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SWGRC
Southwest Georgia Regional Commission
SWGRC.ORG

Mr. Kevin Clark, Executive Director
Georgia Environmental Finance Authority
233 Peachtree Street NE, Harris Tower, Suite 900
Atlanta, Georgia 30303-1506

Received
APR 30 2012

April 30, 2012

RE: Governor's Water Supply Program

Dear Director Clark:

Accompanying this letter is our Application for State Direct Investment funding to initiate implementation of an innovative, large flow augmentation project in the Apalachicola-Chattahoochee-Flint (ACF) River Basin of Southwest Georgia. The Project contemplated by this Application involves Aquifer Storage Recovery (ASR) as well as direct pumpage from deeply buried (and little used) aquifers that currently are not identified by the Georgia Environmental Protection Division (EPD) in the Statewide Water Plan as having ground-water sustainability problems. The water produced from the ASR system and from direct pumpage will be used to augment stream flows in critically important areas of the ACF River Basin.

The applicant for this State Direct Investment is the Southwest Georgia Regional Commission (SWGRC). No region of the state is more acutely aware of its water dependency, problems, and needs than Southwest Georgia:

- The economy of this region is almost entirely agriculture based, and for the last 40 years, our agriculture has been heavily dependent on irrigation. The farm gate value of our agricultural products is $2 billion per year, plus the value of the normal economic multiplier applied.

- The Regional Water Plan completed in 2011 by the Flint-Ochlockonee Water Planning Council shows significant water supply problems. EPD's "gap" analysis indicates stream flow shortfalls of 229 mgd (average) and 837 mgd (maximum) for the Flint River at Bainbridge. These are by far the greatest shortfalls predicted in the ten Water Planning Districts.

- Our region is at the junction of Alabama, Florida and Georgia, and we have been involved in and adversely affected by the interstate water conflicts of the ACF basin for the last 22 years.

- During droughts like 2011 and 2006-2009, numerous stretches of local streams go dry, which imperils fish and two federally listed endangered species of freshwater mussels. Onerous federal action or lawsuits by environmental activist groups are threatening this region's farmers and its economy.

- The federal government's ACF goal of having a minimum of 5,000 cubic feet per second (3,226 mgd) of water flowing over Jim Woodruff Dam puts a tremendous strain on the whole ACF basin in Georgia during droughts. The Corps of Engineers must draw down all of its reservoirs on the Chattahoochee River to meet this goal. This adversely affects the water resources of the River Valley Regional Commission to our north, and the Metropolitan North Georgia Water Planning District farther upstream.

The SWGRC provides a broad range of planning services (including water and other natural resources) for 14 counties and 44 cities. Our mission is to serve our local governments by providing collaborative, progressive leadership and professional, technical services to determine the needs of the region and improve the livability of communities for the citizens of the region. Pursuing the water project described in this Application is highly consistent with our mission.

This is why we are excited about this Application we are submitting to the Governor's Water Supply Program. Our innovative project, probably more than any other water supply project in Georgia, will have positive impacts on the water problems of our region within a year, and when scaled up (based on the information to be developed from this demonstration project) will significantly assist in meeting the water needs and objectives of three water planning districts: Metropolitan North Georgia, Middle Chattahoochee, and Lower Flint/Ochlockonee.

In short, this project can result in "moving the needle" on water problems in the ACF basin from metro Atlanta to Lake Seminole.

The project proposed by this Application easily meets the five Guiding Principles in the December 2011 report on the Governor's Water Supply Program, and as stated in GEFA's workshops in February and March 2012.

1. Local Governments Should Lead. SWGRC is not a local government, but Regional Commissions are created by the General Assembly as "public agencies." "Local government" is defined to include any state or local board or political subdivisions created by the General Assembly (O.C.G.A. 12-5-471). Thus, the SWGRC has sufficient powers to act as the applicant for funding under the Governor's Water Supply Program. Further, we serve 14 counties and 44 cities in Southwest Georgia, all of which are major water users. This application is being made on their behalf.

2. Use State Funds Efficiently to Maximize Water Supply. At a minimum, this project will result in state-owned wells potentially providing flow augmentation of 6 to 10 mgd to the Middle Chattahoochee and Lower Flint Rivers, at half or less of the cost of providing equivalent amounts from surface reservoirs. When fully developed, based on the information developed from this project, it could produce an estimated 250 mgd of flow augmentation in the ACF basin, up to seven months a year for up to three consecutive years and should be attractive enough to have much of it paid for by private investment. That is extremely cost efficient for the initial State Direct Investment of $13.5 million.

3. Support Should Be Tailored to Unique Need of Projects (not pursue one-size-fits-all). This project is UNIQUE. It is a demonstration for flow augmentation by direct ground-water pumping deep aquifers (DA) and by Aquifer Storage Recovery (ASR). It will leave the state with at least four wells that together are anticipated to produce 6 to 10 mgd of flow augmentation in places that need it: two major tributaries of the Flint River (Spring Creek and Chickasawhatchee Creek), and the Lower Chattahoochee River. It will provide the information and the plan needed to scale up direct groundwater pumping and ASR to a total of 250 mgd in the ACF basin.

4. Regional Cooperation is the Preferred Approach. This project will directly benefit the Southwest Georgia region, and the Middle Chattahoochee region. The Chattahoochee ASR project will be in Stewart County in the River Valley Regional Commission jurisdiction. The two Regional Commissions will be working cooperatively in this project. Once the project is complete, the next step (scaling up to 250 mgd) has the potential to benefit all 3.5 million users of Chattahoochee River water in the Metropolitan North Georgia Water Planning District. You can't get more regional than this.

5. State Funding Should Promote Fund Sustainability and Ensure Long Term Sustainability of Water Resources. It is expected that the full scale project will be a public-private partnership, bringing in private capital and ultimately paid by local water utility revenues. The use of ASR allows sustainability like a surface water reservoir would, but at much lower cost and in a much shorter time frame.

The specific long-term technical objective desired from this test well project, in conjunction with subsequent expansion to full scale, is to develop the capability to augment flow in the Chattahoochee and Flint Rivers by adding up to 250 million gallons per day (mgd) for up to seven consecutive months for up to three consecutive years. Flow augmentation would be implemented whenever the Apalachicola River gage at Chattahoochee, Florida, drops below a project target level such as 5,000 cfs (3,226 mgd).

Based on the hydrology of Southwest Georgia, we have identified three tracts, owned by the Georgia Department of Natural Resources (DNR), of state-owned land in which to initiate an extensive subsurface testing program as part of the project contemplated by this Application. The three tracts are (1) at the Florence Marina State Park in Stewart County, (2) at the Chickasawhatchee Wildlife Management Area (WMA) in Baker County, and (3) at the Mayhaw WMA in Miller County. We are working with DNR to receive their permission to use a few acres of their lands for the project. Because the State of Georgia already owns these lands, long term access is secure. Also based on published EPD and USGS geologic reports, the total augmentation flow available via ASR or DA from the proposed test wells at the three sites is estimated to be on the order of 6 to 10 mgd. Expansion of well field facilities at the three sites pursuant to a subsequent master plan would hopefully achieve program goals of 250 mgd based on estimates.

For the project contemplated by this Application, we will:

1. Test three sites, owned by the State of Georgia, for ASR and for withdrawals from deep aquifers. This involves drilling of ASR wells, production wells and monitoring wells at each site. ASR testing at the Florence Marina site also will involve an assessment of bank filtration as a treatment option for recharging local aquifers. At each site, pumping tests will be performed to establish yields and aquifer properties.

2. Assess the flow characteristics at the Apalachicola, Florida gage and locations upstream to estimate travel times and effects from stream augmentation discharges at each of the three sites on the flows as measured at this gage. Basically, this will be a recommendation for when to turn the pumps on and off.

3. Develop a scope of work with estimated costs and time schedule to develop and fully implement a flow augmentation project capable of delivering 250 mgd at the Apalachicola gage from the Flint and Chattahoochee Basins pursuant to a subsequent master plan. Included in this will be the identification of types, depths, and locations for future ASR facilities and DA wells.

4. Upon completion of the phase of the project contemplated by this Application, it is anticipated that the State will own at least four completed, producing wells and pumping equipment, all on state-owned properties. As importantly, test program results will provide a sound technical basis for system expansion to 250 mgd.

In reviewing this Application, it is important for GEFA to note that much of the requested funding for this project is dedicated to demonstrating, through full size well and pump tests, the viability of the concepts of utilization of ASR and deep aquifers. If this project is successful, such demonstration expenses will not be needed or incurred in any future development involving a full build out pursuant to a master plan.

To perform the work described in this application, we have selected the firm of EMB Water LLC as a consultant to oversee all field investigations and engineering/hydrogeological analyses. Well drilling contractors for the ASR and deep aquifer wells and monitor wells will be procured on a competitive basis using our established guidelines.

We are prepared to meet with you at your convenience regarding this Application. We look forward to hearing from you shortly.

Sincerely,

Dan Bollinger, Sr.
Executive Director

RVRC
River Valley Regional Commission

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April 25, 2012

Mr. Dan Bollinger
Executive Director
Southwest Georgia Regional Commission
P. O. Box 346
Camilla, Georgia 31730

RE: Aquifer Storage Demonstration Project

Dear Mr. Bollinger:

The River Valley Regional Council considered the proposed grant application to GEFA being developed by the Southwest Georgia Regional Commission for an Aquifer Storage Recovery (ASR) demonstration project. We understand the application is to implement a flow augmentation project for the Chattahoochee and Flint River Basins in Southwest Georgia. The demonstration project will consist of three well sites, one of which will be located on a state-owned tract of land at Florence Marina State Park in Stewart County, a member government of the River Valley Region.

The River Valley Regional Council is in support of this application and would like to be a part of the demonstration project. We have an Environmental Planner on staff that is available to assist in the implementation of this project. We know the need to resolve our water issues in Southwest Georgia are critical to our continued growth and prosperity.

We look forward to working with Southwest Georgia Regional Commission on this project. If you have any further questions or desire any other information please do not hesitate to call Patti Cullen, our Executive Director.

Sincerely,

Terrell Hudson, Chair
River Valley Regional Council

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Part 1

Application

(Project Information)

Governor's Water Supply Program
Part 1 Application – Applicant and Project Information

This application form will be used to evaluate all potential projects for funding under the Governor's Water Supply Program (GWSP). Applications will not be processed if any of the requested information is not provided. This application will collect data related to several subject areas including applicant contact information, project description, project status, scope of project benefits, project planning and water supply need, water management efficiency, project financing and project schedule. All questions pertain to the project for which you seek funding, unless otherwise specified.

Minimum requirements

To be eligible for funding through the GSWP, applicants must meet certain minimum requirements. Those requirements are:

- Applicant is a county, a municipality, or a water or water and sewer authority in the state of Georgia.
- County and municipality applicants must be certified as Qualified Local Governments by the Department of Community Affairs (DCA). Water and/or water and sewer authority applicants must be within a certified government.
- Applicant must be within a county that has a current DCA-certified Service Delivery Agreement and the proposed project must be consistent with the verified strategy.
- Project must be consistent with applicable Regional Water Plan adopted by Georgia EPD.
- Applicants must be in compliance with all state audit requirements. *(Will be verified directly with state auditor)*
- Communities within the Metro North Georgia Water Planning District must be certified by the Director of the Environmental Protection Division (EPD) as either being in compliance or making a good faith effort to comply with all District Plans and/or enforcement measures. *(Will be verified directly with EPD)*
- If applicant has any current contracts with the Georgia Environmental Finance Authority (GEFA) or DCA, applicant must be in compliance with those contracts.
- Applicant must allow GEFA, DCA and/or EPD to inspect the physical location of a project at any time during the construction process.
- Procurement of construction contracts, construction services, materials and equipment in state-financed projects must be public, open and competitive, as defined by both state law and the procurement requirements of applicable state funding contracts. Funded construction must meet the requirements of both state law and any applicable state funding contracts.

I certify that I am authorized to sign this application on behalf of our governing body and that our application meets the minimum requirements listed above.

Signature of authorized official

Executive Director
Title

Dan Bollinger, Sr.
Print or type name

April 27, 2012
Date

*Please fill out completely. Missing information may disqualify applicant.

(1) APPLICANT CONTACT INFORMATION	FOR GWSP USE ONLY
Applicant Name Southwest Georgia Regional Commission	Project #
Name and Title of Contact Person for this Project Dan Bollinger, Sr., Executive Director	Amount Requested by Applicant
Street Address or PO Box 30 West Broad Street, PO Box 346	Date Application Received
City, State and Zip Code + 4 Camilla, Georgia 31730-0346	Date Letter of Receipt Sent
County Mitchell	Date Application Received by EPD
Telephone Number (229)522-3552	Project Type ☐ New reservoir ☐ Reservoir enhancements ☐ Wells ☐ Interconnections ☐ Indirect potable reuse ☐ Emerging/innovative project
Telephone Number ( )	
Email Address Dbollinger@swgrc.org	
Federal EIN 58-0940910	
Congressional District in which work will occur 2	
DUNS No. 938262636	
Project Place of Performance (where the work will occur) Florence Marina State Park, Chickasawhatchee WMA, Mayhaw WMA	
What State funds are you seeking to finance your project? Check any that apply. X Direct state investment from DCA ☐ Loan from GEFA Are you seeking a public-private partnership for your project. ☒ YES ☐ NO Not in first phase, but in second phase.	

Contact information for city/county/authority attorney, project engineer and finance director.

Attorney

Tommy Coleman
Name

PO Box 71209
Street Address Or P.O. Box

Albany, GA 31708
City, State, and Zip Code

(229)439-4000 (229)432-9967
Telephone Fax number

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Project Engineer

David Pyne, EMB Water, LLC
Engineer's Name, Firm Name

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City, State, and Zip Code

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Finance Director

Suzanne Angell, Director of Finance
Name, Title

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Name

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Valdosta, GA 31602
City, State, and Zip Code

(229)247-8005 (229)247-8998
Telephone Fax number

nick@vracpa.com
Email address

OTHER:

If name, company name, or email address is longer and cannot fit in the above boxes, please type information in below:

Name:
Company:
Email:

Name:
Company:
Email:

(2) PROJECT DESCRIPTION

Subsection A: Please place a check mark in the space(s) next to the project type(s) which best describe your ***project*** (check all that apply):

Reservoirs

- ☐ Construct new reservoir
- ☐ Expand existing reservoir
- ☐ Convert to water supply
- ☐ Sediment removal
- ☐ Adding pump storage
- ☐ Other

Wells

- X Drill new well
- ☐ Reopen inactive well
- ☐ Rehab existing well
- ☐ Other

Redundancy and Reuse

- ☐ Indirect potable reuse project
- ☐ Interconnection
- ☐ Other

Emerging / Innovative Project

- X Aquifer storage and recovery
- X Streamflow augmentation
- X Other

Subsection B: Please place a check mark in the space(s) next to the activity/activities which best describe the ***activities*** for which you are applying for funding (check all that apply):

- ☐ Plant design
- ☐ Land acquisition
- ☐ Stream mitigation
- ☐ Wetland mitigation
- ☐ Grading / site preparation
- ☐ Dam design
- X Other: Bank Filtration
- ☐ Dam construction
- X Pumping equipment and construction
- X Intake structure design / construction
- X Well drilling
- ☐ Well rehabilitation
- X Constructing chemical feed structure
- ☐ Water recycling construction
- ☐ Water transmission line construction
- X ASR pumping equipment and construction
- ☐ Legal
- ☐ Administrative

Subsection C: On a separate sheet, please provide a detailed narrative of the proposed project. Attach a copy of the project engineering report, if available. If you believe that this project represents an emerging / innovative approach to providing new water supply, then please explain: 1) how the project is innovative; 2) how the cost of the project compares to traditional approaches to new water supply; 3) whether this innovative approach can be replicated, or is being replicated, in other places in the state or within a given region; and 4) how easily this approach can meet all relevant regulatory requirements, including permitting (federal and state, if both apply). S*ee "Checklist of Documents To Be Submitted with This Application".*

PART 1 Application – Applicant and Project Information
(2) PROJECT DESCRIPTION
Subsection C

GEFA writes: On a separate sheet, please provide a detailed narrative of the proposed project. Attach a copy of the project engineering report, if available. If you believe that this project represents an emerging/innovative approach to providing new water supply, then please explain: 1) how is the project innovative; 2) how the cost of the project compares to traditional approaches to new water supply; 3) whether this innovative approach can be replicated, or is being replicated, in other places in the state or within a given region; and 4) how easily this approach can meet all relevant regulatory requirements, including permitting (federal and state, if both apply).

Responses to Part 1, Section 2, Subsection C are presented as follows:

C.0.0 Detailed Narrative

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  - Table 1: Consistency with State Environmental Law and Policy
  - Table 2: Regulatory Framework
- C.0.2 Suggested Water Exchange
- C.0.3 Role of the Southwest Georgia Regional Commission (SWGRC)
- C.0.4 Ownership
- C.0.5 Scope of Work
- C.0.6 Technical Considerations (Engineering Report Excerpt)
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  - C.0.6.2 Permitting
  - C.0.6.3 Geologic Setting
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- C.0.9 Schedule
  - Table 5: Proposed Schedule
- C.0.10 Budget Estimate

C.1.0 How the Project is Innovative

C.2.0 How the Cost of the Project Compares to Traditional Approaches to New Water Supply
- Table 6: Comparative Project Costs

C.3.0 Whether This Innovative Approach Can Be Replicated, or Is Being Replicated, in Other Places in the State or Within a Given Region

C.4.0 How Easily this Approach Can Meet All Relevant Regulatory Requirements Including Permitting (Federal and State, if both apply)

C.0.0 Detailed Narrative

C.0.1 Introduction

Typically water supply projects in Georgia have involved wells, reservoirs, or intake structures on surface water bodies; in these cases, water is withdrawn, treated, and then piped to users, who are typically industries, municipalities, or other entities. However, as GEFA points out in their interpretation of the Governor's Water Supply Program, the concept of water supply is much more comprehensive and specifically includes stream flow augmentation. Stream flow augmentation is a technology that can help mitigate the impacts of upstream users on downstream users during times of severe drought when the environmental impacts, such as the destruction of wildlife and aquatic habitats[1] and impaired waste assimilation capacity/reduced dissolved oxygen of low stream flows are often critical.

The project as described in this Application (the "Project"), proposes to use the concepts of (a) Aquifer Storage Recovery (ASR) and (b) utilization of deep aquifers (DA), not specifically identified in EPD's Regional Water Supply Plans as having sustainability problems[2]. Basically water stored as part of an ASR system and/or withdrawn from deep aquifers not having identified sustainability problems will be pumped directly into the Chattahoochee River or indirectly into the Flint River via tributaries during times of low flow. Water scarcity (dry surface streams) is a common phenomenon during times of drought in Southwest Georgia. For example, during the drought years of 2000 and 2001, the State of Georgia under the Flint River Drought Protection Act paid farmers not to irrigate out of concern about low flows in the Flint River Basin.

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[1] These would include some of the rare, threatened, and endangered mussel colonies specifically identified/mapped by Joseph W. Jones Ecological Research Center (JWJ) as part of their 2001 project report on the Flint River and its tributaries prepared for the Nature Conservatory. Further, flow augmentation during times of drought also would prevent some wetlands/ponds, which are breeding habitat for some threatened species of amphibians, from drying up thereby allowing these species to better survive. Because of its concerns about riverine habitat, EPD in cooperation with the U.S. Fish and Wildlife Service in 2011 initiated, including the drilling of wells, a pilot flow augmentation project. This project is designed to protect mussels along Spring Creek in Southwest Georgia during times of high irrigation when this creek is susceptible to drying up. Cypress Creek, which flows through one of the proposed drilling sites, is a tributary of Spring Creek; thus the work proposed as part of this Application would complement and augment EPD's work.

[2] In 2001, EPD made an assessment of ASR potential in Coastal Georgia and concluded: "In summary, ASR has the potential to be a useful water resource management tool in coastal Georgia. Some concerns have been identified, but no environmental impacts have been identified that could not potentially be mitigated. An active permit program administered by GAEPD could insure that pre-construction investigations, pilot testing, and ASR design, operation, and monitoring are adequate to achieve the water resource management benefits while mitigating environmental impacts." The observations and conclusions noted above for the 2001 report are appropriate to Southwest Georgia.

In 2011, EPD presented the results of its ground-water modeling in the Georgia Coastal Plain to support the Statewide Water Plan. In this Plan some aquifers were identified as having potential problems with long-term sustainability whereas other aquifers were not specifically identified as having potential problems with long-term sustainability. The aquifers being considered as part of the flow augmentation program are limited to the latter.

In this regard, it is believed that stream flow augmentation will play some role in the resolution of the Apalachicola-Chattahoochee-Flint Basin dispute between Georgia and Florida. How the negotiations between Georgia and Florida will ultimately be resolved is unclear at this time; nevertheless, it is likely that Georgia will need to come to negotiations with a methodology that could address some of the issues that Florida has raised over the past two decades. One of the issues which Florida has raised from the beginning is low stream flow in the Apalachicola River. The work described in the following sections, including the proposed test well program, and also subsequent buildout to full scale, is designed to augment stream flow in both the Chattahoochee and Flint Rivers, thereby increasing stream flow at the Chattahoochee, Florida gage on the Apalachicola River whenever flow drops below a target level such as 5,000 cfs. To achieve this, it is proposed that the capability be developed to pump into either a tributary of the Flint River or directly into the Chattahoochee River up to 250 mgd (387 cfs) for up to seven months per year for up to three consecutive years. With such a level and duration of flow augmentation, it should be possible to mitigate a future drought of similar intensity to the 2006-2009 drought, which was the drought of record in much of the Chattahoochee and Flint River Basins.

The Chattahoochee, Florida gage on the Apalachicola River has been in operation since July 1, 1922. Up until 1981, there were occasional periods when stream flow was in the 5,000-6,000 cfs range; however, in 1981, flow fell below 5,000 cfs for a single day. Thereafter, flows between 5,000-6,000 cfs and lower than 5,000 cfs became more common. In 2008, USGS stream gage data indicate that there was a seven month stretch when daily flow averaged between 5,000-6,000 cfs for six months and less than 5,000 cfs for an entire month (i.e., seven months total).

Examination of Chattahoochee gage data indicates the flow may linger in the 5,000-6,000 cfs range for several months before falling to below 5,000 cfs, or it may quickly drop to below 5,000 cfs in just a matter of days or weeks. When considering that there will be some travel time for flow augmentation discharges to reach the Chattahoochee, Florida gage, it appears prudent, as part of this Application, to technically evaluate a range of scenarios regarding how frequently low flow augmentation may be initiated and associated target storage volume requirements associated with different stream flow rates at which low flow augmentation at 250 mgd may be initiated[3].

For the Project, a hydrogeological analysis utilizing eight peer-reviewed published EPD hydrogeological reports, an online USGS ground-water model of the Cretaceous Aquifer (http://pubs.usgs.gov/wri/1988/4143/report/pdf) and EPD's 2011 numeric ground-water flow model of the Georgia Coastal Plain was performed. Copies of the eight EPD hydrogeological reports are available and can be provided to GEFA on request[4]. The EPD ground-water model served as the technical basis upon which much of the Statewide Water Plan's ground water sustainability

[3] Initiation of augmentation at 5,000 cfs is not being specifically recommended at this time; the amount and timing of augmentation will be part of a negotiated settlement between Georgia and Florida; however, from the point of view of initial analysis for this project, the 5,000 to 6,000 cfs values represent a reasonable range of starting points.

[4] As part of the application, GEFA is requesting engineering reports, if available. Inasmuch as the initial work proposed as part of the project is primarily of a geological nature, several of the technical reports supporting this application are EPD's published reports.

assessment was made; while there is no hard copy of the model report available to provide to GEFA, the link to the report is:

ftp://ftpx.dnr.state.ga.us/../Public/March%202010%20Resource%20Assessments/March%202010%20Resource%20Assessments/

On the basis of geological analysis of the aforementioned documents, three areas have been identified as being amenable to creation of flow augmentation infrastructure as contemplated by the Project. Within these areas, three tracts of state-owned land also have been identified that are suitable for the proposed test well program. The three land tracts are: (1) Florence Marina State Park in Stewart County, (2) Chickasawhatchee Wildlife Management Area (WMA) in Baker County, and (3) Mayhaw WMA in Miller County (see Figure 1, which is a State of Georgia Highway Map showing general area locations)[5].

The proposed Project work described in this Application includes well construction, pump testing, equipping and cycle testing so that low flow augmentation is possible. The estimated total cost for the Project, which is described in subsequent sections of this Application, is $13.5 million. In addition to the above, the firm of EMB Water LLC has performed an engineering assessment in support of this Application. A summary of this Engineer's Report is incorporated as part of this Application.

As part of this Application, a consistency analysis was made of State of Georgia general environmental laws and policies, including those criteria specifically identified in the GEFA application documents. Included in this is an evaluation of consistency with those portions of the Statewide Water Plan affecting Southwest Georgia (i.e. the Project is within two separate regional water plans; namely (a) The Middle Chattahoochee Regional Water Development and Conservation Plan and (b) the Lower Flint-Ochlockonee Regional Water Development and Conservation Plan). Table 1 following provides the results of the consistency analysis. Table 2 following identifies permitting requirements that will be applicable to work performed as part of the Project and this Application and will be necessary for full implementation of the Project at build out.

[5] All of the work described in this Application will be performed on land currently owned by the State of Georgia. This means that the State will have permanent access to the wells and other infrastructure. Further, all wells and infrastructure constructed and financed as part of this application will be the property of the State of Georgia. At full build-out of the 250 mgd flow augmentation project, some portion of the facilities may involve DA wells and ASR wells on private land; recommendations for this will be provided as part of this project.

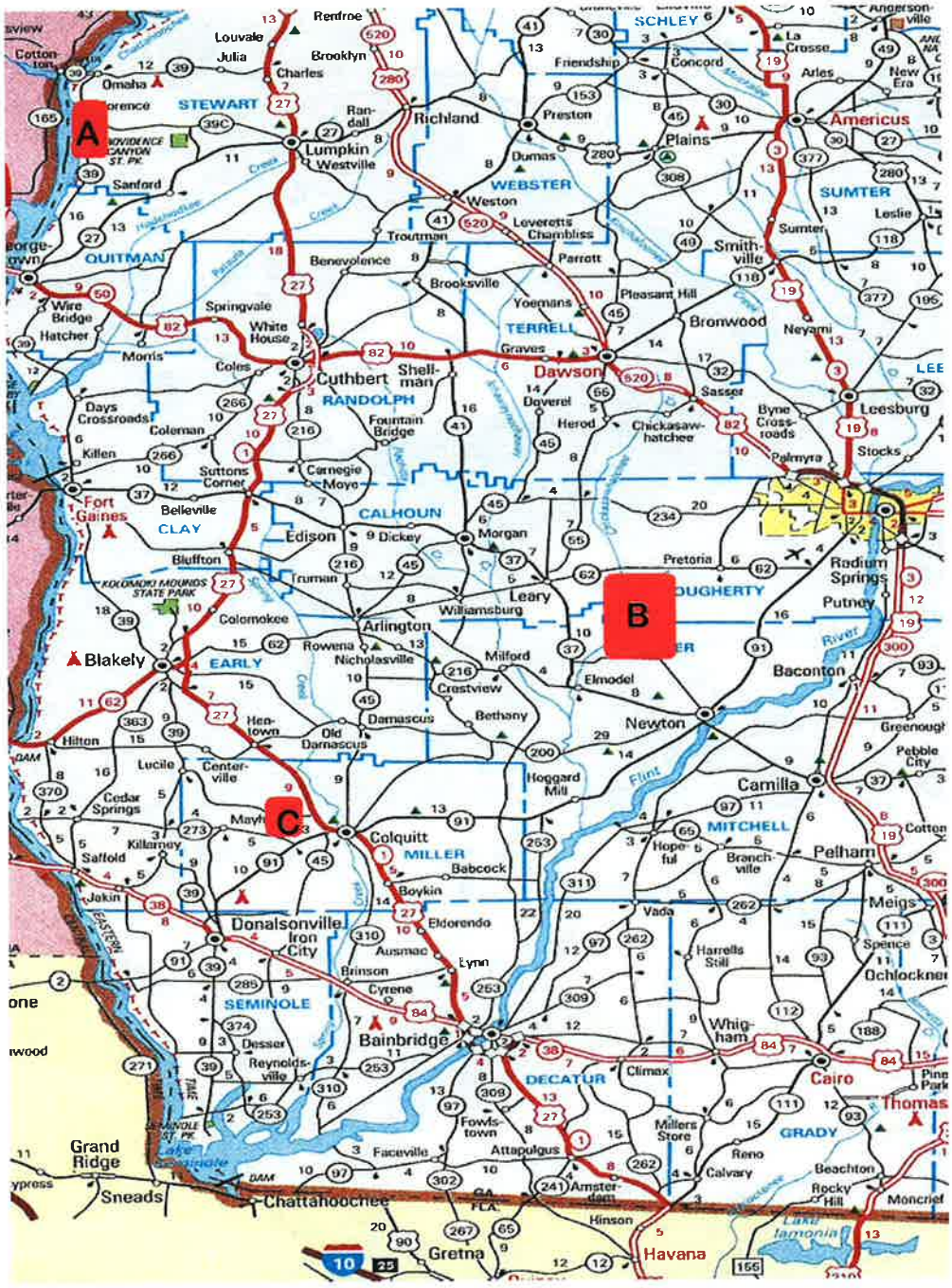


Figure 1: Location Map Showing Flow Augmentation Project Areas (in red). Area A is the Florence Marina Project Area; Area B is the Chickasawhatchee Project Area; and Area C is the Mayhaw Project Area

Table 1

Consistency with State Environmental Law and Policy:

1. **Metro Plan Compliance:** The Project is physically outside of the Metropolitan North Georgia Water Planning District. The compliance criteria associated with this GEFA requirement are not applicable to the Project. However, the proposed Project and subsequent master plan hopefully resulting therefrom offers substantial potential water supply benefits to metro Atlanta.

2. **Conformance with Water Supply Act Regarding Reservoirs (O.C.G.A. § 12-5-472(b) et seq):** The Project does not involve construction or utilization of any existing or proposed reservoir. The compliance criteria associated with this GEFA requirement are not applicable to the Project.

3. **Compliance with That Portion of the Statewide Water Management Plan Dealing with Financing of Multi-Jurisdictional Reservoir Projects:** The Project does not involve construction or utilization of any existing or proposed reservoir. The compliance criteria associated with this GEFA requirement are not applicable to the Project.

4. **Conformance with Water Auditing Rules Promulgated by Georgia DNR Pursuant to O.C.G.A. § 12-5-4.1:** This statute deals with the adoption of minimum standards and best practices for improving efficiency and measuring the effectiveness of water use utilizing water audits. The Project does not involve specific water use or interconnections. The compliance criteria associated with this GEFA requirement are not applicable to the Project.

   It is recognized, however, that ground and surface water monitoring will be necessary at full completion of the Project in order to document the effectiveness of flow augmentation as well as to establish implementation procedures (i.e., when pumps should be turned on or off). An examination of existing USGS ground water monitoring wells and stream gaging stations indicates that the current network is adequate; nevertheless, with time some additional monitoring wells and gaging stations will be needed. The locations and technical specifications of any wells and stations cannot be established at this time but as part of the Project, the locations, specifications, and costs will be identified.

5. **Regional Water Plan Consistency:** The Project is within two separate regional water plans; namely (a) The Middle Chattahoochee Water Regional Development and Conservation Plan and (b) the Lower Flint-Ochlockonee Regional Water Development and Conservation Plan. Neither of these two Water Development and Conservation Plans specifically addresses flow augmentation at the Florida state line (as measured at the Apalachicola gage). Nevertheless, we have reviewed both plans to ensure that our proposed work is not inconsistent with either plan. Consistency with each plan is as follows:

   (a) The Middle Chattahoochee Plan identifies problems in expanding surface water withdrawals from the Chattahoochee River. In this regard, the Plan states:

   Results in the Chattahoochee basin show significant "gaps" (Note: a gap is defined by Georgia EPD to mean that the surface water availability assessment does not account for dramatically reduced lake levels that have been lowered to augment mandated river flows) between available water and minimum lake levels to meet authorized purposes and river flows. Current USACE operation of the system is inadequate.

   The proposal to pump water from the Chattahoochee River, probably utilizing a bank filtration system, on an intermittent basis and only during higher river stages will have minimal or no effect on river flow during lower river stages. Further if such water is utilized as part of an ASR System or derived from aquifers, not identified by EPD as having sustainability problems, the previously withdrawn water will be returned or introduced to the Chattahoochee River at times of lower river stages; in doing this, there would actually be an increased flow in the Chattahoochee during such critical times. Therefore, the Project exceeds the expectations of the Middle Chattahoochee Plan with regard to surface water.

The Middle Chattahoochee Plan addresses ground-water withdrawals from the Claiborne Aquifer. The work proposed as part of this Application, however, does not contemplate any Claiborne Aquifer withdrawals in this area. The proposed wells will be in the Cretaceous Aquifer System; the ground water portion of the Middle Chattahoochee Plan is not applicable to the Project. Therefore, the Project meets (or is not in conflict with) the expectations of the Middle Chattahoochee Plan with regard to ground water.

(b) The Lower Flint-Ochlockonee Plan identifies problems in expanding surface water withdrawals from the Flint River. In this regard, the Plan states:

"The model identified shortfalls in meeting EPD (minimum flow) criteria for surface water flows in the Flint River Basin at Bainbridge.

Address the shortfalls with conservation and supply augmentation practices as much as possible, while also collecting better information to support more thorough evaluation of resource capacity and the impacts of gaps identified by the assessment model on in-stream and downstream uses."

At this time, the work proposed as part of the Project and this Application does not contemplate any surface water withdrawals. Rather it is proposed to pump water from several aquifers into several tributaries of the Flint for flow augmentation purposes. Doing this will increase river flows at times of lower river stages. Therefore, the Project meets the expectations of the Lower Flint-Ochlockonee Plan with regard to surface water and is highly consistent with the high priority management practice of water supply augmentation.

The Lower Flint-Ochlockonee Plan addresses ground-water withdrawals from the Claiborne Aquifer. In this regard, the Plan states:

"Groundwater use is currently within the sustainable yield range identified by the model for the Claiborne Aquifer and above the sustainable yield range identified by the model for the Upper Floridan Aquifer in the Dougherty Plain. Use of the Claiborne Aquifer should be limited geographically as necessary to protect the sustainable yield of this resource. In the Upper Floridan Aquifer in the Dougherty Plain, the impact of groundwater withdrawals on surface water flows in the Flint River Basin should be a determining factor in guiding the location and amount of groundwater use from this aquifer. Collect better and more geographically specific information on groundwater resource capacity, as needed to evaluate specific uses and management practices."

EPD's ground-water model for the Coastal Plain, which serves as the technical basis for the above statement, has been analyzed to identify areas where utilization of the Claiborne appears to be amenable for expansion. The Project, therefore, only proposes to utilize the Claiborne Aquifer south of an east-west line marking the Dougherty-Baker County Line, extending from the Flint River to the Chattahoochee River. South of this line, the Claiborne is relatively deep and is only sporadically used; this area also is distal from areas where the Claiborne is more intensively used. Use of the Claiborne in the proposed Project area should not impact existing users. In addition to the Claiborne Aquifer, the Project proposes to utilize the Clayton Aquifer and possibly the Providence Aquifer. Neither of these other two aquifers is addressed in the Lower Flint-Ochlockonee Plan nor do they appear to be even utilized south of the aforementioned east-west line. Therefore, the Project meets the expectations of the Lower Flint-Ochlockonee Plan with regard to ground water.

The Lower Flint-Ochlockonee plan does identify sustainability problems with increased utilization of the Upper Floridan Aquifer. This is not disputed; however, it may be possible to pump from the Floridan on an intermittent basis (i.e., during times of non-irrigation) when aquifer water levels may tend to be high. This aspect of Floridan Aquifer utilization will be investigated as part of the Project.

6. **Professionalism:** Although not specifically requested in GEFA application documents, all work performed as part of the Project will be performed under the direction of professionals licensed or registered to practice in the State of Georgia. This includes engineers, geologists, well drillers, surveyors, and so forth. Analytical chemical analyses will be performed by EPD- approved laboratories.

7. **Wetlands Issues:** All three sites have been inspected; all three have ample room to perform the work identified in the application without impinging on wetlands.

8. **Hunting:** It is recognized that deer hunting occurs in the WMAs. If appropriate, all drilling and construction sites will be secured by temporary chain link fencing during deer hunting season.

9. **On-site sanitation:** Portable toilets will be provided at all sites.

10. **Waste-water disposal:** All drilling sumps/pits will be of sufficient size to prevent waste drilling fluids from moving offsite. At the conclusion of drilling, the sumps/pits will be filled, compacted and seeded.

11. **Coordination with EPD:** EPD's UIC Coordinator and ACF River Basin Coordinator will be notified of significant Project events via e-mail. If they wish to have site visits, they will be accommodated.

Table 2
Regulatory Framework

Environmental Regulation	Regulatory Agency	Comments
ASR (Underground Injection Control)	Georgia EPD	EPD has primacy for this program from EPA. The technical criteria, including injection and withdrawal rates, water chemistry, and so forth will be based on geological and engineering field investigations, analytical laboratory data, and numeric modeling. It is anticipated that the ASR regulatory program will be similar to those in Florida and South Carolina.
Oil and Gas Deep Drilling	Georgia EPD	This is a State of Georgia environmental program, created by Georgia statute. Some of the deeper wells may be regulated under this program. This is deemed not to be a significant issue.
Surface Water Withdrawals	Georgia EPD	This is a State of Georgia environmental program, created by statute.
Groundwater Withdrawals	Georgia EPD	This is a State of Georgia environmental program, created by statute. Well yields will be based on pumping tests and numeric ground-water modeling.
Surface Water Discharges for Flow Augmentation Purposes	Georgia EPD	This is a State of Georgia environmental program, created by statute. EPD has primacy for this program from EPA.
Stream Buffers	Georgia EPD	This is State of Georgia environmental program, created by statute
Wetlands, including 404 permitting	US Corps of Engineers	Because ASR facilities and wells typically do not involve significant surface area, impact of wetlands/waters is not deemed to be a significant issue. The project also proposes to utilize bank infiltration in lieu of a surface water intake structure(s); if this is technically feasible, then 404 permitting will be avoided.
Erosion and Sedimentation Control	Georgia EPD	Because ASR facilities and wells typically do not involve significant surface disturbance, erosion and sedimentation control is not deemed to be a significant issue.
Historic Sites	Georgia DNR	Some areas near the Chattahoochee River may have been Native American sites.
Rare, Threatened, and Endangered Plant and Animal Species	US Dept of Interior	Because ASR facilities and wells typically do not involve significant surface area or lengthy construction times, negative impact on rare, threatened, and endangered species is not deemed to be a significant issue. On the other hand, the addition of flow augmentation water to tributaries of the Flint River probably will improve riverine and adjacent wetland habitat; this would be a positive impact.
Safe Dams	Georgia EPD	Not applicable
Air Quality	Georgia EPD	Not applicable
Solid Waste	Georgia EPD	Not applicable
Other Wastes	Georgia EPD	Waste drilling muds will need to be disposed of in an approved manner. This is deemed not to be a significant issue.

C.0.2 Suggested Water Exchange

A preliminary estimate of the target storage volume (TSV) required underground in Southwest Georgia to meet anticipated flow augmentation objectives is 400,000 AF. As part of the proposed test program, this estimate will be refined. A key element of this Project when fully implemented, is a suggested "water exchange" whereby an equivalent amount of storage volume (400,000 AF) would be re-allocated by the US Army Corps of Engineers (USACE) at Lake Lanier for low flow augmentation (100,000 AF) and for metro Atlanta water supply (300,000 AF). Water pumped from the ASR or DA wells in Southwest Georgia and discharged to the Flint and Chattahoochee Rivers and their tributaries would be simultaneously released from storage in Lake Lanier. This would supply additional water for metro Atlanta and also augment low flows between Atlanta and Columbus. This would also address water quality issues in the Chattahoochee River immediately downstream of Atlanta, while increasing drought flows between Atlanta and Columbus and farther downstream. Flow augmentation from Lake Lanier plus return flows from Atlanta during droughts (estimated at about 313 cfs) could supplement the increased flows contributed by the ASR or DA wells at the three sites proposed in the Project and this Application (387 cfs), yielding an estimated cumulative total of about 700 cfs low flow augmentation at the Chattahoochee gage on the Apalachicola River.

The projected 2035 need for supplemental water supply for Atlanta is 250 mgd. The Governor's Water Contingency Planning Task Force final report issued in December 2009 evaluated a large number of water supply alternatives to meet this goal. Combined costs ranged from $1.7 billion to $3.1 billion and the time required to bring these projects online was 8 to 12 years or longer. Many of the projects were new surface reservoirs with significant environmental issues and consequent uncertainty as to their viability. The suggested water exchange was not one of the alternatives considered.

During the past two years, our consultant team led by EMB Water LLC has evaluated the proposed ASR/DA plan as an alternative to those options previously considered by the Governor's Water Contingency Planning Task Force. In this regard, a conceptual design of facilities and infrastructure has been prepared as well as a capital cost estimate and estimated schedule to build out. All work to achieve 250 mgd low flow augmentation capacity as contemplated at full buildout could be completed within five years at a capital cost estimated at $0.9 billion to $1.2 billion. Alternatively the low flow augmentation program could be developed in phases. All water would be stored underground or obtained from deeply buried aquifers (DAs) so environmental impacts would be negligible. Through the suggested water exchange, this same supplemental flow of 250 mgd would be made available to metro Atlanta from Lake Lanier. This is less than half the estimated cost of other water supply alternatives to achieve a supplemental 250 mgd water supply for low flow augmentation, and also for metro Atlanta. The actual costs of developing and implementing such a plan could vary from the estimate.

The proposed GEFA funding of $13.5 million for the Project's test well program is projected to provide 6 to 10 mgd of low flow augmentation, or about 2 to 4% of the target 250 mgd.

EMB Water also proposes a Public Private Partnership (PPP) to implement the remainder of the low flow augmentation program, including design, permitting, financing, construction and initial operations. The remaining funds would be obtained by EMB Water through access to the additional water storage in Lake Lanier, reallocated for public water supply purposes to meet projected future demands.

It is anticipated that a commitment by Georgia to augment flows at the Florida state line would likely be an integral part of any eventual settlement of the litigation that has been underway since 1990 between Georgia, Florida and Alabama. Low flow augmentation is an accepted water management approach that has several environmental benefits to riverine ecology and wetland protection. ASR is a proven technology with over 500 ASR wells and over 100 ASR wellfields in 22 states in the USA, and in many other countries. The feasibility of using ASR/DA at the proposed locations is highly probable, however a test program is needed to gather information with which to design and operate the wellfields as an integrated well field operation, to better estimate their yield, and to provide a demonstration project to support the tri-state negotiations. This is a primary goal of the Project.

C.0.3 Role of the Southwest Georgia Regional Commission (SWGRC)

The SWGRC will be responsible for providing Project oversight as well as processing all invoices from consultants and from construction contractors for wells and wellhead facilities. The SWGRC also will invoice GEFA, at project milestone events, to maintain project funding in a timely manner. In this regard:

- The SWGRC will serve as the primary contact with GEFA on the Project.

- To perform the work described in this application, the SWGRC has selected the firm of EMB Water LLC as a sole source consultant [a sole source contractor] to oversee all field investigations and geological/engineering analyses. A description of the unique skills of this firm is provided in the Application as Appendix A. In this regard, the SWGRC has the authority to utilize sole source contractors or consultants to perform or oversee work being done on behalf of the agency. The firm of EMB Water was selected for the Project based on their knowledge and experience of (a) ASR, (b) Georgia well drilling, (c) Georgia geology, and (d) their ability to obtain land access in geologically favorable terrains, particularly public and private lands in the Lower Flint and Chattahoochee River Basins, and for several other reasons. In the selection of well drilling contractors, competitive bids will be solicited. [Note: because of significant differences in drilling characteristics between the three sites, at least two drilling firms will be selected; doing this will permit maximum flexibility for drilling, well construction, and pump testing while accelerating project completion.]

- The SWGRC will conduct bi-monthly project status meetings; the results of the Project status meetings will be provided to GEFA via e-mail.

- The SWGRC will hold meetings with GEFA or EPD, as requested.

- Other SWGRC administrative duties include:

  - Negotiation of the agreement with GEFA for administration of funds;
  - Coordination with DNR for construction of test wells on state lands;
  - Coordination with River Valley Regional Council regarding expenditure of SWGRC grant funds at Florence Marina State Park;
  - Contracting with a minimum of two prequalified well drillers through a competitive bidding process;
  - Contracting with contractors and consultants;
  - Contract administration and payment of approved programmatic invoices;
  - Coordination with GEFA throughout the test program;
  - Invoicing GEFA;
  - Attendance at periodic meetings such as kickoff meeting, prebid, preconstruction, final site inspection, and GEFA coordination meetings; and
  - Preparation and submittal of final reports.

- As discussed in more detail later in this Application, the estimated cost for the Project, being primarily well construction, pump testing, equipping and cycle testing is $13.5 million. Anticipated funding needs are approximately as follows:

Upon signing of the Contract/Agreement	10%
Upon completion of well design	5%
Upon completion of well construction permitting	2%
Upon selection of drilling contractors	15%
Upon completion of 25% of drilling/well construction (by foot)	5%
Upon completion of 50% of drilling/well construction (by foot)	5%
Upon completion of 75% of drilling/well construction (by foot)	5%
Upon completion of 100% of drilling/well construction (by foot)	5%
Upon completion of well construction report	5%
Upon completion of wellhead facilities design	5%
Upon completion of wellhead facilities permitting	2%
Upon selection of wellhead facilities contractors	15%
Upon completion of construction of wellhead facilities	10%
Upon completion of cycle testing	6%
Upon submission of EMB Water LLC's final report	5%
Total	100%

- Invoices will be submitted monthly to GEFA and will be payable within 15 days

C.0.4 Ownership

For the Project work described in this Application, all of the DA wells and ASR facilities/infrastructure will be constructed on lands owned by the State of Georgia. This means

that long term access to these lands is assured. Also, all DA wells and ASR infrastructure funded under the Project as contemplated by this Application will be the property of the State of Georgia. It is anticipated that these wells and ASR infrastructure will be operated and maintained by SWGRC. Ownership of any wells and ASR infrastructure constructed in connection with any future flow augmentation program would depend upon the structure of any such project.

A preliminary hydrogeological analysis indicates that for the Chickasawhatchee WMA and Mayhaw WMA it probably will not be necessary to place any wells on private lands. Depending on the hydrogeologic characteristics of the aquifers underlying the Chickasawhatchee and Mayhaw sites, it is estimated that a total of about 30 wells can be completed and that their combined yield will be on the order of 30-60 mgd. Nevertheless, the exact number of wells and their specific locations will be established on the basis of the program described in this Application. It may turn out that only 25 wells can be constructed on the two sites; on the other hand, it also may turn out that 35 wells can be constructed on the two sites. Only site specific testing will provide the necessary information to resolve this matter. If full scale implementation of the Project in the Flint River Basin is not compatible with DNR's objectives and requirements for the WMA's, additional wells may need to be located on private lands.

At the Florence Marina site in Stewart County, some future ASR wells and wellhead facilities will need to be constructed on privately owned lands. Similar to the above description for the Chickasawhatchee and Mayhaw areas, the exact number of wells and their specific locations as part of any master plan will be established on the basis of the Project's field testing program described in this Application. The flow augmentation program is not dependent on any particular land owner. However, any necessary land rights would have to be obtained from the appropriate governmental or private land owners necessary for the development and implementation of the program.

Regardless of exactly who leases or sells land to the State of Georgia, all of the 22 items specifically identified in the Governor's Water Supply Program Diligence and Document Checklist Item B Real Estate Asset Purchase will be met. Further, no wells or other ASR facilities will be constructed until long term access (at least 50 years) has been assured with the Georgia Department of Natural Resources or the private land owner.

C.0.5 Scope of Work

The scope of work for the Project as contemplated by this Application has five components. These components are:

1. Test three sites, owned by the State of Georgia, for ASR and for withdrawals from DAs. This involves drilling of ASR, production, and monitoring wells at each site. ASR testing at the Florence Marina site also will involve an assessment of bank filtration as a treatment option for recharging local aquifers. At each site, pumping tests will be performed to establish yields and aquifer properties.

2. Assess the flow characteristics at the Apalachicola, Florida gage and locations upstream to estimate travel times and effects from stream augmentation discharges at each of the three

sites on the flows as measured at this gage. Basically this will be a recommendation for when to turn the pumps on and off. Also included in this assessment, will be an estimate of the target storage volume required to achieve flow augmentation objectives.

3. Equip all three sites with pumps, pipelines, power, and so forth so that flow augmentation can be quickly implemented. Conduct cycle testing of the constructed facilities in order to develop their target storage volume and to confirm satisfactory operation during a period of several months.

4. Develop a scope of work with costs and time schedule to fully implement a flow augmentation project capable of delivering 250 mgd (387 cfs) at the Apalachicola gage pursuant to a master plan that would be developed following completion of this test program. Included in this will be the identification of types, depths, and locations for future ASR facilities and DA wells.

5. Describe the above in a technical report and submit appropriate data and analysis to EPD for permitting.

C.0.6 Technical Considerations (Engineering Report Excerpt)[6]

C.0.6.1 Background

As part of the Project, a testing, analysis, and equipping program is proposed at three locations in Southwest Georgia; two in the Flint River Basin and one in the Chattahoochee River Basin. The purpose of the Project's testing and analysis portion of the program is to develop design criteria for three well fields and ASR facilities/infrastructure that would then be equipped to augment low flows in the Flint and Chattahoochee Rivers pursuant to a subsequent master plan. To minimize adverse impacts upon ground-water resources and existing ground-water users in the vicinity of each of the well fields the facilities will be designed not only to augment low flows but also to recharge the aquifers with surface water treated to meet primary drinking water standards. Recharge will occur during months when river flows are average to high and when irrigation demands are low. Water will be stored underground via dual-purpose aquifer storage recovery (ASR) wells and will be recovered from the same wells when needed for low flow augmentation (LFA). Where ASR appears to be inappropriate, ground water from aquifers not specifically identified by EPD as having sustainability problems will be pumped directly to the Chattahoochee River or indirectly to the Flint River via tributaries. In addition to the field testing, hydrogeological analysis will be performed by a Georgia Professional Geologist (PG) to identify areas favorable for wells and ASR facilities. An analysis of data from the Chattahoochee, Florida, stream flow gage and upstream locations will also be undertaken by a Georgia Professional Engineer (PE) so that optimal times to start and stop flow augmentation can be established.

[6] Abstracted from the EMB Water LLC Engineering Report, March 19, 2012.

Target recovery capacity at full buildout of the low flow augmentation ASR and DA facilities is 250 million gallons per day (mgd) (387 cfs) for a period of up to seven months during a drought of up to three years' duration, corresponding to a time in 2008 when the Apalachicola River flow at the Florida state line was below 5,000 cubic feet per second (cfs) for one month and below 6,000 cfs for six months (i.e., seven contiguous months). Based upon a preliminary assessment of the duration and frequency of low flows at this location, a preliminary estimate of the Target Storage Volume (TSV) that would be required is 400,000 acre feet (AF), capable of recovering water during droughts of up to about three years' duration, during which recharge periods will be shorter than normal and recovery durations will be longer than normal. Also, based upon a preliminary assessment of local hydrogeology and well yields, expected yield at build out of facilities at the two proposed locations in the Flint River Basin would total about 50 mgd. For the Chattahoochee Basin expected yield is about 200 mgd. These expected values may change reflecting the results of testing and analysis. In the Flint River Basin, larger yields can be achieved and more streams can be improved by spreading the ASR systems to private lands over more of the Basin.

C.0.6.2 Permitting

Georgia EPD has identified four specific types of environmental assessments that will be required for permitting purposes. These assessments, which are included as part of the following Scope of Work, include:

- Study of the subsurface geology and hydraulic properties of ASR target aquifers, adjacent aquifers, and confining units; mineralogy and chemistry of target aquifer matrices and the chemistries of recharge water and target aquifer.

- Bench scale testing and/or chemical equilibrium modeling to determine how the oxygenated surface water may cause leaching of trace metals and how such system could be detrimental to the ASR system.

- Pilot scale testing of an ASR well or wells, permitted according to DNR Rule 391-3-6.13 (Underground Injection Control Class V Well) to determine the feasibility of ASR and to provide information for the design and operation of an ASR system.

- Quantitative analysis and possibly computer modeling to predict how ASR movement of recharge water within the target aquifer and how water could move between aquifers in complex hydrogeologic regimes.

C.0.6.3 Geologic Setting

Tables 3 and 4 below show the estimated geologic setting at each of the three proposed test well locations, including the elevations at land surface and also at the tops and bottoms of all aquifers. A field visit has been conducted at each location by a Georgia PG and several accessible drilling sites have been identified. All three locations are on state-owned land, thus long term access is confirmed.

Table 3
Geologic Setting at Proposed Test Well Locations
Chickasawhatchee WMA and Mayhaw WMA

Aquifer	Chickasawhatchee WMA	Data Source	Mayhaw WMA	Data Source
Ground Surface Elevation	123'	GPS	185'	GPS
Top of Upper Floridan	at land surface	State Geologic Map	at land surface	State Geologic map
Bottom of Upper Floridan	-100' +/- 50'	HA #10	-100' +/-50'	HA #10
Thickness of Upper Floridan	200' - 250'		200' - 250'	
Top of Claiborne	-150' +/- 50'	IC # 55	-150' +/-50'	IC # 55
Bottom of Claiborne	-300' +/- 50'	IC # 55	-350' +/-50'	IC # 55
Thickness of Claiborne	150' +/- 50'	IC # 55	200' +/- 50'	
Top of Clayton	-500' +/- 100'	IC # 55	-650' +/- 50'	IC # 55
Bottom of Clayton	-700' +/- 100'	IC # 55	-900' +/- 100'	IC # 55
Thickness of Clayton	250' +/- 50'	IC # 55	300' +/- 100'	IC # 55
Top of Providence	-800' +/-100'	HA #11	-1050' +/-100'	HA #11
Bottom of Providence	-1050' +/-100'	calculated from HA#11	-1300' +/-100'	calculated from HA#11
Thickness of Providence	250' +/-50'	HA #11	250' +/-50'	HA #11

Table 4
Geologic Setting at Proposed Test Well Location
Florence Marina State Park

Florence Marina State Park	
Ground Surface Elevation (ft msl)	190-200
Top of Surficial (Providence/Ripley) Aquifer	At land surface
Bottom of Surficial Aquifer (ft msl)	100
Thickness of Surficial Aquifer (ft)	90-100
Top of Cusseta Formation (ft msl)	100
Bottom of Cusseta Formation (ft msl)	50
Thickness of Cusseta Formation (ft)	50
Top of Eutaw-Blufftown (ft msl)	50
Bottom of Eutaw-Blufftown (ft msl)	-600
Thickness of Eutaw-Blufftown (ft)	650
Top of Eutaw-Tuscaloosa Aquifer (ft msl)	-800
Bottom of Eutaw-Tuscaloosa Aquifer (ft msl)	-950
Thickness of Eutaw-Tuscaloosa Aquifer (ft)	150
Top of Tuscaloosa (ft msl)	-950
Bottom of Tuscaloosa (ft msl)	-1500 to -2000 +

Data Sources: USGS, EPD reports and geophysical logs.

C.0.6.4 Mayhaw Wildlife Management Area

Figure 2 shows the proposed Project location. Several alternate well construction sites have been identified and field checked. With input from the SWGRC, DNR and others, one of these sites will be selected, providing reasonable access and proximity to Cypress Creek, a Flint River tributary. Four wells will be constructed at the selected location. This well is expected to produce one to two mgd of yield for flow augmentation either by ASR mode or by direct deep aquifer pumping.

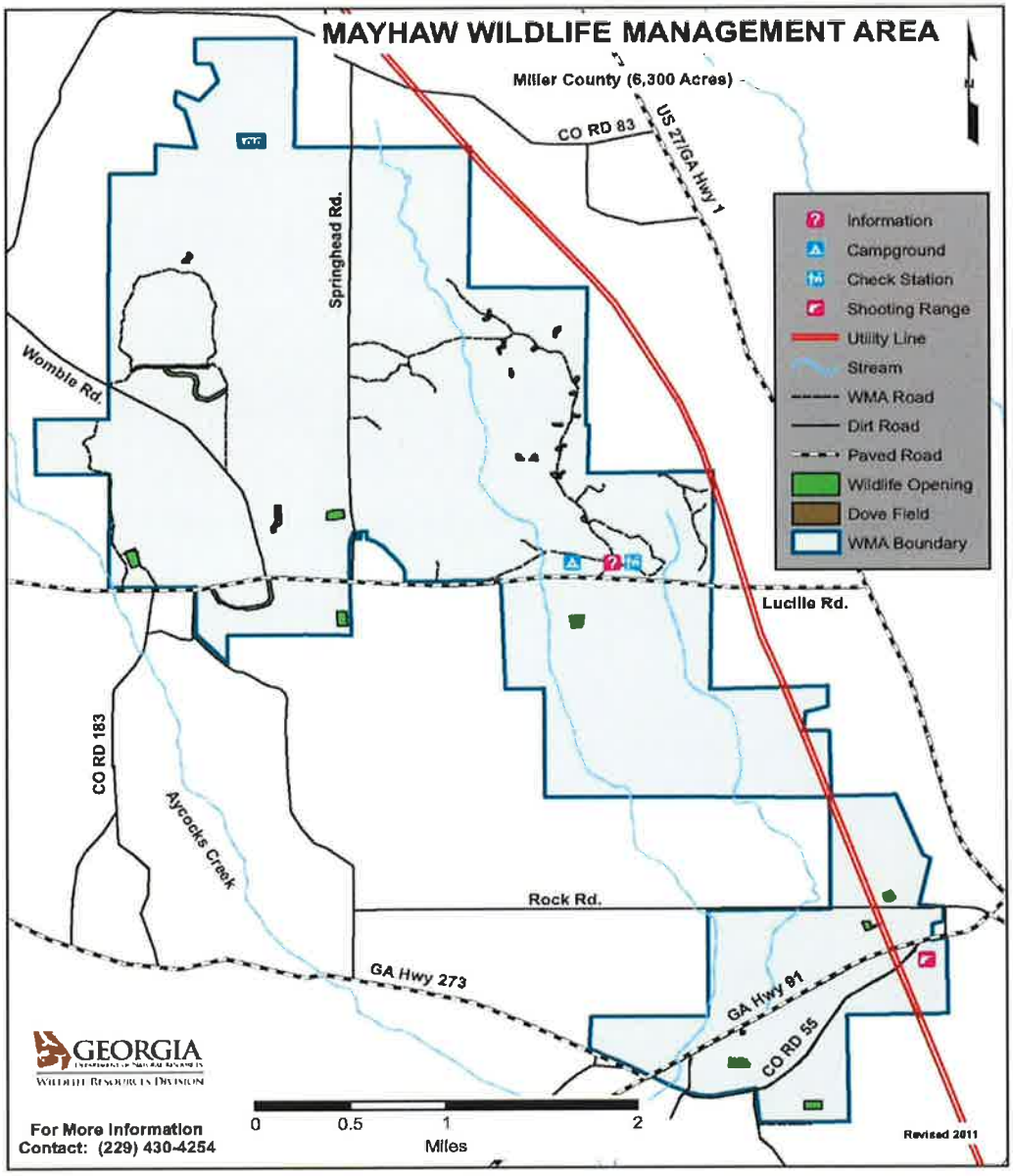


Figure 2: Mayhaw Wildlife Management Area.

Mayhaw WMA - Floridan Aquifer Production Well:

Flow in Cypress Creek may be too small to support a conventional diversion for aquifer storage purposes; however the Upper Floridan Aquifer underlying this area is a productive limestone aquifer and is relied upon regionally for irrigation purposes with estimated average annual withdrawals of 450 to 500 mgd in Southwest Georgia. During months when irrigation demands are low and river flows and aquifer water levels are high, water may be pumped from a production well in the Upper Floridan Aquifer into an adjacent ASR well in underlying aquifers. The viability of this plan will be assessed. While the EPD's Lower Flint-Ochlockonee Regional Water Plan identifies the Upper Floridan Aquifer in the Mayhaw WMA as having sustainability issues, these issues may not be significant if pumping from Upper Floridan wells is limited to those times when aquifer levels are high.

Site inspection indicates that there is no surficial aquifer sand at this location. The Upper Floridan well is present at or very near the land surface and will be cased so that water can be pumped from near the base of the aquifer, providing whatever natural bank filtration water treatment that can be achieved as the water moves through the aquifer from the river to the well. Casing will extend to about 235 ft. to facilitate subsequent ASR operations. Well depth is estimated at 285 ft. The aquifer is underlain by a clay confining layer approximately 50 ft. thick. Upon completion of construction, a pumping test will be conducted to confirm well yield and associated water quality.

Mayhaw WMA - ASR Well:

The ASR well will be completed in the Claiborne Aquifer and/or in the Clayton Aquifers[7]. The Claiborne Aquifer contains unconsolidated sand so the well will be provided with a screen at depths between about 335 and 535 ft. The Clayton Aquifer has a consolidated limestone unit in the middle that is expected at depths of between 835 ft. and 1085 ft., so it can be completed as an open borehole. Yield and water quality will be measured, and water level response will be measured in adjacent monitor wells (discussed below). An injection test will then be conducted, pumping water from the Upper Floridan Aquifer well into the ASR well to determine aquifer and well hydraulic response under injection conditions. This well is expected to produce one to two mgd of yield for flow augmentation either by ASR mode or by direct aquifer pumping.

Mayhaw WMA - Monitor Well – Claiborne Aquifer:

A 6-inch monitor well will be constructed in the Claiborne Aquifer to monitor water level response during pumping tests and thereby determine aquifer transmissivity, storativity and leakance. These data will be important for subsequent development of a well field design for

[7] In the mid 1980s, EPD imposed a temporary moratorium on new wells in both the Claiborne and Clayton Aquifers of Southwest Georgia. The rationale for this temporary moratorium was the declining water levels, particularly in the vicinity of Albany. In 1992 the rationale for the moratorium was reassessed, and the moratorium was continued. Inspection of USGS monitoring well hydrographs, however, indicates that water levels for both aquifers show signs of stabilization and rise; thus the moratorium rationale may no longer be appropriate and should be reassessed.

multiple ASR wells. The monitor well at a later date would be utilized to monitor water quality response to ASR operations.

Mayhaw WMA - Monitor Well – Clayton Aquifer:

This 6-inch monitor well would achieve the same objectives in the Clayton Aquifer. This would be the first well constructed at the site, gathering information with which to refine the design of the other three wells, tailoring the estimated casing and hole depths, and screen intervals, to site-specific conditions.

If actual bid prices for drilling come in lower than those preliminarily estimated in this Application, consideration would be given to extending the open borehole at the base of this well at 1,085 ft. to a depth of about 1,300 ft., corresponding to the anticipated base of the Providence Aquifer. This would provide an excellent opportunity to gather data on this deeper aquifer, including lithology and water quality, and a qualitative estimate of possible yield. It is anticipated that the Providence Aquifer may be productive in this area, but slightly brackish. Successful ASR operations in brackish aquifers are common, using the aquifer's favorable hydraulic properties for aquifer storage but recovering fresh water, not brackish water. The pilot hole would be plugged back to the base of the Clayton Aquifer at 1,085 ft. If results from the Providence test well are encouraging, they would open up the opportunity for future ASR operations in all three aquifers (Claiborne, Clayton and Providence) at the same location, significantly increasing low flow augmentation yield at each location in a future ASR well field. A Providence ASR well could then be added to the test well program, possibly as part of this Application but more likely in conjunction with future funding.

Mayhaw WMA - Water Treatment Requirements:

Since no sands are present in the surficial aquifer (water table) at this site, the opportunity for bank filtration treatment is limited to whatever filtration and other natural processes can be achieved by producing water from near the base of the Upper Floridan Aquifer. Coliform bacteria may be present in the water produced from the Upper Floridan well. Underground injection control (UIC) regulatory requirements typically include the need for water injected into an ASR well to meet all primary drinking water standards, including coliform bacteria. An EPA regulatory process exists for designating a site as being suitable for ASR storage of water that is still high quality but does not comply with drinking water standards for coliform bacteria. This process is based upon the known rapid attenuation rate for coliform bacteria during aquifer storage. Under the temperature conditions expected in the storage aquifer, it would be expected that one log cycle attenuation would occur about every three days. Coliform counts in surface waters not subject to serious contamination are typically in the range of about 10 to 2000 MPN (most probable number) per ml, compared to a drinking water standard of 4 MPN/ml. Consequently storage for more than a week or two would resolve this issue from a technical/scientific point of view; however, the EPA designation process may be time-consuming. Consequently the test program will provide for chlorination of recharge water during the planned injection test, resolving this potential regulatory issue at least temporarily.

Depending upon water quality results from the Floridan Aquifer well, a decision can then be made regarding options going forward.

Options could involve no required pretreatment other than that provided naturally through filtration in the Upper Floridan Aquifer, reflecting adequate bank filtration treatment; no required pretreatment due to obtaining an EPA aquifer designation for this site; disinfection using chlorine or ultraviolet (UV) treatment; or elimination of the ASR aspect of a low flow augmentation project at this site, instead using the Upper Floridan well and the Claiborne/Clayton well as supply wells, augmenting low flows when needed. Natural recharge would then be utilized to restore aquifer water levels between drought periods. For the Upper Floridan Aquifer this would be rapid during wet weather periods since this aquifer is unconfined. Natural recharge to the deeper, confined aquifers would be slower.

Aquifer water level declines are already an issue in Southwest Georgia, increasing pumping costs for farmers and adversely impacting stream flows and aquatic ecosystems during dry periods. Accordingly a key objective of this test well program will be to establish design criteria for well field expansion, including the need for construction and operation of treatment facilities. As indicated above, treatment facilities could include just bank filtration, or may require conventional water treatment, including disinfection, to achieve primary drinking water standards.

C.0.6.5 Chickasawhatchee Wildlife Management Area

Figure 3 shows the proposed Project location. Several alternate well construction sites have been identified. With input from the SWGRC, DNR and others, one of these sites will be selected, providing reasonable access and proximity to Chickasawhatchee Creek, a Flint River tributary. Flows in this creek are substantial, with average monthly flows between December and April ranging from 357 to 720 cfs based on flow records since 1939.

Four wells will be constructed at the selected location as part of the Project. Construction and testing will be identical in concept to the four wells at the Mayhaw site; however casing, screen and hole depths will be shallower since each of the formations is closer to its outcrop to the northwest. The base of the Clayton Aquifer is at a depth of about 873 ft. For each well the description of proposed activities is otherwise identical to that for the Mayhaw site and is therefore not repeated herein.

The ASR/DA well at this site is also expected to produce one to two mgd of yield for flow augmentation, either by ASR mode or by direct deep aquifer pumping.

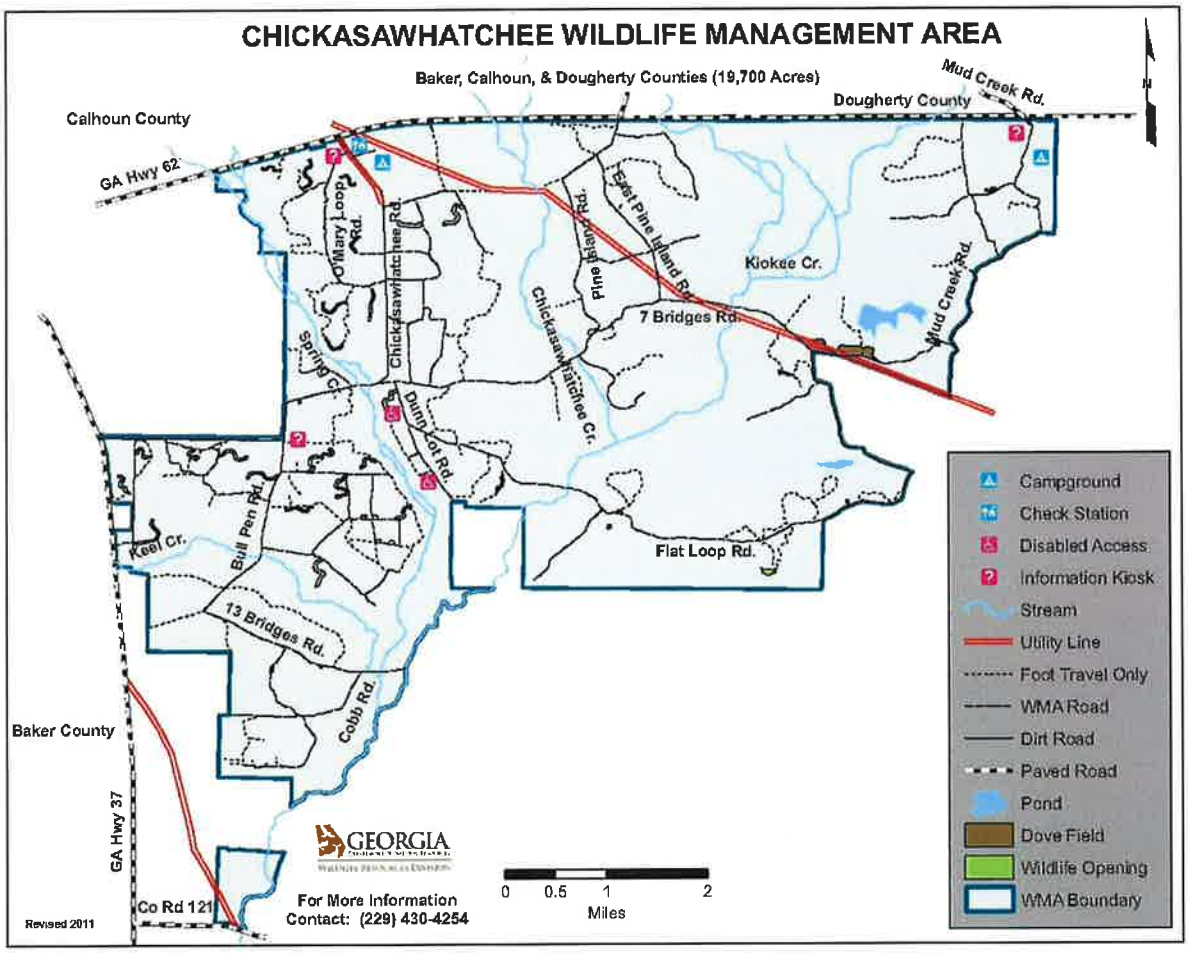


Figure 3: Chickasawhatchee Wildlife Management Area.

C.0.6.6 Florence Marina State Park

Figure 4 shows the proposed project location. The area of the park is 173 acres on the east bank of the Chattahoochee River in Stewart County. Well construction is proposed at the northern end of the property.

This site is located outside the SWGRC planning area and is within the River Valley Regional Commission (RVRC) area. An agreement between the two RCs will be executed to facilitate implementation of the test well program at this site. The RVRC has offered a letter in support of the proposed project, and such an agreement is reasonably anticipated.

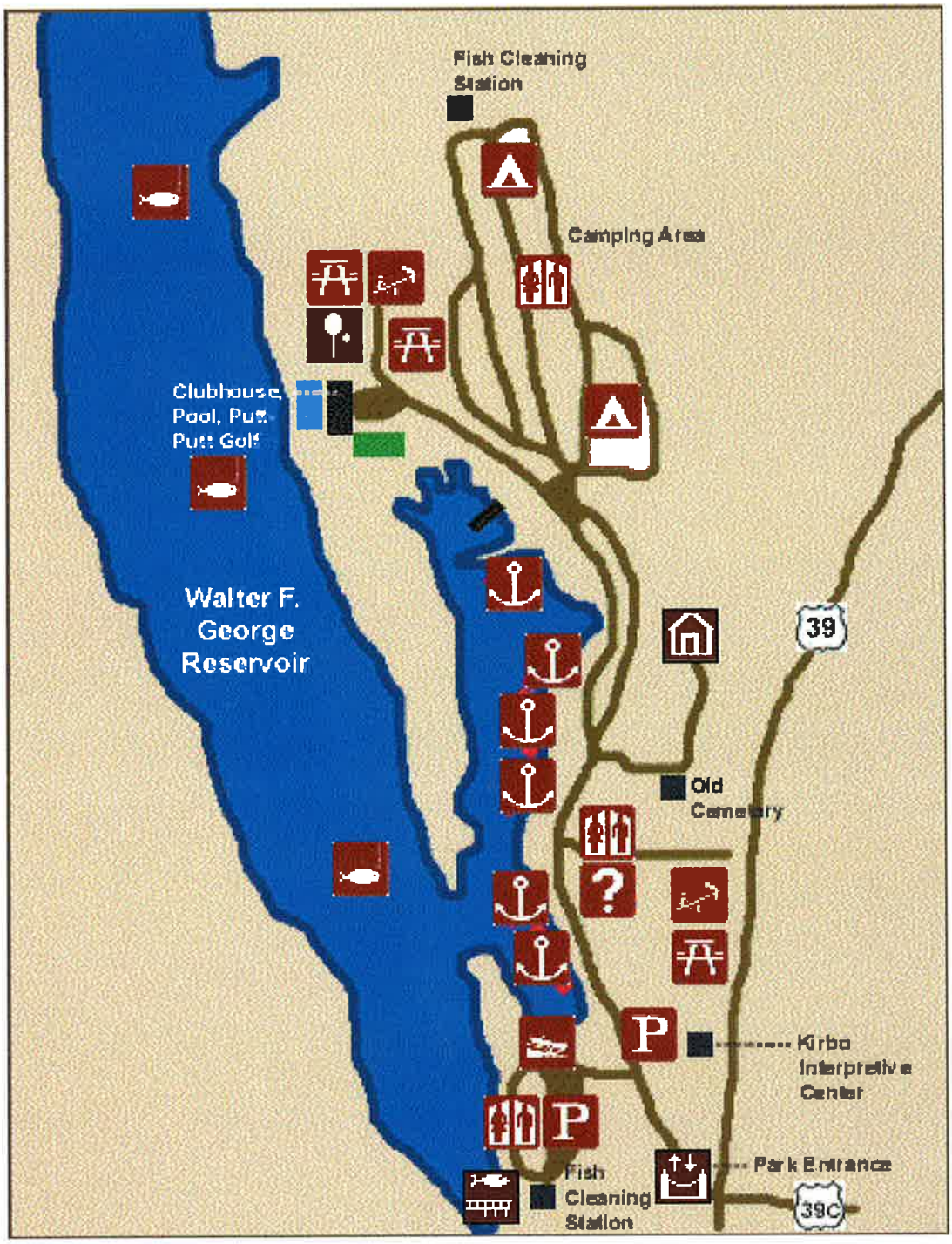


Figure 4: Florence Marina State Park.

Very little site-specific information is available regarding the hydrogeology of this area since there are very few existing deep wells. However this is the outcrop area for the Cretaceous

Aquifer, extending from the Fall Line in Columbus downstream for approximately 50 miles. High yield wells have been developed in this formation at other locations elsewhere in Georgia and along the east coast of the United States. Expected individual well yields in each of two primary aquifers within this formation are up to about 2-3 mgd. A single site with two adjacent wells, one completed in each aquifer, could potentially yield up to a total of 4-6 mgd. The potential storage aquifers for ASR purposes are believed to be the Eutaw-Midville Aquifer and the Eutaw-Tuscaloosa Aquifer. These are referred to as the "Upper Aquifer" and "Lower Aquifer," respectively. Expected well depths are approximately 700 ft. and 950 ft., respectively. These are unconsolidated sediments comprising sands and clays so the wells would be screened.

The deep aquifer is not expected to have any significant hydraulic connection with the shallow, surficial aquifer or with the Chattahoochee River, reflecting the considerable thickness of overlying clay formations. The shallow aquifer is also believed to be overlain by substantial clays, however there is a somewhat higher possibility that a hydraulic connection exists between this aquifer and the surficial aquifer. Testing is needed to establish aquifer hydraulic properties, and the possible hydraulic connection with the Chattahoochee River. Test results will provide a basis for well field design, balancing storage between the two aquifers so that no significant loss of water from the river occurs during ASR recovery periods.

All test well activities at this site would be conducted at the north end of the park at locations and in ways agreed to by DNR, so as not to interfere significantly with park activities and operations. Figure 5 shows the north end of the park, where DNR owns some 70 acres in fee simple. There appears to be ample room to drill and construct the proposed wells in this area. Some brush clearing will be necessary. A temporary fence will also be needed for public protection during drilling and testing. At the completion of field work, the cleared areas will be reclaimed and replanted as directed by DNR.

Florence Marina State Park - Continuous Wireline Core Hole:

A core hole will be constructed from land surface to a depth of 1,500 ft., thoroughly characterizing the lithology and mineralogy of the sediments and providing high quality data to guide the refinement of current estimates regarding casing depths, screen intervals and well depths. Selected cores and samples will be sent to a core lab and a water quality lab for detailed analysis. Mineralogical and water quality data will be utilized to conduct a geochemical analysis, addressing the potential for subsurface geochemical reactions such as precipitation, solution or mobilization of metals, resulting from mixing recharge water and ambient groundwater in the presence of minerals present in each of the aquifers.

Figure 5: Test Area at Florence Marina State Park (within red boundaries at north end)

Florence Marina State Park - Bank Filtration Well:

Several soil borings will initially be obtained along and perpendicular to the alignment of a proposed bank filtration well. Surficial aquifer sands are known to be present at this location however the depth and thickness of the sands is unknown. Nevertheless, it is reasonable to anticipate that alluvial sands would be present in sufficient thickness to provide for a bank filtration well to treat water from the Chattahoochee River, producing water most likely meeting primary drinking water standards. The well would extend about 200 ft. from the river bank and would be about 900 to 1,000 ft. long with the south end near the south property line. This test well may be constructed using horizontal directionally-drilled (HDD) pipeline technology. Alternatively the soil borings may perhaps indicate that adequate yield for test program purposes could be obtained from one or more vertical wells in the shallow sands. Upon completion, the well will be pumped to establish a flow path from the river to the well. Initially the water will be pumped back to the river. After that the water will be pumped to the two ASR wells at this site as part of two successive short-term injection tests, one on each well.

Based on the geology of the area, the subsurface at the Florence Landing site should contain considerable subsurface floodplain sands. The site is on the outer edge of a convex (or higher energy) meander bend, where finer sands, silts, and clays would have been winnowed away during the fluvial depositional process. Field inspection also indicates that most of the larger diameter pine trees are dead, apparently having being killed as a result of the rising water table associated with flooding of Lake Walter F. George. Nevertheless this geological interpretation needs to be verified. In the event that site studies indicate that bank filtration is not viable at the Florence Marina site, the scope of work will be adjusted as follows: (a) identify nearby privately owned lands and secure appropriate long-term leases and perform the aforementioned bank filtration studies on these lands; and/or (b) conceptually design, define permitting constraints, and cost out an appropriately-sized surface water intake structure.

Florence Marina State Park - ASR Well – Lower Aquifer:

This well would have 18-inch inner casing to a depth of about 800 ft. and 12-inch screen to about 950 ft. The casing diameter will be capable of supporting a 3 mgd production rate if the well will provide it. Upon completion pump testing will be conducted, followed by an injection test, and followed by recovery of the injected water.

Florence Marina State Park - ASR Well – Upper Aquifer:

The same construction and testing approach will be followed as for the Lower Aquifer ASR well. However the casing depth will be about 500 ft. and the screen depth will be about 700 ft.

Florence Marina State Park - Monitor Well – Lower Aquifer:

This will be the first well to be constructed following completion of the core hole. The well design will incorporate several features providing flexibility to deal with uncertainty regarding the number of casings required to complete the well as a 6-inch monitor well. The design of subsequent wells will be adjusted as necessary to reflect experience gained during construction of this first well.

Florence Marina State Park - Monitor Well – Upper Aquifer:

Also to be completed as a 6-inch monitor well, this well will have 500 ft. of casing and 200 ft. of screen.

Florence Marina State Park - Additional Test Well Program Tasks during Construction:

These tasks will involve clearing approximately five acres to provide site access, including temporary roads; a survey to establish horizontal and vertical control of the site; approximately 10 two-inch PVC water table monitor wells; and a provision for replanting trees in the cleared area following construction.

Florence Marina State Park - Water Treatment:

It is anticipated that water produced from the bank filtration well will most likely meet primary drinking water standards, requiring no further treatment prior to injection. However until this is shown by water quality lab results, such an outcome cannot be assumed. Accordingly the water to be injected into the two ASR wells during the test program will be disinfected with chlorine. Disinfection byproducts attenuate naturally during ASR storage.

C.0.6.7 Well Equipping

At all three sites the wells will be equipped with permanent access, power supply, well house buildings, river discharge structure, piping, valves, pumps, motors, electrical and monitoring equipment, and controls. Expected combined low flow augmentation capacity will be in the range of 6 to 10 mgd.

C.0.7 Engineering and Hydrogeological Consultant Services

Implementation of the Project's test well program will require a range of contracted engineering services in conjunction with construction activities at all three sites. Engineering services will include at least the following:

- Coordinate with the DNR on permission and activities in the two WMA's and at the State Park
- Prequalification of well drillers
- Design of wells and wellhead facilities
- Procurement of well drilling contractors
- Permitting of wells and related activities through Georgia EPD
- Completion of this test well program
- Resident observation during well construction and testing. This will be provided by or under the direction of a Georgia PG and/or a Georgia PE
- Provide construction management services for wells and wellhead facilities such as review of shop drawings and pay requests; preparation of record drawings; laboratory water quality analyses; coring and core lab analyses; geochemical analyses; surveys; soil borings; archeological survey; land clearing and tree replanting
- Ground-water modeling at all three test well sites
- Assessment of long-term flow records at the Chattahoochee, Florida, gaging station, and reservoir operations along the Chattahoochee River, to establish operating criteria for low flow augmentation and for aquifer recharge at all three wellfields, and to estimate the target storage volume
- Meetings (kickoff, prebid, preconstruction, final site inspection, interim project coordination meetings, final presentation(s))
- Cartographic and reproduction services
- A report summarizing results of the test well program and recommendations for well field build out
- Preparation of a conceptual design for well field expansion in all three areas to achieve ASR goals, and a suggested operations plan. Prepare a preliminary cost estimate for construction and operation of well field facilities
- Coordination and communications with EPD and others to assist with effective integration of the ASR flow augmentation test program results into development of long range plans to meet Georgia's anticipated future water supply needs, including possible guidance regarding tri-state negotiations
- Project management tasks such as coordination with SWGRC and GEFA; scheduling; invoicing, preparation of monthly status reports; contractor coordination; meetings and conference calls

C.0.8 SWGRC Administrative Tasks

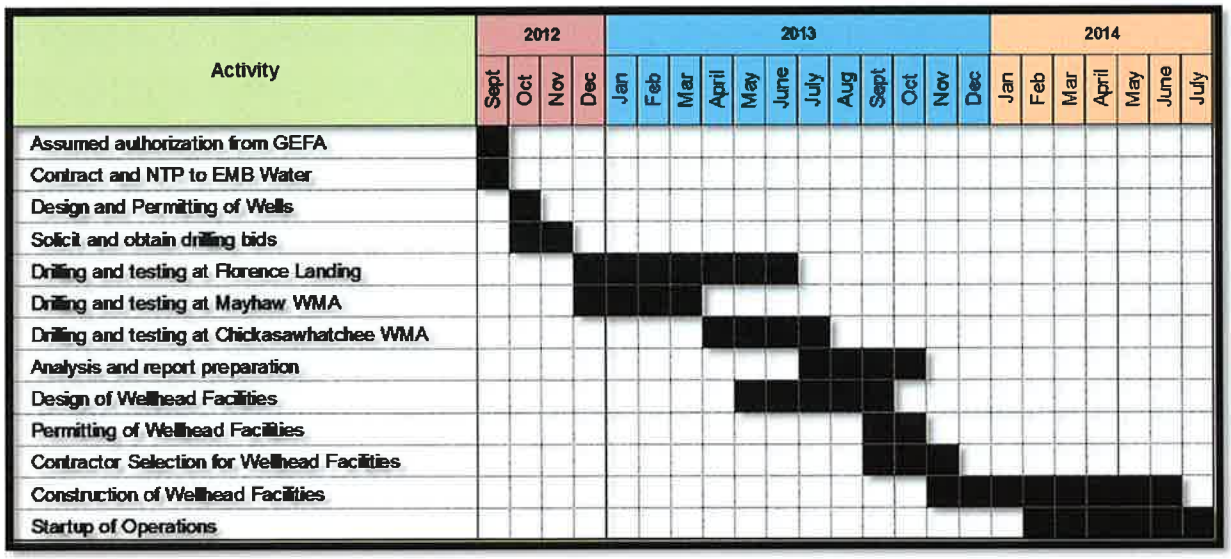
SWGRC will serve as the local government recipient for State Direct Investment funds for the ASR test well program. Tasks to be implemented by SWGRC will include at least the following:

- Negotiation of the agreement with GEFA for administration of funds
- Coordination with DNR for construction of test wells on state lands
- Coordination with the RVRC regarding expenditure of SWGRC grant funds at Florence Marina State Park

- Contracting with a minimum of two prequalified well drillers through a competitive bidding process
- Contracting with contractors and consultants
- Contract administration and payment of approved programmatic invoices
- Coordination with GEFA throughout the test program
- Invoicing GEFA
- Attendance at periodic meetings such as kickoff meeting, prebid, preconstruction, final site inspection, and GEFA coordination meetings.
- Preparation and submittal of final reports

Upon completion of the Project's test well program, it is anticipated that the SWGRC would retain the services of an ecological contractor to assist during design, permitting and operations of flow augmentation wellfield facilities. This contractor would establish baseline conditions and monitor ecosystem response to flow augmentation operations.

Table 5
Proposed Schedule



C.0.9 Schedule

Table 5 shows a proposed schedule in months following execution of an agreement between the SWGRC and EMB Water for implementation of the Project. SWGRC anticipates negotiating and entering into such agreement upon award of the grant based upon the terms and conditions of the grant.

C.0.10 Budget Estimate

The SWGRC has prepared a conceptual design and budget estimate for implementation of the proposed Project test well program. The estimated cost of the Project is $13,500,000, including an administrative fee by SWGRC. Further details are provided in Appendix B.

This budget estimate is a preliminary estimate of the Project cost for construction and equipping of the test wells and monitor wells, and for related engineering and hydrogeological consultant services. This estimate is a budget estimate prepared based upon available information and is not a bid to perform such work for that amount. The budget estimate has been prepared by Georgia licensed professional engineers and professional geologists who are experienced with implementation of such test well programs. Well construction costs have been reviewed and found to be reasonable by a Georgia certified well driller. Construction cost estimates for equipping the wells are based upon experience from other similar, recently bid projects. Consulting services tasks have been identified and best estimates have been prepared for each of these tasks. A 10% contingency has been added by SWGRC to provide flexibility to accommodate changes in project cost resulting from competitive bids which will reflect material costs and market conditions at the time of bidding and also potential changes in scope or level of effort for consultant tasks If this funding application is approved by GEFA and project costs exceed or are lower than the amount funded, SWGRC will discuss with GEFA and with our consultant, EMB Water LLC, an appropriate course of action that is most beneficial to Georgia. This could include a reduction in the project scope to stay within the amount funded, such as by deferring equipping of one or more wells to a later date. Alternatively this could include commissioning of additional tasks that would enhance the value of the flow augmentation program. A possible example would include extending the test program at the two WMAs to include an evaluation of the deeper Providence Aquifer for ASR and flow augmentation purposes, as discussed in Section C.0.6.4 of the Application.

C.1.0 How the Project is Innovative

Innovation differs from invention in that innovation refers to the use of a new idea or method, whereas invention refers more directly to the creation of the idea or method itself. For the flow augmentation process for the Project as described in this Application, it is noted that neither ASR nor pumping from DA wells represents truly new technologies; in fact drawing water from aquifers has been employed for thousands of years. What makes this project innovative first is its scale. At full implementation, it is large enough to make a significance difference in the manner in which Georgia ultimately manages water in the ACF Basin. Second, it is innovative in that it is for flow augmentation to alleviate specific existing problems in several important streams.

The following are several key innovative characteristics of the Project:

- At full build-out, the flow augmentation process developed by the Project could likely produce on the order of 250 mgd for seven months per year for three consecutive years during a 3-year drought.

- This large volume of flow augmentation water pursuant to the Project could offset some upstream consumptive losses, such as those of the Metro Atlanta Water Planning District, and agricultural irrigation in Southwest Georgia.

- The Project can be fully implemented in five years, which is half the time, and at half the cost, of providing the same amount of augmentation water from surface reservoirs.

- This large volume of water could improve riverine habitat in Georgia and Florida. By adding water to the Chattahoochee and Flint River systems, some streams and wetlands would be replenished and prevented from drying up. Moreover, the project is truly unique in that it provides an opportunity to make an existing situation better; that is communities of some rare, threatened, and endangered species, (particularly those downstream of flow augmentation discharges) would be able to survive prolonged droughts.

- The introduction of this large volume of water could improve water quality as well as improve waste assimilative capacity.

- The primary aquifers under consideration are deeply buried and little used. Currently, this unused ground water simply flows deeper and deeper in the subsurface, eventually becoming salty, and ultimately discharging offshore on the Atlantic Continental Shelf, benefiting no one. Use of these aquifers will not reduce the water available to farmers from the Floridan Aquifer, from which most of the irrigation occurs.

- ASR and DA wells are not physically large and simply do not take up much space. For example, a well house need not be more than about 15' x 30'. Land surrounding wells and ASR facilities can continue to be utilized as it has in the past.

- ASR and DA wells can be added at one time or in phases, if desired. Typically such large wellfields are constructed in two or more phases. Phasing provides economic benefits to those paying for the infrastructure.

- Existing Georgia environmental protection statutes are adequate to permit the project. The need for coordination with or obtaining permits from federal agencies appears minimal and probably only would be on a case-by-case basis.

- While not a specific objective of the Project, full implementation pursuant to a master plan could have a positive impact on the water negotiations between Georgia and Florida by demonstrating the viability and effectiveness of low flow augmentation. At no additional cost, full implementation could also provide a 250 mgd supplemental water supply for metro Atlanta from Lake Lanier via the suggested water exchange mechanism if implemented. Water exchanges are increasingly common around the United States, facilitating cost-effective solutions to local and regional water management issues.

C.2.0 How the Cost of the Project Compares To Traditional Approaches to New Water Supply

Based on GEFA's guidance, the estimates of costs for the Project described in this Application are only based on developing new water supplies. Conservation, water reuse, pricing options, leak detection, and so forth are not considered. The costs associated with traditional approaches to new water supplies, provided below, are based on the "The Georgia Water Task Force Final Report" dated December 2009. While the Task Force tended to concentrate on the Metro North Georgia Area, it did include non-metro options such as ASR in northwest Georgia, South Georgia well fields, and desalination. Cost estimates were based upon physical conveyance of water to metro Atlanta through pipelines and pumping stations. No consideration was given to the potential for flow augmentation or for water exchanges as suggested herein. Further, only capital costs are considered; annual operating costs and the discounting of all costs over the life of the project are not considered. Preliminary estimated typical capital costs for various water supply options are shown in Table 6. The options and their associated yields, costs, and cost per gallon of yield, were derived from "The Georgia Water Task Force Final Report", December 2009.

Table 6
Comparative Project Costs

Project Area/Type	Estimated Yield (mgd)	Capital Costs (millions)	Cost/Gallon
Groundwater			
Lawrenceville GW	6	4.5	$ 0.75
Gainesville GW	5	10.2	$ 2.04
Spalding GW	6	7.2	$ 1.20
Bartow GW	7	11	$ 1.57
Palmetto GW	2	3.2	$ 1.60
South Georgia GW	200	2647	$ 13.24
Average Cost per Gallon			$ **11.87**
ASR			
Metro ASR	20	450	$ 22.50
Lawrenceville ASR	4	19	$ 4.75
Average Cost per Gallon			$ **19.54**
Desalination	**200**	**13,630**	$ **68.15**
Reservoirs			
Big Haynes Creek	45	225	$ 5.00
Dog River	205	951	$ 4.64
Tussahaw Creek	20	64	$ 3.20
Etowah Dam #1	40	351	$ 8.78
Bear Creek	20	225	$ 11.25
Hard Labor Creek	40	428	$ 10.70
South Bear Creek	135	719	$ 5.33
Glades	100	803	$ 8.03
Richland Creek (phase I)	35	341	$ 9.74
Richland Creek (phase II)	80	616	$ 7.70
Forsyth County	85	657	$ 7.73
Gwinnett County	50	962	$ 19.24
Average Cost per Gallon			$ **7.42**
Quarries			
Small Quarry	5	95	$ 19.00
Large Quarry	35	250-750	$ 7.14-21.40
Average Cost per Gallon			$ **8.63-21.13**

Flow Augmentation in SW Georgia (at build out)	**250**	**900**	$ **3.60**
Flow Augmentation in SW Georgia (Test Well Program)	**6 to 10**	**15**	**1.50 – 2.50**

As part of the Lower Flint-Ochlockonee Regional Plan, EPD indicates that ASR projects can cost up to $225,000 per million gallons per year. For an ASR project of 250 mgd for seven months and using EPD's cost figures, the total cost would be about $1.2 billion or about $4.80

per gallon. This value, while somewhat higher than the SWGRC estimate, is still less than most of the identified water supply projects in the Task Force Final Report.

It is apparent that using ASR and/or DAs in Southwest Georgia for flow augmentation purposes is relatively cost-effective and, at build out, is less than about half the average cost per gallon of other water supply alternatives. This is consistent with ASR experience nationwide during the past 30 years.

Another aspect of cost is implementation time; that is, the longer it takes to implement a water supply project, the greater the potential for unforeseen events to affect project costs. Implementation times for the aforementioned water supply projects are as follows in Table 7.

It is further apparent that the estimated five year implementation time for the flow augmentation/ASR option, if implemented at one time instead of in phases, compares quite favorably with other options for supplemental water supply.

C.3.0 Whether This Innovative Approach Can Be Replicated, or Is Being Replicated, in Other Places in the State or Within a Given Region

The concept of using ASR or DAs for significant flow augmentation currently is not being done elsewhere in Georgia; however, hydrogeological analysis performed as part of this application process indicates that the concept can be readily applied to many other areas of Georgia. This would include virtually all of South Georgia, where multiple confined aquifers are stacked on top of another. This means that multiple "target" aquifers are candidates for either ASR or DA pumpage. Candidate areas within Southwest Georgia would include other tributaries to the Flint River including Spring Creek, Ichawaynochaway Creek, and Big Slough. Outside of the Flint River Basin, the flow augmentation approach could be applied directly or indirectly via tributaries to the Suwannee River, Coosa River or the Savannah River.

C.4.0 How Easily this Approach Can Meet All Relevant Regulatory Requirements Including Permitting (Federal and State, if both apply)

As previously mentioned, Table 2 identifies those Georgia and federal regulatory statutes that are relevant to this flow augmentation project. If bank filtration viability can be demonstrated at the Florence Marina Site (and possibly at the Mayhaw and the Chickasawhatchee Sites), it would be unnecessary to seek a 404 permit from the USACE for a conventional diversion intake structure, saving substantial time and money not only for permitting but also for construction and operation of treatment facilities to meet primary drinking water standards and to ensure high quality water for recharge into ASR wells.

Table 7
Comparative Project Implementation Times

Project Area/Type	Implementation Time (yrs)[8]
Groundwater	
Lawrenceville GW	3
Gainesville GW	3
Spalding GW	3
Bartow GW	4
Palmetto GW	4
South Georgia GW	8 to 10
Average Implementation Time	**varies from 3 to 10**
ASR	
Metro ASR	4 to 6
Lawrenceville ASR	3 to 5
Average Implementation Time	3.5 to 5.5
Desalination	**8 to 10**
Reservoirs	
Big Haynes Creek	8 to 12
Dog River	8 to 12
Tussahaw Creek	8 to 12
Etowah Dam #1	8 to 12
Bear Creek	8 to 12
Hard Labor Creek	8 to 12
South Bear Creek	8 to 12
Glades	8 to 12
Richland Creek (phase l)	8 to 12
Richland Creek (phase ll)	8 to 12
Forsyth County	8 to 12
Gwinnett County	8 to 12
Average Implementation Time	**8 to 12**
Quarries	
Small Quarry	8 to 12
Large Quarry	8 to 12
Average Implementation Time	**8 to 12**
Flow Augmentation	**5 years assuming work being done at all three sites**

[8] Narrative in Task Force Final Report suggests that some of the identified projects may face public opposition; this suggests that the identified implementation times may be low.

(3) WATER SUPPLY NEED

How soon (year/month) do you expect to experience a water supply shortfall for your water system? Cite and explain the basis of your answer, such as Regional Water Plan(s), MNGWPD Water Supply Plan, local calculations (attach), water quality issues (attach explanation), or other.	See Attachment A*
What is the magnitude in million gallons per day (MGD) of the water supply shortfall you are expected to experience in 2050?	229 Average See Att. B
What was the lowest number of days of available water storage your system reached during the drought of 2007?	N/A
What is the average daily May to October water use of your current water supply system (in MGD)?	N/A
Is the proposed project already part of your existing water and sewer master plan?	☐ YES ☉ NO
Does your water system purchase water?	☐ YES ☉ NO
What percentage of your water use in the summer of 2007 was met through purchased water?	N/A
What is the safe dependable water supply yield of your system (MGD annual average yield)?	N/A
If you rely on a groundwater well for supply, is your well being fully utilized?	☐ YES ☐ NO N/A
If you rely on a groundwater well, are you using over 80% of the well capacity?	☐ YES ☐ NO N/A
(For reservoir projects only) Will the proposed project reasonably allow for future increases in water supply yield through minor modifications such as increased pump storage, moving intakes, raising the dam, etc.?	☐ YES ☐ NO N/A

Exhibit B, Part 1 Application

ATTACHMENT A

A water supply shortfall for the entire ACF Basin and for the Lower Flint River Basin in Southwest Georgia in particular are occurring now (April 2012). In 2011, several major tributaries of the Flint River went dry, notably Spring Creek (zero flow for about 6 months at the USGS gage near Iron City, and zero flow over miles of Ichawaynochaway Creek for weeks). Flint River at the USGS gage at Newton got to an all-time record low flow in September 2011.

Groundwater levels in the Floridan aquifer in Southwest Georgia this month are significantly lower than at this time in 2011, and streamflow levels at most key streamflow gaging stations are significantly lower than historical averages for this time of year. Many low streamflow records were broken in 2011 in Southwest Georgia in 2011, and it appears conditions can easily be worse in 2012, with another nationwide drought already underway.

Flow augmentation, as could be provided by this project, will definitely be needed by June 2012 and through October 2012 to ensure that some water is retained in critical habitats for federally protected species of endangered freshwater mussels.

Exhibit B, Part 1 Ap(plication

ATTACHMENT B

The Lower Flint-Ochlockonee Regional Water Plan, completed and approved in 2011, contains in Section 5 a comparison of water resource capacities and future needs. Table 5-1 on page 5-2 of the Water Plan summarizes the gap analysis provided by Gerogia EPD. The analysis shows that in 2050 the Flint River at Bainbridge is expected to be below EPD's sustainability criteria 13% of the time (one of the highest percentages found in any of the Regional Water Plans), and that the average shortfall at Bainbridge will be 229 mgd (by far the highest in any of the Regional Water Plans), and the maximum shortfall will be 837 mgd (also by far the highest in any of the Regional Water Plans).

These large shortfalls are the cumulative effect of many shortfalls in the large and small tributaries of the Flint River in Southwest Georgia, occurring as a result of low rainfall, low groundwater levels in the Floridan aquifer (which is highly interconnected to the Flint River and its tributaries, and high amount of agricultural irrigation in the dry growing seasons).

In the Chattahoochee River, no significant shortfalls were indicated in the Lower Chattahoochee Regional Water Plan. However, the Plan did not address what drinking water supply would be lost to the municipal water utilities in the Metro Atlanta region when the US Army Corps of Engineers (USACE) draws down its Chattahoochee River reservoirs (especially lake Lanier) in droughts to meet the federal minimum flow objective of 5000 cfs (3226 mgd) out of Jim Woodruff Dam.

The water supply project for which this application is being made, will reduce the Flint River shortfall immediately upon completion (July 2014) of the first phase. Significant reductions in the shortfall, and significantly less drawdown of Lake Lanier will come in the second phase of this project: scaling up to full flow augmentation capacity of 250 mgd.

(4) PROJECT FINANCING

Please provide the basic information for each of the following questions.

Project cost Give an estimated cost outline for the entire project by line item, including the activities you checked above in Section (2) of this application. If more space is required, please attach additional cost details to this application.

Construction.....	$ 8,375,154
Engineering.....	$ 3,363,976
Land acquisition.....	$ -
Other: Administration (5%).....	$ 586,957
Other: Contingency (10%).....	$ 1,173, 913
Other:____	$
Other:____	$
Total project cost:	**$13,500,000**

If the cost of the project is to be shared by multiple communities, please indicate the cost that each community will be incurring. ***N/A***

	Name of System / Community	*Population*	*Cost per Community*
System / Community #1			
System / Community #2			
System / Community #3			
System / Community #4			
System / Community #5			
Total			

*Funding sources**	*Activities funded with this money* (If too many to describe, write "multiple")	*Date funds available**	*Amount*
Direct State investment (state)	Construction, Engineering		$13,500,000
GEFA loan(s) (state)			$
Bond proceeds			$
Tax revenues			$
Service or user fees			$
Private investment **			$
Other			$
		Total Project Funding	**$13,500,000**
If applicable, what is the ratio of the total project cost to the annual average yield of the project in dollars per MGD?			**$1.35 M to $2.25 M *** **
What is the ratio of non-state funding to state funding (i.e. bond proceeds + tax revenues + fees + private investment + other / direct state investment + GEFA loan)?			**0**
If you are applying for a loan from GEFA under the GWSP, do you seek any special loan terms (e.g. amortization period longer than 20 years or capitalized construction interest)?			☐ YES ☒ NO
If you are seeking special loan terms, please explain here:			

*If a commitment has been secured from any of these funding sources, list the commitment date and attach a copy of the commitment letter.

**** Private investment is expected for Phase 2 (full implementation) after completion of this demonstration project (Phase 1).**

*****Based on expected average yield of 6 to 10 mgd for the wells in Phase 1. Phase 2 ratios will be $3.6 M to $4.8 M per mgd ($900M to $1200M for 250 mgd of yield).**

(5) PROJECT STATUS

A. For ***reservoir projects***	N/A
How soon (year/month) do you anticipate your project will yield new water supply?	
What percent of needed land has already been purchased?	
Has a federal 404 permit been issued for your project by the Corps of Engineers?	○ YES ○ NO ◉ N/A
If not, have you submitted an application for a federal 404 permit?	○ YES ○ NO ◉ N/A
If you have submitted a 404 application, when did you submit it?	
Have you received a permit to build a dam for the proposed project from EPD?	○ YES ○ NO ◉ N/A
Has the Corps of Engineers approved the mitigation plan for the proposed project?	○ YES ○ NO ◉ N/A
Has EPD issued a 401 Certification for the proposed project?	○ YES ○ NO ◉ N/A
Has EPD issued a water withdrawal permit for the proposed project?	○ YES ○ NO ◉ N/A
Has EPD approved your drinking water source?	○ YES ○ NO ◉ N/A

B. For ***ground water supply projects***	
How soon (year/month) do you anticipate your project will yield new water supply?	July 2014
Is this project needed to resolve a current water quality problem? Is so, attach explanation.	○ YES ◉ NO ○ N/A
Have you received approval of your project plans and specifications from Georgia EPD?	○ YES ◉ NO ○ N/A
Have you received source approval from Georgia EPD?	○ YES ◉ NO ○ N/A
Has EPD issued a water withdrawal permit for the proposed project?	○ YES ◉ NO ○ N/A
If you have applied for a water withdrawal permit but EPD has not issued one, what supporting documents have you submitted to EPD, if any?	Not submitted yet
Have you completed a test well (or several) with proven water quantity and water quality that meets or exceeds Georgia standards?	○ YES ◉ NO ○ N/A
Have you obtained all necessary easements for the project?	○ YES ◉ NO ○ N/A
Have you received approval of your wellhead protection plan, and a notice from EPD to proceed with drilling and well construction?	○ YES ◉ NO ○ N/A

C. For *system interconnections*	N/A
How soon (year/month) do you anticipate your project will yield new water supply?	
Is this interconnection project related to providing an emergency supply of water?	☐ YES ☐ NO ☉ N/A
Have you received approval of your project plans and specifications from GA EPD, including all necessary permits and source approval?	☐ YES ☐ NO ☉ N/A
Have you received notice to proceed with construction?	☐ YES ☐ NO ☉ N/A
Have you acquired all necessary easements?	☐ YES ☐ NO ☉ N/A
Have all existing water systems that you will connect to or supply fully approved of this project?	☐ YES ☐ NO ☉ N/A

D. For *indirect potable reuse projects*	N/A
How soon (year/month) do you anticipate your project will yield new water supply?	N/A
Have you received approval of your project plans and specifications from GA EPD, including all necessary permits?	☐ YES ☐ NO ☐ N/A
Have you received notice to proceed with construction?	☐ YES ☐ NO ☐ N/A
Have you acquired all necessary easements (if applicable)?	☐ YES ☐ NO ☐ N/A

E. For *emerging technology or innovative projects*	
How soon (year/month) do you anticipate your project will yield new water supply?	July 2014
Have you received approval of your project plans and specifications from GA EPD, including all necessary permits?	☐ YES ☉ NO ☐ N/A
Is the project you are proposing now being used effectively elsewhere in the United States?	☉ YES ☐ NO ☐ N/A
Have all existing water systems that will connect to or benefit from this project fully approved of this project?	☐ YES ☉ NO ☐ N/A

(6) PROJECT SCHEDULE

If actual completion dates are available, please include them in the appropriate column.

ACTION	ACTUAL DATE COMPLETED (if already done)	ANTICIPATED COMPLETION DATE (if not done yet)
Complete project planning	Click here to enter a date.	**9/1/2012**
Initiated design	Click here to enter a date.	**10/1/2012**
Plans and specs submitted to EPD	Click here to enter a date.	**10/1/2012**
Plans and specs approved by EPD	Click here to enter a date.	**11/1/2012**
Notice of award	Click here to enter a date.	**11/1/2012**
Notice to proceed with construction	Click here to enter a date.	**12/1/2012**
Initiation of construction **(Wells)**	Click here to enter a date.	**12/31/2012**
Completion of construction **(Wells)**	Click here to enter a date.	**7/1/2013**
Equipping of wells		**7/31/14**

Please note that for loans, GEFA will only reimburse eligible costs incurred after the date a *complete* application has been submitted to GEFA.

(7) SCOPE OF PROJECT BENEFITS

Will the proposed project provide water to more than one water system or one community? ◉ YES ○ NO

If yes, how many water systems or communities will be supplied by the project? (See table below)

In the table below, list the current number of customers served by each benefiting system or community and total population impacted (at bottom)

	Name of System / Community	*Population*
System / Community #1	SWGA in Flint & Chattahoochee Basins	218,000
System / Community #2	Middle Chattahoochee Basin	222,600
System / Community #3	Metro Atlanta Chattahoochee and Lake Lanier Users	3,521,4000
System / Community #4		
System / Community #5		
Other / new customers		
	Population Total	3,962,600*

Subsection B: **Regional Statement** Applications will be evaluated on their degree of regional cooperation and impact. On a separate sheet, please provide a detailed statement that describes the regional aspects of your project. The statement should address, at least, the following items:

1. Evidence of significant multi-jurisdictional cooperation in project development, implementation, governance and ownership;
2. Description of any revenue and cost sharing agreement or other intergovernmental agreement(s) associated with the project that describe the allocation of costs, benefits and/or service delivery coordination;
3. Evidence that the project will attract regional investment through a public private partnership, or other collaboration with private investment and/or lending institutions;
4. Evidence that the project leads to improved regional economic competitiveness;
5. Evidence that the project supports/enhances regional development strategies and priorities;
6. Evidence that the project supports and enhances regional institutions;
7. Evidence that the project will result in significant and quantifiable public benefits and impacts in multiple jurisdictions, primarily by providing availability to additional water supply as identified as a need in the local regional water plan.

See "Checklist of Documents To Be Submitted with This Application".

Subsection C: **Additional Impact Statement:** On a separate sheet, please provide a detailed statement that highlights key benefits of the project not already captured in this application. For instance, the impact statement could address at least the following impact metrics: creation of passive recreational opportunities, jobs created or preserved by the proposed project, and project activities undertaken to achieve superior environmental performance (performance beyond that required for federal or state permitting). Applicant may address other relevant impact metrics that describe other benefits of the project. *See "Checklist of Documents To Be Submitted with This Application".*

*Population includes all people living in the Chattahoochee and Flint River Basins in SWGRC region. The people and the economy of 10 counties in the SWGRC region are totally dependent on the ground water in surface water in this region. The project will benefit them all. Middle Chattahoochee Basin includes the population of Harris and Muscogee Counties which get their water from the River. Metro Atlanta population includes people living in Cobb, DeKalb, Forsyth, Fulton, Hall and Gwinnett Counties who depend upon water from the Chattahoochee River and Lake Lanier. The project will benefit them all.

PART 1 Application – Applicant and Project Information
(7) SCOPE OF PROJECT BENEFITS
Subsection B: Regional Statement

GEFA writes:

Applications will be evaluated on their degree of regional cooperation and impact. On a separate sheet, please provide a detailed statement that describes the regional aspects of your project. The statement should address, at least, the following items:

1. *Evidence of significant multi-jurisdictional cooperation in project development, implementation, governance, and ownership.*

2. *Description of revenue and cost sharing agreement or other intergovernmental agreement(s) associated with the project that describe the allocation of costs, benefits, and/or service delivery coordination.*

3. *Evidence that the project will attract regional investment through a public private partnership, or other collaboration with private investment and/or leading institutions.*

4. *Evidence that the project leads to improved regional economic competitiveness.*

5. *Evidence that the project supports/enhances regional economic development strategies and priorities.*

6. *Evidence that project supports and enhances regional institutions.*

7. *Evidence that the project will result in significant and quantifiable public benefits and impacts multiple jurisdictions, primarily by providing availability to additional water supply as identified as a need in the local regional water plan.*

1. Evidence of significant multi-jurisdictional cooperation in project development, implementation, governance and ownership.

From Figure 1, presented earlier, it is apparent that this flow augmentation Project potentially affects significant portions of both the Chattahoochee and Flint Basins. These two basins, along with the Apalachicola Basin occupy about 19,600 square miles (with about 90% in Georgia). The described flow augmentation Project has the potential to positively affect the entire area, particularly if it helps Georgia reach an accord with Alabama and Florida. An accord among these three states will remove the major impediment of uncertainty regarding the expansion of long-term water supplies for business, farmers, and local governments in both basins in Georgia.

For example, flow augmentation in the lower Flint basin by ASR or pumping from deep aquifers can avoid extirpation of threatened and endangered mussels, which can mitigate the need for litigation in federal courts against farmers and/or the State of Georgia by the U.S. Fish and Wildlife Service (USFWS) or third parties under the Endangered Species Act. Further, if the work performed as part of the Project as contemplated by this Application were to show that wells in the deeply buried Clayton Aquifer were each capable of yielding several million gallons per day, then numerous municipalities south of Albany could become viable candidates for new water-using industries.

In a similar light, demonstration of the viability of ASR in Stewart County would simultaneously demonstrate the viability of developing very large well fields, away from the Chattahoochee River, as being capable of supplying many millions of gallons per day to a variety of users pursuant to a subsequent master plan and making it easier to meet federal minimum flow standards at the discharge of Jim Woodruff Dam.

With regard to significant multi-jurisdictional cooperation, the SWGRC has notified all affected local governments within the Region, of the general character of the Application and the project. The SWGRC also has notified the adjoining River Valley RC, of the general character of the Application and the project. Each of the above has been solicited for any comments or concerns regarding project development, implementation, governance, and ownership.

In addition to significant multi-jurisdictional cooperation within the Chattahoochee and Flint River Basins of Southwest Georgia, the proposed project addresses a significant issue for the metro Atlanta area regarding uncertainty of future water supplies. For no increase in capital cost a water exchange may be implemented, providing 250 mgd supplemental water supply from Lake Lanier for metro Atlanta to meet its projected needs to 2050. The concept of a water exchange is increasingly utilized elsewhere in the United States but is new to Georgia. As suggested by EMB Water, aquifer storage volume underground in Southwest Georgia could be exchanged for surface reservoir storage volume aboveground in Lake Lanier.

Benefits could accrue not only to metro Atlanta and Southwest Georgia but also to Columbus and locations upstream on the stretch of the Chattahoochee River between Atlanta and Columbus.

2. Description of revenue and cost sharing agreement or other intergovernmental agreement(s) associated with the project that describe the allocation of costs, benefits, and/or service delivery coordination.

For the Project contemplated by this Application, Direct State Investment is initially being requested. No local governments or private entities in Southwest Georgia have been approached by the SWGRC for funding. All of the DA wells and ASR facilities/infrastructure, funded by this Application, will be the property of the State of Georgia; this means that the State, initially, will be the primary organization that will make the decision regarding the timing of flow augmentation. Because flow augmentation water will be discharged directly into Southwest

Georgia rivers and streams rather than being piped to any municipal water treatment facility, it is not appropriate to propose any cost-sharing agreements or any service delivery agreements for the Project's test program. As mentioned above, significant portions of the Chattahoochee and Flint River Basins of Georgia, including those outside of Southwest Georgia, are the potential beneficiaries of the Project.

3. Evidence that the project will attract regional investment through a public private partnership, or other collaboration with private investment and/or lending institutions.

The Project described in this Application has already attracted private investment funds. EMB Water LLC, to date, has already invested well over $1 million in cash and in-kind services developing the proposed Project and master plan concepts during the past four years. If an expanded ASR and low flow augmentation program is subsequently implemented, additional financing would be required and it is anticipated that such future financing would be provided through a public private partnership that would include private equity and the issuance of tax exempt bonds. In addition, the private sector would likely be called upon to share development risk with the public partner(s).

EMB Water LLC is a Georgia company formed in 2010. It is a joint venture of three companies: Etowah Water Bank LLC, Brasfield & Gorrie, LLC, and Merchant Capital Investments Inc. Etowah Water Bank was formed in 2008 to develop and implement a low flow augmentation/ASR solution to the tri-state litigation. Brasfield & Gorrie and Merchant Capital contributed supplemental capital during 2010, recognizing that the proposed Project has considerable merit and is amenable to potential bond financing through a Public Private Partnership (PPP).

4. Evidence that the project leads to improved regional economic competitiveness.

Currently in the ACF basin in Georgia, the uncertainty regarding long-term water supplies seriously handicaps economic development. Counties and municipalities are unwilling to expand water and wastewater infrastructure development because they don't know if they can recoup the capital costs of such facilities. In a similar light, new and existing water using industries also are unwilling to make capital expenditures because of the uncertainty. Basically much of Georgia in the ACF basin is in a "holding pattern" regarding water resources. Complicating this holding pattern is the fact that water supplies cannot be developed overnight; one or two decades are often needed to take a water supply from concept to full implementation.

At full build out pursuant to a future master plan following completion of the Project, the flow augmentation project will lead to improved regional economic competitiveness throughout the Chattahoochee and Flint River Basins, and in Southwest Georgia in particular. If the suggested water exchange is implemented and water uncertainty is also removed for metro Atlanta, improved economic competitiveness would extend to the state as a whole.

5. Evidence that the project supports/enhances regional development strategies and priorities.

The Project and any subsequent master plan flow augmentation project will support and enhance regional development strategies and priorities.

The Southwest Georgia RC is responsible for serving the public interest of the state by promoting and implementing the comprehensive planning process. Originally formed in 1967 as the Southwest Georgia Area Planning and Development Commission, the Growth Strategies legislation adopted in 1989 changed the name to Regional Development Center, and legislation adopted in 2009, changed the name to Southwest Georgia Regional Commission, and added substantial roles and responsibilities. For over 40 years, the Southwest Georgia RC has helped to focus this 14 county region's leadership, attention and resources on key issues of regional consequence including but certainly not limited to: land use, transportation, recreation, historic preservation, natural resources, solid waste and economic development. Through contractual arrangements, the RC also provides other services such as grant writing and reviewing and commenting on applications for federal assistance.

Water resources are critical to our regional economy, ecosystem, and sustainability. The Commission has over the years invested substantial resources in participating in the assessment and planning process. This effort is the culmination of those investments. The 14 counties and 44 cities of our region rely on the Regional Commission to be constantly vigilant to protect and enhance prime agribusiness opportunities for the 356,000 residents in these 6,000 square miles.

6. Evidence that the project supports and enhances regional institutions.

It is recognized that the primary economic activity of Southwest Georgia is agriculture including agribusiness. Currently EPD has determined that the Upper Floridan, which is the primary aquifer of the region, is at or near full capacity. However, the work being proposed as part of this Application involves gathering geologic information on more deeply buried aquifers. Such deeper aquifers may offer water supply opportunities outside of the work described in this Application. In this regard, it is proposed that at least two meetings be scheduled with University of Georgia irrigation scientists from Tifton and one meeting with the Georgia Well Drillers' Association to describe the results of the project's well drilling activities.

7. Evidence that the project will result in significant and quantifiable public benefits and impacts in multiple jurisdictions, primarily by providing availability to additional water supply as identified as a need in the local regional water plan.

As described earlier, the Statewide Water Plan along with the Lower Flint-Ochlockonee and the Middle Chattahoochee Regional Plans have been reviewed; and the work proposed as part of the Project is fully compatible with both regional plans. Both of the plans, however, follow the charge of the General Assembly focused on local water supply needs; whereas the work being proposed in this Application potentially affects the entire Chattahoochee-Flint River Basins as

well as accommodation with adjacent states. In other words, the proposed work is directed at a larger scale issue and is more comprehensive than the individual plans. Nevertheless, no inconsistencies between the Regional Plan (including the Coastal Plain Ground Water Model) and proposed work are apparent.

In addition to demonstrating the viability of low flow augmentation, the proposed Project's test program would also support the viability and relative cost-effectiveness of the suggested water exchange mechanism, and its beneficial environmental attributes. Accordingly, it is possible that metro Atlanta utilities may be willing to support the issuance of bonds to finance construction of the ASR and DA facilities, thereby significantly reducing the financial burden upon GEFA to pay for resolution of water supply needs at far greater costs and adverse environmental impacts associated with most of the other water supply alternatives. Implementation of this Project's program will therefore not only provide a small initial phase of low flow augmentation capacity and the foundation for expansion of that program in Southwest Georgia, it will also open the door to a relatively simple and cost-effective solution for a negotiated settlement of the GA-AL-FL water litigation and remove uncertainty regarding future water supplies for metro Atlanta.

PART 1 Application – Applicant and Project Information
(7) SCOPE OF PROJECT BENEFITS
Subsection C: Additional Impact Statement

GEFA writes:

On a separate sheet, please provide a detailed statement that highlights key benefits of the project not captured in this application. For instance, the impact statement could address at least the following impact metrics: creation of passive recreational opportunities, jobs, created or preserved by the proposed project, and project activities undertaken to achieve superior environmental performance (performance beyond that required for federal or state permitting). Applicant may address other relevant impact metrics that describe other benefits of the project.

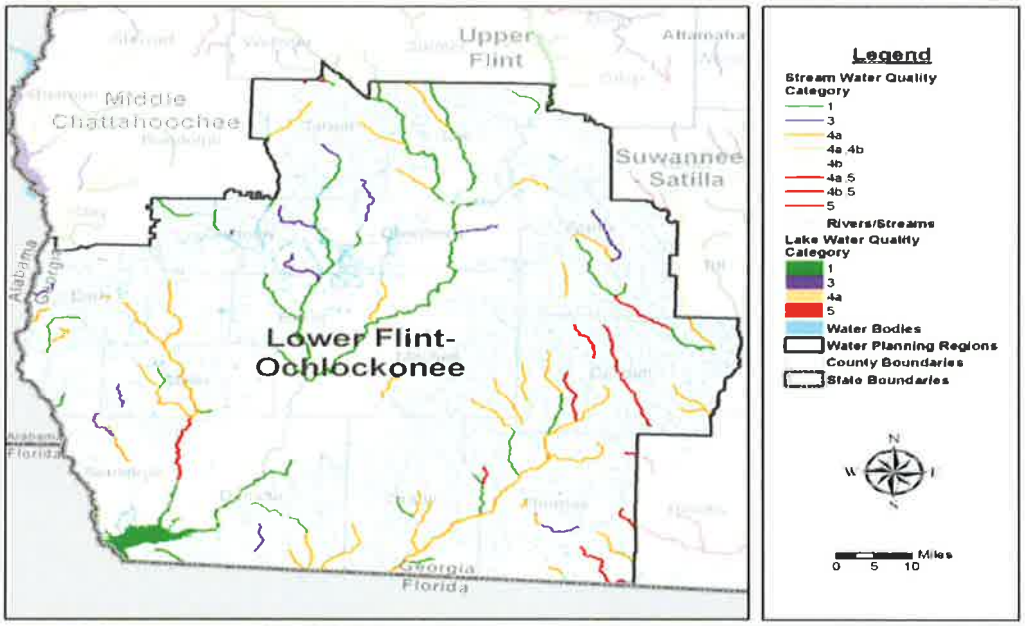
There are four benefits of the flow augmentation Project described in this Application; namely:

1. Provide a mechanism for reaching an accord with Florida regarding the ongoing interstate water dispute. According to a March 25, 2012 article in the Atlanta Journal-Constitution, the State of Georgia and the Atlanta Regional Commission have spent about $18.7 million in outside legal fees in the two-decades-long tri-state water wars. This does not include the cost of scores of thousands of hours spent by State employees and technical contractors, such as the USGS, assessing the Apalachicola-Chattahoochee-Flint River Basin's ground and surface water resources. All of this spending is critical to protect Georgia's economic viability, since a severe shortage of water in these basins could cost Georgia billions of dollars annually. On the other hand, if an agreement with Florida can be reached, this huge potential economic penalty may go away, and Georgia can move out of limbo regarding long-term water supplies. This means that local governments, farmers, businesses, and industries can plan for the future. Doing this has the potential to spur economic development (including creating jobs) throughout the Chattahoochee and Flint River basins. Elimination of uncertainty regarding economic development also means that local governments and industries can have some reasonable assurance that the costs of expansion (i.e., enlarging a water treatment plant, drilling a new well, expanding a manufacturing facility, etc.) are likely to be recovered.

2 Improve the riverine environment in the Apalachicola-Chattahoochee-Flint River Basin. This will include (a) putting more water in the riverine system during times of low flow to protect critical habitat of several rare, threatened, and endangered species in the Basin and (b) putting more water in several streams to improve water quality. EPD's Lower Flint-Ochlockonee Regional Water Plan identifies problems with water quality and protection of species habitat in both the Spring Creek and Chickasawhatchee Creek watersheds. In the Lower Flint-Ochlockonee Region, DNR has identified a number of species on the federal or state lists of rare species, including seven fish species, sixteen invertebrate species, two reptile species, and two amphibian species. Fifteen Critical Habitat Areas have been identified for federally listed endangered and threatened species of freshwater mussels in the region (see USFWS website: http://www.fws.gov/panamacity/mussels.html). Further, as

shown in Figure 6 below, EPD also has identified water quality problems in the region. These types of problems can be ameliorated by using flow augmentation. In essence, the existing situation will be improved, rather than just maintained. This would achieve what GEFA describes as a superior environmental performance (i.e., performance beyond that required for federal or state permitting).

3 Via the "water exchange" suggested in this Application, metro Atlanta utilities would be able to achieve their goals of gaining secure access to a larger amount of water storage in Lake Lanier to meet future water supply needs. This goal would be achieved at less than half the cost of other alternatives currently under consideration, and without significant environmental impact. In fact, there would be substantial environmental benefits. Construction of flow augmentation facilities could occur at one time or in phases, depending upon the terms of a negotiated settlement agreement between Georgia, Florida and Alabama.



Category Definitions:
1 – Waters meeting designated use(s).
2 – Waters having more than 1 designated use and data indicate at least one is being met, but there is insufficient evidence to determine that all uses are being met.
3 – Insufficient data or other information to make a determination as to whether or not the designated use(s) is being met
4a – Data indicate that at least one designated use is not being met, but TMDL(s) have been completed for the parameter(s) that are causing impairment
4b – Data indicate that at least one designated use is not being met, but there are actions in place (other than a TMDL) that are predicted to lead to compliance with water quality standards.
4c – Data indicate that one designated use is not being met, but the impairment is not caused by a pollutant.
5 – Data indicates that at least on designated use is not being met and TMDL(s) need to be completed for one or more pollutants.

River Basin	Total River Miles Impaired in the Lower Flint-Ochlockonee Region				Total
Chattahoochee	0	0	0	10	10
Flint	45	58	15	67	138
Ochlockonee	35	124	63	16	200
Suwannee	49	40	0	12	81
Criterion Violated	DO	Fecal Coliforms	Metal	Other	Regional Total = 427 miles

Note: Stream reaches may have more than one criterion violated, i.e. the sum of DO, Fecal Coliforms, Metals, and Other may be greater than the total number of stream miles listed as impaired. Metals includes mercury trophic-weighted residue value and fish consumptive guidance.

Figure 6: Map of Southwest Georgia Showing Waters Not Meeting Designated Uses.

4 Improve water-related recreational opportunities in the Chattahoochee and Flint Basins in Southwest Georgia. Southwest Georgia provides boaters, fishermen, and other outdoor enthusiasts with a diverse and easily accessible river environment. The crystal blue springs of the lower part of the region are a unique recreational resource. Camping, hunting, and hiking trails are recreational options across the region. Important recreational fisheries in the region include shoal bass, Gulf striped bass, and black bass.

The addition of 250 mgd water to the basin during times when stream and river flow are low will create boating and fishing opportunities. For example, during the drought of October 2001 and as part of a set of spring flow measurements, Dr. McLemore and J. W. Jones personnel found that the Flint River in the vicinity of Newton was too low for most boating activities (i.e., they would have to get out of the boat and drag it across shoals). However, with the addition of flow augmentation water, boating access could remain viable. Again as part of the aforementioned 2001 spring flow study, dead fish were observed in the remnants of isolated Flint River pools. Similarly, addition of flow augmentation water could keep several Flint River tributaries from completely drying up; thereby allowing fish species a greater opportunity to withstand droughts.

Part 2

Application

(Financial Data)

Non-Applicable

Part 3

Application

(State Direct Investment Information)

Governor's Water Supply Program
Part 3 Application – State Direct Investment Information

This application form will be used to evaluate all potential projects for state direct investment. Only applicants seeking state direct investment financing under the GWSP must complete the part 3 application.

Ownership in fee of specific asset

• Does your overall project include an opportunity for the state to take ownership in fee of an asset that is part of your water supply project?	◉ YES ○ NO
• What asset(s)?	See Below 1
• What is the fair market value of that asset?	See Below 2
• How have you determined fair market value?	See Below 2
• What is the useful life of the asset?	50 plus years

Percentage ownership interest

• Does your project include an opportunity for the state to take a percentage ownership interest in the total project?	◉ YES ○ NO

General

• Would state ownership in fee of a discrete asset or the state owning a percentage interest in the total project interfere with any existing financing agreements (e.g. bond covenants)?	○ YES ◉ NO

Narrative Proposal: On a separate sheet, please provide a narrative (no more than one-page) of the structure of any proposed state direct investment financing by the State of Georgia in your water supply project. Please touch on preferred type of state ownership and why you prefer that approach. Please outline any concerns you have concerning the State owning a portion of your water supply project. S*ee "Checklist of Documents To Be Submitted with This Application".*

1. Assets are: 4 ASR wells; 2 production wells; 6 monitoring wells; 1 bank filtration well; wellhead equipment; 1 engineering report.

2. The fair market value of the wells can be considered their costs of construction, testing, and equipping with pumps, power and well-houses. Including a 10% contingency fee, this is approximately $9.2 million. The fair market value of the engineering report, which will show the plan and costs for a 250 mgd flow augmentation project, is incalculable. The full scale project can (1) avoid a major federal restriction on agricultural water use by avoiding mussel extirpation; (2) reduce drawdowns of Lake Lanier and West Point, thus increasing water supplies for the Atlanta and Columbus areas.

PART 3 Application – State Direct Investment Information
Narrative Proposal

GEFA writes: "Please provide a narrative (no more than one-page) of the structure of any proposed equity financing by the State of Georgia in your water supply project. Please touch on preferred type of state ownership and why you prefer that approach. Please outline any concerns you have concerning the State owning a portion of your water supply project."

The State of Georgia already owns the property identified for program implementation at all three sites. Approval would be required from DNR to locate test wells at these locations; however, the SWGRC anticipates that approval would be received since there are many precedents for test and monitor well construction projects on state-owned properties (i.e., the Kolomoki Mounds State Park test wells) and since there are huge potential benefits as discussed in "Scope of Project Benefits." As described earlier, test well/ASR facilities would be constructed utilizing State Direct Investment. The finished wells could be owned by SWGRC, DCA, or DNR.

The SWGRC expects that low flow augmentation, aquifer storage recovery (ASR), and DA wells will emerge as a significant, cost-effective and environmentally beneficial component of a regional water supply plan than can be implemented within as short as five years. This could be done at relatively low cost (when compared to other identified water supply alternatives) to meet a variety of local, regional and statewide needs. Expansion of facilities at all three locations probably will entail construction and operation of up to a total of about 150 wells yielding up to approximately 250 mgd (387 cfs) of low flow augmentation during droughts while recharging the same aquifers during wet periods, thereby achieving no net withdrawal of ground water. At some locations it may be appropriate to use DA wells, relying on slower natural recharge to restore water levels in the aquifer instead of relying on seasonal storage through ASR operations. Initially DA wells and ASR facilities will be sited on State of Georgia lands; some future wells and/or ASR facilities, however, may be on private property, requiring appropriate agreements and leases.

Operation and management of these facilities will require an integrated, coordinated approach to well field management, supported by a design that includes appropriate provisions for instrumentation and control. SWGRC estimates that facilities constructed pursuant to the Project's testing program would comprise about 2 to 4 percent of the ultimate flow augmentation capacity of 250 mgd. Remaining facilities may not require GEFA financing. To provide flexibility to accommodate future expansion of the DA/ASR program we suggest that provision be included in the funding agreement for EMB Water LLC to have the option to reimburse the State for its investment in the Project with an appropriate return on investment, at such time in the future as bond financing is received for the well field expansion. It is anticipated that having such a provision may facilitate sale of the bonds. EMB Water LLC would then manage operation of all of the Project's test program facilities (but would not own the land) and would need an agreement from the State providing for integrated operation of all well field facilities, whether on public or private property.

APPENDIX A

Unique Qualifications of the SWGRC's Prime Consultant/Project Management Team

The SWGRC has put together a team of experienced professionals to carry out the work necessary for the Project to implement flow augmentation in Southwest Georgia. The team consists of three separate firms; namely EMB Water LLC and its subcontractors, Joe Tanner and Associates (JTA), and Golder Associates (Golder). These three firms, working as a team, are the only entities SWGRC has identified that have the ability to perform the services and work required for the Project. The SWGRC will have primary oversight of the above firms' work to assure that overall Project goals are met and there is no duplication of work. The SWGRC will be the primary contact with GEFA. SWGRC anticipates that it will then enter into appropriate contractual arrangements to secure the desired services of these firms.

Before describing the capabilities of each of the aforementioned firms that SWGRC desires to perform the services required by the Project, it is important to note that Joe Tanner (of JTA), Harold Reheis (of JTA), and William McLemore (one of Etowah Water Bank LLC's members) have participated in the interstate discussions with Florida and Alabama agencies regarding the water disputes with these two states since 1990. Allen Barnes (JTA) has been one of Governor Perdue's and Governor Deal's chief negotiators with Florida and Alabama for the last three years. This means that they have insight into expectations of these states from Georgia.

EMB Water LLC is anticipated to have primary responsibility for ASR and DA engineering and hydrogeological investigations, interpretations, and analysis. EMB Water has the necessary skill sets and experience to perform the services and work described in this Application for the Project. Principals in one of EMB Water LLC's members, Etowah Water Bank, include David Pyne and William McLemore. Mr. Pyne is president of ASR Systems LLC, and has over 40 years of experience in developing, implementing, and permitting ASR systems in 22 states, including Florida and South Carolina, plus several countries overseas. He has pioneered the development of ASR science and technology and has written a book on ASR as a guide to its successful implementation. Dr. McLemore was the State Geologist of Georgia for almost 27 years and had responsibility for over 50 technical investigations of the ground-water resources of Southwest Georgia as well as the drilling of over 250 aquifer monitoring wells in the Southwest Georgia area. Based on their collective experience, they recognized several years ago that ASR and DAs represented a technical methodology for Georgia to resolve a number of its water supply problems. Beginning in 2008, Mr. Pyne and Dr. McLemore began engineering and geological studies in Georgia to identify areas that are geologically favorable for ASR. As part of this work, Southwest Georgia was identified as an area where ASR technology and the stacked DAs complemented one another, thus making the ASR/DA concept particularly attractive.

EMB Water LLC is a Georgia company formed in 2010. It is a joint venture of three companies: Etowah Water Bank LLC, Brasfield & Gorrie, LLC, and Merchant Capital Investments Inc. Etowah Water Bank was formed in 2008 to develop and implement a low flow augmentation/ASR solution to the tri-state litigation. Brasfield & Gorrie is one of the largest construction companies in the southeastern United States. As noted previously in this Application, one proposal for the development and implementation of the master plan is a Public Private Partnership (PPP) proposed by EMB Water LLC to implement the remainder of the low flow augmentation program in accordance with a master plan. Through the proposed PPP, EMB

Water would propose to design, permit, finance, construct and initially operate all augmentation facilities until such time as facilities have been constructed and the Target Storage Volume has been achieved, and then transfer operational responsibilities to a state or local government agency.

Joe Tanner and Associates (JTA) bring a unique set of skills to the flow augmentation project. Joe Tanner was Commissioner of the Georgia Department of Natural Resources for 19 years, including the first seven years of the ACT water conflict, in which he served as Governor Miller's chief negotiator. Harold Reheis was Director of DNR's Environmental Protection Division (EPD) for 12 years and was second negotiator in the ACF water conflict for Governors Miller, Barnes, and Perdue. Allen Barnes was US Environmental Protection Agency (EPA) Chief of Staff for the eight southeastern states for five years, was EPD Director in 2010-2011, and was second negotiator for Governors Perdue and Deal. He continues in that position for Governor Deal as a JTA employee. The SWGRC desires for JTA to have primary responsibility for assisting the SWGRC in contacts with State of Georgia agencies, local agencies, federal agencies, agencies of other states, and the lay public. It will lead the state permitting activities needed for the Project. The firm also will be instrumental obtaining access to State-owned lands for drilling and other testing.

The SWGRC desires for Golder Associates Inc. to have primary responsibility for supervising field investigations, analyzing pumping test data, and developing conceptual, analytical, and numeric ground-water models. Golder is a global earth science and engineering consulting company with experience in surface and ground water supply projects throughout the world. For over 20 years, it has been the primary water supply consultant for Dalton Utilities, Gwinnett County, various mining companies, and other municipalities and industries in Georgia. In this role, they have designed, permitted, and developed ground water supplies and surface water reservoirs throughout the state. In support of these projects Golder has prepared surface water and ground water models, calculated sustainable yields, and prepared aquifer protection and watershed management plans. Additionally, Golder was the principal hydrogeologic consultant to the Georgia Environmental Protection Division's Sound Science Initiative to assess the Upper Floridan Aquifer in south Georgia. They performed a wide variety of studies pertaining to the resource development potential of this aquifer, including an assessment of potential impacts of Aquifer Storage Recovery. Related to this proposal, Golder developed a preliminary ground-water flow model for the area in the vicinity of Florence Marina State Park. This model serves as the basis for the technical and cost estimates provided as part of this application. The principal for Golder on this project is Mr. Jim Renner, P.G. Mr. Renner is a geologist and natural resource specialist with 25 years of environmental consulting experience. He has served as the project manager and key permitting consultant for several surface water and ground water development projects and was the program manager for Golder's work under the Sound Science Initiative. Mr. Renner has been active in several water management policy initiatives including the Joint House-Senate Water Planning Committee, the Upper Floridan Aquifer Technical Advisory Group, and the Statewide Water Basin Planning Initiative.

Resumes for key EMBW team members are readily available and will be provided on request.

APPENDIX B

Budget

EMB Water LLC
SWGRC Application Preliminary Budget Estimate
Summary of Construction Costs Plus Consultant Services for All Three Sites
April 12, 2012

Budget Estimate

The SWGRC has prepared a conceptual design and budget estimate for implementation of the proposed Project test well program. The estimated cost of the Project is $13,500,000, including an administrative fee by SWGRC.

This budget estimate is a preliminary estimate of the Project cost for construction and equipping of the test wells and monitor wells, and for related engineering and hydrogeological consultant services. This estimate is a budget estimate prepared based upon available information and is not a bid to perform such work for that amount. The budget estimate has been prepared by Georgia licensed professional engineers and professional geologists who are experienced with implementation of such test well programs. Well construction costs have been reviewed and found to be reasonable by a Georgia certified well driller. Construction cost estimates for equipping the wells are based upon experience from other similar, recently bid projects. Consulting services tasks have been identified and best estimates have been prepared for each of these tasks. A 10% contingency has been added by SWGRC to provide flexibility to accommodate changes in project cost resulting from competitive bids which will reflect material costs and market conditions at the time of bidding and also potential changes in scope or level of effort for consultant tasks. If this funding application is approved by GEFA and project costs exceed or are lower than the amount funded, SWGRC will discuss with GEFA and with our consultant, EMB Water LLC, an appropriate course of action that is most beneficial to Georgia. This could include a reduction in the project scope to stay within the amount funded, such as by deferring equipping of one or more wells to a later date. Alternatively this could include commissioning of additional tasks that would enhance the value of the flow augmentation program. A possible example would include extending the test program at the two WMAs to include an evaluation of the deeper Providence Aquifer for ASR and flow augmentation purposes, as discussed in Section C.0.6.4 of the Application.

Site	Consultant Services, $	Construction, $			Total, $
		Test Wells	Equipping	Subtotal	
Chickasawhatchee WMA	858,338	990,493	1,158,000	2,148,493	3,006,831
Mayhaw WMA	858,338	1,158,000	1,158,000	2,316,000	3,174,338
Florence Marina State Park	1,647,300	2,340,761	1,569,900	3,910,661	5,557,961
Subtotals	3,363,976	4,489,254	3,885,900	8,375,154	11,739,130
SWGRC (5%)					586,957
Contingency (10%)					1,173,913
Total Budget Estimate					13,500,000

APPENDIX C

A SYNOPSIS OF FLOW AUGMENTATION IN THE CHATTAHOOCHEE-FLINT RIVER BASINS OF SOUTHWEST GEORGIA

The Southwest Georgia Regional Commission (SWGRC) proposes to implement a flow augmentation project for the Chattahoochee and Flint River Basins of Southwest Georgia. The SWGRC is an entity of the State of Georgia that was created as a result of the 1989 Georgia Planning Act; it serves 14 counties in Southwest Georgia. The SWGRC provides a variety of services to local governments, including traditional planning services to more specialized areas such as human services, geographic information systems, transportation, and water planning.

The project, described in this Application, involves utilizing a combination of the emerging/innovative technologies of Aquifer Storage Recovery (ASR) and new wells from deep aquifers (DA) that are not identified by Georgia EPD as having sustainability problems, to augment Chattahoochee-Flint River flows. This augmentation can be up to about 250 million gallons per day (387 cfs) for up to seven months per year for up to three consecutive drought years. ASR, direct groundwater pumping, and flow augmentation are all identified by GEFA as being eligible for funding. The specific objective is to initiate the design and development capability to augment flow at the Apalachicola gage (at Chattahoochee, FL) whenever flow drops below a target level such as 5,000 cfs.

ASR wells recharge and recover water so that long-term net withdrawal from the storage aquifers is zero. DA wells only withdraw water from these aquifers, relying upon natural recharge to restore aquifer water levels over a longer time period.

The project involves drilling wells and constructing pipelines whereby water can be withdrawn from surface water streams during times of high flow, treated properly, stored underground, and discharged to these streams during times of low flow. On the basis of geological analysis, three general areas have been identified as being amenable to creation of flow augmentation infrastructure. For the initial phase of the project, three tracts of state-owned land have been identified within these general areas where long term access can be obtained. The three land tracts are: (1) Florence Marina State Park in Stewart County, (2) Chickasawhatchee WMA in Baker County, and (3) Mayhaw WMA in Miller County (see Figure 1 below).

At each site, 2 to 4 acres of land will be utilized for test well program purposes. One or two large diameter and 2 or 3 smaller diameter wells will be constructed and evaluated for ASR potential as well as general ground-water production potential. Flow augmentation infrastructure will be constructed at each of the three sites with the objective of creating 6 - 10 mgd (10 to 15 cfs) of flow augmentation capability within two years of project authorization. The estimated cost of State Direct Investment Funding necessary to implement this first phase and this level of flow augmentation is $13.5 million. Ultimately, the project would be expanded to include about 150 wells having up to 250 mgd (387 cfs) of flow augmentation capability at an estimated build out construction cost of $900 million to $1.2 billion. Through a suggested "water exchange" discussed in this Application, exchanging water storage underground in Southwest Georgia for

reallocation of water storage aboveground in Lake Lanier, total flow augmentation at the Chattahoochee gage is estimated at about 700 cfs at no additional capital cost.

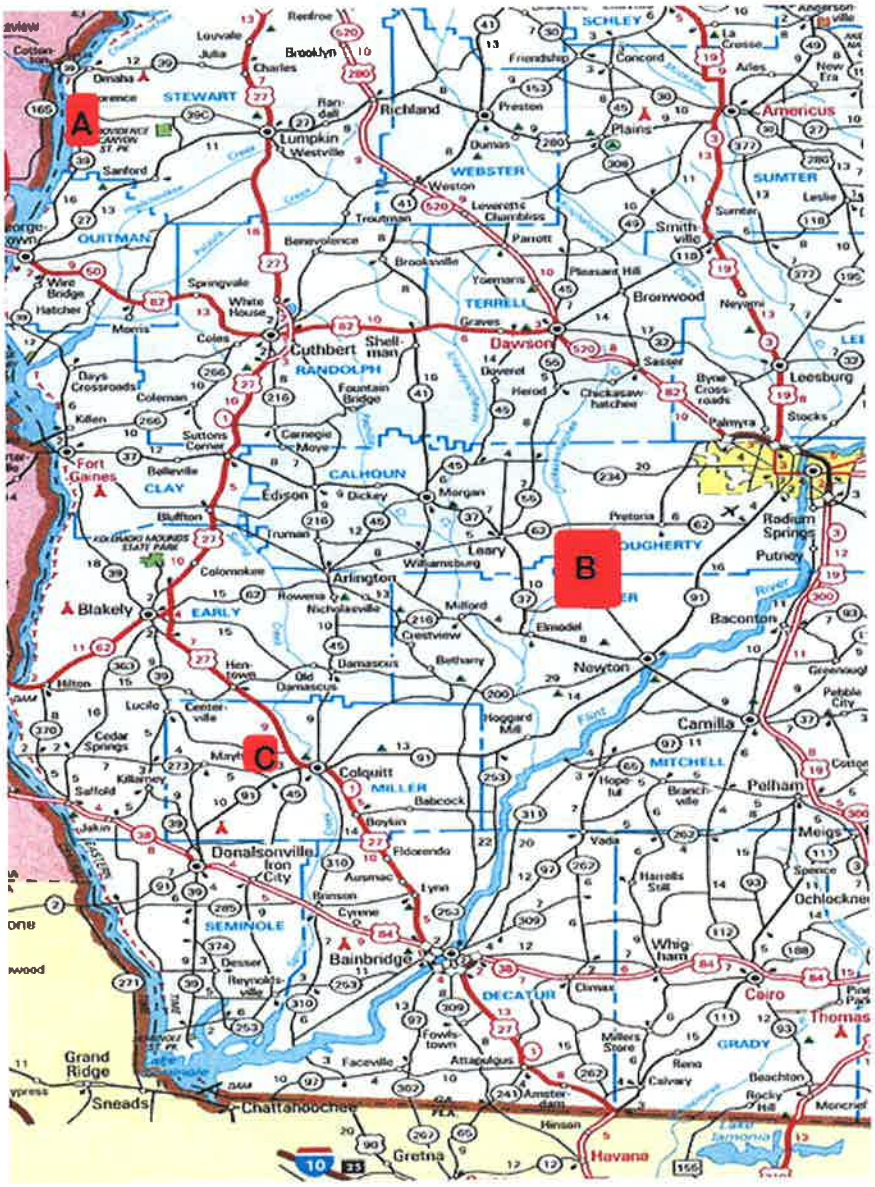


Figure 1: Location Map Showing Flow Augmentation Project Areas (in red). Area A is the Florence Marina Project Area; Area B is the Chickasawhatchee Project Area; and Area C is the Mayhaw Project Area