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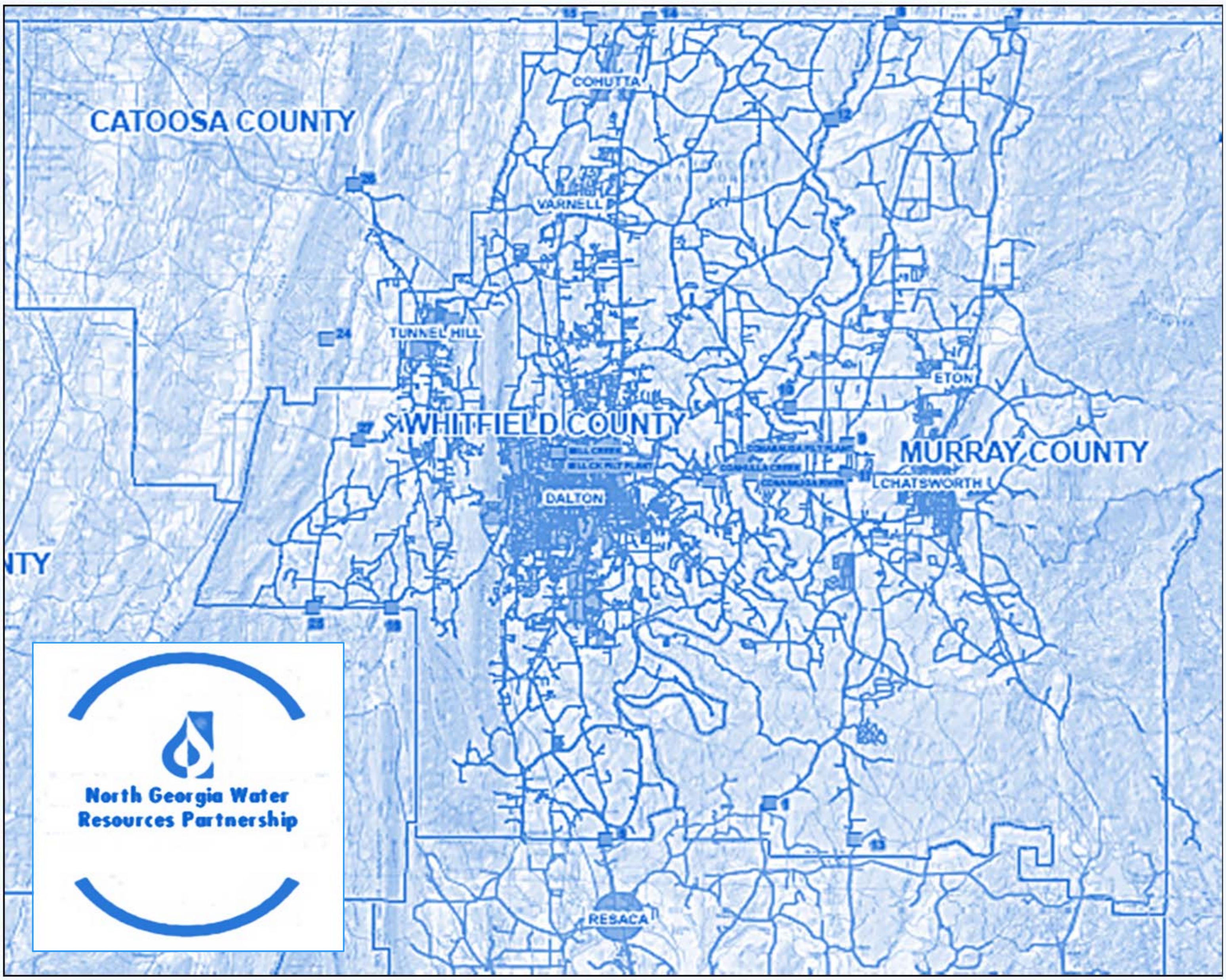
Redundancy and Emergency Interconnectivity Plan for the Coosa North Georgia Water Planning Region

North Georgia Water Resources Partnership &
Coosa North Georgia Regional Planning Council

Submitted to
Northwest Georgia Regional Commission

September 2017



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Section 1 Introduction

This Redundancy and Emergency Interconnectivity Plan (REI Plan) was commissioned by the North Georgia Water Resources Partnership (Partnership) to evaluate the current status of emergency water supply via municipal water interconnections, and the reliability and redundancy of emergency supply for the Coosa North Georgia Region (Figure 1). This project is a continuation of an Interconnection Study completed in 2015. Both studies were modeled on a similar study conducted by Jacobs and a team of consultants for the Metro North Georgia Water Planning District (District). The District study was financed and managed by the Georgia Environmental Finance Authority (GEFA) and was in response to the Water System Interconnection, Redundancy and Reliability Act of 2010.

The Partnership, through the contracting services of the Northwest Georgia Regional Commission (RC) contracted with the Jacobs-AMEC Foster Wheeler team to evaluate the potential and feasibility for emergency supply through municipal water interconnections and to complete a Redundancy and Emergency Interconnectivity Plan.

The Partnership, established in 2003, has been a leader in proactive regional water-based planning, technical assistance and education, and contributing to sound decisions on water policy. Since 2008, the Partnership has been highly active in state and regional water planning. In 2011, the Coosa North Georgia Regional Water Planning Council (Council) voted to establish the Partnership as a Technical Advisory Group to the Council. As the “technical arm” of the Council, the Partnership often staffs working committees, makes technical recommendations, and generally serves as the day-to-day implementers of much of the Regional Water Plan. The Council and the Partnership have most recently successfully collaborated to complete the 5-year Review and Revision of the *Coosa North Georgia Regional Water Plan*, adopted by Georgia EPD in June 2017.

As part of their ongoing efforts to implement management practices from the Coosa North Georgia Regional Water Plan, the Partnership, working with the Council, has applied for several Regional Water Plan Seed Grants. These grants are comprised of funding made available by Gerogia EPD through state appropriation, specifically for regional water plan implementation. The Partnership has received a total of $225,000 in funding to conduct several studies in support of plan implementation. Two studies were completed in 2015: Water Transmission Grid Study, and the Emergency Redundancy and Interconnectivity Study (Phase I). This first phase to study interconnectivity in the region focused on an area comprising four water systems: Chatsworth, Dalton, Rome, and Calhoun. This focus area was initially selected due to the high levels of existing interconnections, the known availability of Geographic Information System (GIS) data, and its centralized location. This initial study facilitated the development of a plan and protocol that was efficiently replicated to the remainder of the Coosa North Georgia Region.

This REI Plan continues the efforts of the Phase I Interconnectivity Study, and incorporates the results of the initial focus area into an overall study and plan for the entire region. This regional plan of interconnections is an important tool for future rounds of Regional Water Planning.

This report is divided into six sections:

Section 1: Introduction
Section 2: Data Collection and Analysis
Section 3: Existing Systems and Interconnections
Section 4: Reliability Targets for Redundancy and Emergency Interconnections
Section 5: Emergency Interconnection Plan for the Focus Area
Section 6: Recommendations

This report also has 18 Appendices: Interconnection and Emergency Scenario Tables, one for each County in the region. Each Appendix contains sections on existing interconnections, proposed interconnections, system summary and supporting risk information sub-tables.

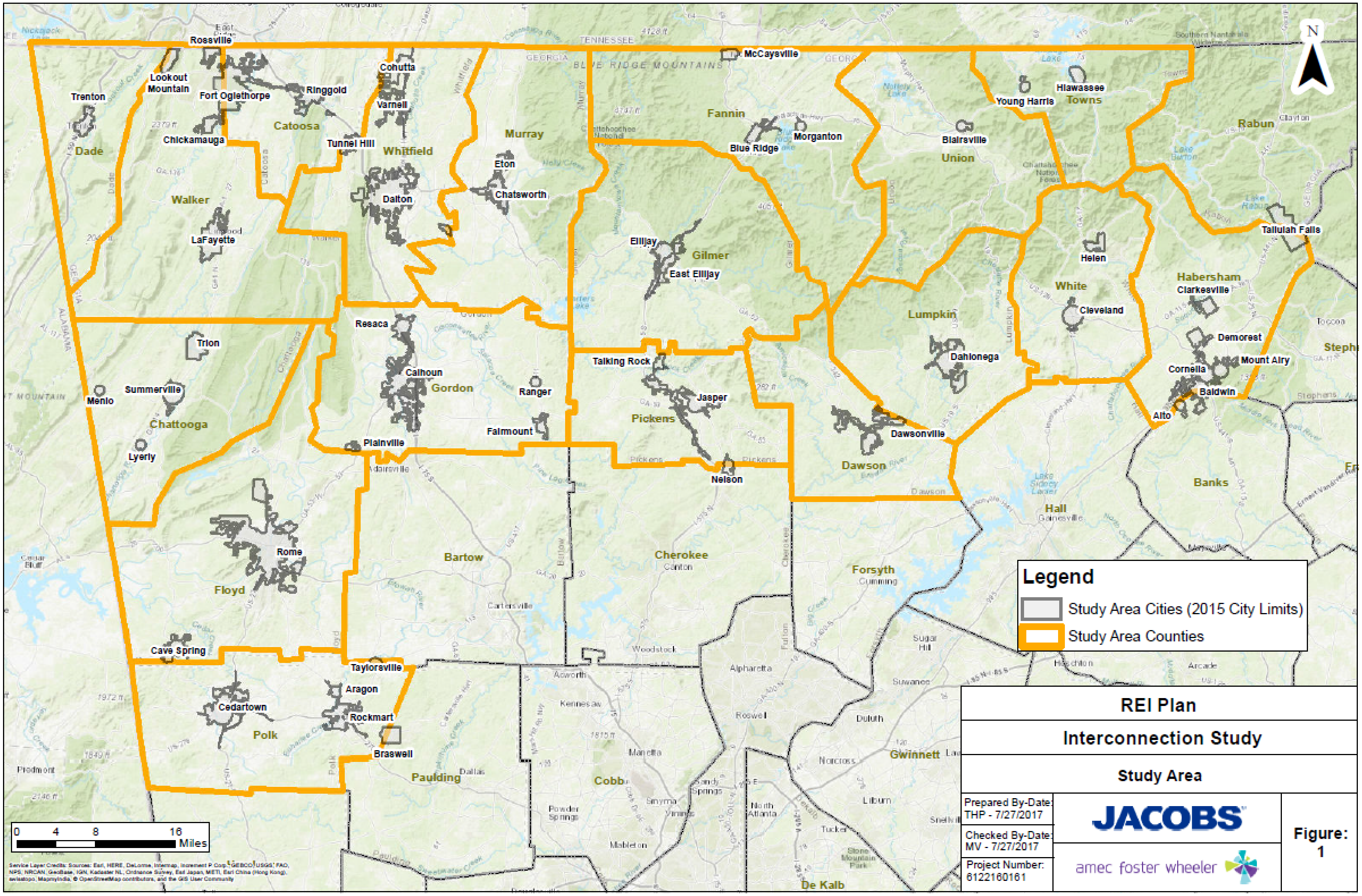

Figure 1: Interconnection Study Area

Section 2 Data Collection and Analysis

The Study required up front data collection and analysis to determine the existing service areas and characteristics of the distribution systems operating in the 18 counties comprising the Coosa North Georgia Region. Water demand and supply information was also collected and compiled.

Each of the major distribution systems was asked to provide mapping data and critical information regarding existing distribution systems in their service area including:

- Transmission mains
- Interconnections
- Water treatment plant locations
- Raw water intake locations
- Distribution system tank locations
- Pressure zone boundaries and hydraulic grades
- Planned capital improvements that affect interconnection/transmission capacity

Partnership systems submitted mapping data and information of varying detail in various formats. There were many participants with varying levels of data quality ranging from nonexistent to high quality complete digital data. Paper maps were often the only record of line locations and pipe sizes. In some cases CAD files were available which were good for location, but data about pipe sizes were not included. In the best cases fully attributed and documented GIS data were available. The four Phase I systems submitted substantial digital mapping data (GIS data); however, the digital mapping data provided for the region as a whole was more fragmentary. Some participants declined to share any data whatsoever.

Existing service areas for major distribution systems were delineated using data submitted by Partnership systems for this study and applicable GIS data from previous studies. Boundaries of the public water service areas are shown in Figure 2. In the cases where data were nonexistent assumptions about service areas were made or maps were provided to the participants for them to sketch out their service areas.

Planned capital improvements to be considered for this study were not identified by any of the systems, with one exception. Etowah Water & Sewer Authority indicated that Russell Creek Reservoir is a future raw water source currently being permitted. Some capital improvement projects in progress or under construction were discovered through internet research, and were included where noted.

Additional collected water system data included water demand and supply, permitted surface water and groundwater withdrawals, water purchases, and capacity of water treatment plants.

The Coosa-North Georgia Regional Water Plan was the primary source of the water demand and supply information. The Phase I study referenced data from the September 2011 version of the plan while this comprehensive REI study references data from the January 2017 update. A list of primary sources is presented in Table 1.

Table 1: Water System Data and Sources

Data	Source
Current and Future Demand	• Coosa-North Georgia Regional Water Plan
Surface Water Withdrawals	• List of Georgia EPD Non-Farm Surface Water Withdrawal Permits (Revised July 2016)
Groundwater Withdrawals	• List of Georgia EPD Non-Farm Groundwater Withdrawal Permits (Revised July 2016)
Public Water Systems	• Georgia EPD Public Drinking Water System List Current as of January 2016
Self-Supplied Water	• "Water Use in Georgia, 2010" published by USGS
Water purchases and existing interconnections	• Coosa-North Georgia Supplemental Document: Comparison of Water and Wastewater Forecasts to Existing Permits and Planned Projects, September 30, 2010 • EPA's Safe Drinking Water Information System (SDWIS) at http://gadrinkingwater.net/
General supplemental information	• EPA's Safe Drinking Water Information System (SDWIS) at http://gadrinkingwater.net/ • Water quality reports i.e. Consumer Confidence Reports (CCR) • Water system websites such as the one for Notla Water Authority at http://www.notlawaterauthority.org • Information provided by and interviews with water system managers, plant superintendents and other staff • "Public Water-Supply Systems and Associated Water Use in Tennessee, 2005"

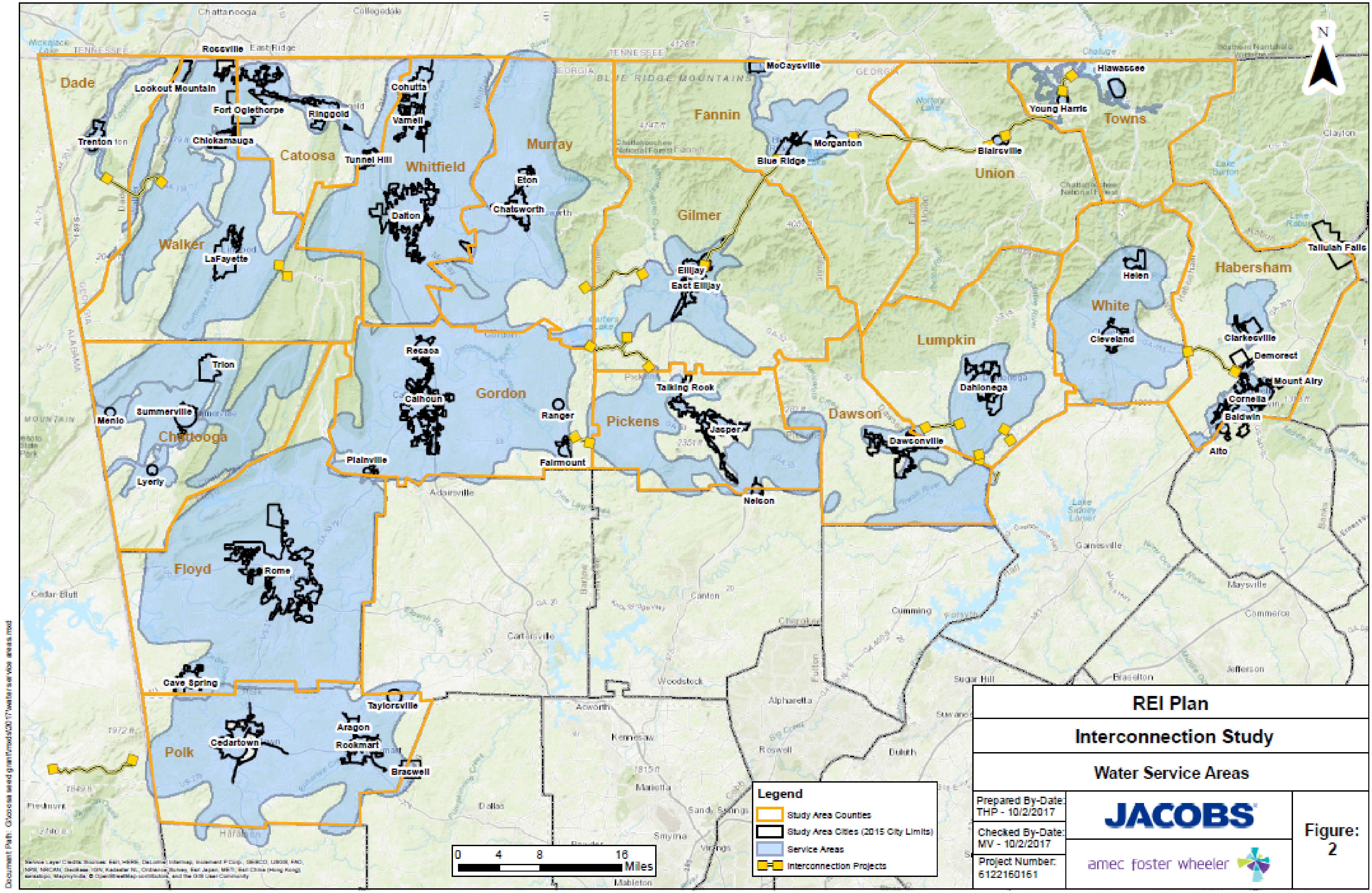

Figure 2: Water Service Areas

Section 3 Existing Systems and Study Area Interconnections

3.1 Existing Systems

A water system map for the region was developed using the collected background data and information collected from the Partnership. The map is the basis for subsequent analyses, including the interconnection plan. The water system map includes:

- Municipal boundaries
- Major city identifiers
- Available water system data, such as treatment plant locations, transmission mains, raw water sources, and interconnection locations.

The interconnection study area water system maps are shown in Figure 3-5. GIS data for actual water systems service areas (i.e., pipes in the ground) was not uniformly available across the region. Sources for the data included here were: GIS data (where available), maps of service areas from comprehensive plans for all counties, and updated city limits areas for communities that had municipal supply. In some cases, we also mapped general estimates of service areas, incorporating comments received from the Partnership and/or water system staff. This map includes most municipally supplied areas, although some areas are generalized due to data constraints.

3.2 Evaluating Existing Systems and Interconnections in Each County

To complete the REI Plan, we analyzed systems in all 18 counties. The overall region has nearly 250 permitted public water systems, many of which serve small populations and are very small in permitted withdrawal amounts. For the purposes of this study, we analyzed at least two water systems per county, except in Dade and Whitfield counties where one only water system serves the entire county. The criteria for systems which were included were: the largest capacity systems, any systems directly connected with those larger systems, any water systems of comparable size, and others as feasible and appropriate.

The connected systems in each County are analyzed collectively as a group. Intracounty connections among water systems are not shown on maps in this study, since the location of said connections was largely excluded from the data submitted by the water systems in the Region. For example, in Dawson County, the City of Dawsonville purchases water from Etowah Water & Sewer Authority; therefore adequate connections are assumed to exist but are not shown on the map. Similarly, the City of Rome and Floyd County both operate water systems in Floyd County. The City of Rome is surrounded by the Floyd County water service area; adequate connections between Rome and Floyd County were assumed to exist but are not shown. Following is a county by county description of the systems analyzed for each county and the information which supports the assumption that the systems can be analyzed collectively. The source for these data is Georgia EPD's Drinking Water database, including EPD's naming conventions and abbreviations as recorded on drinking water permits. These may have some slight variations from other referenced sources.

3.2.1 System Specific Considerations

Catoosa County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
CATOOSA	GA0470000	CATOOSA UTIL. DIST. AUTHORITY	Local/Municipal	50677	Surface Water Purchase
CATOOSA	GA0470001	FORT OGLETHORPE	Local/Municipal	9446	Surface Water Purchase
CATOOSA	GA0470002	RINGGOLD	Local/Municipal	2743	Surface Water

Catoosa Utility District Authority (CUDA), Fort Oglethorpe and City of Ringgold operate water systems in Catoosa County. These three systems serve all of Catoosa County with the exception of self-supplied private wells, and a small portion served by the City of Lafayette. CUDA withdraws groundwater from Yates Spring and Ringgold withdraws surface water from South Chickamauga Creek. Fort Oglethorpe does not have any raw water sources and purchases surface water exclusively from Tennessee American Water Company (TAWC).

CUDA has purchased water from multiple water systems historically, including Ringgold and Fort Oglethorpe. Ringgold and Fort Oglethorpe have also purchased from CUDA, therefore known interconnections exist amongst the three systems to analyze them as a group.

According to the CUDA Water Quality report, "On occasions such as extremely high demand, drought, or emergencies, CUDA purchases water from Tennessee American Water Company (TAWC) and Eastside Utility District (EUD)." The total purchase from Tennessee is 1.8 MGD as presented in the Coosa-North Georgia Regional Water Plan Supplemental Document: Comparison of Water and Wastewater Forecasts to Existing Permits and Planned Projects, page 4. With no further information, it was assumed that Fort Oglethorpe purchases 0.8 MGD from TAWC, and CUDA purchases 0.5 MGD from TAWC and 0.5 MGD from EUD.

There are nine known interconnections among water systems in Catoosa County and systems in adjacent Georgia counties and Tennessee, although not all are currently in use. Bids have been accepted for construction of the CUDA and EUD Water System Connection which is a 24-inch pipe connecting the two systems. No new interconnections were proposed for Catoosa County.

Chattooga County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
CHATTOOGA	GA0550000	CHATTOOGA COUNTY	Local/Municipal	7306	Ground Water
CHATTOOGA	GA0550001	LYERLY	Local/Municipal	1360	Surface Water Purchase
CHATTOOGA	GA0550003	SUMMERVILLE	Local/Municipal	11651	Surface Water

Five municipal water systems and one private water system serve Chattooga County. The two largest systems are Chattooga County Water District and Summerville. Chattooga County Water District withdraws groundwater from seven active wells. To supplement the groundwater supply, Chattooga County Water District can purchase from Town of Lyerly, City of Summerville and Fort Payne Water Works in Alabama. Summerville withdraws from Raccoon Creek and Lowe Spring, and can purchase water from Mount Vernon Mills. Mount Vernon Mills is a private community that withdraws groundwater from Regal Spring and is a wholesale seller of water. Lyerly currently purchases water from Chattooga County Water District and City of Summerville; therefore Lyerly was included in this analysis. Lyerly has also purchased from Northeast Alabama Water District. Sufficient interconnections exist amongst Chattooga County Water District, Summerville and Lyerly to analyze the systems together as a group.

Two municipal water systems were not included in this analysis, the City of Menlo and the Town of Trion. Menlo withdraws a monthly limit of 0.187 MGD of groundwater from one spring and one well. Their average usage is approximately 0.075 MGD. Menlo has purchased from Summerville in the past; however, the connection is now inactive. Trion purchases from Mount Vernon Mills and Summerville, and their average water usage is 0.05 MGD.

Dade County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
DADE	GA0830000	DADE COUNTY WATER & SEWER AUTHORITY	Local/Municipal	36400	Surface Water

Dade County Water & Sewer Authority (WSA) is the only municipal water system in Dade County. Dade County WSA has one treatment plant where water from Lookout Creek and the groundwater source are treated; the groundwater is treated as groundwater under the influence of surface water. Dade County WSA has an existing connection with TAWC of Tennessee that is used for emergency purposes only.

Dawson County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
DAWSON	GA0850007	ETOWAH WSA	Local/Municipal	13843	Surface Water

Etowah Water & Sewer Authority (EWSA) is the principal municipal water system in Dawson County. EWSA has existing connections with Cherokee County, Forsyth County, and Lumpkin County; however, emergency supply can only be provided by Forsyth County given the existing pipe configurations.

The City of Dawsonville operates a municipal water system in Dawson County that serves approximately 2400 people. Although Dawsonville has previously purchased water from Pickens County, presently Dawsonville's only active external connection is with EWSA. Dawsonville can withdraw a monthly average of 0.5 MGD of groundwater, and purchases approximately 0.054 MGD from EWSA. EWSA can provide complete redundancy for City of Dawsonville now and in long range projections.

Fannin County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
FANNIN	GA1110000	BLUE RIDGE	Local/Municipal	5506	Surface Water
FANNIN	GA1110001	MCCAYSVILLE	Local/Municipal	7020	Surface Water
FANNIN	GA1110003	MORGANTON	Local/Municipal	2060	Ground Water

The three major municipal water systems in Fannin County are City of Blue Ridge Water & Sewer, City of Morganton and City of McCaysville. Blue Ridge and McCaysville both have intakes on the Toccoa River and have sold water to each other in the past; Blue Ridge has purchased from McCaysville and vice versa. Morganton has historically purchased from Blue Ridge, and now has three groundwater wells which are presently their primary water source. Sufficient connections exist amongst the three systems to analyze the systems together as a group.

Floyd County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
FLOYD	GA1150001	FLOYD COUNTY	Local/Municipal	41738	Surface Water
FLOYD	GA1150002	ROME	Local/Municipal	45586	Surface Water

The City of Rome is entirely surrounded by the Floyd County water service area, therefore this study focused on interconnections between Floyd County and surrounding water systems. Adequate connections between the City of Rome and Floyd County were assumed to exist.

Two large water systems were not included in this analysis, City of Cave Spring and Berry College. Cave Spring is a municipal system serving a population of approximately 4180. The City of Cave Spring has a permitted maximum daily withdrawal of 1.5 MGD from Cave Spring. The Berry College water system is a private system serving a population of approximately 2200. Berry College has a permitted maximum daily withdrawal of 1.0 MGD from Berry Reservoir. There are no known connections between Cave Spring, Berry College and Floyd County or Rome.

Gilmer County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
GILMER	GA1230000	ELLIJAY GILMER CO. WATER & SEWERAGE AUTH.	Local/Municipal	13010	Surface Water
GILMER	GA1230004	WALNUT MOUNTAIN S/D POA	Private	1105	Surface Water Purchase

The only municipal water system in Gilmer County is the Ellijay-Gilmer County Water and Sewerage Authority (EGCWSA). Walnut Mountain is a private community that purchases water from EGCWSA; therefore, Walnut Mountain has also been included in the analysis of Gilmer County.

Potential interconnections for EGCWSA will require pipeline projects from an estimated 5 to 14 miles in length. Carters Lake lies within the shortest routes to connect EGCWSA to City of Chatsworth and City of Calhoun. Routes for the pipelines have been proposed; however, other alternatives should be considered for this sensitive area.

Gordon County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
GORDON	GA1290000	CALHOUN	Local/Municipal	49088	Surface Water
GORDON	GA1290021	TALKING ROCK CREEK PROPERTIES	Private	270	Surface Water Purchase

The only large municipal water system in Gordon County is the City of Calhoun. Talking Rock is a private community that purchases water from Calhoun; therefore, demand for the small population of Talking Rock has also been included in this study.

City of Fairmount operates a municipal water system in Gordon County and provides water to a population of 130. Fairmount purchases water exclusively from Pickens County Water Authority. There are no known connections between Fairmount Water System and the City of Calhoun; therefore, Fairmount is not included in the analysis for Gordon County.

Habersham County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
HABERSHAM	GA1370000	ALTO	Local/Municipal	2500	Ground Water
HABERSHAM	GA1370001	BALDWIN	Local/Municipal	4160	Surface Water
HABERSHAM	GA1370002	CLARKESVILLE	Local/Municipal	5785	Surface Water
HABERSHAM	GA1370003	CORNELIA	Local/Municipal	6130	Surface Water
HABERSHAM	GA1370004	DEMOREST	Local/Municipal	15130	Surface Water Purchase
HABERSHAM	GA1370005	MOUNT AIRY	Local/Municipal	1384	Ground Water

There are six municipal water systems in Habersham County. The City of Demorest purchases surface water from the City of Baldwin and the City of Clarksville, and has two active wells. The City of Cornelia has three surface water intakes and does not purchase water; however, there is an existing emergency connection between Cornelia and Baldwin. The Town of Alto has nine active wells and purchases water from Demorest. Clarkesville has one intake on Soque River and does not purchase water. Baldwin has one intake on the Chattahoochee River and is a wholesaler of water. The Town of Mount Airy purchases from Cornelia and Demorest, and has five active wells. Sufficient interconnections exist amongst the six systems to analyze the systems together as a group.

There are also existing interconnections between Habersham County water systems and water systems in neighboring counties. Demorest purchases water from City of Toccoa in Stephens County and Alto purchases water from Banks County. The quantity of purchased water from neighboring counties is unknown.

Lumpkin County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
LUMPKIN	GA1870000	DAHLONEGA	Local/Municipal	4120	Surface Water
LUMPKIN	GA1870043	LUMPKIN CO.- 400 WATER SYSTEM	Local/Municipal	834	Surface Water Purchase

The City of Dahlonega is the primary municipal water system in Lumpkin County. The demand included for this study included only the demand for City of Dahlonega and for Lumpkin County – 400 Water System whose primary source is surface water purchased from City of Dahlonega. The Lumpkin County – 400 Water System groundwater supply was not included in the Total Water Source Capacity, because the withdrawal amount is unknown and assumed to be small.

There are 12 small groundwater systems operated by Lumpkin County that are not included in this study. Combined, those system share a permit limit monthly average of 0.395 MGD of groundwater. Sufficient information is unavailable to determine the interconnectivity of those systems and connectivity to City of Dahlonega. Additionally, the self-supplied population of approximately 19,650 in Lumpkin County is the largest self-supply population in the Coosa region.

Murray County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
MURRAY	GA2130000	CHATSWORTH	Local/Municipal	29617	Surface Water

Chatsworth Water Works Commission is the only municipal water system in Murray County. There is one small privately owned system, and there are various small systems owned by the state or federal government.

Pickens County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
PICKENS	GA2270000	JASPER	Local/Municipal	9850	Surface Water
PICKENS	GA2270002	PICKENS COUNTY WATER AUTH.	Local/Municipal	6357	Surface Water Purchase
PICKENS	GA2270004	BIG CANOE SUBDIVISION	Private	6396	Surface Water

The City of Jasper and Pickens County Water Authority operate municipal water systems in Pickens County. The City of Jasper has one treatment plant which treats water sourced from an intake on Long Swamp Creek and from one well. The City of Jasper sells water to Pickens County Water Authority and purchases from Cherokee County Water and Sewerage Authority, if necessary. Pickens County Water Authority holds a groundwater permit for 0.4 MGD; however, their primary source of water is purchased surface water from Cherokee County Water and Sewerage Authority, City of Calhoun and City of Jasper.

Big Canoe Utilities, Inc. is a company that services a large private community of approximately 6400 residents living in Big Canoe. According to Big Canoe's 2015 Consumer Confidence Report (CCR), Big Canoe Utilities, Inc. can purchase water from Pickens County Water Authority, and Big Canoe and Pickens County Water Authority have signed an agreement to provide water to each other in case of emergency. Big Canoe was included in this study.

Bent Tree is another private community that operates a large water system that serves 2860 users. Bent Tree is not currently connected to other water systems in Pickens County. GIS data was unavailable for Bent Tree, Big Canoe, and City of Jasper; therefore no existing interconnections have been identified connecting those systems to any system other than Pickens County Water Authority. Outside of the County, the EWSA to the east in Dawson County would be the closest interconnection for Bent Tree and for Big Canoe.

Polk County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
POLK	GA2330000	CEDARTOWN	Local/Municipal	9750	Surface Water Purchase
POLK	GA2330001	POLK COUNTY WATER AUTHORITY	Local/Municipal	23325	Surface Water Purchase
POLK	GA2330002	ROCKMART	Local/Municipal	6500	Ground Water Under the Influence of Surface Water

There are three large municipal water systems in Polk County. Polk County Water Authority withdraws groundwater from four springs and has purchased water from Haralson County Water Authority. The City of Cedartown has two active wells and purchases from Polk County Water Authority. Rockmart withdraws groundwater from three wells. Rockmart holds a withdrawal permit for 2.0 MGD from Euharlee Creek; however the pump station is in disrepair and is too expensive to repair; therefore, the City plan does not intend to renew the permit. There is no known emergency connection between Rockmart and Polk County Water Authority; however, Rockmart was included because of the large population it serves.

The fourth water system in the county is the Polk County-Vinson Mountain Water system which serves an approximate population of 740. The system's water is purchased from Paulding County Water System. This system was not included in the Emergency Scenario analysis. Although the Polk County-Vinson Mountain Water system is administered by Polk County, it is not known to be connected to the separate Polk County Water Authority distribution system or any other water system in the Coosa region.

Towns County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
TOWNS	GA2810000	HIAWASSEE	Local/Municipal	5496	Surface Water
TOWNS	GA2810007	TOWNS COUNTY	Local/Municipal	9991	Surface Water Purchase

The three municipal water systems of significant size in Towns County are City of Hiawassee, Towns County Water and Sewerage Authority (WSA) and City of Young Harris. Hiawassee withdraws surface water from Lake Chatuge, and treats the water at the Rowe-Cannup WTP. Towns County WSA purchases finished water from City of Hiawassee, and does not hold any raw water withdrawal permits. During normal operations, the City of Hiawassee and Towns County WSA both depend on one water source, Lake Chatuge, and one treatment plant, Rowe-Canupp WTP.

According to the 2011-2021 Clay County (NC) Comprehensive Plan, an emergency interconnection 12-inch pipe was installed connecting Towns County WSA with Clay County Water and Sewer District (CCWSD) at McDonald Road in North Carolina, and the two systems entered into a water purchase agreement for Towns County WSA to purchase from CCWSD and vice versa during water supply emergencies. The CCWSD filter plant treats 0.4 MGD, and customers consume about half of the district's supply each day.

The third significant municipal system in Towns County is Young Harris. Young Harris withdraws from three active groundwater wells. Young Harris does not have emergency connections with any surrounding systems, and there are no plans to construct interconnections. The system does have an emergency plan.

Union County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
UNION	GA2910000	BLAIRSVILLE	Local/Municipal	4035	Surface Water
UNION	GA2910003	NOTLA WATER AUTHORITY	Local/Municipal	13465	Surface Water
UNION	GA2910006	COOSA WATER AUTHORITY	Local/Municipal	3944	Ground Water

There are three large municipal water systems in Union County: Notla Water Authority (NWA), City of Blairsville and Coosa Water Authority. The NWA has a surface water intake on Lake Nottley, and draws groundwater from six to eight wells. Notla Water Authority does not purchase any water. The City of Blairsville has a surface water intake on Nottley River, has four active wells, and does not purchase any water. Coosa Water Authority has four active wells and does not purchase any water. Blairsville has an emergency connection with NWA, but does not have an emergency connection with Coosa Water Authority.

Walker County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE

WALKER	GA2950002	LAFAYETTE	Local/Municipal	18177	Surface Water Purchase
WALKER	GA2950003	WALKER COUNTY WATER AUTHORITY	Local/Municipal	36000	Surface Water

The two largest municipal water systems in Walker County are Walker County Water & Sewerage Authority (WCWSA) and City of Lafayette. Lafayette has two springs and a well; however, their primary water source is water purchased from WCWSA and from CUDA. WCWSA and Lafayette are considered jointly for this study; however, system hydraulics currently prevent Lafayette from supplying water to WCWSA.

Two large systems in Walker County are not included in this analysis: City of Chickamauga and Walker County Rural Water and Sewer Authority (WSA), which service 4150 and 3270 users, respectively. Chickamauga has purchased water from WCWSA in the past, but they have one active groundwater well which is now their primary source. Chickamauga's estimated 2015 and 2050 demands are approximately 0.64 and 0.59 MGD, respectively, and their current groundwater permit is for 1.8 MGD. Chickamauga presently cannot supply WCWSA with water. Walker County Rural Water and Sewer Authority (WSA) withdraws groundwater from three wells, and purchases from Lafayette and CUDA as needed. Walker County Rural WSA does not purchase water from WCWSA. Walker County Rural WSA is in the Coosa River Basin while Walker County Water Authority is in the Tennessee River Basin. Walker County Rural WSA's estimated 2015 and 2050 demands are approximately 0.5 and 0.47 MGD, respectively, and their current groundwater permit is for 0.4 MGD. They should continue to maintain interconnectivity through connections with Lafayette and CUDA.

Existing interconnections 25 and 16 identified on the map link Dalton Utilities in Whitfield County with a distribution system in Walker County with infrastructure owned by WCWSA and water supplied by Dalton Utilities. This system is not connected to the greater WCWSA system or Lafayette.

White County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
WHITE	GA3110000	CLEVELAND WATERWORKS	Local/Municipal	3640	Surface Water Purchase
WHITE	GA3110001	HELEN	Local/Municipal	1851	Surface Water Purchase

WHITE	GA3110072	WHITE CO WATER & SEWERAGE AUTH	Local/Municipal	4420	Surface Water

Cleveland Water Works, City of Helen, and White County Water & Sewer Authority (WSA) operate public water systems in White County. Sufficient interconnections exist amongst the systems to analyze the systems together as a group. White County WSA operates the Turner Creek WTP. Helen purchases water from White County WSA and withdraws a monthly limit of 0.4 MGD of groundwater from six active wells. Cleveland Water Works purchases water from White County WSA and withdraws a monthly limit of 0.841 MGD of groundwater from four active wells.

Whitfield County

COUNTY	WSID	NAME	OWNER TYPE	POPULATION	WATER SOURCE
WHITFIELD	GA3130000	DALTON UTILITIES	Local/Municipal	99315	Surface Water

Dalton Utilities is the only municipal water system in Whitfield County, and is the largest water system in terms of population served in the Coosa Region.

3.3 Evaluating Interconnections in the Region

Interconnections considered for emergency supply for the purpose of this study are primarily connections between water systems in adjacent counties within the Region. Interconnections with water systems outside of the Coosa Region were also included for analysis, as data were available. Interconnections with bordering systems in the Metro District (such as Bartow County, Forsyth County and City of Gainesville) were evaluated. Interconnections with systems across the state line in Tennessee, North Carolina and Alabama were also considered. Existing interconnections are shown in Figures 5-5, 5-6, 5-7 in Section 5 and listed in the Existing Interconnections tables in the Appendices.

Spatial and attribute data for some existing interconnections was acquired during the data collection phase. When interconnections were not included in the data that was received, existing interconnections were assumed based on apparent overlaps in the transmission mains in the GIS data. Other interconnections were assumed based on information documenting prior purchases. Pipe attribute data associated with interconnections was often unavailable; where pipe diameters were unknown, it was assumed that the pipe diameters of transmission mains for connecting systems were equivalent to the known pipe diameters of the connected focus area system. If no information was available, a default pipe size of 6 inches was assumed.

Following the completion of the focus area map and identification of interconnections, the capacity of the existing interconnections within the focus area was evaluated using maximum pipe velocity criteria. The following maximum velocity criteria were used to determine the interconnection hydraulic capacities: 3 feet per second (fps) for pipe diameters greater than or equal to 16 inches and 5 fps for pipe diameters less than or equal to 12 inches. These velocity criteria are commonly used as guidance when calculating pipe flow capacity.

3.3.1 Limitations

Pressure criteria were not considered in the evaluation of existing and proposed interconnections. Information regarding hydraulic grade was not submitted by any of the systems; therefore, it was assumed that the hydraulic grades of two connected systems were compatible or could be made compatible through pumping. The Council may wish to develop a hydraulic model (or a series of independent models) to determine the effect of possible differences in hydraulic gradients between interconnected systems and verify that an open interconnection does not result in excessively low or high pressures that could potentially damage either connected system or present public safety (low-pressure) risks.

Water quality parameters were not considered in the evaluation of existing and proposed interconnections. The majority of water supply sources within the Region are surface water supplies; thus, the treatment technologies to produce potable water are assumed to be similar. Water systems sharing interconnections should discuss chemical and physical characteristics of their treated water to predict and possibly mitigate any issues that may arise from mixing their respective waters. Also, it was generally assumed that flow at emergency interconnections could be reversed, unless specific information showed otherwise. A reversal in water flow can re-suspend previously precipitated particles that have settled in pipes. Accumulated scale may also be pulled from the pipe as water flow is reversed when an interconnection is opened.

The availability of water or willingness of a utility system to provide water from interconnections identified as existing or proposed has not been investigated. Some water systems have intergovernmental agreements with neighboring systems; however, the existence of an agreement or verified surplus of water were not criteria for inclusion as an emergency supplier.

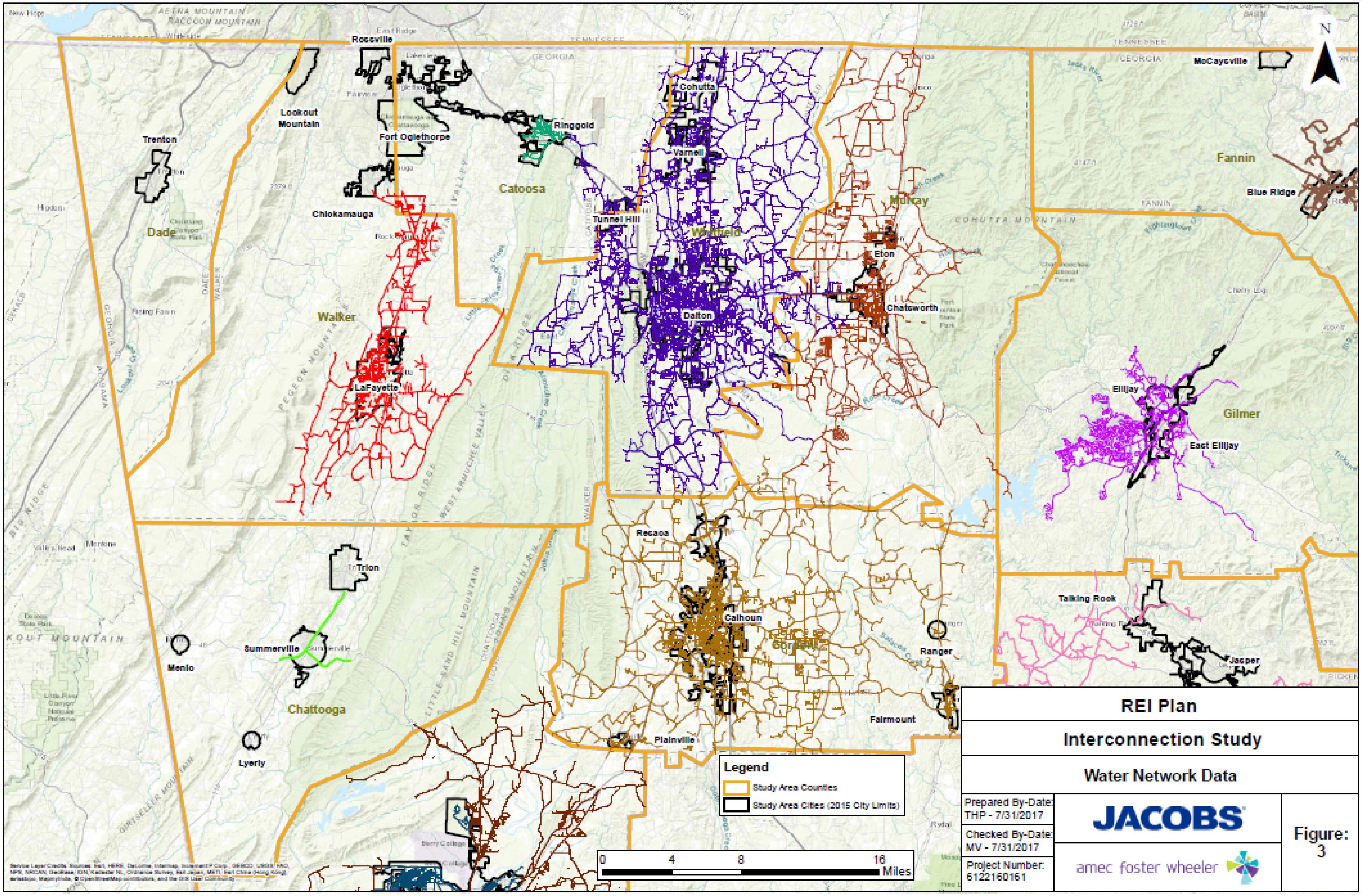

Figure 3: Water Network Data, Northwest Area

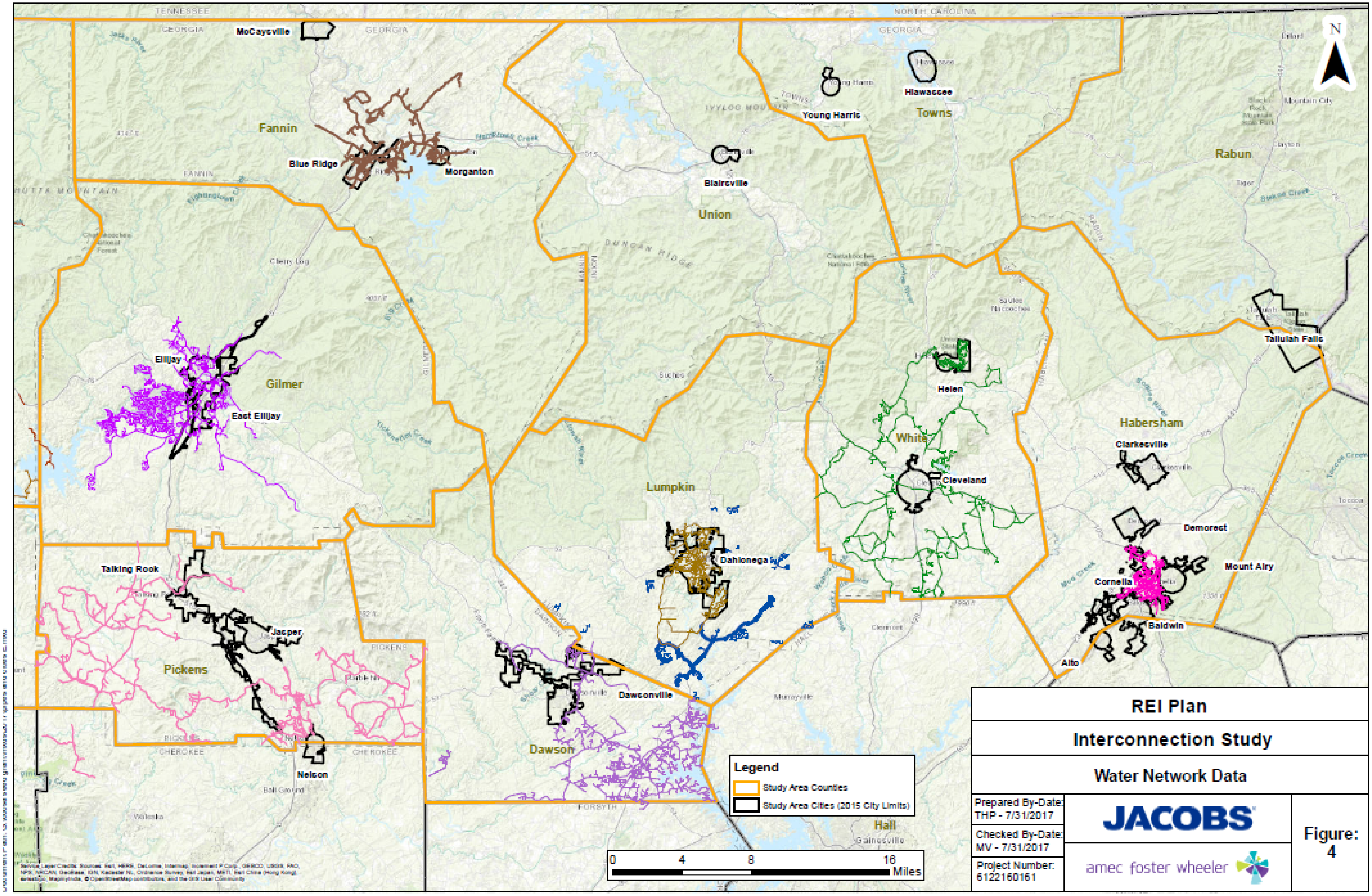

Figure 4: Water Network Data, East Area

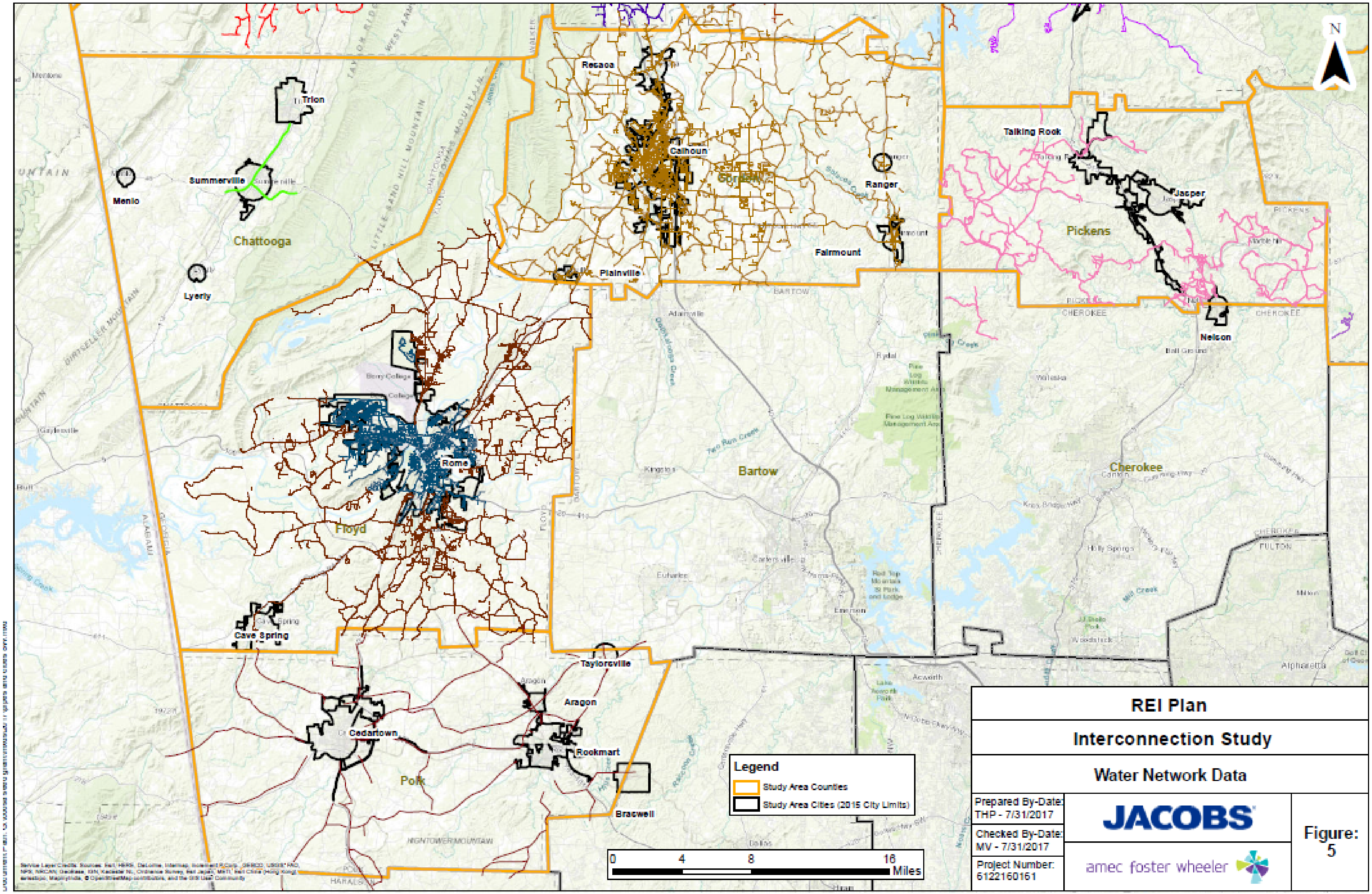

Figure 5: Water Network Data, Southwest Area

Section 4 Meeting Reliability Targets in Emergency Scenarios

To evaluate each county's ability to meet target water demands in current and future emergency scenarios, we first determined overall demand, set reliability targets, and then evaluated the systems in four different emergency scenarios. Reliability targets, i.e. target levels of service, were defined in order quantify system deficiencies.

4.1 Current and Future Demand

4.1.1 Comparing Demand and Permitted Water Supply

Prior to evaluating emergency scenarios, we determined if the existing permitted water withdrawals, aggregated by county, could meet current and future demands. We used the data from the Coosa North Georgia Regional Water Plan Update (January, 2017) which compared existing (2015) and future (2050) demand of Annual Average Day (AAD) demand with permitted water withdrawal availability (in MGD). The results are presented in Table 2. Counties with adequate permitted supply to meet demand have green checkmarks. The amounts of any projected potential shortfall are shown in red.

The demand numbers presented in the Regional Water Plan include all municipal users in the county, including those obtaining water from small private communities and private wells (self-supply). All but two of the counties in the region had available water withdrawal permitted capacity to meet the 2015 and future AAD demand.

Table 2: Current and Future Demand vs Permitted Supply

County	Annual Average Day - 2015 Demand	Annual Average Day - 2050 Demand
Murray County (Chatsworth)	✓	✓
Whitfield County (Dalton)	✓	✓
Floyd County (Rome)	✓	✓
Gordon County (Calhoun)	✓	✓
Catoosa County	✓	✓
Chattooga County	✓	✓
Dade County	✓	✓
Dawson County	✓	(1.65)
Fannin County	✓	✓
Gilmer County	✓	✓
Habersham County	✓	✓
Lumpkin County	✓	✓
Pickens County	✓	✓
Polk County	✓	✓
Towns County	✓	(0.18)
Union County	✓	✓
White County	✓	✓
Walker County	✓	✓

(Source: Coosa North Georgia Regional Water Plan, 2017)

4.1.2 Calculated Demand for the Emergency Scenario Tables and Interconnection Analysis

Annual Average Day (AAD) Demand defined by county in Table 4.2 of the Coosa-North Georgia Regional Water Plan Update (January, 2017) was used as the basis for calculating the publicly supplied municipal water demand forecasts for 2015 and for 2050. Self-supplied water withdrawals as presented in "Water Use in Georgia, 2010" published by USGS for domestic and commercial users were deducted from countywide demands to determine the publicly supplied part of the total municipal demand. The publicly supplied demand for each county was then allocated among all water systems listed in the Georgia EPD's "Public Drinking Water System

List Current As Of January 2016.xls" on the basis of population. The demands for the systems selected for analysis in each County (as described in Section 3.2) were then totaled to arrive at the demand forecasts used in the calculations in the Emergency Scenario Tables. The demand forecast for Dawson County for 2015 is based on actual system data. The long term demand forecast for Dawson County is for 2057 and is based on the Russell Creek Reservoir 404 Permit application.

The forecasted demands allocated to each selected water system are presented in Table 3. The Total 2015 Demand and Total 2050 Demand in Table 3 correspond to the immediate and future demands for each County in the Emergency Scenario Tables.

Table 3: Water Systems Analyzed Aggregated by County for this Study

County	Water Systems Analyzed	2015 Demand (AAD-MGD)	2050 Demand (AAD-MGD)
Catoosa	Catoosa Utility District Authority	5.8	6.7
	Fort Oglethorpe	1.1	1.2
	City of Ringgold	0.3	0.4
	Total	**7.2**	**8.3**
Chattooga	City of Summerville	1.6	1.3
	Chattooga County Water District	1.0	0.8
	Town of Lyerly	0.2	0.2
	Total	**2.7**	**2.3**
Dade	Dade County Water Authority	1.9	1.7
	Total	**1.9**	**1.7**
Dawson	Etowah Water and Sewer Authority	1.5	11.5
	Total	**1.5**	**11.5**
Fannin	Blue Ridge Water System	0.7	0.6
	City of McCaysville	0.9	0.7
	City of Morganton	0.3	0.2
	Total	**1.8**	**1.5**
Floyd	Floyd County	5.4	5.4
	City of Rome	5.9	0.7
	Total	**11.3**	**11.3**
Gilmer	Ellijay-Gilmer County WSA	1.5	1.8
	Walnut Mountain (Private)	0.1	0.2
	Total	**1.7**	**1.9**

County	Water Systems Analyzed	2015 Demand (AAD-MGD)	2050 Demand (AAD-MGD)
Gordon	City of Calhoun	7.1	8.3
	Talking Rock (Private)	0.0	0.0
	Total	**7.1**	**8.3**
Habersham	Town of Alto	0.3	0.6
	City of Baldwin	0.5	1.0
	City of Clarkesville	0.8	1.4
	City of Cornelia	0.8	1.5
	City of Demorest	2.0	3.7
	Town of Mount Airy	0.2	0.3
	Total	**4.6**	**8.6**
Lumpkin	City of Dahlonega	0.8	1.7
	Lumpkin County - 400 Water System	0.2	0.3
	Total	**1.0**	**2.0**
Murray	Chatsworth Water Works Commission	3.8	3.1
	Total	**3.8**	**3.1**
Pickens	City of Jasper	1.3	1.7
	Pickens County WSA	0.8	1.1
	Big Canoe (Private)	0.8	1.1
	Total	**3.0**	**3.9**
Polk	Polk County Water Authority	3.8	4.0
	City of Cedartown	1.6	1.7
	City of Rockmart	1.1	1.1
	Total	**6.4**	**6.7**
Towns	Towns County Water & Sewer Authority	0.8	1.3
	City of Hiawassee	0.5	0.7
	Total	**1.3**	**2.0**
Union	Notla Water Authority	1.4	1.5
	City of Blairsville	0.4	0.5
	Coosa Water Authority	0.4	0.4
	Total	**2.2**	**2.4**
Walker	Walker County WSA	5.5	5.2
	City of Lafayette	2.8	2.6
	Total	**8.3**	**7.8**

County	Water Systems Analyzed	2015 Demand (AAD-MGD)	2050 Demand (AAD-MGD)
White	White County WSA	0.8	1.0
	Cleveland Waterworks	0.6	0.8
	City of Helen	0.3	0.4
	Total	**1.7**	**2.3**
Whitfield	City of Dalton	23.5	25.8
	Total	**23.5**	**25.8**

4.2 Emergency Scenarios

Emergency scenarios were defined that are consistent with similar emergency supply planning projects in the state, such as the GEFA Emergency Water Supply Plan for Metro Atlanta. Potential emergency scenarios identified in the focus area include:

- Failure of largest treatment facility within a Partnership member's system
- Short-term catastrophic failure of distribution system
- Short-term contamination of a water supply system
- Short-term contamination of a raw water source

These four scenarios identify short-term emergency scenarios, less than three days in most instances, but never more than 120 days. These scenarios represent the more traditional emergencies that water systems face and are typically prepared to address.

The demand impact of the emergency scenarios was quantified based on operational information gained during the data collection process. The emergency scenarios are summarized in the System Summary tables in the Appendices. Supporting information is found in the Scenario Information tables in the Appendices. Several emergency scenarios which were applicable in other parts of Georgia were less applicable to the study area, and so were not evaluated. One example of an emergency scenario that did not apply to the study area was full unavailability of major raw water sources due to federal or state government actions.

4.3 Emergency Supply Goals and Reliability Targets

Next, tiered emergency supply goals within each system were established to highlight how much of full demand could be met during emergency scenarios, and to determine to what degree critical needs can be met. The tiered supply goals chosen for evaluation by the Partnership are consistent with the set used by the Metro Atlanta study, and for previous work in the region:

- 100% Annual Average Day Demand

- 65% Annual Average Day Demand
- 35% Annual Average Day Demand

The 35% 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, and critical industry needs. The 65% reliability targets include essential water needs plus water needs associated with schools.

The reliability targets identified reflect the amount of water needed by each system in the focus area to meet 35% and 65% of AAD demands for the duration of the emergency.

4.4 Emergency Scenario Evaluations

Spreadsheets summarizing the specific system deficiencies (in MGD of demand) of the emergency scenarios and supply goals were developed using the described methodology. The System Summary spreadsheets in the Appendices highlight available emergency supply and deficits under existing and future conditions under normal operating conditions. The Interconnection Summary spreadsheets (see Appendices A-R) highlight available emergency supply and deficits when existing interconnections are activated for emergency supply. The results summarized in Table 4 correspond to the Interconnection Summary sheets in the Appendices; additional emergency supply from existing interconnections has been included. A brief summary for each county follows.

Table 4: Summary of Emergency Scenario Results by County (In MGD)

County	35% of 2015 Demand	65% of 2015 Demand	35% of 2050 Demand	65% of 2050 Demand
Catoosa County	✓	✓	✓	✓
Chattooga County	✓	✓	✓	✓
Dade County	✓	0.1	✓	✓
Dawson County	✓	✓	2.9	6.3
Fannin County	0.4	0.9	0.3	0.7
Floyd County (Rome)	✓	✓	✓	✓
Gilmer County	0.6	1.1	0.7	1.3
Gordon County (Calhoun)	✓	✓	✓	✓
Habersham County	✓	✓	✓	✓
Lumpkin County	0.4	0.7	0.7	1.3

County	35% of 2015 Demand	65% of 2015 Demand	35% of 2050 Demand	65% of 2050 Demand
Murray County (Chatsworth)	✓	✓	✓	✓
Pickens County	✓	✓	✓	✓
Polk County	✓	✓	✓	✓
Towns County	0.2	0.6	0.5	1.1
Union County	✓	✓	✓	✓
Walker County	✓	✓	✓	✓
White County	✓	✓	✓	✓
Whitfield County (Dalton)	✓	✓	✓	✓

Totals include potential supply from existing interconnections. Numbers in red are deficits.

Catoosa County

Catoosa County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios due to its numerous interconnections, most notably those with TAWC and EUD in Tennessee.

Chattooga County

Chattooga County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios.

Dade County

	35% of 2015 demand deficit	65% of 2015 demand deficit	35% of 2050 demand deficit	65% of 2050 demand deficit
Maximum deficit, for evaluated emergency planning scenarios	--	**0.1 MGD**	--	--

Dade County has a very small deficit at 65% for 2015 demand, but due to the projected reduction in demand, this deficit resolves by 2050. Dade County was vulnerable to a failure of the largest water treatment facility. Likely no additional drastic emergency planning or interconnection projects will be needed for Dade County in the immediate future.

Dawson County

	35% 2015 demand deficit	65% of 2015 demand deficit	35% of 2057 demand deficit	65% of 2050 demand deficit
Maximum deficit, for evaluated emergency planning scenarios	--	--	**2.9 MGD**	**6.3 MGD**

Dawson County has deficits at 35% and 65% of 2057 demand for several emergency scenarios. Dawson County was vulnerable to a short-term catastrophic failure of a water distribution system, failure of largest water treatment facility, or contamination of major water source. Each of these emergency scenarios resulted in the same deficits.

Fannin County

	35% 2015 demand deficit	65% of 2015 demand deficit	35% of 2050 demand deficit	65% of 2050 demand deficit
Maximum deficit, for evaluated emergency planning scenarios	**0.4 MGD**	**1.2 MGD**	**1.3 MGD**	**2.9 MGD**

Fannin County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 for three of four emergency scenarios. Fannin County does not meet emergency targets for short-term contamination of a raw water source, because both Blue Ridge and McCaysville withdraw from the Toccoa River and it was assumed that a contamination of the Toccoa River at Blue Ridge also results in a contamination of the Toccoa River at McCaysville.

There are no known existing connections from the three Fannin County municipal water systems to other systems inside or outside of the County. Potential interconnections for the Fannin County systems are with Ellijay Gilmer Water & Sewer Authority in Gilmer County and with Notla Water Authority in Union County; however, the required length of pipeline to establish interconnections with those systems is problematic. McCaysville is situated on the state line with Tennessee and approximately two miles from North Carolina. The closest water systems in Tennessee are Copperhill Water Department and Copper Basin Utility District, which hold a groundwater permit for 0.81 MGD and a surface water withdrawal permit for 0.25 MGD, respectively. Copper Hill currently purchases an unknown amount of water from McCaysville. Limited research suggests that neither of the two systems in Tennessee is a good candidate for a potential interconnection project with McCaysville.

Floyd County

Floyd County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios.

Gilmer County

	35% 2015 demand deficit	65% of 2015 demand deficit	35% of 2050 demand deficit	65% of 2050 demand deficit
Maximum deficit, for evaluated emergency planning scenarios	**0.6 MGD**	**1.1 MGD**	**0.7 MGD**	**1.3 MGD**

Gilmer County has deficits at 35% for 2015 and 2050 demand, as well as 65% of 2015 and future demand for several emergency scenarios because Gilmer has no known existing interconnections. Gilmer County was vulnerable to a short-term catastrophic failure of a water distribution system, failure of largest water treatment facility, or contamination of major water source. Each of these emergency scenarios resulted in the same deficits.

Gordon County

The City of Calhoun, the major system in Gordon County, is able to meet long-term reliability targets due to its existing interconnections with other systems. The emergency scenarios that created the largest impact were either a failure of the largest water treatment facility or a short-term failure of a water distribution system.

Habersham County

Habersham County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios.

Lumpkin County

	35% 2015 demand deficit	65% of 2015 demand deficit	35% of 2050 demand deficit	65% of 2050 demand deficit
Maximum deficit, for evaluated emergency planning scenarios	**0.4 MGD**	**0.7 MGD**	**0.7 MGD**	**1.3 MGD**

Lumpkin County has deficits at 35% for 2015 and 2050 demand, as well as 65% of immediate and future demand for several emergency scenarios. Lumpkin County was vulnerable to as Short-term catastrophic failure of a water distribution system, Failure of largest Water Treatment Facility, or contamination of major water source. Each of these emergency scenarios resulted in the same deficits.

Murray County

Chatsworth Water Works Commission is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios. The targets are met through a combination of multiple treatment plants, multiple raw water sources, and existing interconnections currently used to purchase water.

The 2050 demand for Murray County had the greatest percentage decrease of all counties in the Coosa region from the 2011 Regional Water Plan (RWP) to the 2017 Regional Water Plan. The results of the Phase I analysis based on the 2011 RWP indicated that Chatsworth would require additional raw water sources and additional treatment capacity to meet 2050 demand; however, the revised demand projections based on the 2017 RWP now show demand decreasing from 2015 to 2050 due to the decrease in the population projection.

Pickens County

Pickens County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios due to its existing interconnections with other systems. The targets are met through a combination of multiple treatment plants, multiple raw water sources, and existing interconnections currently used to purchase water.

Polk County

Polk County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios. The targets are met through a combination of excess capacity of treatment plants and excess permitted water withdrawals. The City of Rockmart holds a withdrawal permit for a maximum daily withdrawal of 2.0 MGD from Euharlee Creek; however the pump station is in disrepair and there are no plans to return it to service. Due to adequate permitted withdrawals from other sources, the City of Rockmart does not plan to renew the withdrawal permit for Euharlee Creek.

Towns County

	35% 2015 demand deficit	65% of 2015 demand deficit	35% of 2050 demand deficit	65% of 2050 demand deficit
Maximum deficit, for evaluated emergency planning scenarios	**0.2 MGD**	**0.6 MGD**	**0.5 MGD**	**1.1 MGD**

Towns County has deficits at 35% and 65% for 2015 and 2050 demand, for several emergency scenarios. Towns County was vulnerable to failure of largest water treatment facility, short-term catastrophic failure of a water distribution system, and short-term contamination of a raw water source. Each of these emergency scenarios resulted in the same deficits, because the City of Hiawassee and Towns County WSA both depend on one water source and one treatment plant, Lake Chatuge and Rowe-Canupp WTP, respectively.

Towns County WSA has a 12 inch existing emergency interconnection with Clay County Water Sewerage District in North Carolina (CCWSD), and an interconnection agreement. The CCWSD filter plant treats 0.4 MGD, and customers consume about half of the district's supply each day. It was therefore assumed that CCWSD could only supply 0.2 MGD. Using standard study calculations, a 12 inch pipe could theoretically supply 2.5 MGD; therefore, it is possible that the CCWSD could rely on its 0.65 MG storage and supply more than 0.2 MGD for emergencies of short duration, and consequently reduce the deficits presented herein.

Union County

Union County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios.

Walker County

WCWSA had a well failure in June 2017, and cannot currently meet the permitted 4.5 MGD. They are able to supply 2 MGD using mobile filtration units. WCWSA is also pursuing grants for additional interconnections as well. Walker County was able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios prior to well failure. For the purposes of this analysis, we assume that WCWSA will again be able to meet emergency targets upon successful resolution of the well failure issue.

White County

White County is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios. Emergency targets are met with additional water supply from City of Gainesville available through interconnections 46 and 61, which were assumed based on apparent overlaps in the transmission mains in the GIS data.

Whitfield County

Dalton Utilities is able to meet emergency targets of both 35% of demand and 65% of demand for 2015 and 2050 in all emergency scenarios. The emergency scenario that created the largest impact for Dalton Utilities is failure of the largest water treatment facility due to a critical asset failure at the largest WTP, V.D. Parrott WTP. V.D. Parrott WTP treats 50.3 MGD of the total water treatment capacity of 65.5 MGD.

4.4.2 Limitations

The reliability targets were not compared with actual usage associated with essential water needs. GEFA has identified customers with essential water needs as hospitals, nursing home/assisted living facilities, correctional facilities, and critical industry needs. Systems in the study area should verify the essential water needs for their respective systems are less than the 35 percent and 65 percent reliability targets. If their essential water needs are greater than the 35%, those systems should plan to achieve higher targets for emergency scenarios.

Section 5 Identification of Potential Interconnection and Redundancy Projects

Once the available supply and demand for the region was identified, and emergency scenarios were evaluated, potential conceptual projects were developed for the region.

5.1 Potential Projects

Conceptual projects were developed for most systems in the study area. The number of projects proposed for a county was loosely based on the magnitude of their respective deficits. An effort was made to identify at least one potential interconnection to a water system in the Coosa Region if no such interconnection exists. In some cases these additional interconnections may assist the county in meeting reliability targets. For systems with no deficits, no additional interconnections may be necessary; however, potential logical interconnection projects are included. The majority of the potential projects consist of establishing a new interconnection. Other types of projects include an upgrade to the capacity of an existing interconnection and construction of a new reservoir. The list of potential projects is summarized in Table 5 and locations of the potential projects are shown on Figures 5, 6 and 7. Some projects are described in further detail in Section 5.1.1.

5.1.1 Explanation of Some Potential Projects

Reservoir 24 (not shown) – In Phase I, a new reservoir was proposed for Dalton Utilities on Dry Creek. In the Preliminary Water Supply Study Technical Memorandum prepared in 2008, the site on Dry Creek was categorized as a Tier 2 site, one of the highest rated of the potential reservoirs evaluated in the study. The dam pool and assumed location of the intake would be situated approximately two miles from the border between Catoosa and Whitfield counties. The preliminary estimated yield of the reservoir is 12.23 MGD, and it was assumed that Dalton Utilities could use up to half of the estimated yield. Given the revised demand projections, a new reservoir is likely not necessary, and may be unnecessary and expensive.

Interconnection 57 – Proposed interconnection 57 connects a 6” EWSA pipe with a 12” pipe on Price Rd. that belongs to the City Gainesville system. The Gainesville system could potentially be expanded along Lawson-Robinson Rd. to allow EWSA to connect to Gainesville’s 12” pipe on Cool Springs Road. Both options cross Lake Lanier on Price Road because no other roadways cross Lake Lanier from Dawson County to Hall County. The eastern part of the EWSA system is composed of 6” and smaller pipes therefore any potential interconnection between EWSA and Gainesville may have to be extend further west to reach larger EWSA mains.

Interconnection 72 – Interconnection 72 from Dade County WSA to Walker County WSA is included, because Dade County WSA is already servicing a part of western Walker County. The interconnection would also connect Dade County to water systems in the state of Georgia. The interconnection route proposed on the map links a known segment of the Dade County WSA system with a known segment of the Walker County WSA system. Additional GIS data could shorten the length of the pipeline linking the two systems.

Interconnection 73 – Interconnection 73 connects a known part of the Polk County Water Authority system with a known part of the Cherokee County WSA of Alabama. GIS data was unavailable for Cherokee WSA in Alabama; however, it is possible that the connection distance could be reduced by 50% or more if the Cherokee WSA system extends further east. This interconnection is an exploratory project and is not necessary to meet an emergency deficit.

Table 5: Potential Interconnection Projects

Map ID #	County	Connecting Water System	Connecting Water System	Description/Location	Diameter (in)	Total New Water Supply (MGD)
6	Floyd - Calhoun	Floyd County	City of Calhoun	Main on GA Hwy 53	6	0.6
12	Dalton - Chatsworth*[1]	Dalton Utilities	City of Chatsworth	Install 1400 ft 8" pipe on Sugar Creek Rd	8	1.1
13	Calhoun - Chatsworth	City of Calhoun	City of Chatsworth	Install 1500 ft 6" pipe on Maple Grove Church Rd	6	0.6
15	Tennessee - Dalton		Dalton Utilities	Dry Valley Rd	12	2.5
17	Bartow - Floyd	Bartow County Water Department	Floyd County	GA-140 / City of Adairsville - Upgrade connection size from 6" to 12"	12	1.9
18	Bartow - Floyd	Bartow County Water Department	Floyd County	GA-293 / Kingston Hwy	6	0.6
19	Bartow - Floyd	Bartow County Water Department	Floyd County	Taylorsville Rd	6	0.6
20	Polk - Floyd	Polk County Water Authority	Floyd County	Polk County Water Authority connection with Floyd County on Old Wax Rd	6	0.6
21	Polk - Floyd	Polk County Water Authority	Floyd County	Reeceburg Rd	6	0.6
22	Polk - Floyd	Polk County Water Authority	Floyd County	Polk County Water Authority connection with Floyd County on US-27 / Cedartown Hwy	6	0.6

[1] This interconnection was implemented and completed by Chatsworth concurrently with Phase I study.

Map ID #	County	Connecting Water System	Connecting Water System	Description/Location	Diameter (in)	Total New Water Supply (MGD)
23	Chattooga - Floyd	Chattooga County Water District	Floyd County	Connection with Floyd County Water on US-27 / Martha Berry Hwy	6	0.6
37	Murray - Gilmer	City of Chatsworth	EGCWSA	Install 8 miles 6" pipe on GA-282 / Tails Creek Rd from City of Chatsworth to EGCWSA	6	0.6
38	Gordon - Pickens	Calhoun	Pickens County Water Authority	Install 2.5 miles of 8" pipe on Fairmount Hwy SE from Pickens County WSA to City of Calhoun	8	1.1
45	Pickens - Gilmer	Pickens County WSA	EGCWSA	Install 8 miles 8" pipe on Mt. Pisgah Road and Leeches Rd from Pickens County to EGCWSA	8	1.1
50	Gilmer - Fannin	EGCWSA	Blue Ridge Water System	Install 14.2 miles of 8" pipe on GA-5-N from Blue Ridge to EGCWSA	12	1.1
57	Hall - Dawson	Gainesville	Etowah WSA	Install 1.4 miles of 8" pipe on Thomas Rd. and Price Rd. from City of Gainesville to Etowah WSA	8	1.1
58	Dawson - Lumpkin	Etowah WSA	Dahlonega	Install 4.6 miles of 8" pipe on Castleberry Bridge Rd from Dahlonega to Etowah WSA	8	1.1
59	Dawson - Lumpkin	Etowah WSA	Lumpkin County. - 400 Water System	Install 1.4 miles of 6" pipe on GA-400 from Lumpkin Co. - 400 Water System to Etowah WSA	6	0.6
60	Hall - Lumpkin	Gainesville	Lumpkin County. - 400 Water System	Install 2 miles of 12" pipe on S Chestatee St from Lumpkin Co. - 400 Water System to City of Gainesville	12	2.5
67	Habersham - White	City of Cornelia	White County WSA	Install 6.7 miles of 10" pipe on GA-5-N from White County WSA to City of Cornelia on Cannonbridge Rd	10	1.8
69	Fannin - Union	Blue Ridge WS	Notla Water Authority	Install 15.2 miles of 12" pipe on Appalachian Hwy from Blue Ridge WS to	12	2.5

Map ID #	County	Connecting Water System	Connecting Water System	Description/Location	Diameter (in)	Total New Water Supply (MGD)
				Notla Water Authority		
70	Gordon - Gilmer	City of Calhoun	EGCWSA	Install 6 miles 8" pipe on Hwy 136 from City of Calhoun to EGCWSA	8	1.1
71	~~Walker - Chattooga~~	~~City of Lafayette~~	~~Chattooga County Water District~~	~~2 miles of piping at Center Post Rd.~~ [This project deleted due to Partnership input]	~~6~~	~~0.6~~
72	Dade - Walker	Dade County Water Authority	Walker County WSA	Install 8.3 miles of 10" main from Walker County WSA connection to Dade County Water Authority along Hwy 136	12	2.5
73	Polk - Alabama	Cherokee County WSA (Alabama)	Polk County Water Authority	Polk County Water Authority 10.5 mile connection with Cherokee County WSA of Alabama on Prior Station Rd	6	0.6
74	Walker	Dalton Utilities	City of Lafayette	3 miles 6" pipe for City of Lafayette connection with Dalton Utilities at Old Villanow Rd.	6	0.6
76	Union - Towns	Notla Water Authority	Towns County WSA	Install 12.4 miles of 12" pipe from Towns County WSA to Notla Water Authority on GA-2	12	2.5
77	Towns	Young Harris	Towns County WSA	Install 10.5 Miles of 8" interconnection piping from Young Harris to Towns County WSA on GA Hwy 74	8	1.1

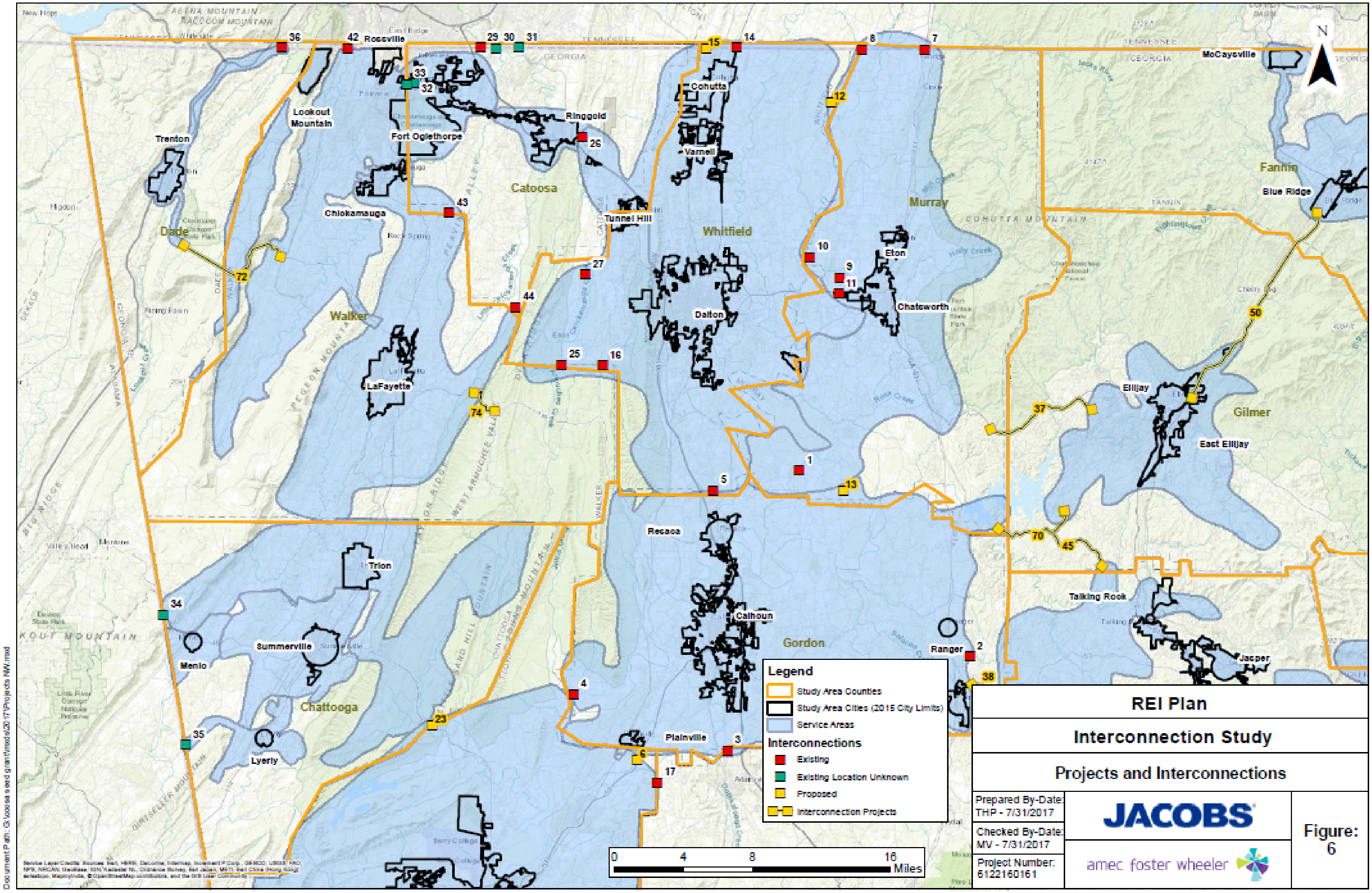

Figure 6: Projects and Interconnections, Northwest Area

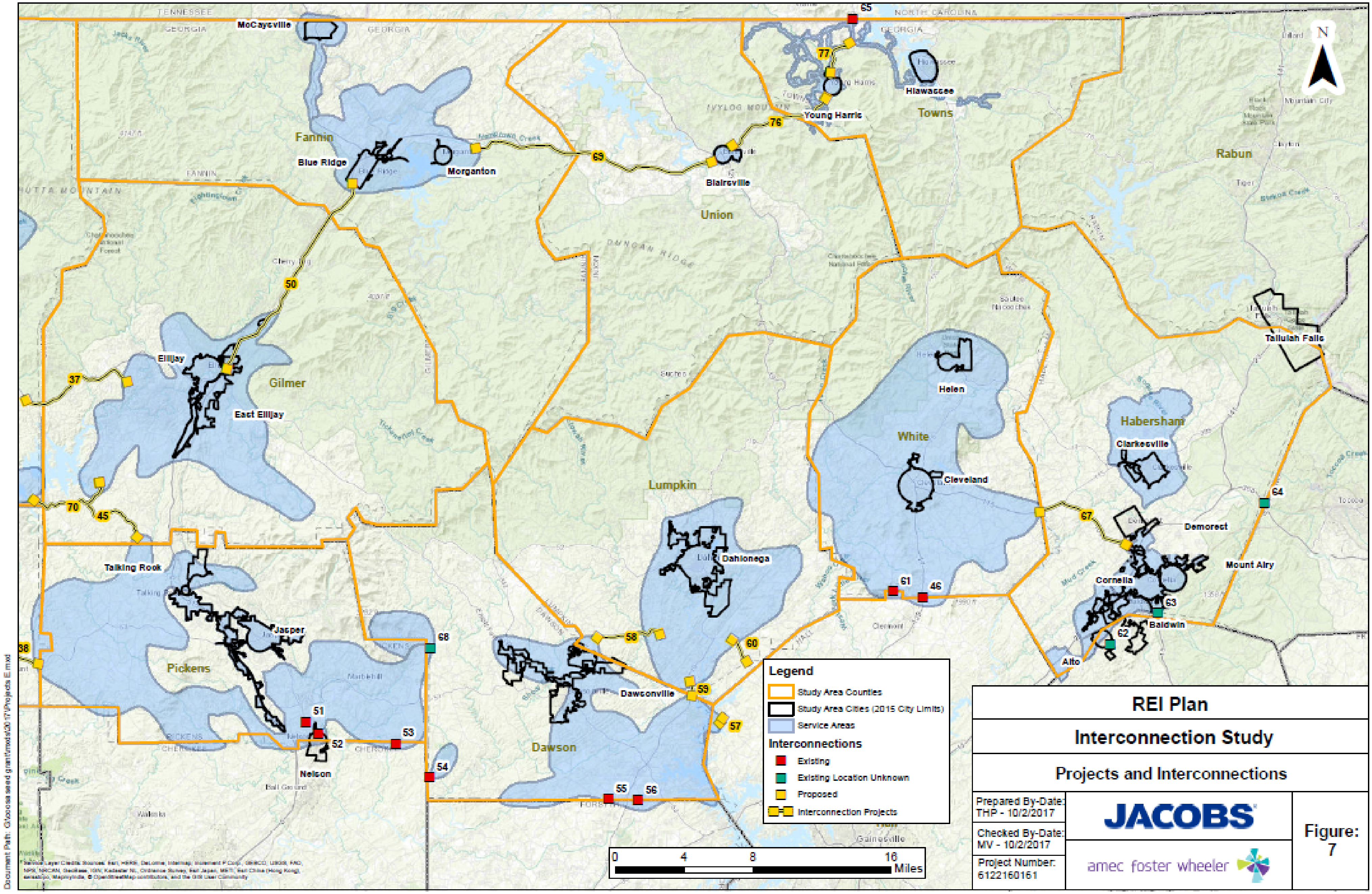

Figure 7: Projects and Interconnections, East Area

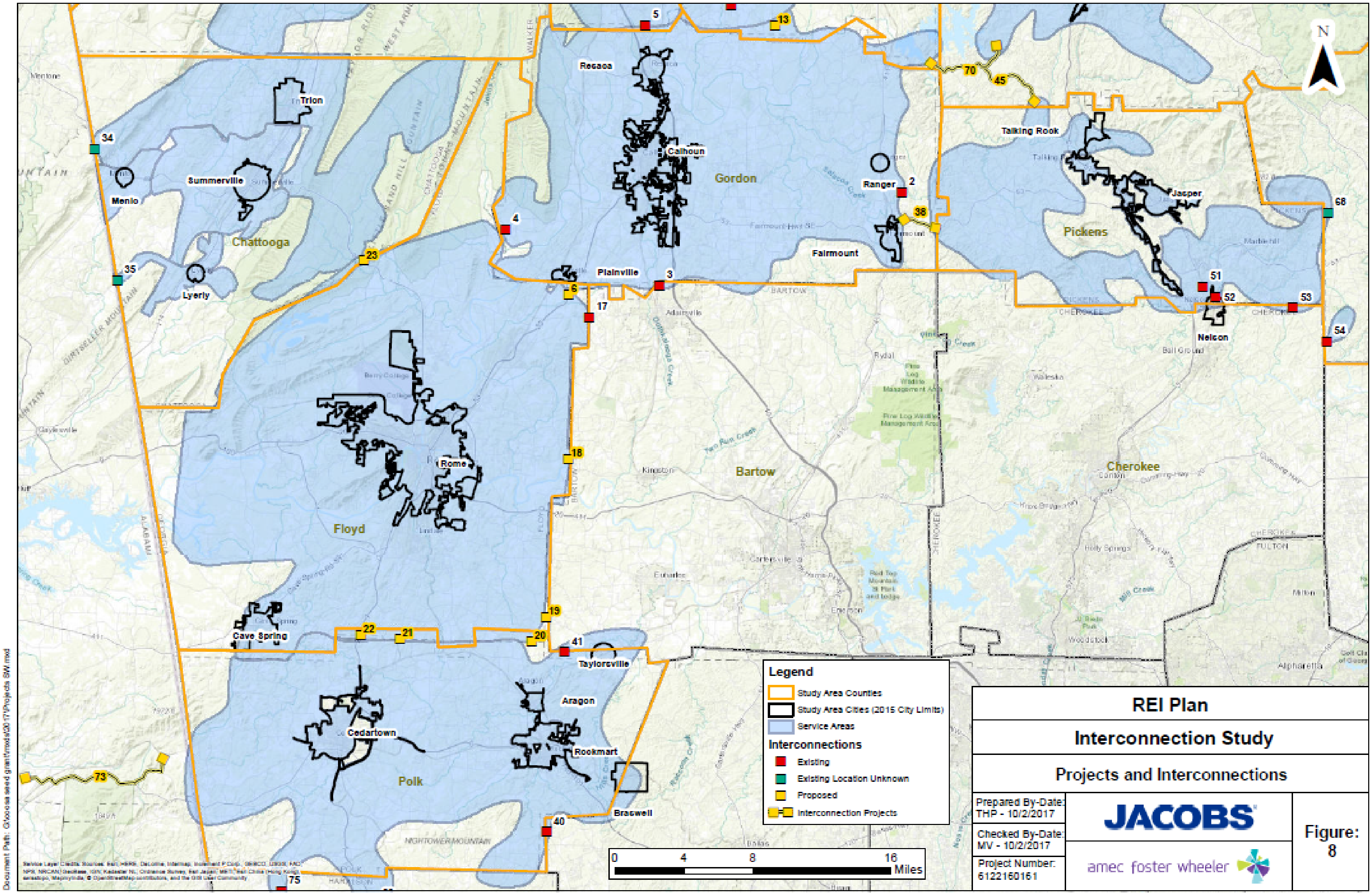

Figure 8: Projects and Interconnections, Southwest Area

5.2 Planning Level Costs

The planning level costs are based on the *Supplemental Guidance for Planning Contractors: Water Management Practice Cost Comparison* by Georgia EPD revised in April 2011 that was developed as a regional water planning guidance. The guidance document presents unit costs for a representative list of anticipated water management practices. To facilitate the comparison of water management practices, most of the unit costs were developed in terms of cost per million gallons or cost per foot to support this interconnection study. Cost considerations were made for operation and maintenance, environmental, permitting, piping or public infrastructure, and any other pertinent elements where applicable. The low cost range was assumed to be representative for this study. Planning level costs are presented in Table 6.

In cases where interconnections were proposed between the focus area and water systems for which GIS data was not available, the length of pipe needed to establish the interconnection was assumed to be a minimum of 10 feet. When GIS data for the relevant systems is available, the Partnership should revise the required pipe lengths and update the costs accordingly. As previously stated, pressure criteria were not considered in the evaluation of existing and proposed interconnections. It was assumed that pump stations would not be required to establish new interconnections; however it is possible that differences in hydraulic gradients between interconnected systems would require a pump station to establish a working interconnection. Differences in hydraulic gradient were not quantified, therefore at this time it is not known which interconnections are likely to require pump stations. The cost of interconnections that do require pump stations will increase by orders of magnitude.

Table 6: Interconnection Project Cost Estimates

Map ID	Interconnection Systems	Description	Diameter (inch)[1]	Length of pipe (ft)[1]	O&M[2]	Environment[3]	Permitting[3]	Community Age[3]	Pipelines/ Public Infrastructure[3]	Practice[4]	Cost Range[5]	Additional Cost Items[3, 6]	Unit	Estimated Unit Cost ($)[4,5,]	Additional Costs [7,8]	Total Estimated Cost
6	**Floyd-Calhoun**	Main on GA Hwy 53	6	10	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$10,502
12	**Dalton-Chatsworth**	Install 1400 ft 8" on Sugar Creek Rd	8	1,400	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$120 - $195 (8" dia)/ ft	(2) control valves, (1) flow meter	$/ft	158	$11,231	$232,696
13	**Calhoun-Chatsworth**	Install 1500 ft 6" on Maple Grove Church Rd	6	1,500	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$152,335
15	**Tennessee-Dalton**	Dry Valley Rd	12	10	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$225 - $300 (12" dia)/ft	(2) control valves, (1) flow meter	$/ft	225	$18,483	$20,735
17	**Bartow-Floyd**	GA-140 / City of Adairsville - Upgrade connection size from 6" to 12"	12	10[10]	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$225 - $300 (12" dia)/ft	(2) control valves, (1) flow meter	$/ft	225	$18,483	$245,924
18	**Bartow-Floyd**	GA-293 / Kingston Hwy	6	10[10]	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$105,692
19	**Bartow-Floyd**	Taylorsville Rd	6	10[10]	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$105,692
20	**Polk-Floyd**	Old Wax Rd	6	10[10]	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$105,692
21	**Polk-Floyd**	Reeceburg Rd	6	10[10]	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$105,692
22	**Polk-Floyd**	US-27 / Cedartown Hwy	6	10[10]	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$105,692
23	**Chattooga-Floyd**	US-27 / Martha Berry Hwy	6	10[10]	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$105,692
37	**Gilmer-Murray**	Install 8 miles on GA Hwy 76	6	41,579	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$3,967,402
38	**Gordon - Pickens**	Install 2.5 miles on GA Hwy 53	8	13,348	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$120 - $195 (8" dia)/ ft	(2) control valves, (1) flow meter	$/ft	120	$11,231	$1,615,565
45	**Gilmer - Pickens**	Install 8 miles from Ellijay to Pickens	8	36,226	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$120 - $195 (8" dia)/ ft	(2) control valves, (1) flow meter	$/ft	120	$11,231	$4,365,257
50	**Gilmer - Fannin**	14 miles on GA HWY 5	12	74,715	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$225 - $300 (12" dia)/ft	(2) control valves, (1) flow meter	$/ft	225	$18,483	$16,843,601
57	**Hall - Dawson**	1 Mile on GA Hwy 136	8	4,912	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$120 - $195 (8" dia)/ ft	(2) control valves, (1) flow meter	$/ft	120	$11,231	$601,588
58	**Lumpkin - Dawson**	5 m iles on Castleberry Bridge Rd	8	24,248	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$120 - $195 (8" dia)/ ft	(2) control valves, (1) flow meter	$/ft	120	$11,231	$2,925,571
59	**Lumpkin - Dawson**	1.4 Miles on GA Hwy 400	6	7,430	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$716,762
60	**Lumpkin - Hall**	2 miles on GA Hwy 249	12	11,425	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$225 - $300 (12" dia)/ft	(2) control valves, (1) flow meter	$/ft	225	$18,483	$2,591,184

REI Plan

Interconnection Project Cost Estimates

Map ID	Interconnection Systems	Description	Diameter (inch)[1]	Length of pipe (ft)[1]	O&M[2]	Environment[3]	Permitting[3]	Community Age[3]	Pipelines/ Public Infrastructure[3]	Practice[4]	Cost Range[5]	Additional Cost Items[3, 6]	Unit	Estimated Unit Cost ($)[4,5,]	Additional Costs [7,8]	Total Estimated Cost
67	Habersham - White	7 miles on Cannon bridge Rd	10	35,161	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$175 - $250 (10" dia)/ ft	(2) control valves, (1) flow meter	$/ft	175	$16,200	$6,175,961
69*	Fannin - Union	15 miles on Ga Hwy 76	12	80,097	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$225 - $300 (12" dia)/ft	(2) control valves, (1) flow meter	$/ft	225	$18,483	$18,055,536
70	Gilmer-Gordon-Murray	6 miles on GA Hwy 136	8	31,107	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$120 - $195 (8" dia)/ ft	(2) control valves, (1) flow meter	$/ft	120	$11,231	$3,749,946
72*	Walker - Dade	12 miles on GA Hwy 136	12	43,706	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$225 - $300 (12" dia)/ft	(2) control valves, (1) flow meter	$/ft	225	$18,483	$9,860,611
74*	Walker	3 miles on GA Hwy 136	6	16,217	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$95 - $145 (6" dia)/ ft	(2) control valves, (1) flow meter	$/ft	95	$9,551	$1,553,282
76*	Towns -Union	7 miles on GA Hwy 76	12	37,790	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$225 - $300 (12" dia)/ft	(2) control valves, (1) flow meter	$/ft	225	$18,483	$8,528,302
77	Young Harris - Towns	4.3 Miles on GA Hwy 2	8	22,556	$1000 per mile per year	NA	NA	low range	yes	Interconnection Piping	$120 - $195 (8" dia)/ ft	(2) control valves, (1) flow meter	$/ft	120	$9,551	$2,720,542

Notes:

= not applicable

1. Source: Jacobs Interconnectivity Study, 2015
2. O&M Cost, Georgia State-wide Water Management Plan Water Management Practice Cost Comparision Appendix B: Pipeline Costs
3. Georgia State-wide Water Management Plan Water Management Practice Cost Comparision Table 3: Description of Categories for Additional Cost Considerations
4. Georgia State-wide Water Management Plan Water Management Practice Cost Comparision Appendix A: Unit Cost Tables
5. Extrapolated for smaller diameters, Georgia State-wide Water Management Plan Water Management Practice Cost Comparision Appendix B: Pipeline Costs
7. New reservoir proposed, Jacobs Interconnectivity Study, 2015 - $/MG as storage volume has not been estimated
6. Valve and meter cost, based on Grainger quoted 2015 price plus 1.5 contingency factor
7. Assumption for metal control valve, manual operation
8. Pump stations may be required at some interconnections to transfer water between systems, but are not included in this estimate.
9. * Assumptions of connectivity were made due to insufficient data. Estimates are very general.
10. These lengths were determined using a standard estimate.

Projects 6-23 are from Phase I of Interconnection Study (2015)

Section 6 Recommendations

In this section of the plan, we include some recommendations for systems with critical scenario deficits and identify priority projects. In some areas of the study region, interconnections are recommended and are reasonable in scope and cost. In other areas, seeking additional redundancy of water treatment facilities, storage, and alternate emergency planning and sources will present more logical and efficient solutions.

6.1 Priority Projects

6.1.1 Interconnection Projects

Priority projects were selected using the following qualifications: First, priority projects were selected to satisfy an identified shortfall in the Redundancy and Emergency planning analysis. Second, potential interconnection projects for systems in close proximity were evaluated to determine if they enhanced necessary water supply in emergency scenarios. Third, cost and general feasibility were strong factors for prioritization (see Table 7).

Eight priority interconnection projects were selected (three from phase I) as determined by proximity and cost. (Project 12 has already been implemented concurrent with phase I, and is now completed.)

Table 7: Recommended Potential Projects

Project	Counties	Description	Cost/unit	Total Estimated Cost	Additional Water Supply Available (MGD)
6	**Floyd – Calhoun**	Install Main and 6" Interconnection Piping on GA 53 / New Calhoun Hwy NE	$95/ft'	$ 10,500	0.6
12	**Dalton – Chatsworth**	Install 1400 ft 8" Interconnection Piping on Sugar Creek Rd	$158/ft'	*completed*	*completed*
13	**Calhoun – Chatsworth**	Install 1500 ft 6" Interconnection Piping on Maple Grove Church Rd	$95/ft'	$ 152,000	0.6
38	**Gordon - Pickens**	Install 2.5 miles of 8" pipe on Fairmount Hwy SE from Pickens County WSA to City of Calhoun	$120/ft	$1,615,500	1.1
57	**Hall - Dawson**	Install 1.4 miles of 8" pipe on Thomas Rd. and Price Rd. from City of Gainesville to Etowah WSA	$120/ft	$601,600	1.1
60	**Lumpkin - Hall**	Install 2 miles of 12" pipe on S Chestatee St from Lumpkin Co. - 400 Water System to City of Gainesville	$225/ft	$2,591,000	2.5
70	**Gilmer-Gordon-Murray**	Install 6 miles 8" pipe on Hwy 136 from City of Calhoun to EGCWSA	$120/ft	$3,750,000	1.1
74	**Walker**	Install 3 miles 6" pipe to connect City of Lafayette with Dalton Utilities at Old Villanow Rd.	$95/ft	$1,553,000	0.6

With additional partnership input, additional projects could be prioritized, if different metrics are chosen (i.e., cost per population served, etc.). All of the projects identified are eligible for GEFA loans, and other funding sources as well. Future Partnership efforts could target implementation with participating water systems as local partners.

Due to the high costs of interconnection, we recommend only a few pipeline projects as priority projects. We recommend that enhanced redundancy of water treatment facilities, water distribution systems and water sources be explored as more reasonable, cost-effective ways to ensure reliability in emergency scenarios.

6.1.2 Enhanced Redundancy

In many areas of the study region, systems are located far apart, making interconnection via pipelines an expensive and unrealistic solution. To increase effective planning for emergency situations, water systems should examine areas where effective redundancy would be beneficial throughout their supply, treatment, and distribution systems. This examination should analyze where there are single points of failure in water supply, treatment, and storage. There are several failure points that, once reached, can have catastrophic impact to water quality and distribution. These potential failure points, as well as approaches to mitigate their impact, are presented in Table 8.

Table 8: Potential Single Points of Failure and Their Respective Mitigation

Potential Single Points of Failure	Mitigation Techniques
Malfunction of a sole-source raw water intake	• Parallel raw water intakes • Interconnection to neighboring systems • Back-up wells • Tanker trucks • Back-up intake
Electrical failure/loss of power from a sole-source of power supply	• Dual power feeds • Onsite diesel generators
Loss of pump without an adequate back-up	• Pumping unit redundancy
Loss of storage facilities/insufficient storage capacity	• Tank isolation
Lack of a secured SCADA system/unauthorized remote access into the SCADA network	• Capability to manage the system manually
Lack of access to repair equipment	• Service level agreements with vendors servicing critical assets

6.1.3 Alternate Emergency Solutions

During short duration emergencies, water systems may need to employ alternative solutions to ensure water quality and distribution is maintained. Depending on the type of emergency, state and/or federal agencies can assist with the temporary restoration of water supplies and treatment systems. Requests for public and/or local government assistance during short duration emergencies should be directed to the Georgia Emergency Management & Homeland Security Agency. Federal assistance is coordinated through the Federal Emergency Management Agency (FEMA) which can be assisted by the Department of Homeland Security (DHS) and the United States Army Corps of Engineers (USACE) – an acting agent of the Department of Defense (DOD), as needed.

Temporary water supply can include bulk treated water hauling with tanker trucks or pre-packaged (bottled) water during short duration emergencies. Established contractual agreements with tanker truck vendors are helpful to ensure that multiple water systems are not dependent on the same water as well as ensure distribution of the water has been assessed. As pre-packaged water is often readily available, it is often the first implemented strategy, dependent upon the estimate duration of the water source outage.

Temporary restoration of water treatment can include the utilization of reverse osmosis water purification units (ROWPUs). These units are typically used for water purification during overseas troop deployment; however, some National Guard units store them onsite for emergency domestic use. Currently, ROWPUs may all be in deployment or located out of state. It is recommended that a query is completed to assess the accessibility of ROWPUs in the region. In addition, and perhaps the most simple solution, where appropriate, systems may exceed existing permitted capacity of water withdrawals during short duration emergencies with state approval. We recommend discussing this option regularly with state permitting officials, prior to any possible emergencies.

6.2 Data Needs and Future Redundancy and Interconnectivity Studies

The Partnership and Council intended this study to include data for all major systems within the entire Coosa Region for emergency redundancy and interconnectivity; however, pipe location data, particularly GIS data was simply not made available or was non-existent for some systems in the region. Continuing to support small systems and communities to improve the quantity and quality of their water infrastructure data will be a beneficial planning tool for water systems moving forward.

6.2.1 GIS Data Needs

Communities and systems in the study area had highly varied data quality ranging from nonexistent to high quality complete digital data. Paper maps were often the only record of line locations and pipe sizes. In the cases where data were nonexistent, assumptions about service areas were made or maps were provided to the participants for them to sketch out their service areas. In some cases CAD files were available which were good for location, but data about pipe sizes were not included. In the best cases fully attributed and documented GIS data were available. Communities should continue to take active steps toward increasing the quality of GIS data on their water network due to the many benefits of integrating GIS into water supply management.

Advantages of a GIS platform for Water Supply Utilities

A GIS platform provides a water system with numerous strategic and efficient advantages. The combination of locational and informational data combined in a single powerful analytical platform centralizes and streamlines data management and analysis. The geography of a water system, mostly points and lines, is tabularly attributed with information about the geometric features. A supply line might contain tabular data about its diameter, length, construction materials, installation date, depth, start and end elevation, and maintenance records. Even if the data are not complete, the structure to receive information is critical and must be well thought out.

Table

Example Water Network

FID	Shape *	OBJECTID	FACILITYID	INSTALLDAT	MATERIAL	DIAMETER	WATERTYP	TRANSMISS	ENABLED	ACTIVEFLAG	OWNEDB	MAINTBY	LASTUPDATE	LASTEDITOR	COMMEN	LOCDES	Shape_Leng
106	Polyline M	1085	WM1065	<Null>	PVC	2			1	1	1	1	<Null>		P-1087		37.636445
106	Polyline M	1084	WM1064	<Null>	PVC	2			1	1	1	1	<Null>		P-1089		279.188677
106	Polyline M	1083	WM1063	<Null>	PVC	2			1	1	1	1	<Null>		P-1090		332.747846
178	Polyline M	199	WM179	<Null>	PVC	8			1	1	1	1	<Null>		P-1091		1567.580869
177	Polyline M	198	WM178	<Null>	PVC	8			1	1	1	1	<Null>		P-1170		1406.481524
568	Polyline M	590	WM570	<Null>	PVC	6			1	1	1	1	<Null>		P-1174		9.821094
567	Polyline M	589	WM569	<Null>	PVC	6			1	1	1	1	<Null>		P-1175		8.455541
175	Polyline M	196	WM176	<Null>	PVC	8			1	1	1	1	<Null>		P-1176		665.420671
174	Polyline M	195	WM175	<Null>	PVC	8			1	1	1	1	<Null>		P-1177		854.374466
173	Polyline M	194	WM174	<Null>	PVC	8			1	1	1	1	<Null>		P-1192		806.482579
171	Polyline M	192	WM172	<Null>	PVC	8			1	1	1	1	<Null>		P-1261		818.026446
170	Polyline M	191	WM171	<Null>	PVC	8			1	1	1	1	<Null>		P-1263		382.392741
169	Polyline M	190	WM170	<Null>	PVC	8			1	1	1	1	<Null>		P-1299		1206.343847
168	Polyline M	189	WM169	<Null>	PVC	8			1	1	1	1	<Null>		P-1305		1628.595187
756	Polyline M	778	WM758	<Null>	Asbestos Cement	6			1	1	1	1	<Null>		P-1379		282.445076
755	Polyline M	777	WM757	<Null>	Asbestos Cement	6			1	1	1	1	<Null>		P-1380		1542.353347
754	Polyline M	776	WM756	<Null>	Cast iron	6			1	1	1	1	<Null>		P-1381		23.078841
753	Polyline M	775	WM755	<Null>	Cast iron	6			1	1	1	1	<Null>		P-1382		512.402767
752	Polyline M	774	WM754	<Null>	PVC	6			1	1	1	1	<Null>		P-1383		222.07883
751	Polyline M	773	WM753	<Null>	PVC	6			1	1	1	1	<Null>		P-1384		357.713875
750	Polyline M	772	WM752	<Null>	Cast iron	6			1	1	1	1	<Null>		P-1385		41.135701
749	Polyline M	771	WM751	<Null>	Cast iron	6			1	1	1	1	<Null>		P-1386		143.938909
242	Polyline M	263	WM243	<Null>	PVC	8			1	1	1	1	<Null>		P-1387		937.167405
247	Polyline M	268	WM248	<Null>	PVC	8			1	1	1	1	<Null>		P-1388		105.106866
107	Polyline M	1100	WM1080	<Null>	PVC	2			1	1	1	1	<Null>		P-1404		1662.337614
748	Polyline M	770	WM750	<Null>	PVC	6			1	1	1	1	<Null>		P-1405		232.151485
747	Polyline M	769	WM749	<Null>	PVC	6			1	1	1	1	<Null>		P-1408		300.744162
746	Polyline M	768	WM748	<Null>	PVC	6			1	1	1	1	<Null>		P-1409		1167.14285
745	Polyline M	767	WM747	<Null>	PVC	6			1	1	1	1	<Null>		P-1410		1016.164786
735	Polyline M	757	WM737	<Null>	PVC	6			1	1	1	1	<Null>		P-1425		301.962702
744	Polyline M	766	WM746	<Null>	PVC	6			1	1	1	1	<Null>		P-1426		636.626162

Figure 9: Example of well-structured tabular data (City of Ellijay)

An accurate water network can be used to represent gaps in service or trends in breakages spatially to help utilities decide what improvements to make and how to best prioritize execution.

These networks require proper connectivity of lines and points. Vertices need to snap between lines (pipes) and point (connections, pumps, valves). Start and end elevations must also match between features. Tabular data is entered and maintained/updated as needed. This may seem like a daunting prerequisite, however the GIS creates a stable, reliable repository for these data. The GIS should be considered an ongoing work in progress. As the water system changes and grows, the GIS should as well. As more data is collected and stored the analytical possibilities grow. The ability to use the GIS to calculate current capacities and run "what if" scenarios becomes more powerful. The ability to share the information with stakeholders also becomes easier and more robust. Maps, graphs, charts, models, animations, CAD data, or shapefiles can easily be produced to inform stakeholders and decision makers. Collaboration can be enhanced by creating GIS data for additional utilities within the same municipality or, other water utilities in the region. A plan for expansion to neighboring areas can be informed by a visual representation of existing pipe diameters. Capacities can be calculated and scenarios of different diameters for new lines can be evaluated. Other types of utilities can be mapped to identify potential rights-of-way and also to plan for avoidance of existing utilities.

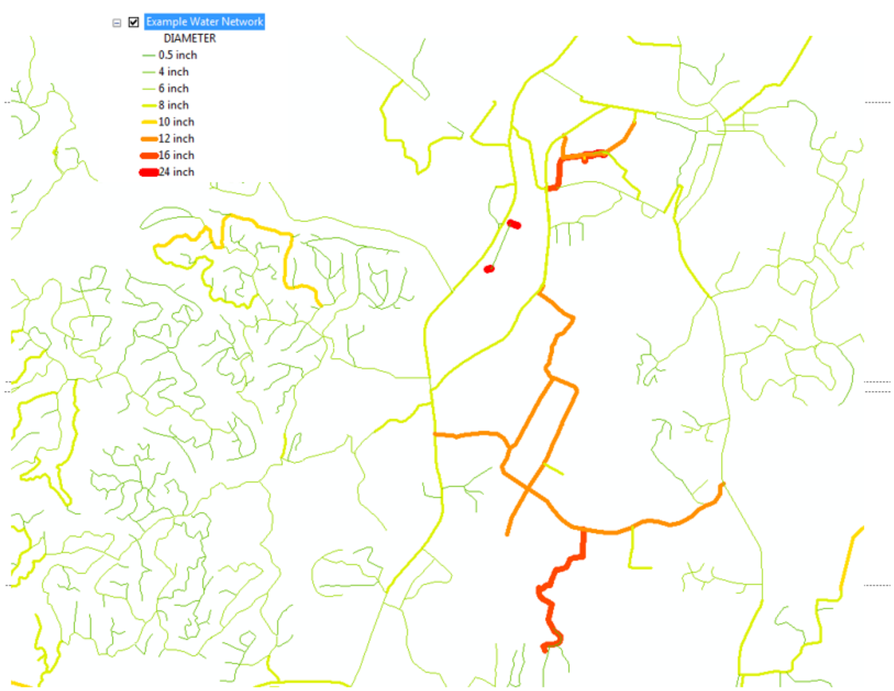

Figure 10: Pipes symbolized by diameter (City of Ellijay)

Phased Implementation

There are different levels of engagement into a GIS centric utility database. This allows for phased implementation according to budget, stakeholder commitment, current capabilities and results.

- **Initial Phase** - An "initial" action might be to purchase software and begin digitizing features from paper maps. Many small municipalities rely on very simple institutional knowledge based methods which are susceptible to error or even failure. One person with many years of experience and knowledge is often the only reliable source of information for an entire system. An initial level of data compilation may be as simple as printing high quality GIS maps on current aerial imagery and tasking that knowledgeable person to sketch out and annotate information as they recall it. Then a GIS analyst can digitize the geographic information, and capturing the annotations in the tabular portion of the database. This level of commitment could be as inexpensive as the cost of the software and hardware and the time to do it. There are many opportunities for GIS staffing in the form of college interns. This could be an initial foundational step to a fully functioning utility network. It might take an initial financial investment of $5,000 to $10,000 depending on the size of the system to get things started.

- **Progression Phase** - As the GIS grows a management plan is necessary to guide and constrain it. It should contain plans to expand hardware and software capabilities as well as adding or training staff to facilitate more and better information product deliverables. A list of desired results and goals is critical to include. It should also contain a system for QA/QC of data and analytical results. It should identify stakeholders and decision makers and identify training opportunities for all parties. This "middle" range step of engagement may seem beyond budgetary constraints; however, it has scalable and flexible costs associated with it. It can be implemented in phases according to the management plan and as it grows it will produce efficiency and informed decision making. Instead of digging through a file cabinet of paper maps to identify the diameter of a specific line, or relying on the memory of a single individual, the information can be easily and quickly interrogated from the GIS database. An additional $5,000 to $10,000 investment might be sufficient, depending on the level of complexity of the management plan to continue the effort.

- **Advanced Phase -** The growth of a utility GIS may stop at the second phase. It might be sufficient to meet the stakeholder's needs. There are more "advanced" processes that can be implemented. Surveyed locations of lines and structures are common and can add quality to the data. Mobile data collection applications for tablets and phones have realized significant advances in reliability and availability as well as automated metering and reporting devices. Integration of other municipal data sets are common. Interactive

GIS based web mapping applications can be used to inform and collaborate with stakeholders or the general public. At this level yearly costs should be clearly defined by the goals in the management plan. A GIS department will have been developed. Costs will be offset by the benefits of efficiency and agility provided to the business by the GIS department.

Implementing GIS into a water supply utility's day to day operations adds value and efficiency to daily operations, planning, reporting, and collaboration. A structured phased approach allows for scalability by spreading out costs over time. Benefits are realized within the first phases of building a GIS, and help to develop the management plan for growth and success.

6.2.2 Water and Infrastructure Evaluations

As previously mentioned in Section 3.3.1, it was assumed that the hydraulic grades of two connected systems were compatible or could be made compatible through pumping. The Council may wish to develop a hydraulic model (or a series of independent models) to determine the effect of possible differences in hydraulic gradients between interconnected systems and verify that an open interconnection does not result in excessively low or high pressures that could potentially damage either connected system or present public safety (low-pressure) risks.

As previously mentioned in Section 3.3.1, water systems sharing interconnections should discuss chemical and physical characteristics of their treated water to predict and possibly mitigate any issues that may arise from mixing their respective waters. Predicting potential issues and notifying the public of potential aesthetic issues could prevent public concern during water sharing.

Many of the potential long distance pipeline projects identified in Section 5.1 are likely cost prohibitive; infrastructure redundancy may be more feasibly achieved by addressing redundancy at the treatment plant. As previously mentioned in Section 6.12, water systems should investigate other options for infrastructure redundancy. Systems with only one treatment plant should determine what improvements would be necessary to provide full redundancy for each unit process, treatment train, storage tank and flow distribution structure, and perform a cost/benefit analysis comparing the treatment plant projects with potential pipeline distribution projects.

6.3 Additional Recommendations and Considerations

6.3.1 Maintenance and Testing Plan

An inventory and maintenance plan should be developed for all emergency connections. The plan should include schedules and procedures for inspecting pipes, testing meters, and exercising valves. Generally, pipes should be monitored and locations of leaks and breaks should be tracked and repaired. Water meters should be inspected and tested every year or two. Valves should be exercised annually; water systems sharing an emergency connection should jointly plan to flush emergency interconnection pipes every 12 months. The inventory and maintenance plan will ensure that system interconnections, in particular those designated as emergency interconnections, will function properly and as expected when needed.

6.3.2 Intergovernmental Agreements

Focus area water systems may wish to enter into intergovernmental agreements regarding installation, maintenance and operation of emergency interconnections. The agreements would include information such as: which party will pay for the construction and maintenance of proposed emergency interconnections; what constitutes an emergency; and communication procedures prior to opening an interconnection and while the interconnection is being used. Georgia Water/Wastewater Agency Response Network (GAWARN) may be a resource for templates to facilitate creating intergovernmental agreements.

One potential model for regional coordination would be the Coosawattee Regional Water and Sewerage Authority, a regional authority coordinating with Gilmer County, Pickens County, the City of Calhoun, the City of Chatsworth and Ellijay-Gilmer County Water and Sewerage Authority. The Coosawattee Regional Water and Sewerage Authority coordinates with these entities with the objectives of acquiring and developing adequate sources of water supply, water treatment, and transmission of water to the various counties, municipalities, and public authorities located within the Coosawattee River Basin area.

6.3.3 Permitting and Regulatory Challenges

New water projects may be subject to a variety of permitting and regulatory challenges. This section identifies a few relevant permits and/or requirements, and discusses some broad strategies to manage challenges effectively.

Water Withdrawal Permits

A water withdrawal over 100,000 gallons per day requires a permit from EPD. The applicant for a permit must meet EPD's requirements including downstream flow protection from the point of withdrawal, and is required to submit information related to source location, documentation of projected growth/needs, and plant capacities. Permittees must have in place (or submit a plan to develop) a Drought Contingency Plan, a Water Conservation Plan, and a Watershed Protection (or Reservoir) Plan. Forms and information may be found at Georgia EPD's website.

Interbasin Transfers (IBT)

New permits that include an interbasin transfer (IBT) must include the same information as any new water withdrawal permit, and may only be issued if downstream flows are protected. Specifically in regards to permits with interbasin transfers, there are additional requirements related to consideration of other existing uses, and public notice. EPD rules state that: "the Director shall give due consideration to competing existing uses and applications for permits which would not involve interbasin transfer of surface water and, shall endeavor to allocate a reasonable supply of surface waters to such users and applicants." Public notice and a comment period are also required, and if sufficient public interest exists, a public hearing may also be scheduled. Permittees with interbasin transfers must also submit an IBT report annually describing the amount of the transfer(s) and basins as appropriate.

Section 10 of the Comprehensive Statewide Water Plan proposed additional considerations that the Director or the Board may consider when granting a permit that includes an interbasin transfer. These included donor basin and receiving basin considerations, such as quantity, reasonable foreseeable needs, water quality, treatment capacity, and special considerations given to low flow conditions. However, these suggestions were never incorporated into rules, and are therefore not required. Compiling some or all of this information, however, would make a strong case for any new permits that involved interbasin transfers. Building a strong case for a permit involving an IBT may require additional effort to complete the application, but could proactively address any potential challenges or objections. Carefully considering the political climate at the time of the application may provide guidance on how to best to approach the permit process.

Other Potential Permits

New water pipelines, reservoirs, and treatment plants could potentially require a variety of permits and/or processes, such as:

- Permit to operate a public water system
- Land acquisitions or condemnation
- Coordination with existing utility corridor entities
- Buffer variances for stream crossings
- Environmental Assessment (EA) or Environmental Impact Statement (EIS)
- Section 401 or Section 404 permits

6.4 Funding and Financing for REI Projects

For Phase I (studying the communities of Rome/Floyd, Chatsworth, Dalton, and Calhoun) the scope and cost of recommended projects was much smaller due to high level of intrinsic interconnectivity, and redundancy already in place. For other parts of North Georgia, many systems are isolated, or have minimal interconnections. Infrastructure costs to link such systems may be substantial.

6.4.1 Traditional Sources

Traditional sources of funding are those most commonly used for capital projects, such as general funds, loans/bonds, and service fees or special assessments. General funds are usually the least complicated to obtain, but are usually in short supply due to competing interests of different governmental departments. Bonds (revenue or general obligation) may be issued based on fees or rates to be recovered, but usually require a voter referendum and are subject to local government debt ceilings. SPLOST (Special Purpose Local Option Sales Tax) funds are popular for specific projects that can be shown to provide a public benefit, usually by adding a 1% additional sales tax on goods and services within a certain area. SPLOSTs need to be recommended by an elected body and voted on during a general election.

North Georgia Water Partnership Funding

Each year, the Partnership collects membership dues. This source of funding is an excellent potential source for grant matching funds, and sets up the Partnership with a notable advantage over other similar organizations. As the Technical Advisory Group for the Coosa North Georgia Water Planning Council, it gives both the Council and the Partnership an unprecedented reach in terms of proactive planning, strategy, and access to potential grant funds. The Partnership may consider exploring, in the far planning horizon, additional options such as a Metro District –type designation, that would increase funding and implementation authority. Future possibilities could include a regional overlay district or regional water utility.

Public/Private Partnerships and Cost-Sharing

Numerous opportunities exist for systems to partner with local or regional industries or organizations that may benefit from enhanced access to water systems. These should be evaluated on a case-by-case basis, as specifics will vary widely across the region. In addition, cost-sharing is an effective way to stretch funding for systems both benefiting from interconnection projects.

6.4.2 Grants and Loans

GEFA loans

The Georgia Environmental Finance Authority (GEFA) provides low-interest loans to local governments to assist them with a variety of water and environmental projects. Counties, cities, and authorities are eligible to apply and receive loans, whose interest rates may be as low as 2%, paid over a 20-year period. GEFA's loan programs can fund water, wastewater, nonpoint source and septic projects, solid waste, and land conservation. GEFA has three programs that could fund projects related to water supply, the Georgia Fund, the Georgia Reservoir Fund, and the Drinking Water State Revolving Fund.

- The Georgia Fund is a loan program that uses state funds for a variety of water supply projects such as wells, storage tanks, water treatment facilities, pipes and water lines, pumping stations and interconnections.
- The Georgia Reservoir Fund (Governor's Water Supply Program) is a state funded program that specifically funds projects to enhance water supply. Eligible projects include installing system interconnections, new and/or rehabilitated wells, reservoir modifications for water supply purposes and new water supply reservoirs. Funds may also be used for design and planning of these systems.
- The Drinking Water State Revolving Fund (DWSRF) is a Federal loan program that is administered by GEFA. The loan program can fund many different drinking water programs related to enhancing existing supplies, or developing new ones, fixing aging infrastructure, and building or upgrading water treatments plants. Funds may also be used to combine water systems or create a new water system.

Communities in Georgia must have qualified local government status to receive a GEFA loan, and can receive a discount on loan rates if they are a "WaterFirst" Community. The WaterFirst Community Program is a voluntary partnership between local governments, state agencies, and other organizations recognizing communities that have demonstrated a strong commitment to water resource stewardship.

Georgia EPD Regional Water Planning Seed Grants

Georgia EPD has offered Regional Water Planning Seed Grants to Regional Water Councils since 2014, and is planning to continue to offer funding in the future, subject to resource availability and other Regional Water Planning needs. For the first several years of the grant program,

$150,000 was available, with a project maximum of $75,000. The grant funds projects with a 40% match requirement, 10% of which is required to be cash match. Eligible projects must specifically be implementing management practices or other recommendations of the Regional Water Plans, and may include activities such as identifying critical information gaps and collecting data, developing implementation guidelines or technical guidance, and technical assistance to support implementation of management practices detailed in Regional Water Plans.

Department of Community Affairs Community Development Block Grant

The Department of Community Affairs (DCA) Community Development Block Grant (CDBG) provides funding for projects that will benefit low to moderate-income people or neighborhoods.

Many water and sewer facilities-related projects may be eligible for funding including repair of water infrastructure, additional storage (water tanks), water conservation programs, and flood and drainage improvements.

Other programs or projects may also qualify, as long as the beneficiaries are low-moderate income. Cities and Counties are eligible for one of two different CDBG designations:

CDBG Entitlement Communities are funded directly from the US Department of Housing and Urban Development (HUD). These communities create programs that meet their specific needs and priorities, and submit to HUD. HUD allocates funds based on standard metrics such as % of population at or below poverty thresholds, age of housing and housing needs, and housing overcrowding. In the Coosa North Georgia Region, this includes Dalton and Rome.

CDBG Non-Entitlement Communities must apply for a state-wide competitive grant administered by DCA. Approximately $26 million is available annually. Grants up to $500,000 require 5% local matching funds. Grants of more than $500,000 require 10% local matching funds. All counties in the Coosa North Georgia Region are eligible to apply.

Appalachian Regional Commission Area Development Fund

The Appalachian Regional Commission (ARC) Area Development Fund supports the development and improvement of infrastructure, including water and sewer services. Potential projects must be consistent with the priorities identified in the Governor's Annual Strategy Statement, and applicants are encouraged to work with their local Regional Commission to develop projects.

The Governor's Strategy Statement includes the following:

State Objective 3.2: Provide Appalachian communities access to safe drinking water and wastewater facilities.

- Strategy 3.2.1 – The provision of water and sewer infrastructure projects should be orderly and coordinated and projects should be related to local and regional development plans.

- Strategy 3.2.2 – Projects that extend water or sewer lines to distressed areas or unserved areas or areas that have health hazards will be given priority.

All counties in the Coosa North Georgia Region are part of the 37 counties in the Appalachian region of the state. The region includes 13 Transitional Counties (Catoosa, Dade, Dawson, Fannin, Floyd, Gilmer, Habersham, Lumpkin, Pickens, Towns, Union, Walker and White), which are eligible to receive 50% funding assistance, and three At-Risk Counties (Gordon, Murray, Polk and Whitfield), eligible to receive 70% funding assistance. Georgia has one Distressed County (Chattooga), which is eligible to receive ARC Distressed County funding at 80% federal - 20% local match from ARC.

USDA Rural Development – Water & Waste Disposal Loan and Grant Program

Long-term, low-interest loans are available for rural areas and towns with fewer than 10,000 people. Loans may be combined with grants, as funds are available. Funds may be used to finance the acquisition, construction or improvement of drinking water sourcing, treatment, storage and distribution, stormwater collection, transmission and disposal

In some cases, funding may also be available for related activities such as: legal and engineering fees, land acquisition, water and land rights, permits and equipment, start-up operations and maintenance, interest incurred during construction, and purchase of existing facilities to improve service or prevent loss of service.

Department of Commerce Economic Development Administration (EDA), Public Works and Development Facilities Grant Program

EDA's Public Works and Economic Adjustment Assistance and Regional Innovation Grants support economic development, infrastructure development/improvement and seek to create an "entrepreneurial nexus" with infrastructure, technology, and economic development.

These grants support projects that promote economic development in economically distressed areas. EDA solicits applications from applicants in rural and urban areas to provide investments that support construction, non-construction, technical assistance, and revolving loan fund projects under EDA's Public Works and Economic Adjustment Assistance programs. Grants and cooperative agreements made under these programs are designed to leverage existing regional assets and support the implementation of economic development strategies in distressed communities.

Appendices

Appendix A	Catoosa Interconnection and Emergency Scenario Tables
Appendix B	Chattooga Interconnection and Emergency Scenario Tables
Appendix C	Dade Interconnection and Emergency Scenario Tables
Appendix D	Dawson Interconnection and Emergency Scenario Tables
Appendix E	Fannin Interconnection and Emergency Scenario Tables
Appendix F	Floyd Interconnection and Emergency Scenario Tables
Appendix G	Gilmer Interconnection and Emergency Scenario Tables
Appendix H	Gordon Interconnection and Emergency Scenario Tables
Appendix I	Habersham Interconnection and Emergency Scenario Tables
Appendix J	Lumpkin Interconnection and Emergency Scenario Tables
Appendix K	Murray Interconnection and Emergency Scenario Tables
Appendix L	Pickens Interconnection and Emergency Scenario Tables
Appendix M	Polk Interconnection and Emergency Scenario Tables
Appendix N	Towns Interconnection and Emergency Scenario Tables
Appendix O	Union Interconnection and Emergency Scenario Tables
Appendix P	Walker Interconnection and Emergency Scenario Tables
Appendix Q	White Interconnection and Emergency Scenario Tables
Appendix R	Whitfield Interconnection and Emergency Scenario Tables

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