrie-Moultrie Spence Field 2.8 miles along GA-133 South	1.13	14,784	8-inch diameter DIP	$ 170	(1) control valve station (1) 50 HP booster pump	$ 1,110,050	$ 3,623,300	16 months
8	Moultrie	New generator: WTP/Well 105	2.88	-	400 KW	$ 137,000	-	-	$ 137,000	6 months
9	Pelham	New generator: WTP/Well 101 or WTP/Well 103	0.98	-	200 KW	$ 61,500	-	-	$ 61,500	6 months
10	Sylvester	New generator: WTP/Well 104	2.59	-	400 KW	$ 137,000	-	-	$ 137,000	6 months

Prepared by: GJH 02/16/21
Checked by: LCT 03/25/21

Notes:
DIP - ductile iron pipe
ft - feet
HP - horsepower
KW - kilowatts
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant

Table 7-1

Potential Project Scoring Criteria Matrix

		Assigned Score				
	Criterion	**1**	**2**	**3**	**4**	**Weighting**
1	Systems Benefitted	One (Internal Project)	Mutually Benefits One Non-QWS	Mutually Benefits Two or More Non-QWS	Mutually Benefits Another QWS	1
2	Population Benefitted	<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	Albany Lee County	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	Albany Lee County	4	91,500	4	A1, A2, B, D1, D2	3
2	Albany Lee County	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	Albany Lee County	4	91,500	4	A1, A2, B, D1, D2	3
3	Albany Sylvester	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	Albany Sylvester	4	82,100	4	A1, A2, B, D1, D2	3
4	Bainbridge	New generator: WTP/Well 306 or WTP/Well 307	Bainbridge	1	12,600	3	A1	1
5	Dawson	New generator: WTP/Well 302	Dawson	1	4,100	1	A1	1
6	Lee County	New generator: WTP/Well 101 or WTP/Well 103 or WTP/Well 108	Lee County	1	16,300	4	A1	1
7	Moultrie Moultrie-Spence Field	Interconnection: Moultrie-Moultrie Spence Field 2.8 miles along GA-133 South	Moultrie Moultrie-Spence Field	2	15000[1]	3	A1, A2, B, D1, D2	3
8	Moultrie	New generator: WTP/Well 105	Moultrie	1	14,400	3	A1	1
9	Pelham	New generator: WTP/Well 101 or WTP/Well 103	Pelham	1	3,300	1	A1	1
10	Sylvester	New generator: WTP/Well 104	Sylvester	1	6,900	2	A1	1

Notes:
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. GA0710021-Moultrie-Spence Field serves an estimated population of 600 people.

Table 7-2
Potential Project Criteria Scores and Weight Calculations

			4: Added Capacity as a Percent of Total Demand					5: Cost	
Project Number	**Water System(s) Benefitted**	**Potential Project Description**	**Maximum Capacity Added (MGD)**	**2050 Total Demand (MGD)**	**Capacity as a Percent of Total Demand (%)**	**Individual Scores**	**Score: Added Capacity as a Percent of Total Demand**	**Cost ($)**	**Score: Cost**
1	Albany Lee County	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	1.1	Albany: 12.0 Lee County: 2.4	Albany: 9% Lee County: 46%	Albany: 1 Lee County: 2	1.5	$ 47,600	4
2	Albany Lee County	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	1.1	Albany: 12.0 Lee County: 2.4	Albany: 9% Lee County: 46%	Albany: 1 Lee County: 2	1.5	$ 141,100	4
3	Albany Sylvester	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	1.76	Albany: 12.0 Sylvester: 0.6	Albany: 15% Sylvester: 302%	Albany: 1 Sylvester: 4	2.5	$ 12,163,300	1
4	Bainbridge	New generator: WTP/Well 306 or WTP/Well 307	2.88	1.6	185%	-	4	$ 137,000	4
5	Dawson	New generator: WTP/Well 302	1.49	0.6	248%	-	4	$ 93,500	4
6	Lee County	New generator: WTP/Well 101 or WTP/Well 103 or WTP/Well 108	1.22	2.4	50%	-	2	$ 61,500	4
7	Moultrie Moultrie-Spence Field	Interconnection: Moultrie-Moultrie Spence Field 2.8 miles along GA-133 South	1.1	Moultrie: 2.2 Moultrie-Spence Field: unknown	Moultrie: 52% Moultrie-Spence Field: unknown	Moultrie: 3 Moultrie-Spence Field: unknown	3	$ 3,623,300	1
8	Moultrie	New generator: WTP/Well 105	2.88	2.2	134%	-	4	$ 137,000	4
9	Pelham	New generator: WTP/Well 101 or WTP/Well 103	0.98	0.7	148%	-	4	$ 61,500	4
10	Sylvester	New generator: WTP/Well 104	2.59	0.6	444%	-	4	$ 137,000	4

Notes:
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. GA0710021-Moultrie-Spence Field serves an estimated population of 6

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	Albany Lee County	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	Low	4	Albany: low Lee County: medium-high	Medium-low	Medium-low	Withdrawal: (4+2)/2 = 3 Water Quality: 3 Community: 3	3
2	Albany Lee County	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	Medium-high	2	Albany: low Lee County: medium-high	Medium-low	Medium-high	Withdrawal: (4+2)/2 = 3 Water Quality: 3 Community: 2	2.7
3	Albany Sylvester	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	High	1	Albany: low Sylvester: medium-low	Medium-low	High	Withdrawal: (4+3)/2 = 3.5 Water Quality: 3 Community: 1	2.5
4	Bainbridge	New generator: WTP/Well 306 or WTP/Well 307	Low	4	NA	NA	Low	-	4
5	Dawson	New generator: WTP/Well 302	Low	4	NA	NA	Low	-	4
6	Lee County	New generator: WTP/Well 101 or WTP/Well 103 or WTP/Well 108	Low	4	NA	NA	Low	-	4
7	Moultrie Moultrie-Spence Field	Interconnection: Moultrie-Moultrie Spence Field 2.8 miles along GA-133 South	High	1	Moultrie: low Moultrie Spence Field: low	Low	High	Withdrawal: (4+4)/2 = 4 Water Quality: 4 Community: 1	3
8	Moultrie	New generator: WTP/Well 105	Low	4	NA	NA	Low	-	4
9	Pelham	New generator: WTP/Well 101 or WTP/Well 103	Low	4	NA	NA	Low	-	4
10	Sylvester	New generator: WTP/Well 104	Low	4	NA	NA	Low	-	4

Notes:
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. GA0710021-Moultrie-Spence Field serves an estimated population of 6

Table 7-2
Potential Project Criteria Scores and Weight Calculations

Project Number	Water System(s) Benefitted	Potential Project Description	8: Excess Capacity Index			Absolute Score	Weighing Calculation								Weighted Score
			2050 Excess Capacity Index	Individual Scores	Score: Excess Capacity Index		1	2	3	4	5	6	7	8	
1	Albany Lee County	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	Albany: (+) <0.5 Lee County: (+) <0.5	Albany: 2 Lee County: 2	2	3.19	4	12	3	3	12	12	9	4	7.38
2	Albany Lee County	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	Albany: (+) <0.5 Lee County: (+) <0.5	Albany: 2 Lee County: 2	2	2.90	4	12	3	3	12	6	8.0	4	6.50
3	Albany Sylvester	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	Albany: (+) <0.5 Sylvester: (+) >0.5	Albany: 2 Sylvester: 1	1.5	2.44	4	12	3	5	3	3	7.5	3	5.06
4	Bainbridge	New generator: WTP/Well 306 or WTP/Well 307	Bainbridge: (+) >0.5	-	1	2.75	1	9	1	8	12	12	12	2	7.13
5	Dawson	New generator: WTP/Well 302	Dawson: (+) >0.5	-	1	2.50	1	3	1	8	12	12	12	2	6.38
6	Lee County	New generator: WTP/Well 101 or WTP/Well 103 or WTP/Well 108	Lee County: (+) <0.5	-	2	2.75	1	12	1	4	12	12	12	4	7.25
7	Moultrie Moultrie-Spence Field	Interconnection: Moultrie-Moultrie Spence Field 2.8 miles along GA-133 South	Moultrie: (+) >0.5	Moultrie: 1 Moultrie-Spence Field: unknown	1	2.13	2	9	3	6	3	3	9	2	4.63
8	Moultrie	New generator: WTP/Well 105	Moultrie: (+) >0.5	-	1	2.75	1	9	1	8	12	12	12	2	7.13
9	Pelham	New generator: WTP/Well 101 or WTP/Well 103	Pelham: (+) >0.5	-	1	2.50	1	3	1	8	12	12	12	2	6.38
10	Sylvester	New generator: WTP/Well 104	Sylvester: (+) >0.5	-	1	2.63	1	6	1	8	12	12	12	2	6.75

Prepared by: GJH 02/17/21
Checked by: LCT 03/25/21

Notes:
MGD - million gallons per day
NA - not applicable
WTP - water treatment plant
1. GA0710021-Moultrie-Spence Field serves an estimated population of 6

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	Albany Lee County	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	$ 43,273	$ 0.52	3.19	7.38	1
2	Albany Lee County	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	$ 128,273	$ 1.54	2.90	6.50	6
3	Albany Sylvester	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	$ 6,899,206	$ 148.15	2.44	5.06	9
4	Bainbridge	New generator: WTP/Well 306 or WTP/Well 307	$ 47,569	$ 10.87	2.75	7.13	4
5	Dawson	New generator: WTP/Well 302	$ 62,752	$ 22.80	2.50	6.38	8
6	Lee County	New generator: WTP/Well 101 or WTP/Well 103 or WTP/Well 108	$ 50,410	$ 3.77	2.75	7.25	2
7	Moultrie	Interconnection: Moultrie-Moultrie Spence Field 2.8 miles along GA-133 South	$ 3,293,909	$ 241.55	2.13	4.63	10
8	Moultrie	New generator: WTP/Well 105	$ 47,569	$ 9.51	2.75	7.13	3
9	Pelham	New generator: WTP/Well 101 or WTP/Well 103	$ 62,755	$ 18.64	2.50	6.38	7
10	Sylvester	New generator: WTP/Well 104	$ 52,896	$ 19.86	2.63	6.75	5

Prepared by: GJH 02/04/21
Checked by: LCT 03/25/21

Notes:
WTP - water treatment plant

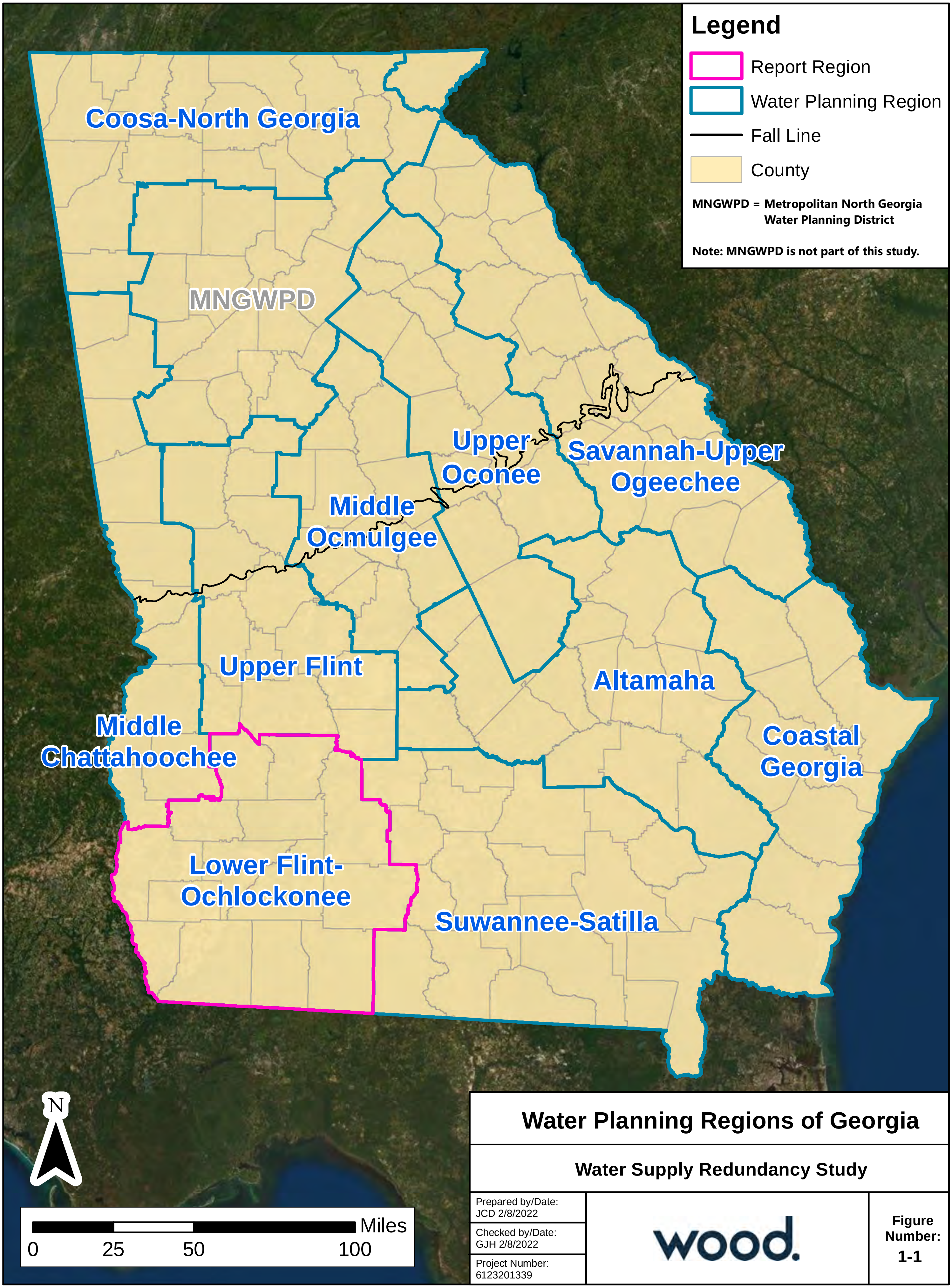
Table 7-4
Potential Projects Sorted by Final Rank Order

Project Number	Qualified Water System(s) Benefitted	Potential Project Description	Cost ($)	Final Rank
1	Albany Lee County	Low Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	$ 47,600	1
6	Lee County	New generator: WTP/Well 101 or WTP/Well 103 or WTP/Well 108	$ 61,500	2
8	Moultrie	New generator: WTP/Well 105	$ 137,000	3
4	Bainbridge	New generator: WTP/Well 306 or WTP/Well 307	$ 137,000	4
10	Sylvester	New generator: WTP/Well 104	$ 137,000	5
2	Albany Lee County	High Range: Interconnection: Albany-Lee County Multiple options near Ledo Road	$ 141,100	6
9	Pelham	New generator: WTP/Well 101 or WTP/Well 103	$ 61,500	7
5	Dawson	New generator: WTP/Well 302	$ 93,500	8
3	Albany Sylvester	Interconnection: Albany-Sylvester 8.5 miles along Red Rock Road	$ 12,163,300	9
7	Moultrie	Interconnection: Moultrie-Moultrie Spence Field 2.8 miles along GA-133 South	$ 3,623,300	10

Prepared by: GJH 02/04/21
Checked by: LCT 03/25/21

Notes:
WTP - water treatment plant

FIGURES



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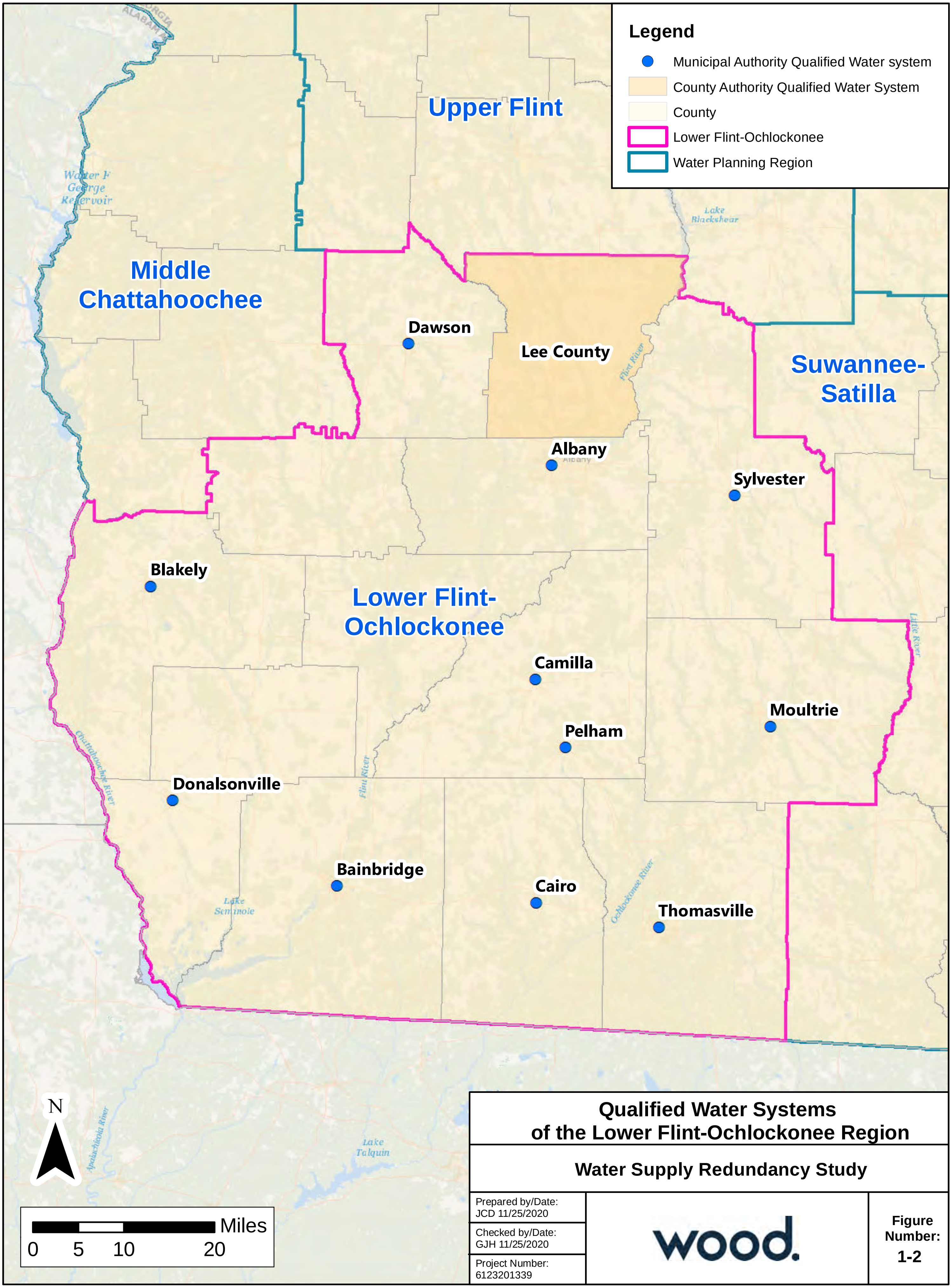


Qualified Water Systems of the Lower Flint-Ochlockonee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 11/25/2020

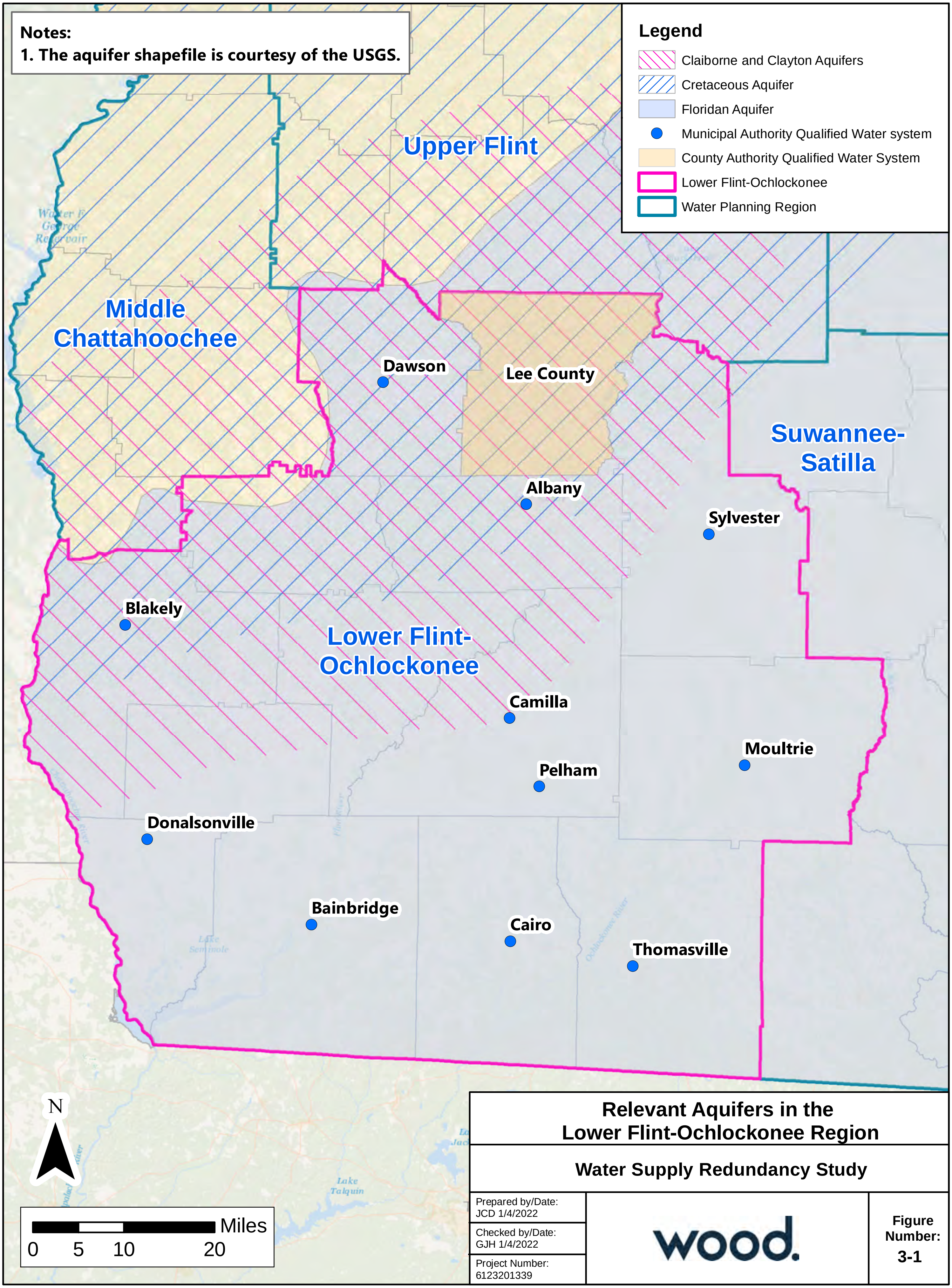
Checked by/Date: GJH 11/25/2020

Project Number: 6123201339

wood.

Figure Number: 1-2

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



Relevant Aquifers in the Lower Flint-Ochlockonee Region

Water Supply Redundancy Study

Prepared by/Date: JCD 1/4/2022

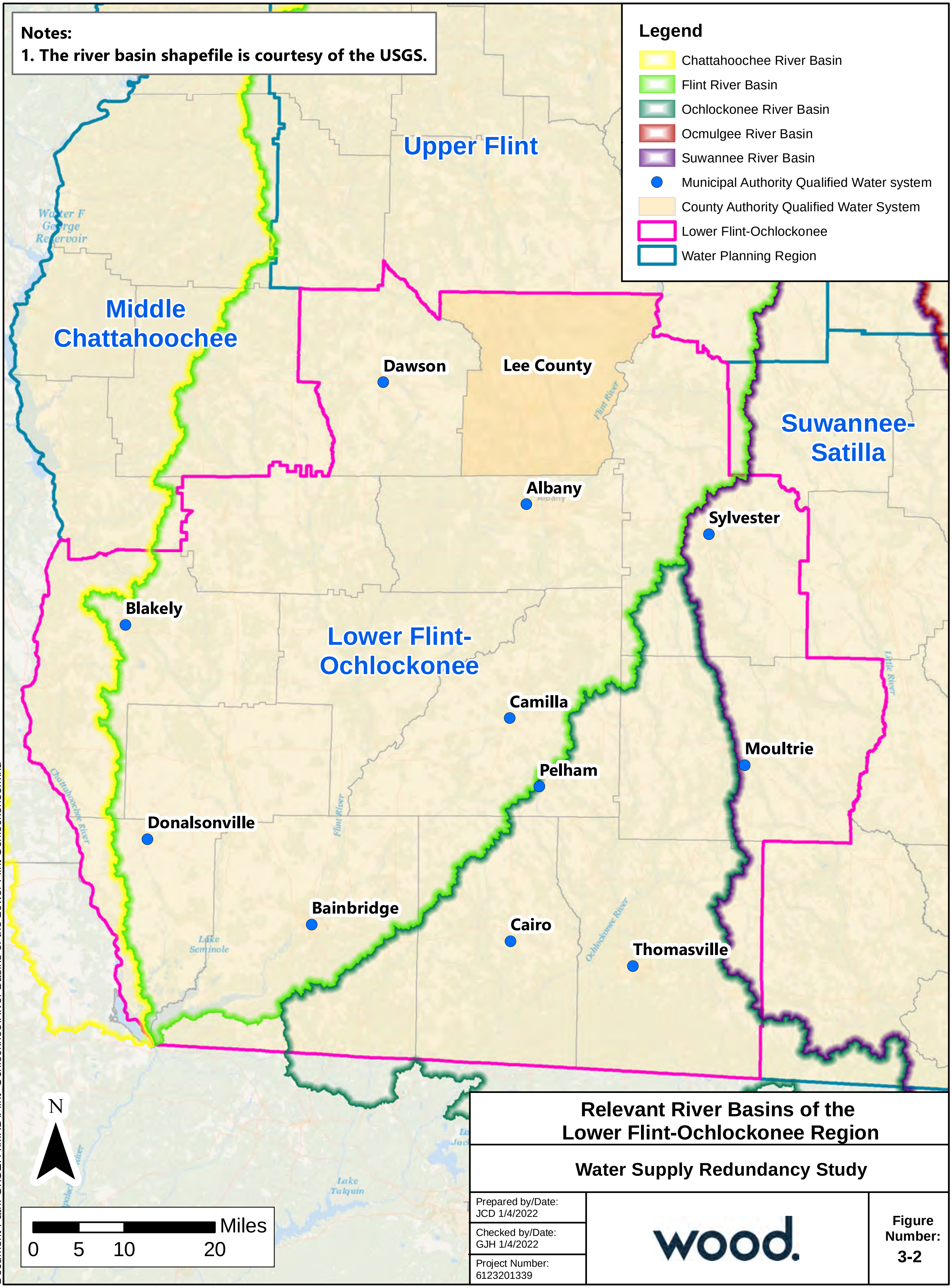
Checked by/Date: GJH 1/4/2022

Project Number: 6123201339

wood.

Figure Number: 3-1

Document Path: G:\GEFA\MXD\Flint_Ochlockneel\Relevant Aquifers of the Lower Flint Ochlockonee.mxd



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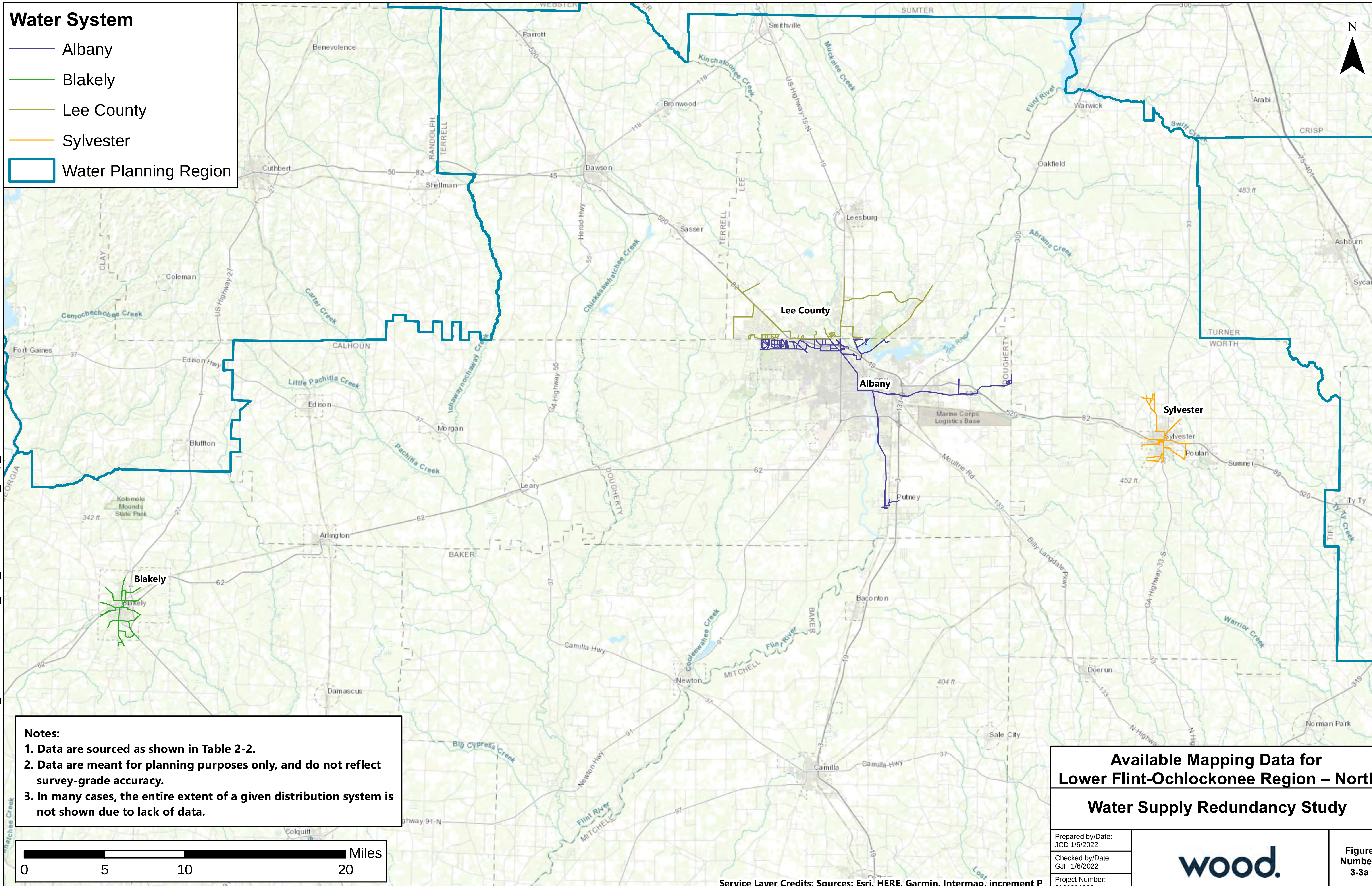


Available Mapping Data for Lower Flint-Ochlockonee Region – North

Water Supply Redundancy Study

Prepared by/Date: JCD 1/6/2022

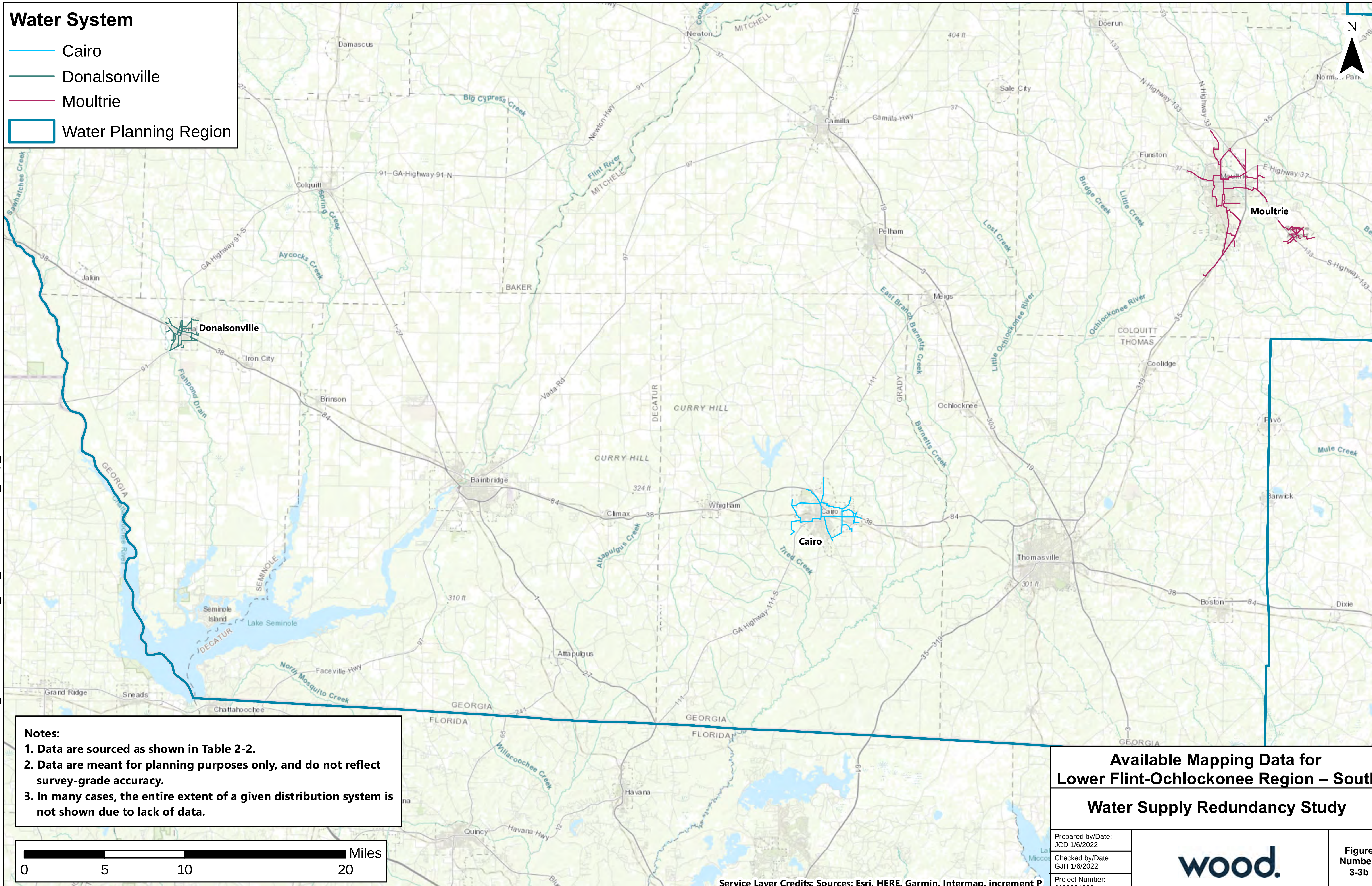
Checked by/Date: GJH 1/6/2022

Project Number: 6123201339

wood.

Figure Number: 3-3a

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

Miles
0 5 10 20

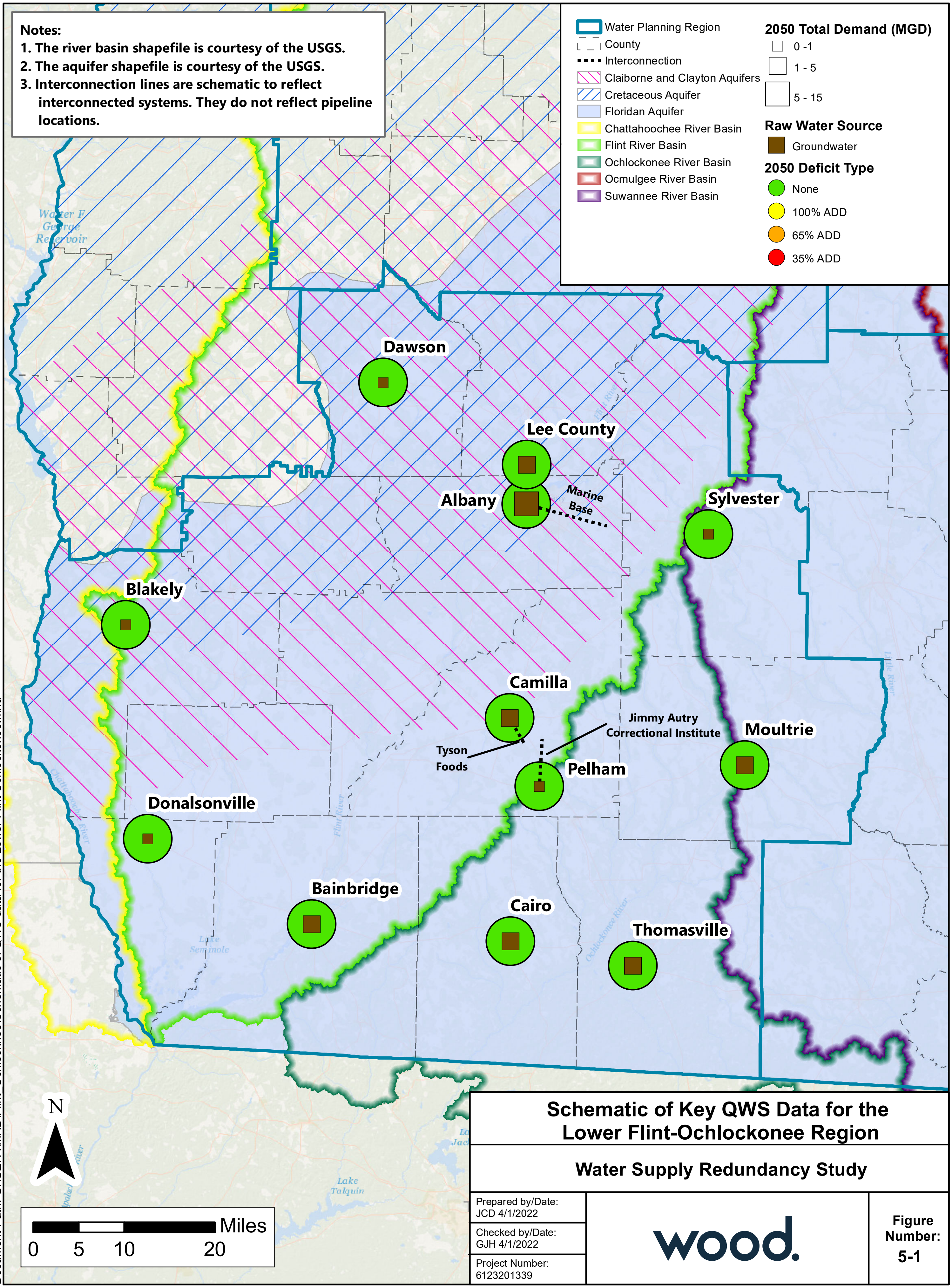
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P

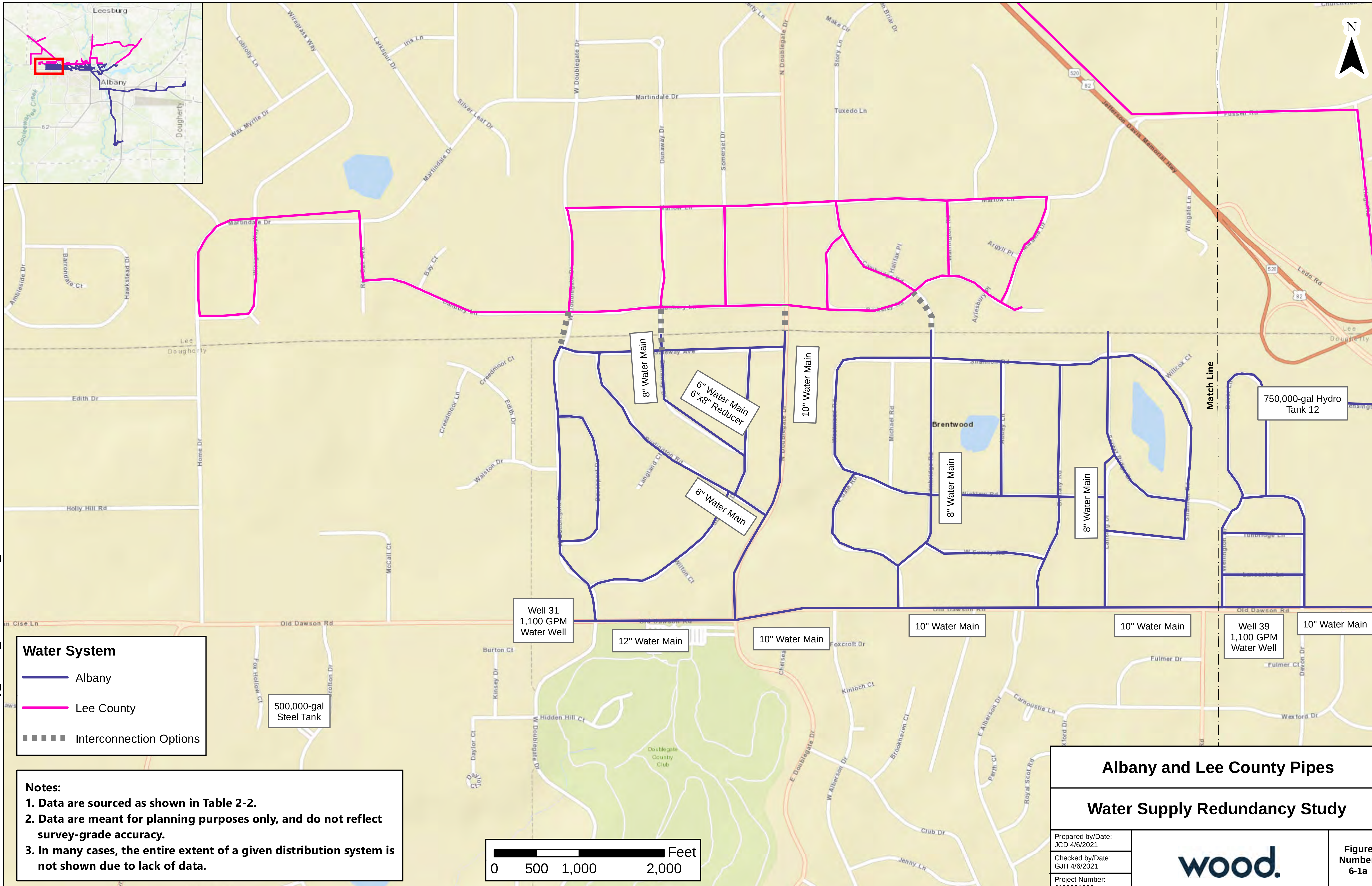
Available Mapping Data for Lower Flint-Ochlockonee Region – South

Water Supply Redundancy Study

Prepared by/Date: JCD 1/6/2022	wood.	Figure Number: 3-3b
Checked by/Date: GJH 1/6/2022		
Project Number: 6123201339		

Document Path: G:\GEFA\MXD\Flint_Ochlockonee\lower_flint_interconnection_map_south.mxd


Notes:
1. The river basin shapefile is courtesy of the USGS.
2. The aquifer shapefile is courtesy of the USGS.
3. Interconnection lines are schematic to reflect interconnected systems. They do not reflect pipeline locations.
Water Planning Region
County
Interconnection
Claiborne and Clayton Aquifers
Cretaceous Aquifer
Floridan Aquifer
Chattahoochee River Basin
Flint River Basin
Ochlockonee River Basin
Ocmulgee River Basin
Suwannee River Basin
2050 Total Demand (MGD)
0 -1
1 - 5
5 - 15
Raw Water Source
Groundwater
2050 Deficit Type
None
100% ADD
65% ADD
35% ADD
Walter F George Reservoir
Dawson
Lee County
Albany
Marine Base
Sylvester
Blakely
Camilla
Jimmy Autry Correctional Institute
Tyson Foods
Pelham
Moultrie
Donalsonville
Bainbridge
Cairo
Thomasville
Lake Seminole
Lake Talquin
N
Miles
0 5 10 20
Schematic of Key QWS Data for the Lower Flint-Ochlockonee Region
Water Supply Redundancy Study
Prepared by/Date: JCD 4/1/2022
Checked by/Date: GJH 4/1/2022
Project Number: 6123201339
wood.
Figure Number: 5-1
Document Path: G:\GEFA\MXD\Flint_Ochlocknee\Schematic of QWS data for the Lower Flint Ochlocknee.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.

Albany and Lee County Pipes

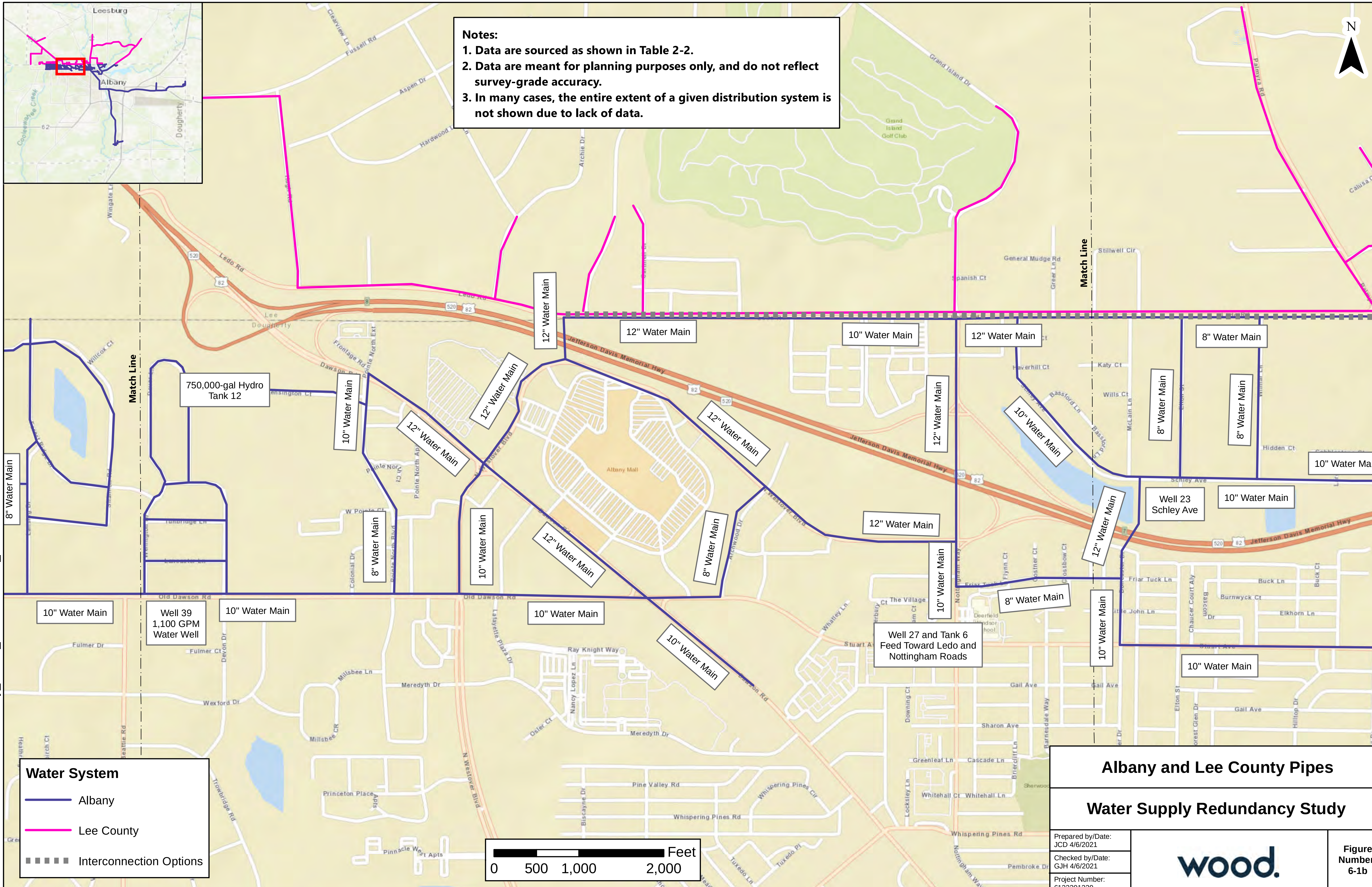
Water Supply Redundancy Study

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

wood.

Figure Number: 6-1a

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



Albany and Lee County Pipes

Water Supply Redundancy Study

Prepared by/Date: JCD 4/6/2021

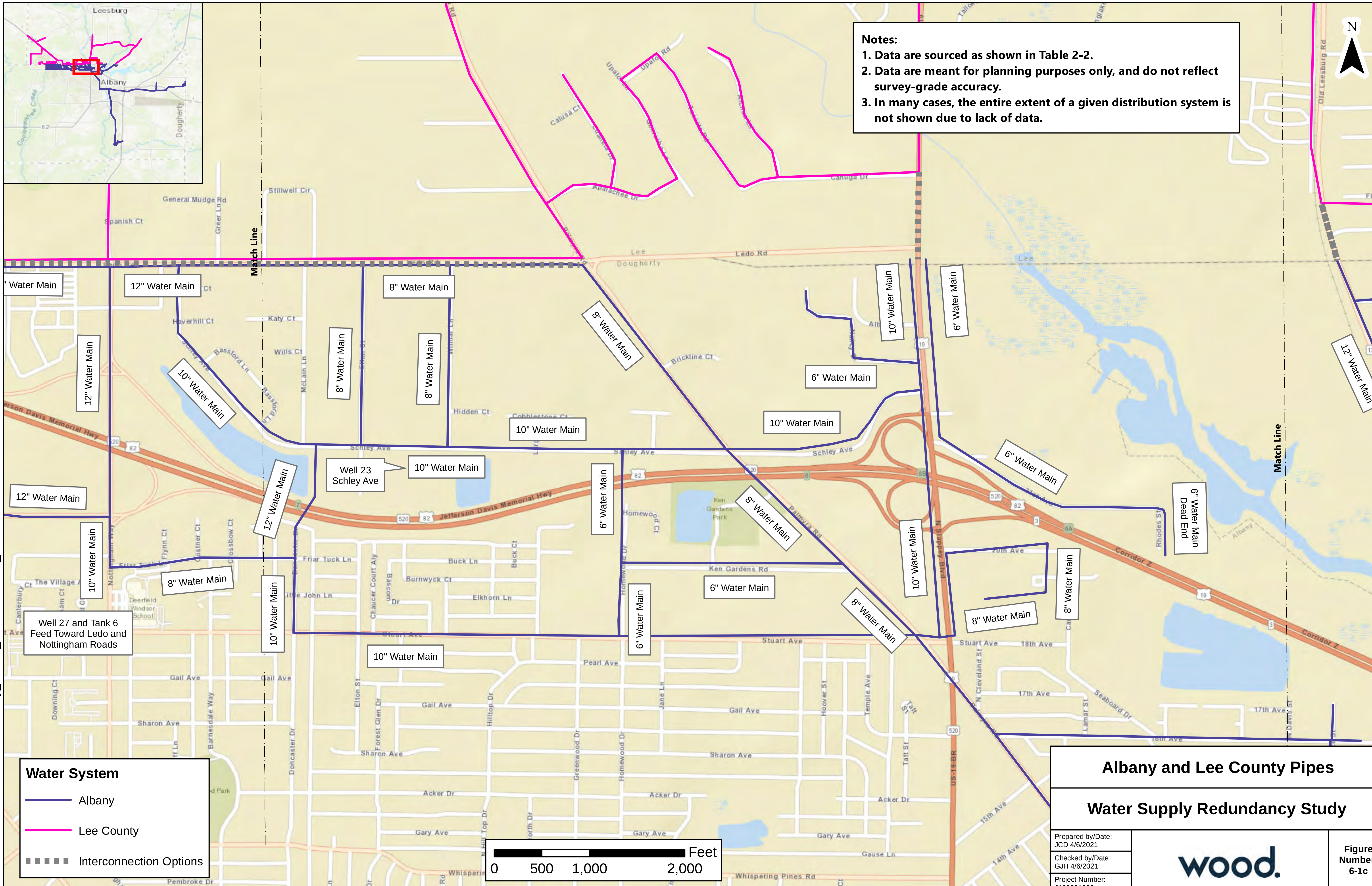
Checked by/Date: GJH 4/6/2021

Project Number: 6123201339

wood.

Figure Number: 6-1b

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



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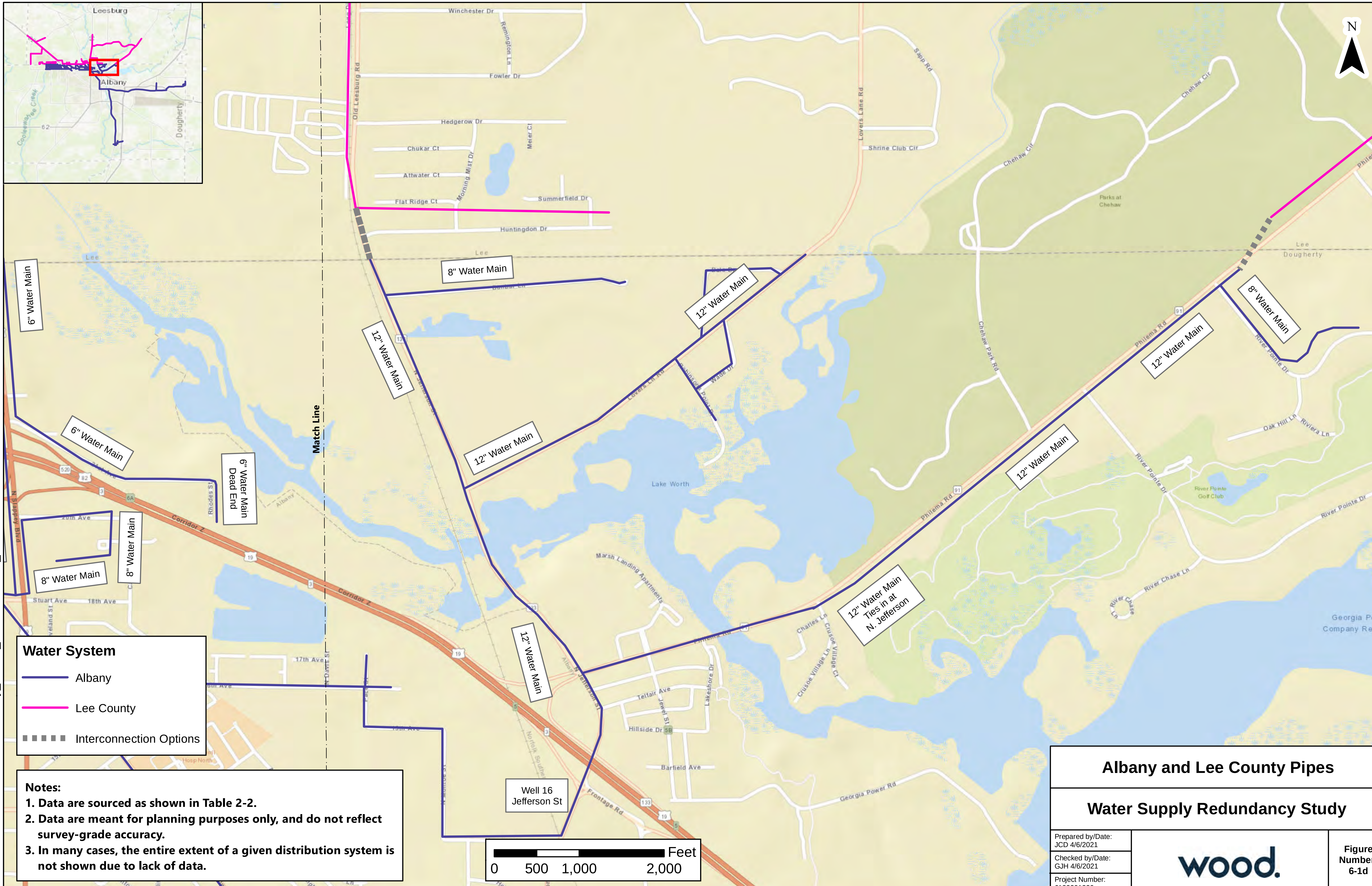


Notes:

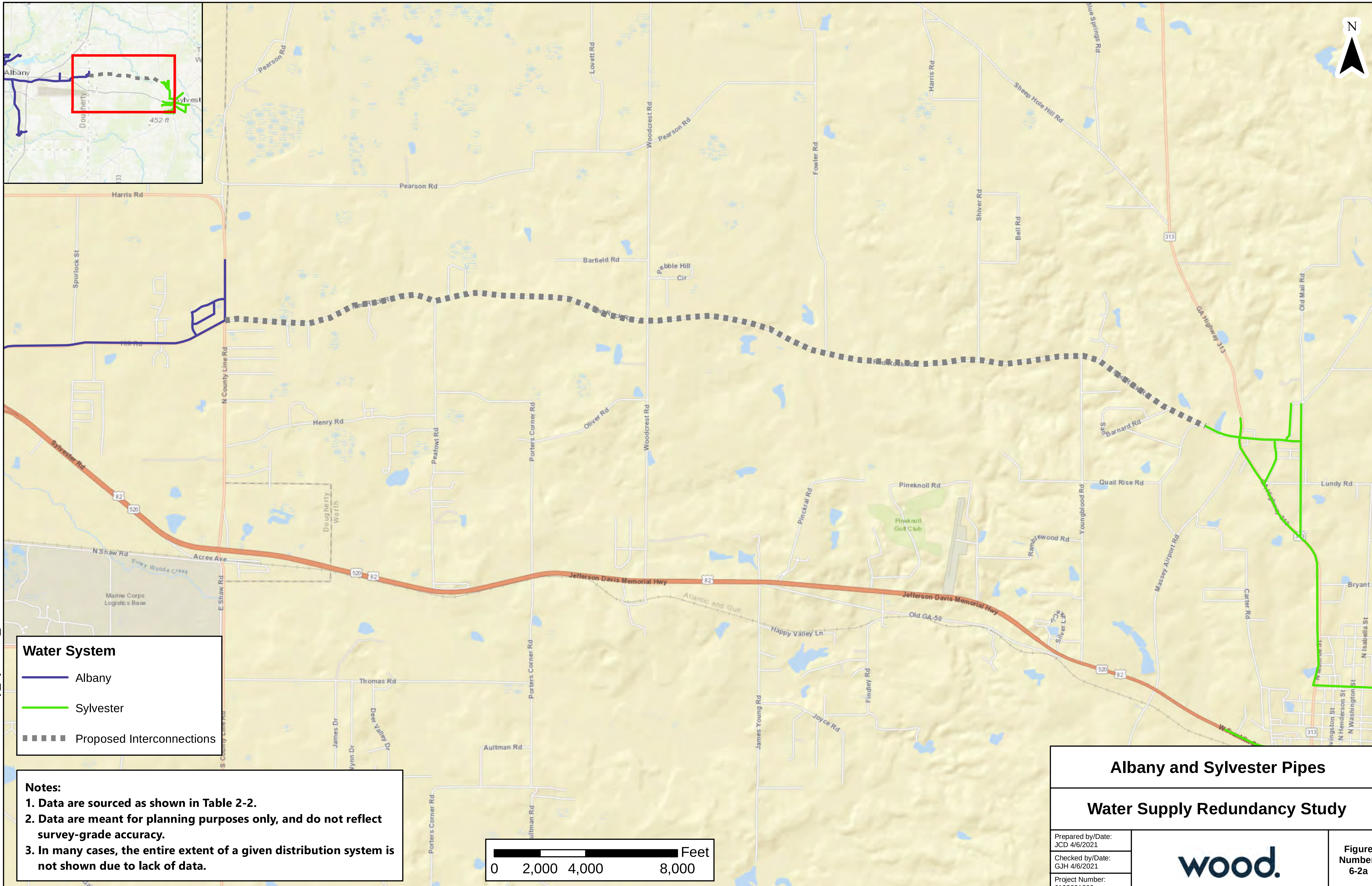
1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Albany and Lee County Pipes

Water Supply Redundancy Study

Prepared by/Date: JCD 4/6/2021	wood.	Figure Number: 6-1d
Checked by/Date: GJH 4/6/2021		
Project Number: 6123201339		

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



Water System

- Albany
- Sylvester
- Proposed Interconnections

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.

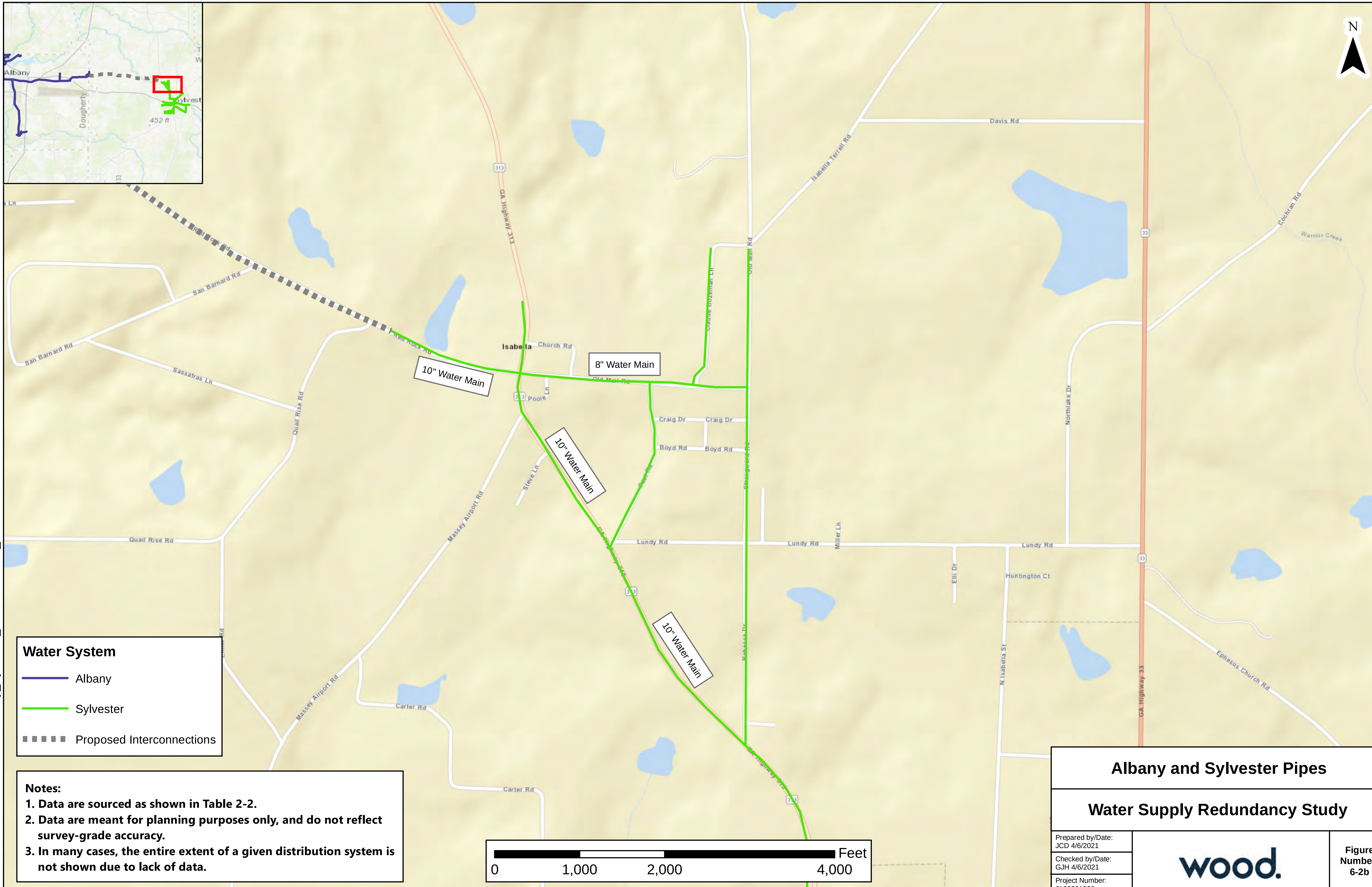
Feet
0 2,000 4,000 8,000

Albany and Sylvester Pipes

Water Supply Redundancy Study

Prepared by/Date: JCD 4/6/2021	wood.	Figure Number: 6-2a
Checked by/Date: GJH 4/6/2021		
Project Number: 6123201339		

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



Notes:

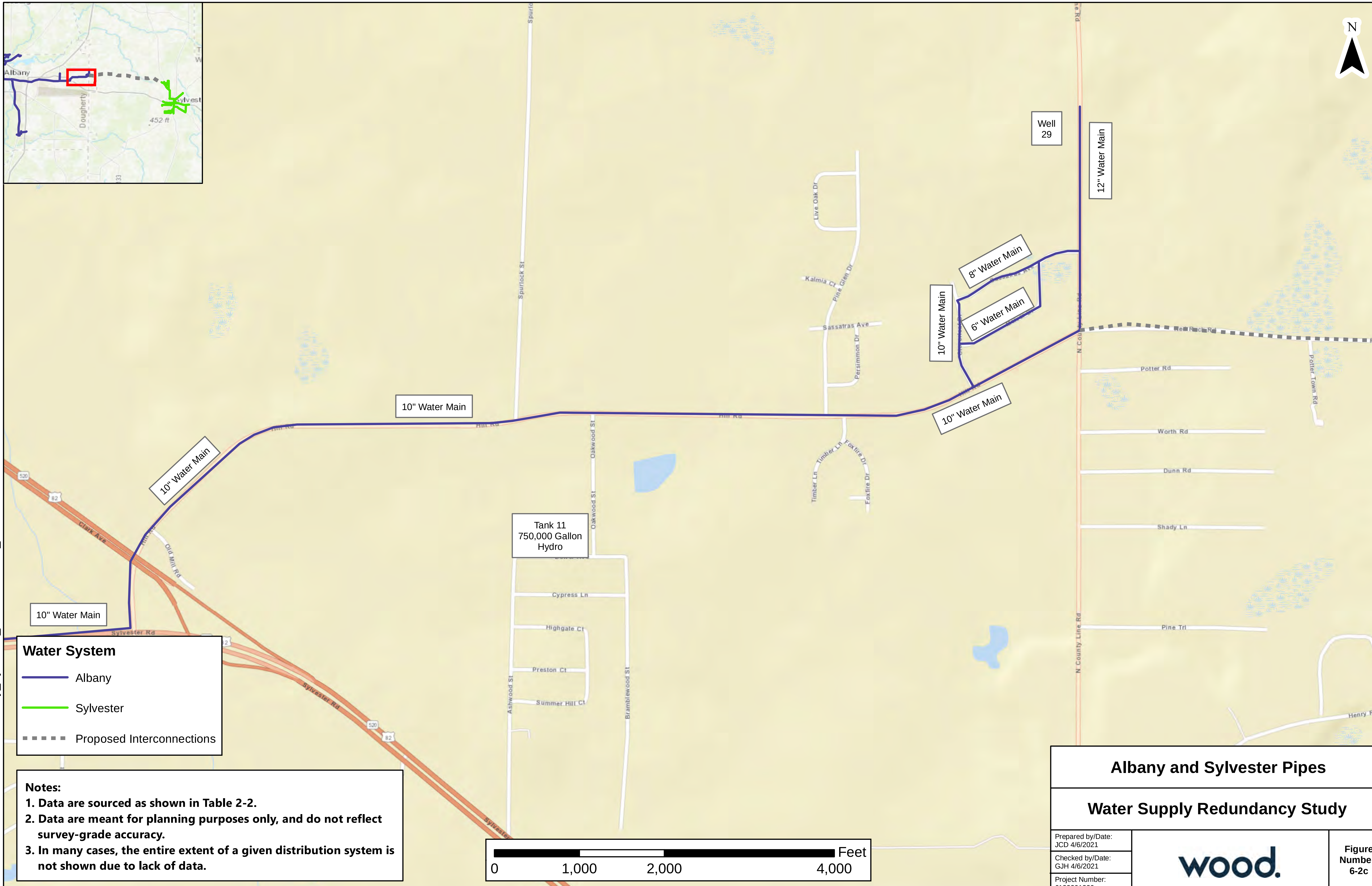
1. Data are sourced as shown in Table 2-2.
2. Data are meant for planning purposes only, and do not reflect survey-grade accuracy.
3. In many cases, the entire extent of a given distribution system is not shown due to lack of data.

Albany and Sylvester 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: 6-2b

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



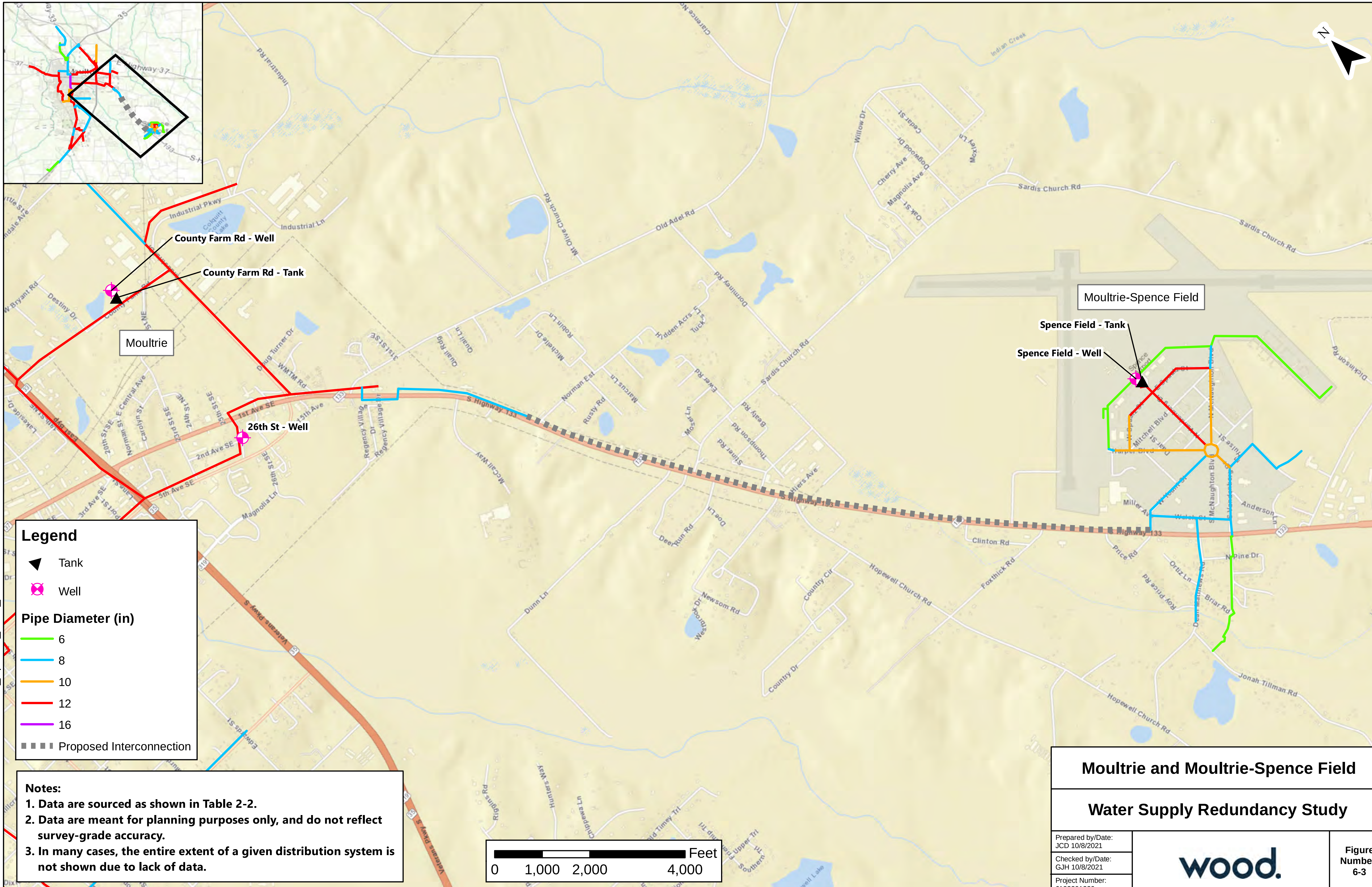
Notes:
1. **Data are sourced as shown in Table 2-2.**
2. **Data are meant for planning purposes only, and do not reflect survey-grade accuracy.**
3. **In many cases, the entire extent of a given distribution system is not shown due to lack of data.**

Albany and Sylvester Pipes

Water Supply Redundancy Study

Prepared by/Date: JCD 4/6/2021	wood.	**Figure Number: 6-2c**
Checked by/Date: GJH 4/6/2021		
Project Number: 6123201339		

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



Legend

- Tank
- Well

Pipe Diameter (in)

- 6
- 8
- 10
- 12
- 16
- Proposed Interconnection

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.

Moultrie and Moultrie-Spence Field

Water Supply Redundancy Study

Prepared by/Date: JCD 10/8/2021	wood.	Figure Number: 6-3
Checked by/Date: GJH 10/8/2021		
Project Number: 6123201339		

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

Appendix A: Excess Capacity Calculations

Contents

List of Tables

Acronyms

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

1.0 Introduction

This appendix describes 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, both Bainbridge and Blakely indicated the addition of a potential new supply well each.

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. All but one QWS, Donalsonville, had 2015 water loss audit data. The Donalsonville value was 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 (Black & Veatch, 2017). As defined by the Lower Flint-Ochlockonee Water Planning Council, the municipal sector includes public and private water withdrawal data for residential, commercial, and light 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) and Technical Memorandum 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 the 12 QWS were included in the report. 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 (131.1 MGD) to obtain a QWS-specific percent. This percent was then applied to the 2050 RWP regional industrial projection (133.1 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 Lower Flint-Ochlockonee 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 Lower Flint-Ochlockonee 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 Lower Flint-Ochlockonee QWS are in index regime (b). Albany's 2015 and 2050 scaled excess capacity sufficiency is the lowest relative to other Lower Flint-Ochlockonee QWS.

References

Black & Veatch, 2017. *Lower Flint-Ochlockonee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum*. February 15, 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]
Baker	3,244	1,785	0.14
Calhoun	6,503	6,507	0.81
Colquitt	47,235	63,355	6.88
Decatur	27,566	27,730	3.40
Dougherty	93,142	88,575	14.14
Early	10,488	8,327	1.40
Grady	25,694	31,360	3.27
Lee	30,113	49,757	4.49
Miller	5,928	4,865	0.45
Mitchell	23,076	20,848	2.50
Seminole	8,951	8,514	0.85
Terrell	8,926	5,638	0.80
Thomas	45,517	52,910	7.13
Worth	21,236	17,730	1.72
Totals	**357,619**	**387,901**	**47.98**

Prepared by: GJH 12/29/20

Checked by: LCT 12/30/20

Notes:

MGD - million gallons per day

1. Values are from the 2017 Black & Veatch *Lower Flint-Ochlockonee Water Planning Region: Water and Wastewater Forecasting Technical Memorandum.*

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]
Dougherty	Albany	75,200	0	75,200	81%	11.42
Decatur	Bainbridge	12,600	0	12,600	46%	1.55
Early	Blakely	5,600	0	5,600	53%	0.75
Grady	Cairo	10,000	0	10,000	39%	1.27
Mitchell	Camilla	5,000	0	5,000	22%	0.54
Terrell	Dawson	4,100	0	4,100	46%	0.37
Seminole	Donalsonville	2,700	0	2,700	30%	0.26
Lee	Lee County	16,300	0	16,300	54%	2.43
Colquitt	Moultrie	14,400	0	14,400	30%	2.10
Mitchell	Pelham	3,300	0	3,300	14%	0.36
Worth	Sylvester	6,900	0	6,900	32%	0.56
Thomas	Thomasville	25,000	0	25,000	55%	3.92
	Totals	**181,100**	**0**	**181,100**	**-**	**25.52**

Prepared by: GJH 12/29/20

Checked by: LCT 12/30/20

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]	131.1 MGD
Regional Water Plan - 2050 Regional Industrial Projection[1]	133.1 MGD

Albany

Dougherty County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.29	6.50	6.21
Commercial	0.00	3.09	3.09
Industrial	7.55	8.08	0.53
Water Loss	-	-	1.74
Inter-County Delivery	-	-	0.00
		Total (MGD)	11.57
		Albany Public Supply (MGD)	11.54
		QWS's Percent of County's Public Supply (%)	100%
		QWS's Supplied Industrial Demand (MGD)	0.53
		2015 QWS Percent of Regional Industrial Demand (%)	0.40%
		2050 QWS Industrial Demand Estimate (MGD)	0.54

Bainbridge

Decatur County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.89	2.79	1.90
Commercial	0.00	0.30	0.30
Industrial	1.19	1.19	0.00
Water Loss	-	-	0.23
Inter-County Delivery	-	-	0.00
		Total (MGD)	2.43
		Bainbridge Public Supply (MGD)	2.31
		QWS's Percent of County's Public Supply (%)	95%
		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

Blakely

Early County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.39	1.15	0.76
Commercial	0.00	0.25	0.25
Industrial	104.40	104.40	0.00
Water Loss	-	-	0.20
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.21
		Blakely Public Supply (MGD)	0.35
		QWS's Percent of County's Public Supply (%)	29%
		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

Cairo

Grady County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.01	2.22	1.21
Commercial	0.00	0.27	0.27
Industrial	0.00	0.00	0.00
Water Loss	-	-	0.25
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.73
		Cairo Public Supply (MGD)	1.58
		QWS's Percent of County's Public Supply (%)	91%
		QWS's Supplied Industrial Demand (MGD)	0.00
		2015 QWS Percent of Regional Industrial Demand (%)	0.00%
		2050 QWS Industrial Demand Estimate (MGD)	0.00

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

Camilla

Mitchell County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.85	1.84	0.99
Commercial	0.26	0.92	0.66
Industrial	0.96	2.69	1.73
Water Loss	-	-	0.39
Inter-County Delivery	-	-	0.00
		Total (MGD)	3.77
		Camilla Public Supply	3.01
		QWS's Percent of County's Public Supply (%)	80%
		QWS's Supplied Industrial Demand (MGD)	1.38
		2015 QWS Percent of Regional Industrial Demand (%)	1.05%
		2050 QWS Industrial Demand Estimate (MGD)	1.40

Dawson

Terrell County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.22	0.71	0.49
Commercial	0.02	0.17	0.15
Industrial	0.00	0.25	0.25
Water Loss	-	-	0.55
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.44
		Dawson Public Supply (MGD)	1.33
		QWS's Percent of County's Public Supply (%)	92%
		QWS's Supplied Industrial Demand (MGD)	0.23
		2015 QWS Percent of Regional Industrial Demand (%)	0.18%
		2050 QWS Industrial Demand Estimate (MGD)	0.23

Donalsonville

Seminole County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.34	0.69	0.35
Commercial	0.00	0.07	0.07
Industrial	0.00	0.01	0.01
Water Loss	-	-	0.07
Inter-County Delivery	-	-	0.00
		Total (MGD)	0.50
		Donalsonville Public Supply (MGD)	0.44
		QWS's Percent of County's Public Supply (%)	88%
		QWS's Supplied Industrial Demand (MGD)	0.01
		2015 QWS Percent of Regional Industrial Demand (%)	0.01%
		2050 QWS Industrial Demand Estimate (MGD)	0.01

Lee County

Lee County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.79	2.17	1.38
Commercial	0.11	0.30	0.19
Industrial	0.00	0.02	0.02
Water Loss	-	-	0.28
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.87
		Lee County Public Supply (MGD)	1.28
		QWS's Percent of County's Public Supply (%)	68%
		QWS's Supplied Industrial Demand (MGD)	0.01
		2015 QWS Percent of Regional Industrial Demand (%)	0.01%
		2050 QWS Industrial Demand Estimate (MGD)	0.01

Table A-3

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

Moultrie

Colquitt County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.76	3.27	1.51
Commercial	0.00	0.64	0.64
Industrial	1.14	1.21	0.07
Water Loss	-	-	0.89
Inter-County Delivery	-	-	0.00
		Total (MGD)	3.11
		Moultrie Public Supply	2.49
		QWS's Percent of County's Public Supply (%)	80%
		QWS's Supplied Industrial Demand (MGD)	0.06
		2015 QWS Percent of Regional Industrial Demand (%)	0.04%
		2050 QWS Industrial Demand Estimate (MGD)	0.06

Pelham

Mitchell County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.85	1.84	0.99
Commercial	0.26	0.92	0.66
Industrial	0.96	2.69	1.73
Water Loss	-	-	0.39
Inter-County Delivery	-	-	0.00
		Total (MGD)	3.77
		Pelham Public Supply (MGD)	0.65
		QWS's Percent of County's Public Supply (%)	17%
		QWS's Supplied Industrial Demand (MGD)	0.30
		2015 QWS Percent of Regional Industrial Demand (%)	0.23%
		2050 QWS Industrial Demand Estimate (MGD)	0.30

Sylvester

Worth County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	0.86	1.45	0.59
Commercial	0.00	0.15	0.15
Industrial	0.00	0.03	0.03
Water Loss	-	-	0.24
Inter-County Delivery	-	-	0.00
		Total (MGD)	1.01
		Sylvester Public Supply (MGD)	0.83
		QWS's Percent of County's Public Supply (%)	82%
		QWS's Supplied Industrial Demand (MGD)	0.02
		2015 QWS Percent of Regional Industrial Demand (%)	0.02%
		2050 QWS Industrial Demand Estimate (MGD)	0.03

Thomasville

Thomas County[2]	2015 Total Withdrawal (MGD)	2015 Total Use (MGD)	2015 Total Publicly Supplied (MGD)
Domestic	1.03	3.56	2.53
Commercial	0.01	1.25	1.24
Industrial	0.17	0.54	0.37
Water Loss	-	-	1.50
Inter-County Delivery	-	-	0.00
		Total (MGD)	5.64
		Thomasville Public Supply (MGD)	4.69
		QWS's Percent of County's Public Supply (%)	83%
		QWS's Supplied Industrial Demand (MGD)	0.31
		2015 QWS Percent of Regional Industrial Demand (%)	0.23%
		2050 QWS Industrial Demand Estimate (MGD)	0.31

Prepared by: GJH 12/29/20
Checked by: LCT 12/30/20

Notes:

MGD - million gallons per day

QWS - qualified water system

1. Values are from the 2017 Lower Flint-Ochlockonee Water Planning Council *Lower Flint-Ochlockonee 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
Dougherty	Albany	31.6	11.6	20.0	0.42	31.6	12.0	19.7	0.39
Decatur	Bainbridge	11.5	2.3	9.2	0.75	14.4	1.6	12.8	0.88
Early	Blakely	3.0	1.1	2.0	0.46	3.8	0.7	3.0	0.75
Grady	Cairo	8.0	1.3	6.7	0.80	8.0	1.3	6.7	0.81
Mitchell	Camilla	13.3	3.4	9.9	0.66	13.3	1.9	11.4	0.83
Terrell	Dawson	3.8	1.3	2.5	0.46	3.8	0.6	3.2	0.81
Seminole	Donalsonville	4.0	0.4	3.6	0.89	4.0	0.3	3.8	0.93
Lee	Lee County	6.9	1.4	5.5	0.75	6.9	2.4	4.5	0.45
Colquitt	Moultrie	10.1	2.5	7.6	0.67	10.1	2.2	7.9	0.73
Mitchell	Pelham	2.9	0.7	2.2	0.68	2.9	0.7	2.3	0.71
Worth	Sylvester	6.2	0.8	5.4	0.84	6.2	0.6	5.6	0.90
Thomas	Thomasville	15.5	4.6	10.9	0.57	15.5	4.2	11.3	0.62
	Totals	**116.9**	**31.5**	**85.4**	**-**	**120.6**	**28.4**	**92.1**	**-**

Prepared by: GJH 01/07/21
Checked by: LCT 01/08/21

Notes:
ADD - average daily demand
MGD - million gallons per day
1. 2015 EPD-validated water loss audit values are reported. In the event a QWS is not in that dataset, as identified in Table 2-3, QWS-provided values are reported.
2. Bainbridge and Blakely each indicated one potential new well, 2.88 MGD and 0.75 MGD, respectively.
3. Municipal and publicly-supplied industrial demand by county were allocated to each QWS.

Appendix B: Water Supply and Deficit Calculations

Table B-1a
Albany Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 333	Peak Day Design Capacity (MGD): WTP All Others[3]	Max Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.75	29.86	NA	5.55	37.16	1.75	35.41
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.75	29.86	NA	NA	31.61	0.00	31.61
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.75	29.86	NA	5.55	37.16	1.75	35.41
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.75	29.86	NA	NA	31.61	0.00	31.61
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.75	29.86	NA	5.55	37.16	1.75	35.41
	D2. Chemical contamination of largest raw water source	0.1	1	1.75	29.86	NA	5.55	37.16	1.75	35.41
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:

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 WTPs have backup generators.
2. Backup equipment is available, rendering no capacity loss.
3. Albany has 28 wells, so all but the largest well are summarized in one column.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

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

Table B-1b

Albany 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]	35.41	11.58	7.53	4.05	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	31.61	11.58	7.53	4.05	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	35.41	11.58	7.53	4.05	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	31.61	11.58	7.53	4.05	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	35.41	11.58	7.53	4.05	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	35.41	11.58	7.53	4.05	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 11/11/20
Checked by: LCT 11/19/20

Table B-1c

Albany Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 333	Peak Day Design Capacity (MGD): WTP All Others[3]	Max Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.75	29.86	NA	5.55	37.16	1.75	35.41
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.75	29.86	NA	NA	31.61	0.00	31.61
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.75	29.86	NA	5.55	37.16	1.75	35.41
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.75	29.86	NA	NA	31.61	0.00	31.61
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.75	29.86	NA	5.55	37.16	1.75	35.41
	D2. Chemical contamination of largest raw water source	0.1	1	1.75	29.86	NA	5.55	37.16	1.75	35.41
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:

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

1. No WTPs have backup generators.
2. Backup equipment is available, rendering no capacity loss.
3. Albany has 28 wells, so all but the largest well are summarized in one column.
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 11/11/20
Checked by: LCT 11/19/20

Table B-1d
Albany 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]	35.41	11.95	7.77	4.18	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	31.61	11.95	7.77	4.18	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	35.41	11.95	7.77	4.18	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	31.61	11.95	7.77	4.18	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	35.41	11.95	7.77	4.18	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	35.41	11.95	7.77	4.18	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable			
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

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

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

4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw and treated water storage.

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

Table B-2a

Bainbridge Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 301	Peak Day Design Capacity (MGD): WTP Well 302	Peak Day Design Capacity (MGD): WTP Well 306	Peak Day Design Capacity (MGD): WTP Well 307	Max 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	2.88	2.88	2.88	2.88	NA	1.20	12.72	2.88	9.84
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.88	2.88	2.88	2.88	NA	NA	11.52	0.00	11.52
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.88	2.88	2.88	2.88	NA	1.20	12.72	2.88	9.84
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	2.88	2.88	2.88	2.88	NA	NA	11.52	0.00	11.52
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.88	2.88	2.88	2.88	NA	1.20	12.72	2.88	9.84
	D2. Chemical contamination of largest raw water source	0.1	1	2.88	2.88	2.88	2.88	NA	1.20	12.72	2.88	9.84
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 11/11/20
Checked by: LCT 11/19/20

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. WTPs 301 and 302 have backup generators able to supply full treatment capacity. There is potential for full capacity loss at WTPs 306 and 307.
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-2b
Bainbridge 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]	9.84	2.31	1.50	0.81	0.0	0.0	0.0
	A2. Critical asset failure at largest WTP[2]	11.52	2.31	1.50	0.81	0.0	0.0	0.0
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	9.84	2.31	1.50	0.81	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	11.52	2.31	1.50	0.81	0.0	0.0	0.0
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	9.84	2.31	1.50	0.81	0.0	0.0	0.0
	D2. Chemical contamination of largest raw water source	9.84	2.31	1.50	0.81	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.

4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw and treated water storage.

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

Table B-2c

Bainbridge Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP Well 301	WTP Well 302	WTP Well 306	WTP Well 307	WTP New	Max 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	2.88	2.88	2.88	2.88	2.88	NA	1.50	15.90	2.88	13.02
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.88	2.88	2.88	2.88	2.88	NA	NA	14.40	0.00	14.40
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.88	2.88	2.88	2.88	2.88	NA	1.50	15.90	2.88	13.02
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	2.88	2.88	2.88	2.88	2.88	NA	NA	14.40	0.00	14.40
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.88	2.88	2.88	2.88	2.88	NA	1.50	15.90	2.88	13.02
	D2. Chemical contamination of largest raw water source	0.1	1	2.88	2.88	2.88	2.88	2.88	NA	1.50	15.90	2.88	13.02
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable											
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable											
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	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 11/11/20
Checked by: LCT 11/19/20

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. WTPs 301 and 302 have backup generators able to supply full treatment capacity. There is potential for full capacity loss at WTPs 306 and 307.
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. A new 0.5 MG tank was assumed, as indicated by the QWS.

Table B-2d
Bainbridge 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]	13.02	1.55	1.01	0.54	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	14.40	1.55	1.01	0.54	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	13.02	1.55	1.01	0.54	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	14.40	1.55	1.01	0.54	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	13.02	1.55	1.01	0.54	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	13.02	1.55	1.01	0.54	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

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

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

4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw and treated water storage.

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

Table B-3a

Blakely Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 103	WTP Well 104	WTP Well 105	Max 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	0.65	1.12	1.27	NA	0.75	3.79	0.00	3.79
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.65	1.12	1.27	NA	NA	3.04	0.00	3.04
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.65	1.12	1.27	NA	0.75	3.79	1.27	2.52
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.65	1.12	1.27	NA	NA	3.04	0.00	3.04
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.65	1.12	1.27	NA	0.75	3.79	1.27	2.52
	D2. Chemical contamination of largest raw water source	0.1	1	0.65	1.12	1.27	NA	0.75	3.79	1.27	2.52
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	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 11/11/20
Checked by: LCT 11/19/20

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

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

Table B-3b
Blakely 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]	3.79	1.07	0.70	0.37	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	3.04	1.07	0.70	0.37	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.52	1.07	0.70	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	3.04	1.07	0.70	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	2.52	1.07	0.70	0.37	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.52	1.07	0.70	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 11/11/20
Checked by: LCT 11/19/20

Table B-3c

Blakely 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 104	Peak Day Design Capacity (MGD): WTP Well 105	Peak Day Design Capacity (MGD): WTP New	Max 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	0.65	1.12	1.27	0.75	NA	0.90	4.69	0.00	4.69
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.65	1.12	1.27	0.75	NA	NA	3.79	0.00	3.79
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.65	1.12	1.27	0.75	NA	0.90	4.69	1.27	3.42
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.65	1.12	1.27	0.75	NA	NA	3.79	0.00	3.79
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.65	1.12	1.27	0.75	NA	0.90	4.69	1.27	3.42
	D2. Chemical contamination of largest raw water source	0.1	1	0.65	1.12	1.27	0.75	NA	0.90	4.69	1.27	3.42
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable										
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable										
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable										

Notes:

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

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. WTP 105 has a backup generator able to supply full treatment capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage. A new 0.25 MG tank was assumed, as indicated by the QWS,

Table B-3d

Blakely Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	4.69	0.75	0.49	0.26	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	3.79	0.75	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)	3.42	0.75	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	3.79	0.75	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	3.42	0.75	0.49	0.26	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	3.42	0.75	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 11/11/20
Checked by: LCT 11/19/20

Table B-4a

Cairo Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Max Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP 1 (Wells 10, 11)	WTP 2 (Wells 7, 8, 9)					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.00	4.00	NA	0.84	8.84	0.00	8.84
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.00	4.00	NA	NA	8.00	0.00	8.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.00	4.00	NA	0.84	8.84	4.00	4.84
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	4.00	4.00	NA	NA	8.00	0.00	8.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.00	4.00	NA	0.84	8.84	4.00	4.84
	D2. Chemical contamination of largest raw water source	0.1	1	4.00	4.00	NA	0.84	8.84	4.00	4.84
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 11/11/20
Checked by: LCT 11/19/20

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

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

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

Table B-4b
Cairo 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]	8.84	1.35	0.87	0.47	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	8.00	1.35	0.87	0.47	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	4.84	1.35	0.87	0.47	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	8.00	1.35	0.87	0.47	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.84	1.35	0.87	0.47	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.84	1.35	0.87	0.47	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 11/11/20
Checked by: LCT 11/19/20

Table B-4c

Cairo Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Max Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP 1 (Wells 10, 11)	WTP 2 (Wells 7, 8, 9)					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	4.00	4.00	NA	0.84	8.84	0.00	8.84
	A2. Critical asset failure at largest WTP[2]	0.1	30	4.00	4.00	NA	NA	8.00	0.00	8.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	4.00	4.00	NA	0.84	8.84	4.00	4.84
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1.0	3	4.00	4.00	NA	NA	8.00	0.00	8.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	4.00	4.00	NA	0.84	8.84	4.00	4.84
	D2. Chemical contamination of largest raw water source	0.1	1	4.00	4.00	NA	0.84	8.84	4.00	4.84
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. Both WTPs have backup generators able to supply full treatment capacity, rendering no capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

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

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

Table B-4d
Cairo 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]	8.84	1.27	0.83	0.45	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	8.00	1.27	0.83	0.45	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	4.84	1.27	0.83	0.45	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	8.00	1.27	0.83	0.45	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.84	1.27	0.83	0.45	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.84	1.27	0.83	0.45	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

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

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

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

Table B-5a

Camilla Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 101	WTP Well 102	WTP Well 105	WTP Well 106	WTP Well 107	Max 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	2.20	1.70	3.60	2.20	3.60	NA	1.50	14.80	0.00	14.80
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.20	1.70	3.60	2.20	3.60	NA	NA	13.30	0.00	13.30
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.20	1.70	3.60	2.20	3.60	NA	1.50	14.80	3.60	11.20
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.20	1.70	3.60	2.20	3.60	NA	NA	13.30	0.00	13.30
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.20	1.70	3.60	2.20	3.60	NA	1.50	14.80	3.60	11.20
	D2. Chemical contamination of largest raw water source	0.1	1	2.20	1.70	3.60	2.20	3.60	NA	1.50	14.80	3.60	11.20
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. WTPs 101, 105, and 107 have backup generators able to supply full treatment capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

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

Table B-5b
Camilla 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]	14.80	3.40	2.21	1.19	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	13.30	3.40	2.21	1.19	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	11.20	3.40	2.21	1.19	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	13.30	3.40	2.21	1.19	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	11.20	3.40	2.21	1.19	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	11.20	3.40	2.21	1.19	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 11/11/20
Checked by: LCT 11/19/20

Table B-5c

Camilla Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 101	WTP Well 102	WTP Well 105	WTP Well 106	WTP Well 107	Max 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	2.20	1.70	3.60	2.20	3.60	NA	1.50	14.80	0.00	14.80
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.20	1.70	3.60	2.20	3.60	NA	NA	13.30	0.00	13.30
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.20	1.70	3.60	2.20	3.60	NA	1.50	14.80	3.60	11.20
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.20	1.70	3.60	2.20	3.60	NA	NA	13.30	0.00	13.30
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.20	1.70	3.60	2.20	3.60	NA	1.50	14.80	3.60	11.20
	D2. Chemical contamination of largest raw water source	0.1	1	2.20	1.70	3.60	2.20	3.60	NA	1.50	14.80	3.60	11.20
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. WTPs 101, 105, and 107 have backup generators able to supply full treatment capacity, rendering no capacity loss at the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

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

Table B-5d

Camilla 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]	14.80	1.94	1.26	0.68	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	13.30	1.94	1.26	0.68	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	11.20	1.94	1.26	0.68	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	13.30	1.94	1.26	0.68	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	11.20	1.94	1.26	0.68	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	11.20	1.94	1.26	0.68	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 11/11/20
Checked by: LCT 11/19/20

Table B-6a

Dawson Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Max Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 301	WTP Well 302	WTP Well 303					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.25	1.49	1.06	NA	0.60	4.40	1.49	2.91
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.25	1.49	1.06	NA	NA	3.80	0.00	3.80
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.25	1.49	1.06	NA	0.60	4.40	1.49	2.91
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.25	1.49	1.06	NA	NA	3.80	0.00	3.80
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.25	1.49	1.06	NA	0.60	4.40	1.49	2.91
	D2. Chemical contamination of largest raw water source	0.1	1	1.25	1.49	1.06	NA	0.60	4.40	1.49	2.91
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 11/11/20
Checked by: LCT 11/19/20

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

1. No WTPs have backup generators.
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
Dawson 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]	2.91	1.33	0.87	0.47	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	3.80	1.33	0.87	0.47	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.91	1.33	0.87	0.47	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	3.80	1.33	0.87	0.47	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.91	1.33	0.87	0.47	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.91	1.33	0.87	0.47	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 11/11/20
Checked by: LCT 11/19/20

Table B-6c
Dawson Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Max Possible Purchased Water (MGD)	Water Storage (MGD)[3]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP Well 301	WTP Well 302	WTP Well 303					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.25	1.49	1.06	NA	0.60	4.40	1.49	2.91
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.25	1.49	1.06	NA	NA	3.80	0.00	3.80
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.25	1.49	1.06	NA	0.60	4.40	1.49	2.91
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.25	1.49	1.06	NA	NA	3.80	0.00	3.80
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.25	1.49	1.06	NA	0.60	4.40	1.49	2.91
	D2. Chemical contamination of largest raw water source	0.1	1	1.25	1.49	1.06	NA	0.60	4.40	1.49	2.91
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 11/11/20
Checked by: LCT 11/19/20

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

1. No WTPs have backup generators.
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-6d
Dawson 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]	2.91	0.60	0.39	0.21	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	3.80	0.60	0.39	0.21	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.91	0.60	0.39	0.21	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	3.80	0.60	0.39	0.21	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.91	0.60	0.39	0.21	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.91	0.60	0.39	0.21	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

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

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

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

Table B-7a

Donalsonville 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	Max 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	2.02	2.02	NA	0.33	4.36	0.00	4.36
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.02	2.02	NA	NA	4.03	0.00	4.03
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.02	2.02	NA	0.33	4.36	2.02	2.35
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.02	2.02	NA	NA	4.03	0.00	4.03
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.02	2.02	NA	0.33	4.36	2.02	2.35
	D2. Chemical contamination of largest raw water source	0.1	1	2.02	2.02	NA	0.33	4.36	2.02	2.35
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 11/11/20
Checked by: LCT 11/19/20

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

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

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

Table B-7b
Donalsonville 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]	4.36	0.41	0.27	0.14	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	4.03	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)	2.35	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	4.03	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	2.35	0.41	0.27	0.14	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.35	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 11/11/20
Checked by: LCT 11/19/20

Table B-7c

Donalsonville Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)		Max 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	2.02	2.02	NA	0.33	4.36	0.00	4.36
	A2. Critical asset failure at largest WTP[2]	0.1	30	2.02	2.02	NA	NA	4.03	0.00	4.03
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	2.02	2.02	NA	0.33	4.36	2.02	2.35
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	2.02	2.02	NA	NA	4.03	0.00	4.03
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	2.02	2.02	NA	0.33	4.36	2.02	2.35
	D2. Chemical contamination of largest raw water source	0.1	1	2.02	2.02	NA	0.33	4.36	2.02	2.35
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. Both WTPs have backup generators able to supply full treatment capacity, rendering no capacity loss.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

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

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

Table B-7d
Donalsonville 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]	4.36	0.27	0.17	0.09	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	4.03	0.27	0.17	0.09	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.35	0.27	0.17	0.09	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	4.03	0.27	0.17	0.09	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	2.35	0.27	0.17	0.09	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.35	0.27	0.17	0.09	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 11/11/20
Checked by: LCT 11/19/20

Table B-8a

Lee County Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)					Max 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 103	WTP Well 108	WTP Well 109	WTP All Others[3]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.22	1.22	1.22	0.79	2.45	NA	0.92	7.84	1.22	6.61
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.22	1.22	1.22	0.79	2.45	NA	NA	6.91	0.00	6.91
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.22	1.22	1.22	0.79	2.45	NA	0.92	7.84	1.22	6.61
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.22	1.22	1.22	0.79	2.45	NA	NA	6.91	0.00	6.91
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.22	1.22	1.22	0.79	2.45	NA	0.92	7.84	1.22	6.61
	D2. Chemical contamination of largest raw water source	0.1	1	1.22	1.22	1.22	0.79	2.45	NA	0.92	7.84	1.22	6.61
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable											
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable											
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable											
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable											

Notes:

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

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 WTPs have backup generators.
2. Backup equipment is available, rendering no capacity loss.
3. Lee County has 10 wells, so all but the largest four wells are summarized in one column.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

Table B-8b
Lee County 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]	6.61	1.37	0.89	0.48	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	6.91	1.37	0.89	0.48	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	6.61	1.37	0.89	0.48	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	6.91	1.37	0.89	0.48	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	6.61	1.37	0.89	0.48	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	6.61	1.37	0.89	0.48	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 11/11/20
Checked by: LCT 11/19/20

Table B-8c

Lee County Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)					Max 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 103	WTP Well 108	WTP Well 109	WTP All Others[3]					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.22	1.22	1.22	0.79	2.45	NA	0.92	7.84	1.22	6.61
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.22	1.22	1.22	0.79	2.45	NA	NA	6.91	0.00	6.91
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.22	1.22	1.22	0.79	2.45	NA	0.92	7.84	1.22	6.61
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.22	1.22	1.22	0.79	2.45	NA	NA	6.91	0.00	6.91
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.22	1.22	1.22	0.79	2.45	NA	0.92	7.84	1.22	6.61
	D2. Chemical contamination of largest raw water source	0.1	1	1.22	1.22	1.22	0.79	2.45	NA	0.92	7.84	1.22	6.61
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable											
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable											
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable											
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable											

Notes:

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 WTPs have backup generators.
2. Backup equipment is available, rendering no capacity loss.
3. Lee County has 10 wells, so all but the largest four wells are summarized in one column.
4. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

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

Table B-8d

Lee County 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]	6.61	2.44	1.59	0.86	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	6.91	2.44	1.59	0.86	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	6.61	2.44	1.59	0.86	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	6.91	2.44	1.59	0.86	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	6.61	2.44	1.59	0.86	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	6.61	2.44	1.59	0.86	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 11/11/20
Checked by: LCT 11/19/20

Table B-9a

Moultrie 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 105	WTP Well 106	WTP Well 107	Max 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	1.52	1.56	1.17	2.88	1.54	1.43	NA	1.01	11.11	2.88	8.23
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.52	1.56	1.17	2.88	1.54	1.43	NA	NA	10.10	0.00	10.10
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.52	1.56	1.17	2.88	1.54	1.43	NA	1.01	11.11	2.88	8.23
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.52	1.56	1.17	2.88	1.54	1.43	NA	NA	10.10	0.00	10.10
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.52	1.56	1.17	2.88	1.54	1.43	NA	1.01	11.11	2.88	8.23
	D2. Chemical contamination of largest raw water source	0.1	1	1.52	1.56	1.17	2.88	1.54	1.43	NA	1.01	11.11	2.88	8.23
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. WTPs 101 and 102 have a shared backup generators, but neither WTP is the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

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

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

Table B-9b
Moultrie 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]	8.23	2.50	1.63	0.88	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	10.10	2.50	1.63	0.88	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	8.23	2.50	1.63	0.88	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	10.10	2.50	1.63	0.88	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	8.23	2.50	1.63	0.88	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	8.23	2.50	1.63	0.88	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 11/11/20
Checked by: LCT 11/19/20

Table B-9c

Moultrie Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)						Max 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	WTP Well 103	WTP Well 105	WTP Well 106	WTP Well 107					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	1.52	1.56	1.17	2.88	1.54	1.43	NA	1.01	11.11	2.88	8.23
	A2. Critical asset failure at largest WTP[2]	0.1	30	1.52	1.56	1.17	2.88	1.54	1.43	NA	NA	10.10	0.00	10.10
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	1.52	1.56	1.17	2.88	1.54	1.43	NA	1.01	11.11	2.88	8.23
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	1.52	1.56	1.17	2.88	1.54	1.43	NA	NA	10.10	0.00	10.10
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	1.52	1.56	1.17	2.88	1.54	1.43	NA	1.01	11.11	2.88	8.23
	D2. Chemical contamination of largest raw water source	0.1	1	1.52	1.56	1.17	2.88	1.54	1.43	NA	1.01	11.11	2.88	8.23
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. WTPs 101 and 102 have a shared backup generators, but neither WTP is the largest WTP.
2. Backup equipment is available, rendering no capacity loss.
3. Scenarios A1 and B include treated water storage; Scenarios D1 and D2 include raw (non-reservoir) and treated water storage.

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

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

Table B-9d
Moultrie 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]	8.23	2.20	1.40	0.80	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	10.10	2.20	1.40	0.80	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	8.23	2.20	1.40	0.80	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	10.10	2.20	1.40	0.80	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	8.23	2.20	1.40	0.80	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	8.23	2.20	1.40	0.80	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

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

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

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

Table B-10a
Pelham Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 101	WTP Well 102	WTP Well 103	Max 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	0.98	0.97	0.98	NA	0.48	3.41	0.98	2.43
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.98	0.97	0.98	NA	NA	2.93	0.00	2.93
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.98	0.97	0.98	NA	0.48	3.41	0.98	2.43
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.98	0.97	0.98	NA	NA	2.93	0.00	2.93
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.98	0.97	0.98	NA	0.48	3.41	0.98	2.43
	D2. Chemical contamination of largest raw water source	0.1	1	0.98	0.97	0.98	NA	0.48	3.41	0.98	2.43
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable									
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable									

Notes:

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, but the others do not. It was assumed that one of the other two WTPs would lose full 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

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

Table B-10b
Pelham 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]	2.43	0.70	0.46	0.25	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.93	0.70	0.46	0.25	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.43	0.70	0.46	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	2.93	0.70	0.46	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	2.43	0.70	0.46	0.25	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.43	0.70	0.46	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 11/11/20
Checked by: LCT 11/19/20

Table B-10c

Pelham Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Max 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	WTP Well 103					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	0.98	0.97	0.98	NA	0.48	3.41	0.98	2.43
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.98	0.97	0.98	NA	NA	2.93	0.00	2.93
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.98	0.97	0.98	NA	0.48	3.41	0.98	2.43
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.98	0.97	0.98	NA	NA	2.93	0.00	2.93
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.98	0.97	0.98	NA	0.48	3.41	0.98	2.43
	D2. Chemical contamination of largest raw water source	0.1	1	0.98	0.97	0.98	NA	0.48	3.41	0.98	2.43
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable									
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable									
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable									

Notes:

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, but the others do not. It was assumed that one of the other two WTPs would lose full 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

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

Table B-10d
Pelham Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	2.43	0.84	0.55	0.30	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	2.93	0.84	0.55	0.30	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	2.43	0.84	0.55	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	2.93	0.84	0.55	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	2.43	0.84	0.55	0.30	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	2.43	0.84	0.55	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 11/11/20
Checked by: LCT 11/19/20

Table B-11a

Sylvester 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	Max 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	1.08	1.80	2.59	NA	0.81	7.00	2.59	4.41
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.72	1.08	1.80	2.59	NA	NA	6.19	0.00	6.19
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.72	1.08	1.80	2.59	NA	0.81	7.00	2.59	4.41
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.72	1.08	1.80	2.59	NA	NA	6.19	0.00	6.19
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.72	1.08	1.80	2.59	NA	0.81	7.00	2.59	4.41
	D2. Chemical contamination of largest raw water source	0.1	1	0.72	1.08	1.80	2.59	NA	0.81	7.00	2.59	4.41
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:

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 WTPs have backup generators.
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 11/11/20
Checked by: LCT 11/19/20

Table B-11b

Sylvester Deficits: 2015

Risk	Scenario	Available Water Supply (MGD)	2015 - Immediate Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	4.41	0.83	0.54	0.29	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	6.19	0.83	0.54	0.29	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	4.41	0.83	0.54	0.29	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	6.19	0.83	0.54	0.29	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.41	0.83	0.54	0.29	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.41	0.83	0.54	0.29	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	Not Applicable						
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought	Not Applicable						

Notes:

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

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

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

Table B-11c
Sylvester Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD) WTP Well 101	WTP Well 102	WTP Well 103	WTP Well 104	Max 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	1.08	1.80	2.59	NA	0.81	7.00	2.59	4.41
	A2. Critical asset failure at largest WTP[2]	0.1	30	0.72	1.08	1.80	2.59	NA	NA	6.19	0.00	6.19
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	0.72	1.08	1.80	2.59	NA	0.81	7.00	2.59	4.41
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	0.72	1.08	1.80	2.59	NA	NA	6.19	0.00	6.19
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	0.72	1.08	1.80	2.59	NA	0.81	7.00	2.59	4.41
	D2. Chemical contamination of largest raw water source	0.1	1	0.72	1.08	1.80	2.59	NA	0.81	7.00	2.59	4.41
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:

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 WTPs have backup generators.
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 11/11/20
Checked by: LCT 11/19/20

Table B-11d
Sylvester 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]	4.41	0.58	0.38	0.20	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	6.19	0.58	0.38	0.20	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	4.41	0.58	0.38	0.20	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	6.19	0.58	0.38	0.20	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	4.41	0.58	0.38	0.20	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	4.41	0.58	0.38	0.20	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--				Not Applicable			
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment				Not Applicable			
H. Water supply reduction due to drought	Raw water supply available is 40% of ADD due to drought				Not Applicable			

Notes:

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

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

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

Table B-12a

Thomasville Emergency Scenario Evaluation: 2015

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD)			Max Possible Purchased Water (MGD)	Water Storage (MGD)[4]	Total Possible Water Supply (MGD)	Capacity Loss (MGD)	Available Water Supply (MGD)
				WTP 101[(3)]	WTP Well 107	WTP Well 108					
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	0.5	1	8.60	4.60	2.30	NA	1.98	17.48	4.60	12.88
	A2. Critical asset failure at largest WTP[2]	0.1	30	8.60	4.60	2.30	NA	NA	15.50	0.00	15.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	8.60	4.60	2.30	NA	1.98	17.48	8.60	8.88
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	8.60	4.60	2.30	NA	NA	15.50	0.00	15.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	8.60	4.60	2.30	NA	1.98	17.48	8.60	8.88
	D2. Chemical contamination of largest raw water source	0.1	1	8.60	4.60	2.30	NA	1.98	17.48	8.60	8.88
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 11/11/20
Checked by: LCT 11/19/20

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

1. All WTPs have backup generators, but at WTP 101, the largest, the backup generator can only provide 4 MGD capacity.
2. Backup equipment is available, rendering no capacity loss.
3. WTP 101 has five operating wells and one emergency well.
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-12b
Thomasville 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]	12.88	4.64	3.02	1.62	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	15.50	4.64	3.02	1.62	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	8.88	4.64	3.02	1.62	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	15.50	4.64	3.02	1.62	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	8.88	4.64	3.02	1.62	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	8.88	4.64	3.02	1.62	0.00	0.00	0.00
E. Full unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
F. Limited or reduced unavailability of major raw water sources due to federal or state government actions	--	Not Applicable						
G. Failure of an existing dam that impounds a raw water source	Dam failure for largest impoundment	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 11/11/20
Checked by: LCT 11/19/20

Table B-12c
Thomasville Emergency Scenario Evaluation: 2050

Risk	Scenario	Relative Liklihood	Duration (Days)	Peak Day Design Capacity (MGD): WTP 301[(3)]	Peak Day Design Capacity (MGD): WTP Well 307	Peak Day Design Capacity (MGD): WTP Well 308	Max 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	8.60	4.60	2.30	NA	1.98	17.48	4.60	12.88
	A2. Critical asset failure at largest WTP[2]	0.1	30	8.60	4.60	2.30	NA	NA	15.50	0.00	15.50
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	0.1	1	8.60	4.60	2.30	NA	1.98	17.48	8.60	8.88
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	1	3	8.60	4.60	2.30	NA	NA	15.50	0.00	15.50
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	0.5	1	8.60	4.60	2.30	NA	1.98	17.48	8.60	8.88
	D2. Chemical contamination of largest raw water source	0.1	1	8.60	4.60	2.30	NA	1.98	17.48	8.60	8.88
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 11/11/20
Checked by: LCT 11/19/20

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

1. All WTPs have backup generators, but at WTP 301, the largest, the backup generator can only provide 4 MGD capacity.
2. Backup equipment is available, rendering no capacity loss.
3. WTP 101 has five operating wells and one emergency well.
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-12d
Thomasville Deficits: 2050

Risk	Scenario	Available Water Supply (MGD)	2050 - Long-Range Reliability Target			Total Demand Deficit (MGD)	65% ADD Deficit (MGD)	35% ADD Deficit (MGD)
			Total Demand (MGD)[1]	65% ADD (MGD)	35% ADD (MGD)			
A. Failure of largest water treatment facility	A1. Power supply failure of largest WTP[1]	12.88	4.23	2.75	1.48	0.00	0.00	0.00
	A2. Critical asset failure at largest WTP[2]	15.50	4.23	2.75	1.48	0.00	0.00	0.00
B. Short-term catastrophic failure of a water distribution system	Critical asset failure (transmission main)	8.88	4.23	2.75	1.48	0.00	0.00	0.00
C. Short-term contamination of a water supply within distribution system	Contamination of distribution system triggers issuance of boil water notice	15.50	4.23	2.75	1.48	0.00	0.00	0.00
D. Short-term contamination of a raw water source	D1. Biological contamination of largest raw water source	8.88	4.23	2.75	1.48	0.00	0.00	0.00
	D2. Chemical contamination of largest raw water source	8.88	4.23	2.75	1.48	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 11/11/20
Checked by: LCT 11/19/20

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. Two interconnection projects improved rank and two maintained rank
    b. Generator projects worsened rank by one or two ranks
    c. Interpretation: it is expected that interconnection projects improved or maintained 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. Three interconnection projects improved rank and one maintained rank
    b. Generator projects worsened rank by one or two ranks
    c. Interpretation: it is expected that interconnection projects improved or maintained 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. Three interconnection projects improved rank and one maintained rank
    b. Generator projects worsened rank by two ranks
    c. Interpretation: it is expected that interconnection projects improved or maintained 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. Two interconnection projects maintained rank and two worsened rank
    b. Five generator projects improved rank by two ranks and one worsened rank by six ranks
    c. Interpretation: a clear pattern does not emerge with this weighting adjustment, although higher priority is generally given to generator projects. This criterion is especially project-specific rather than the weighting adjustment improving or worsening projects by project type.
5. Cost ($) weight = 3; all other criteria weights = 1
    a. One interconnection project improved rank by four ranks and three maintained rank
    b. Two generator projects maintained rank and four worsened rank by one rank

   c. Interpretation: a clear pattern does not emerge with this weighting adjustment. Upon closer inspection, the high-range Albany-Lee County interconnection project improved rank by four places, worsening the rank of four generator projects.

6. Potential Environmental Impacts weight = 3; all other criteria weights = 1
   a. Three interconnection projects maintained rank and one worsened rank by two ranks
   b. Two generator projects improved rank by one rank and four maintained rank
   c. Interpretation: there is an overall minor effect on rank order with this weighting adjustment, although higher priority is generally given to generator projects.
7. Potential System and Community Impacts weight = 3; all other criteria weights = 1
   a. Interconnection projects maintained rank
   b. Generator projects maintained rank
   c. Interpretation: this weighting adjustment had no effect on rank order.
8. Excess Capacity Index weight = 3; all other criteria weights = 1
   a. Two interconnection projects improved rank and two maintained rank
   b. Generator projects worsened rank by one rank
   c. Interpretation: higher priority is generally given to interconnection projects, which is driven by two Albany-Lee County interconnection projects. Albany has lower excess capacity relative to other QWS, so this weighting adjustment improves the rank of two Albany-Lee County interconnection projects and worsens the rank of generator projects.

The sensitivity analysis results demonstrate that each criterion is generally insensitive to weighting. Because interconnection projects are ranked higher based on higher Criterion 1, 2, and 3 weights, retaining initial assigned weights of 1, 3, and 1, respectively, is appropriate. Criterion 4 through 8 weighting adjustments had minor effects on rank order, and therefore retaining their initial assigned weights is appropriate.