



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
SAVANNAH DISTRICT, CORPS OF ENGINEERS  
100 WEST OGLETHORPE AVENUE  
SAVANNAH, GEORGIA 31401-3640

**JUNE 29 2015**

Regulatory Division  
SAS-2011-00779

**PUBLIC NOTICE  
Savannah District**

The Savannah District has received a Mitigation Plan for restoration activities along Upedee Creek through use of In-Lieu Fee funds from the Georgia-Alabama Land Trust, as follows:

Application Number: SAS-2011-00779

Applicant: Mr. Alex Robertson  
Georgia-Alabama Land Trust  
226 Old Ladiga Road  
Piedmont, Alabama 36272

Agent: Mr. Greg Smith  
Corblu Ecology Group, LLC  
1305 Lakes Parkway, Suite 110  
Lawrenceville, Georgia 30043

Sponsor: Ms. Ann Lee  
Alapaha River Mitigation Partners, LLC  
230 West Highway 37  
Lakeland, Georgia 31635

This public notice does not imply, on the parts of the U.S. Army Corps of Engineers or other agencies, an either favorable or unfavorable opinion of the work to be performed, but is issued to solicit comments regarding the factors on which final decisions will be based.

Location of Proposed Work: The project site is located along approximately 12,060 linear feet of Upedee Creek northeast of the City of Lakeland, Lanier County, Georgia (Latitude 31.0561, Longitude -83.0283). Additionally, the project is located in the Alapaha River Watershed, in USGS Hydrologic Unit 03110202.

Description of Mitigation Proposal: Corblu Ecology Group, LLC (Corblu) is proposing 2,364 linear feet of priority 1 stream restoration, 9,696 linear feet of stream preservation, and approximately 28 acres of riparian buffer preservation along Upedee Creek. Restoration along Upedee Creek would involve filling a diversion channel and restoring flow to the 2,364 linear feet of relict channel. The site is currently undeveloped and riparian buffer consists of forested/shrub wetland, pine plantation, and mixed pine-hardwood uplands. The limits of jurisdiction for streams and wetlands have not yet been field verified. The Corps completed a site visit for this project with the Savannah District Inter-agency Review Team (IRT) on May 14, 2015, and documented the diversion channel, along with general habitat types along Upedee Creek.

Corblu proposes to monitor the project for seven years following full project implementation. Monitoring would consist of physical variables (channel cross sections, longitudinal profile, and streambank stability) and biological variables (macroinvertebrates, fish, habitat assessment, and buffer structure)

The proposed project site would be evaluated for potential effects to historic resources listed in or eligible for listing in the National Register of Historic Places. We request any information on known historic or archeological resources that may be affected by the proposed project. A Phase I cultural resources survey would be completed for the project area of potential effect.

The project would also be evaluated for potential effects to any Federally listed threatened or endangered species. We request any information on known species occurrences in the project area that may be affected by the proposed project. At this time, due to the nature of the activities proposed, it is anticipated that the proposed project would have no effect on any listed threatened or endangered species.

Geographic Service Area: The proposed restoration would provide mitigation for previously authorized unavoidable impacts to waters of the United States within the Withlacoochee River Service Area under Section 404 of the Clean Water Act. The permits that are proposed to fund this project required 14,976 stream credits to mitigate for unavoidable impacts to waters of the United States. These credits are associated with approximately 3,536 linear feet of stream impact. Upon successful completion of the mitigation plan (including monitoring, meeting success criteria, and providing permanent protection), the proposed restoration, preservation, and upland buffer preservation could generate approximately 30,702 stream mitigation credits for 2,364 linear feet of stream channel restoration, preservation of 9,696 linear feet of stream channel, and 28 acres of upland buffer.

Oversight: Oversight of this In-Lieu Fee project would be by a group of Federal and State agency representatives collectively referred to as the IRT. The IRT shall be chaired by the Corps and is comprised of representatives from the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the Georgia Department of Natural Resources Environmental Protection Division. The applicant has proposed seven years of monitoring, and this is reflected in the potential amount of credit generation for the site. It would be the responsibility of Corblu to assure that monitoring occurs and stream stability, riparian vegetation composition and abundance, and in-stream habitat are being maintained on the site.

Authority: A public notice regarding the proposed use of In-Lieu Fee funds for providing compensatory mitigation is required pursuant to 33 Code of Federal Regulations (CFR) parts 325 and 332 and 40 CFR part 230, "Compensatory Mitigation for Losses of Aquatic Resources; Final Rule" published in the Federal Register on April 10, 2008.

Consideration of Public Comments: The Corps is soliciting comments from the public; federal, state, and local agencies and officials; Native American Tribes; and any other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps to determine whether to approve, modify, condition, or deny this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and other public interest factors. Comments are also used to determine the overall public interest of the proposed activity.

Comment Period: Anyone wishing to comment on this proposal should submit comments in writing to the Commander, U.S. Army Corps of Engineers, Savannah District, Attention: Mr. William Rutlin, Chief, Coastal Branch, 100 West Oglethorpe Avenue, Savannah, Georgia 31401-3640, no later than 30 days from the date of this notice. Please refer to the applicant's name and the application number in your comments. The full mitigation plan can be reviewed in the Savannah District, U.S. Army Corps of Engineers, Regulatory Division, 100 West Oglethorpe Avenue Savannah, Georgia 31401-3640.

If you have any further questions concerning this matter, please contact Mr. William Rutlin, Chief, Coastal Branch at (912) 652-5893.

Encl. Upedee Creek Stream Mitigation Site, Alapaha River Watershed  
(HUC 03110202), Lanier County, Georgia, Project Proposal and Draft Project Mitigation  
Plan



March 23, 2015

Georgia Land Trust, Inc.  
Attn: Mr. Justin Park  
In-Lieu Fee Program  
428 Bull Street, Suite 201  
Savannah, Georgia 31401

**RE: Upedee Creek Project Proposal and Draft Project Mitigation Plan Submittal and Request for IRT Meeting**

Mr. Park:

Corblu Ecology Group, LLC (Corblu), on behalf of the Project Sponsor, Alapaha River Mitigation Partners, LLC, is submitting this proposal and Draft Project Mitigation Plan for the development of the Upedee Creek Stream Mitigation Site (Project) located in Lanier County, GA in order to be placed on the April 9, 2015 IRT meeting agenda in Savannah. The proposed Project would be used to satisfy stream impacts in the Withlacoochee service area that have utilized advanced stream credits through GLT's approved In-Lieu Fee (ILF) program that is authorized to operate in the Savannah District.

Please let us know if you require any assistance in submitting this document to the IRT or requesting to be placed on the April 9, 2015 IRT meeting agenda.

Should you have any questions or require any additional information please do not hesitate to contact me at 770-682-9731 or email at [gsmith@corblu.com](mailto:gsmith@corblu.com).

Sincerely,

**CORBLU ECOLOGY GROUP, LLC**

A handwritten signature in black ink, appearing to read "Gregory P. Smith", is written over a faint, large watermark of a tree.

Gregory P. Smith  
Chief Executive Officer

Enclosures

**Upedee Creek Stream Mitigation Site**  
**Alapaha River Watershed (HUC 03110202)**  
**Lanier County, Georgia**

***Project Proposal and Draft Project Mitigation Plan***  
**USACE Project No.: TBD**  
**GLT-ILF Project No.: 2011-00779**

A proposed mitigation project submitted to the Georgia Land Trust, Inc. for use of In-Lieu Fee Funds in the Withlacoochee Service Area;

And to the Interagency Review Team:

U.S. Army Corps of Engineers, Savannah District  
U.S. Environmental Protection Agency, Region 4  
U.S. Fish and Wildlife Service  
Georgia Department of Natural Resources, Environmental Protection Division

Submitted by:

Corblu Ecology Group, LLC  
1305 Lakes Parkway, Suite 110  
Lawrenceville, Georgia 30043

Project Sponsor:

Alapaha River Mitigation Partners, LLC  
230 West Highway 37  
Lakeland, Georgia 31635



March 2015

## EXECUTIVE SUMMARY

Alapaha River Mitigation Partners, LLC (Project Sponsor) is proposing to restore approximately 2,364 linear feet (lf) of stream at the Upedee Creek Stream Mitigation Site (Site) located approximately 2.5 miles northeast of Lakeland in Lanier County, GA. In addition to stream restoration, approximately 9,696 lf of stream and associated riparian buffer is also proposed as preservation. The Site encompasses approximately 28 acres of land that has historically been used for agriculture, timber production, and recreation. Portions of the Site have recently been clearcut with the remaining areas in active forestry and/or managed for wildlife and recreation.

The Site is located within the Alapaha River watershed in the 8-digit Hydrologic Unit Code (HUC) 03110202. Upedee Creek is a perennial stream and direct tributary to the Alapaha River; its confluence with the Alapaha River directly adjacent to and at the downstream end of the Site. Upedee Creek is considered a high priority conservation stream within a high priority watershed under the State Wildlife Action Plan (2005) due to the presence of high priority species and aquatic community.

Approximately 2,364 lf of stream have been identified within the Site that is suitable for restoration. Stream restoration activities have been designed to restore geomorphic features and functions similar to historic, or relic conditions. This will be achieved primarily through priority 1 restoration of Upedee Creek by reconnecting the relic stream channel to its floodplain. Additionally, areas both upstream and downstream of the proposed restoration area will provide preservation of existing, high quality, and stable stream channel and associated wetlands and forested riparian buffer. The Site will provide other ancillary watershed benefits including enhanced water quality and biodiversity.

The Site will be protected in perpetuity by placing a restrictive covenant over the entire 28 acres, including approximately 12,060 lf (2.28 miles) of stream channel and associated buffer. Additionally, a conservation easement may also be placed over the Site which would provide additional Site protections.

Following implementation of the restoration plan, the Site is expected to support approximately 2,364 lf of stream restoration, 9,696 lf of stream preservation, and 28 acres of associated riparian buffer preservation. Monitoring of the Site will be performed for seven years or until final success criteria are met as outlined in this Plan.

## **USE OF THIS PROPOSAL AND DRAFT PROJECT MITIGATION PLAN**

This Proposal and Draft Project Mitigation Plan for the proposed Upedee Creek Stream Mitigation Site in Lanier County, GA should be considered a preliminary document and used for evaluation purposes only at this time. The Project Sponsor has developed portions of this Plan with all existing and currently available data for the purposes of responding to a request for proposal (RFP) and determining Project feasibility with the current In-Lieu Fee (ILF) Program Sponsor (Georgia Land Trust) and the U.S. Army Corps of Engineers (USACE) for use of existing ILF source funds for project implementation. Should the Project be determined feasible, the Project Sponsor would finalize Draft and Final Project Mitigation Plans to include all other information, elements, data sets, analysis, etc. required to submit a formal and complete Project Mitigation Plan for consideration and approval.

## **REQUIRED STATEMENT OF AUTHORIZATION**

I give the U.S. Army Corps of Engineers permission to conduct an on-site inspection at this Project; and I certify that I have the authority to make this request and give said permission.

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## 1.0 Objectives

This stream mitigation project (the **Project**) is being proposed to offset stream resource losses from projects previously authorized by the Savannah District of U.S. Army Corps of Engineers (USACE) in accordance with the Savannah District's *Guidelines to Establish and Operate In-Lieu Fee Programs in Georgia* (August 2011) on the submittal of proposals for new mitigation projects. The Georgia Land Trust, Inc. (GLT) is an approved In-Lieu Fee (ILF) program that accepts fees from permittees in exchange for assuming the burden and liability of providing compensatory mitigation for impacts to Waters of the U.S. The Project will provide appropriate compensation for permits resulting in unavoidable stream impacts for which fees have been collected by the ILF program. The intent of this proposal is to request funding from the program to implement the proposed stream mitigation project described throughout this document. This Proposal and Draft Project Mitigation Plan (the **Plan**) is being prepared for consideration by the GLT, USACE, and Interagency Review Team (IRT) to serve as adequate compensation for past stream impacts in the Withlacoochee service area and where advanced credits have been utilized. Alapaha River Mitigation Partners, LLC, the Project Sponsor, is requesting the use of ILF funds to implement the Project.

The proposed Upedee Creek stream mitigation site (the **Site**) is approximately 28 acres located along Upedee Creek in a high priority watershed in Lanier County, Georgia (Figure 1). Approximately 2,364 lf of restored stream is proposed for compensatory mitigation through stream channel restoration activities using a priority 1 approach. Additionally, approximately 9,696 lf of stream is also proposed as preservation. A fifty-foot preservation buffer on both sides of Upedee Creek is proposed on both the restoration and preservation sections along the entire Project length. This Project will provide restoration and preservation of significant aquatic resources which warrants perpetual protection for the purposes of overall watershed health. More specifically, the stream mitigation will: (1) restore/preserve a significant length of Upedee Creek that will provide adequate stream mitigation within the Alapaha River watershed; (2) restore hydrodynamic character and maintain stream evolutionary processes, (3) restore and maintain sediment continuity, (4) restore, support, and maintain appropriate biological communities, and (5) restore water quality and maintain chemical processes and nutrient cycles. This Plan is intended to summarize site specific project elements and includes the twelve (12) required fundamental components under the 2008 final rule: objectives, site selection criteria, site protection instruments, baseline information, credit determination methodology, mitigation work plan, maintenance plan, ecological performance standards, monitoring requirements, a long-term management plan, an adaptive management plan, and financial assurances.

## 2.0 Service Area and Use of Credits

The use of credits generated from the Project will be applicable to the Withlacoochee River watershed's standard service area according to the *Guidelines on the Establishment and Operation of Wetland Mitigation Banks in Georgia* (2011). The geographical service area applicable to the ILF projects and source funds will include the following Hydrologic Unit Codes (HUCs): 03110201, 03110202, 03110203, 03110204, 03110103, 03120001, 03120002, and 03120003 (Figure 2). Stream credits generated from the Project will become immediately available to offset all advanced credits previously sold by the ILF program to compensate for unavoidable project impacts. Any residual credits developed by this Project may potentially be used by the ILF program sponsor to offset future stream impacts and satisfy compensatory mitigation requirements in this service area as specified in their approved Program Instrument (November 2013).

### **3.0 Opportunity for In-Lieu Fee Program Implementation**

The proposed Site provides a unique opportunity for implementation of an in-kind stream mitigation project in the Alapaha River watershed. This project approach is consistent with the Final Rule on Compensatory Mitigation (Federal Register, April 10, 2008) and the goals of no-net-loss. The use of ILF funds for this Project is consistent with § 332.3(h)(2) [§ 230.98(h)(2)] of the Final Rule on Compensatory Mitigation, which requires that to the extent appropriate and practicable, any preservation, which the program has historically been, is done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities.

The Project has a high likelihood of success due to its watershed position, simplified restoration design approach, and true restoration/preservation potential. Further, the proposed Project Sponsor (Alapaha River Mitigation Partners, LLC) as well as their consultant (Corblu Ecology Group, LLC), has extensive experience in the development, implementation, and management of both wetland and stream mitigation banks and permittee responsible mitigation projects within the Savannah District, including within the Withlacoochee service area.

### **4.0 Establishment, Ownership, and Project Sponsor**

Four separate landowners currently own the underlying real property constituting the Site (Figure 3). The Project Sponsor, Alapaha River Mitigation Partners, LLC, will control, develop, and operate the Site through acquired easement rights between the Project Sponsor and the landowners. The Project Sponsor currently has options on all four landowner parcels and will own a perpetual easement

over the Site prior to Project approval and/or project implementation. Information as it relates to real property requirements will be included in future draft and final project mitigation plans (Appendix A). The Project Sponsor, through an agreement with the ILF Program Sponsor, will be responsible for the development, protection, monitoring, and maintenance of the Site. As currently proposed, Alapaha River Mitigation Partners, LLC would be the Project Sponsor and responsible for providing the Site, development of the mitigation plan, permitting, project implementation, annual monitoring, and long-term management. According to § 332.8(l)(3) [§ 230.98(l)(3)] of the Final Rule, an ILF program sponsor is responsible for the implementation, long-term management, and any required remediation of the restoration, establishment, enhancement, and/or preservation activities, even though those activities may be conducted by other parties through requests for proposals or other contracting mechanisms. Per the contractual agreements between the Project Sponsor and the ILF Program Sponsor, Alapaha River Mitigation Partners, LLC will agree to provide all elements required for project implementation and compliance.

The ILF Program Sponsor would be the beneficiary of the generated credits. Upon permit issuance and proper recording of site protections, the ILF Program Sponsor would transfer funds to the Project Sponsor with a pre-determined portion of the funds being set aside in escrow as a financial assurance for the Project. Escrowed funds would be released to the Project Sponsor as pre-determined success milestones, as described in this Plan, are met over time.

Project Sponsor and Consultant contact information is provided below:

Project Sponsor

Alapaha River Mitigation Partners, LLC  
Attn: Ms. Ann Lee  
230 West Highway 37  
Lakeland, Georgia 31635

Consultant/Agent

Corblu Ecology Group, LLC  
Attn: Mr. Gregory Smith  
1305 Lakes Parkway, Suite 110  
Lawrenceville, Georgia 30043  
Phone: 770-682-9731  
Email: [gsmith@corblu.com](mailto:gsmith@corblu.com)

## 5.0 Site Description

The Site is located at Latitude N31° 03q22+ and Longitude W83° 01q42+ in the Alapaha River watershed (HUC 03110202) just northeast of Lakeland, GA between Unity Church Road and Old River Road in Lanier County, GA (Figure 1). Compensatory mitigation is proposed from approximately 2,364 lf of priority 1 stream restoration and 9,696 lf of stream preservation. Approximately 28 acres of riparian buffer will also be preserved. The Site is undeveloped and consists of various habitat types within the buffer including forested/shrub wetland, pine plantation, and mixed pine-hardwood uplands (Figure 4). Although there are

various habitat types associated with the Project, the majority of the buffer along Upedee Creek is existing forested/shrub wetland as indicated on the U.S. Fish and Wildlife (USFWS) National Wetland Inventory map (Figure 5).

The Site is primarily surrounded by various aged pine stands; with some small agricultural areas to the north and south of the Property. A small pond (~19 acres) is located approximately 0.3 miles directly upstream of the Site and at the headwaters of Upedee Creek. Topography, as indicated on the *Lakeland, GA* USGS 7.5-minute topographic quadrangle, is flat within the floodplain limits of the Alapaha River (Figure 6). There are no FAA-regulated airports within a 5-mile radius of the Project.

Historical land use on the property includes timber management and agriculture. Hydrology along Upedee Creek has been altered due to a channel cut-off that has dewatered a significant length of the original Upedee Creek. As a result, Upedee Creek is no longer connected to its floodplain or its historical channel. Specifically, flow regime along Upedee Creek has been altered from past land management practices that has resulted in geomorphic instability, increased erosion potential, lack of biological diversity and habitat, and floodplain abandonment (see representative Site photos in Appendix B). This alteration has compounded hydrologic degradation of the stream and floodplain resources due to significant changes in the frequency and duration of flood events and resulting natural floodplain function and ecosystem processes.

## 6.0 Watershed Assessment

The Site is located along a direct tributary to the Alapaha River in the Alapaha River watershed (0311020207) (Figure 7). The Site encompasses over 12,000 linear feet of stream draining to the Alapaha River where it is listed as a high priority stream+ for conservation due to high priority species and aquatic community,+ according to the State Wildlife Action Plan (2005). The watershed containing Upedee Creek is also within a high priority+ watershed according to the State Wildlife Action Plan (2005). There are currently no other designated conservation lands within this high priority watershed, therefore stream restoration and preservation work along Upedee Creek and permanent protection of riparian and stream habitat would significantly contribute to the conservation goals within this watershed.

The Georgia State Wildlife Action Plan has also designated a large portion of the Alapaha River corridor immediately downstream of the Site as priority for conservation due to presence of species of concern. There are two imperiled aquatic species known to occur within the Alapaha River immediately downstream from its confluence with Upedee Creek. The alligator snapping turtle (*Macrochelys temminckii*) is listed as Threatened in Georgia and the Suwannee River Cooter (*Pseudemys cocinna suwanniensis*) is considered critically

imperiled in Georgia. Restoration and protection of aquatic resources at the Site will improve downstream habitat conditions for these species in the Alapaha River watershed by potentially reducing sediment loads and improving overall water quality. Protection of riparian areas may also provide a refuge for the netleaf pawpaw (*Asimina reticulata*), a critically imperiled plant existing in low-lying areas and documented to occur in the immediate vicinity of the Site.

The lower reach of the Alapaha River in this watershed is listed as impaired based on criterion TWR or Trophic-Weighted Residue Value of mercury in fish tissue exceeding the EPD human health standard of 0.3 mg/kg (Figure 7). According to the Georgia Environmental Protection Division’s Total Maximum Daily Load report on the Alapaha River (2002), atmospheric deposition, largely from coal-fired power plant emissions have contributed to this problem. When mercury is deposited on the landscape during dry fallout or during precipitation events, it can travel to larger water bodies such as the Alapaha, or become stored in sediments. Mercury stored in sediment can then be transported as a result of excessive erosion from stream channels. Stream restoration and preservation work along Upedee Creek at the Site could potentially reduce erosion from this reach and reduce sediment loads to the Alapaha River.

## 7.0 Site Selection

Proposal review criteria are an integral part of GLT’s evaluation of suitable mitigation projects. The proposed Upedee Creek mitigation site was carefully selected for ILF program implementation based on meeting numerous criteria that would warrant consideration of a suitable mitigation project. Table 7-1 outlines specific Site selection characteristics and watershed benefits that were considered when selecting the proposed Site.

<b>Criteria</b>	<b>Proposed Site Characteristics and Benefits</b>	<b>Criteria Met</b>
Watershed	(1) Located in a SWAP “High Priority” watershed; (2) Adjacent to 303(d) listed stream (Alapaha River); (3) Known T&E location on and near Site; (4) Large Site that encompasses majority of localized watershed and over 2 miles of perennial stream/riparian buffer; (5) Helps achieve water quality goals in this reach of the Alapaha River	✓
Resource Benefit	(1) Self-sustaining system that will provide significant ecological benefit due to large project size and resource diversity;	✓

<b>Table 7-1 Site Selection Criteria</b>		
<b>Criteria</b>	<b>Proposed Site Characteristics and Benefits</b>	<b>Criteria Met</b>
	(2) Increased watershed/resource benefit due to preservation of high quality forested/shrub wetlands as of part riparian buffers; (3) High degree of functional lift provided by restoring base flow to stream and restoring natural floodplain processes; (4) Project contains three streams with various ecosystem function suitable to compensate for a wide range of project impacts within the service area; (5) Appropriate ratio of restoration (72%) to preservation (28%) credits generated by mitigation activities	
Feasibility	(1) The Project fits in with current and future watershed planning efforts and goals; (2) The proposed restoration plan is not complex yet it will provide immediate and significant stream/riparian/wetland/floodplain benefit; (3) Due to the type of restoration proposed and existing site conditions the likelihood of project success and achieving functional lift is high; (4) Project sponsor has obtained options for permanent easements on all parcels associated with the project; (5) The Project Sponsor is proposing adequate financial assurances and long term management funding	✓
Partner Capacity	(1) Both the Project Sponsor and their consultant have extensive mitigation and ecosystem restoration experience in this region; (2) The Project Sponsor is financially sound and capable of securing adequate financial assurances and long term management funding; (3) The Project Sponsor and their consultant have shown on past similar projects a high level of success and commitment to fully develop and deliver projects	✓
Other Benefits	(1) The current Proposal is comprehensive and easily converted into draft and final project mitigation plans for immediate development; (2) The Project will develop additional credits that	✓

<b>Table 7-1 Site Selection Criteria</b>		
<b>Criteria</b>	<b>Proposed Site Characteristics and Benefits</b>	<b>Criteria Met</b>
	may be used by ILF Program as future advanced stream credits (3) The Project is restoration ready and can be implemented in a short timeframe to reduce temporal loss of resource function	

## 8.0 Site Protection Instrument

If approved, the Project Sponsor would be responsible for obtaining final permits on behalf of the ILF Program Sponsor and implementing the proper Site restrictions and protections. This would be in the form of a perpetual restrictive covenant and/or conservation easement held by a qualified land trust, if appropriate, and recorded over the Site in favor of the ILF Program Sponsor. The perpetual protections placed on the Site will assure that anthropogenic activities on-site will not threaten the ability of these resources to continue providing the exceptional ecosystem functions and values described above indefinitely.

## 9.0 Baseline Conditions and Assessment

The 2004 U.S. Army Corps of Engineers Standard Operating Procedure (SOP) for Compensatory Mitigation states that appropriate baseline and reference stream data should be collected for each of the proposed stream reaches considered for mitigation. The 2011 Draft Guidelines to Establish and Operate Mitigation Banks in Georgia goes into further detail on baseline and reference stream data. The data is used to set benchmarks for success criteria and will be compared to post-restoration data in future monitoring reports to determine the amount of functional lift on the Site. Corblu has performed preliminary baseline assessments at the Site between December 2013 and November 2014. Based on these initial assessments, it is apparent that the stream flow regime for Upedee Creek has been significantly altered from past land use practices including restriction of base flow in the historic (relic) stream channel, channelization of the existing channel, and abandonment of the existing floodplain. Currently available baseline information as it relates to the proposed baseline monitoring plan, jurisdictional areas, soils, hydrology, vegetation, and other variables are provided in more detail below.

*Note: Baseline data is incomplete at this time and pending ILF Project proposal review and approval. If approved, this section will be updated in future Draft and Final Project Mitigation Plans with the appropriate data summaries with the complete suite of baseline data to be included in Appendix C.*

## 9.1 Baseline Monitoring Plan

The baseline assessment for streams and riparian buffers will focus on assessing existing conditions of these areas and generally follows the most recent guidance provided by the IRT for assessment of functions. Generally, the Project will follow Appendix 10 of the current Guidelines (2011) which requires monitoring of the physical and biological components of stream restoration and preservation. Riparian buffer preservation components of the Project will also generally follow Appendix 10 as currently required. A comprehensive map of the proposed baseline sampling locations as described in the baseline sampling plan below is provided in Figure 8.

### ***Stream Geomorphic Assessment***

A baseline geomorphic stream survey will be conducted along all proposed restoration and preservation stream reaches (Upedee Creek, UT1, and UT2). The baseline geomorphic stream survey will assess dimension, pattern, and profile including detailed channel cross-sections, channel geometry, substrate sampling and analysis, stream bank erosion potential, and channel stability analysis. In addition, a study of the local watershed and site history will be conducted to determine the most likely causes of disturbances. All stream survey data is field collected with GPS, laser level, and/or total station survey equipment.

*Channel Dimension:* Four permanent cross sections will be installed within the proposed restored portion of Upedee Creek, with two located at representative riffles and two located at representative pools. Permanent cross sections will also be installed on each stream preservation stream reach, with one located at a representative riffle cross section and one located at a representative pool cross section.

Each cross section will be marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be consistently used to facilitate comparison monitoring over the course of the monitoring period. The cross section survey includes points measured at all breaks in slope, including top of bank, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross sections will be classified for stream type using the Rosgen stream classification system. Bankfull width, bankfull mean depth, cross sectional area, width/depth ratio, bankfull max depth, floodprone area width, bank height ratio, entrenchment ratio, max pool depth, and pool width will be calculated from cross section surveys.

*Longitudinal Profiles:* A representative longitudinal profile will be surveyed on the restored section of Upedee Creek. A representative longitudinal profile will also be surveyed on each stream preservation reach.

The lengths of the longitudinal profiles are determined largely by stream size and bankfull width and conducted on a length appropriate to adequately represent existing condition and as-built profile conditions. Profile measurements include thalweg, water surface, inner berm, bankfull, and top of low bank. Each of these measurements is taken at the head of a feature (e.g., riffles and pools). The survey will be tied to a permanent benchmark and its start and end points permanently marked for easy future comparison monitoring. Pool to pool spacing and channel sinuosity will be calculated from longitudinal profile surveys. Bulk sampling will also be performed on the channel substrate in order to classify the stream and will be used for sediment transport capacity during the design phase of the Project.

**Streambank Stability:** For the restored section of Upedee Creek, an evaluation of bank stability will be conducted before restoration is implemented. The Bank Erodibility Hazard Index (BEHI) will be used for the evaluation. The streambank stability assessment will be conducted for the entire length of the restoration reach. An evaluation of bank stability using BEHI will also be conducted along a representative reach (determined by overall stream length) for each stream preservation reach. The preservation BEHI assessment will be in a location as to best determine changing conditions to the overall preservation networks and to identify any areas of potential instability (i.e. headcuts).

### ***Stream Biological Assessment***

A baseline biological assessment of benthic macroinvertebrates, fisheries, and their habitats will be conducted along the proposed restoration and preservation stream reaches. Benthic macroinvertebrate and fisheries sampling will only be conducted in proposed stream restoration and preservation reaches along Upedee Creek. UT1 and UT2 stream preservation reaches include very short lengths with less than 1 square mile drainage areas; therefore, macroinvertebrate and fisheries sampling will not be required for these streams.

**Benthic Macroinvertebrates:** The sampling methodology for macroinvertebrate assessments will follow the *Macroinvertebrate Biological Assessment of Wadeable Streams in Georgia* (GADNR 2007). Upon collection, macroinvertebrate samples will be immediately shipped and processed by a certified laboratory. The macroinvertebrate assessment will include calculation of GAEPD Site Metric Index Score, total taxa richness, and physical habitat assessment score. An assessment of the macroinvertebrate community will be conducted in the restoration and preservation reaches along Upedee Creek before restoration is implemented.

**Fisheries:** The sampling methodology for fisheries assessment follows *Georgia EPD Standard Operating Procedures for Conducting Biomonitoring on Fish Communities in Wadeable Streams in Georgia*. Fisheries assessment will include calculation of GAEPD IBI Index Score, Iwb Index Score, total taxa richness, and physical habitat assessment score. The baseline fisheries assessment will be

conducted in the restoration and preservation reaches of Upedee Creek where drainage areas are greater than 1 square mile.

***Physical Habitat Assessment:*** A physical habitat assessment will be conducted in the restoration reach along Upedee Creek and at the downstream location of all stream preservation reaches at baseline and before restoration is implemented. Physical habitat assessments will utilize the Physical Habitat Assessment Methodology as outlined in the *Macroinvertebrate Biological Assessment of Wadeable Streams in Georgia* (GADNR 2007).

### ***Riparian Buffer Assessment***

Riparian buffer assessments will include a collection of quantitative and qualitative vegetative data in the proposed riparian buffer preservation areas. Baseline vegetation sampling will occur on six (6) permanent 0.10-acre circular sampling plots stratified across the Site in riparian buffer preservation areas. A visual assessment of the permanent monitoring plot will be accomplished that includes an assessment of the existing riparian vegetative structure including dominant species, percent of non-native species, percent of hard/soft mass stems, and percent of native shrubs. Photographs of the sampling plot from permanent photo stations will also be taken. There is currently no riparian buffer restoration proposed as part of this Project.

## **9.2 Existing Jurisdictional Areas**

A complete jurisdictional area delineation of the Site has not yet been performed. However, all streams currently proposed for mitigation (restoration/preservation reaches) were field located and surveyed by Corblu with sub-meter Global Positioning System (GPS) equipment to verify existing, preserved, and proposed restored stream lengths (Figure 9). A complete delineation of the Site will be conducted prior to the submittal of the draft and final project mitigation plans. Once complete, the mapped jurisdictional areas, wetland data sheets, and a request for verification of the delineated areas of the Site will be provided in Appendix D.

## **9.3 Summary of Stream Resources**

There are three streams located within the Site that will be incorporated into the Project as either restoration or preservation. This includes approximately 11,265 lf of Upedee Creek, 524 lf of Unnamed Tributary 1 (UT1), and 271 lf of Unnamed Tributary 2 (UT2). A summary of stream resources proposed as mitigation including the classification type, length, drainage area, and predominant watershed land use are summarized in Table 9-1 below.

<b>Table 9-1 Stream Resource Summary and Characterization</b>				
<b>Stream</b>	<b>Classification Type</b>	<b>Linear Feet</b>	<b>Drainage Area (sq.mi.)</b>	<b>Predominant Watershed Land Use</b>
Upedee Creek	Perennial	11,265	3.450	~75% Forested; 25% Agriculture
UT1	Intermittent	524	0.008	~100% Forested
UT2	Intermittent	271	0.027	~100% Forested
<b>Total Length</b>		<b>12,060</b>		

#### 9.4 Soils

According to the NRCS Web Soil Survey for Berrien and Lanier Counties, the predominant soil type within the Site is the Johnson-Osier-Bibb association, a very poorly drained hydric soil for Lanier County, Georgia. Other soil series identified within the site include the Leefield loamy sand, Lakeland sand, Ardilla loamy sand, Mascotte sand, and Alapaha loamy sand (Figure 10). Characteristics of the predominant on-site soil types associated with the proposed Site are described in more detail in Table 9-2 below.

<b>Table 9-2 Project Soil Types and Descriptions (NRCS 2014)</b>			
<b>Mapped Soil Unit</b>	<b>% of Site</b>	<b>General Location</b>	<b>General Description</b>
Johnson-Osier-Bibb association	~50%	Floodplains	Very poorly drained soil on 0-2% slopes; frequently flooded
Leefield loamy sand	~10%	Flats	Somewhat poorly drained soil on 0-3% slopes
Lakeland sand	~12%	Hillslopes	Excessively drained soil on 2-8% slopes
Ardilla loamy sand	~5%	Flats	Somewhat poorly drained soil on 0-3% slopes
Mascotte sand	~8%	Flats	Poorly drained soil on 0-2% slopes
Alapaha loamy sand	~15%	Flats and drainageways	Poorly drained soils on 0-2% slopes; frequently flooded

#### 9.5 Stream Physical and Biological Assessment

A quantitative assessment of the physical and biological conditions for the proposed stream restoration and preservation reaches has not yet been conducted. However, upon Project selection a complete assessment of the

physical and biological conditions of all proposed stream reaches and level of impairment for the proposed restoration reach will be provided (as described in the baseline monitoring plan in Section 9.1) in order to validate any qualitative assessments as provided in this Plan.

Geomorphic and Channel Stability Functional Assessment

The primary purpose of the existing condition survey is to determine the stability of each proposed stream reach and it's potential for restoration. This is accomplished through a quantitative and qualitative investigation of the stream corridor, including channel dimension, pattern, and profile. This analysis provides information that is used to assess the potential for restoration. Data collected during the existing condition survey are used to determine if the stream is moving towards stability or instability and if the cause of instability is localized or system-wide.

Corblu uses a modified stream channel stability assessment methodology developed by Rosgen (2001). The Rosgen method is a field assessment of the following variables:

1. Stream Channel Condition or "State" Categories,
2. Vertical Stability – Degradation/Aggradation,
3. Lateral Stability,
4. Channel Pattern,
5. River Profile and Bed Features,
6. Channel Dimension Relations,
7. Stream Channel Scour/Deposition Potential (Sediment Competence), and
8. Channel Evolution

Upon completion of the existing conditions survey, the following geomorphic data as identified in Table 9-3 below will be provided for all proposed stream restoration and preservation reaches and included in future draft and final mitigation plans.

<b>Table 9-3 Geomorphic Data Table</b>					
<b>Parameters</b>	<b>Notation</b>	<b>Units</b>	<b>Existing Conditions</b>		
			<b>minimum</b>	<b>maximum</b>	<b>average</b>
stream type					
drainage area	DA	sq mi			
Manning's Roughness Coefficient	"n"				
bankfull discharge	Q <sub>bkf</sub>	cfs			
<b>Cross-Section Features</b>					
bankfull cross-sectional area	A <sub>bkf</sub>	SF			

<b>Table 9-3 Geomorphic Data Table</b>					
<b>Parameters</b>	<b>Notation</b>	<b>Units</b>	<b>Existing Conditions</b>		
			<b>minimum</b>	<b>maximum</b>	<b>average</b>
average velocity during bankfull event	$V_{bkf}$	fps			
width at bankfull	$W_{bkf}$	feet			
riffle maximum depth at bankfull	$d_{max}$	feet			
riffle mean depth at bankfull	$d_{bkf}$	feet			
bankfull width to depth ratio (W/D)	$W_{bkf}/d_{bkf}$				
riffle max depth ratio	$d_{max}/d_{bkf}$				
max depth @ tob	$d_{max\ to\ b}$	feet			
bank height ratio	BHR	feet/feet			
floodprone area width	$W_{fpa}$	feet			
entrenchment ratio ( $W_{fpa}/W_{bkf}$ )	ER	feet/feet			
<b>Sinuosity</b>					
valley slope	$S_{valley}$	feet/foot			
channel slope	$S_{channel}$	feet/foot			
sinuosity	K				
<b>Riffle Features</b>					
riffle slope	$S_{riffle}$	feet/foot			
riffle slope ratio	$S_{riffle}/S_{channel}$				
<b>Pool Features</b>					
pool slope	$S_{pool}$	feet/foot			
pool slope ratio	$S_{pool}/S_{channel}$				
pool-to-pool spacing	$L_{p-p}$	feet			
pool spacing ratio	$L_{p-p}/W_{bkf}$				
maximum pool depth at bankfull	$d_{pool}$	feet			
pool depth ratio	$d_{pool}/d_{bkf}$				
pool width at bankfull	$W_{pool}$	feet			
pool width ratio	$W_{pool}/W_{bkf}$				
pool cross-sectional area at bankfull	$A_{pool}$	SF			
pool area ratio	$A_{bkf}/A_{pool}$				

<b>Table 9-3 Geomorphic Data Table</b>					
<b>Parameters</b>	<b>Notation</b>	<b>Units</b>	<b>Existing Conditions</b>		
			<b>minimum</b>	<b>maximum</b>	<b>average</b>
<b>Sediment</b>					
Particle Size Distribution from Reach-Wide Pebble Count or Bulk Sampling d <sub>50</sub> material for Rosgen classification					
	d <sub>16</sub>	mm			
	d <sub>35</sub>	mm			
	d <sub>50</sub>	mm			
	d <sub>84</sub>	mm			
	d <sub>95</sub>	mm			

Streambank Stability

Bank erosion rates will be approximated using the Bank Erosion Hazard Index (BEHI) procedures developed by Rosgen (2001). The traditional application of BEHI predicts an annual estimation of sediment tonnage entering the stream solely from stream bank erosion. Results from BEHI will be included within future draft and final mitigation plans as identified in Table 9-4.

<b>Table 9-4 BEHI Data Table</b>			
<b>Reach</b>	<b>Length Assessed (linear feet)</b>	<b>Approx. Sediment Contribution (tons / year)</b>	<b>Sediment Contribution (tons / 1,000 linear feet / year)</b>
Stream(s)			
<b>Totals</b>			

Stream Biological Assessment

An assessment of the benthic macroinvertebrate community will be conducted in the proposed restoration and preservation reaches along Upedee Creek. The sampling methodology for assessment of benthic macroinvertebrate communities will follow the Georgia Rapid Bioassessment *Standard Operating Procedures for Benthic Macroinvertebrates* (GDNR 2007). The biological assessment will include data on total taxa richness and calculate a site metric index score that will compare site specific data to data previously collected and scored by Georgia EPD at reference and non-reference quality streams within the same ecoregion. Results from the macroinvertebrate assessment will be included in future draft and final mitigation plans as identified in Table 9-5.

<b>Table 9-5 Macroinvertebrate Data Table</b>				
<b>Sampling Reach</b>	<b>Monitoring Year</b>	<b>Metrics</b>		
		<b>GAEPD Site Metric Index Score</b>	<b>Total Taxa Richness</b>	<b>Habitat Assessment Score</b>
Stream(s)	Baseline			

An assessment of the fisheries community will be conducted in each reach proposed for restoration and/or preservation with a drainage area greater than 1 square mile (Upedee Creek). The sampling methodology for assessment of fisheries will follow the *Georgia EPD Standard Operating Procedures for Conducting Biomonitoring on Fish Communities in Wadeable Streams in Georgia*. The biological assessment will include data on total taxa richness and calculate an IBI and lwb index score. Results from the fisheries assessment will be included in future draft and final mitigation plans as identified in Table 9-6.

<b>Table 9-6 Fisheries Data Table</b>					
<b>Sampling Reach</b>	<b>Monitoring Year</b>	<b>Metrics</b>			
		<b>GAEPD IBI Index Score</b>	<b>GAEPD lwb Index Score</b>	<b>Total Taxa Richness</b>	<b>Habitat Assessment Score</b>
Stream(s)	Baseline				

Habitat Assessment

A physical habitat assessment will be conducted at each stream proposed for restoration and/or preservation. The habitat assessment is an evaluation of the quality of the physical habitat as it affects the local biological communities in the stream. Results from the habitat assessment will be included in future draft and final mitigation plans.

**9.6 Vegetation**

Based on cursory examination of baseline sampling plots, existing vegetation associated with the Site can be broken down into the following types: (1) freshwater forested/shrub wetlands and (2) upland forested buffer. Predominant species associated with the vegetation types are described in more detail in Table 9-7 below.

<b>Type</b>	<b>Location/Unit</b>	<b>Approx. Size (Acres)</b>	<b>General Description</b>
Freshwater forested/shrub wetland	Riparian buffer immediately adjacent to stream corridor	20	<i>Alnus serrulata, Acer rubrum, Magnolia virginiana, Salix nigra, Myrica cerifera, Leucothoe racemosa, Polygonum arifolium, Juncus effusus, Cyperus spp., Woodwardia areolata, Saururus cernuus, Rubus spp., Solidago spp., Dichanthelium spp., Phlox spp., Smilax spp., Pluchea odorata, Eriocaulon compressum</i>
Upland forested buffer	Riparian buffer outside of immediate stream corridor	8	<i>Pinus taeda, Pinus palustris, Pinus eliottii, Quercus nigra, Quercus laurifolia, Acer rubrum, Liquidambar styraciflua, Magnolia virginiana, Arundinaria gigantea, Myrica cerifera, Baccharis spp., Ilex spp., Rhododendron spp., Smilax spp., Vitis rotundifolia, Rubus spp., Vaccinium spp., Scutellaria spp., Aster spp., Eupatorium capillifolium, Thelypteris novaboracensis, Lonicera japonica, Andropogon virginicus</i>

The majority of the riparian buffers along Upedee Creek and the unnamed tributaries are heavily forested with forested/shrub wetlands common along its entire length, generally within 25-30 feet from the top of bank. As buffers extend outward to 50 feet and beyond the buffer gradually transitions from wetland to upland communities dominated primarily by mixed pine-hardwood types and managed pine plantations. Photos of the representative vegetation types are provided in Appendix B.

### **9.7 Threatened and Endangered Species**

The Georgia Department of Natural Resources (GADNR) Wildlife Resource Division (WRD) database (GADNR Biotics Database, 2011) was searched for known locations of federal and/or state listed plant and animal species within a three-mile radius of the Site (Figure 11). According to the data, several federal and/or state listed species were identified within a three-mile radius including the alligator snapping turtle (*Macrochelys temminckii*), eastern indigo snake

(*Drymarchon corais couperi*), Florida worm lizard (*Rhineura floridana*), gopher tortoise (*Gopherus polyphemus*), hooded pitcherplant (*Sarracenia minor*), netleaf pawpaw (*Asimina reticulata*), palafox (*Palafoxia spp.*), and the Suwanee River cooter (*Pseudemys cocinna suwanniensis*).

The US Fish and Wildlife Service (USFWS) databases were searched for federally listed threatened and endangered plant and animal species for Lanier County. According to USFWS Information, Planning, and Conservation System (IPAC, 2014) there are four federally listed animal species in Lanier County that have the potential to occur on or near the Site. These species include the federally threatened frosted flatwoods salamander (*Ambystoma cingulatum*), wood stork (*Mycteria americana*), and eastern indigo snake. The gopher tortoise, a candidate species, is also listed in Lanier County.

Federally listed species and habitat descriptions for Lanier County, GA are identified in Table 9-8 below. Marginal habitat for the federally listed wood stork exists on the Site. However, the Project is a stream restoration and preservation project and will not disturb or degrade existing wetland/riparian buffer habitat or function along Upedee Creek. Therefore, it is not anticipated that the Project will have any adverse effect on federally listed species.

<b>Table 9-8 Listed Species for Lanier County, Georgia</b>			
<b>Species</b>	<b>Federal Status</b>	<b>State Status</b>	<b>Habitat</b>
<b>U.S. Fish and Wildlife Service ESA List (IPAC 11/13/2014)</b>			
<b>Amphibians</b>			
Frosted flatwoods salamander ( <i>Ambystoma cingulatum</i> )	T	T	Mesic flatwoods within longleaf pine-wiregrass communities; Breeding sites are shallow, ephemeral cypress and/or swamp tupelo ponds
<b>Birds</b>			
Wood stork ( <i>Mycteria americana</i> )	T	E	Freshwater and estuarine wetlands for breeding, feeding, and roosting;
<b>Reptiles</b>			
Eastern indigo snake ( <i>Drymarchon corais couperi</i> )	T	T	Sandhills and turkey oak scrub; floodplains or the periphery of cypress ponds
Gopher tortoise ( <i>Gopherus polyphemus</i> )	C	T	Sandy soil for burrowing; sandhills, dry flatwoods, and turkey oak scrub;
E = Endangered; T = Threatened; PE = Proposed Endangered; C = Candidate; NS = No Status Identified			

## **9.8 Cultural Resources**

A cultural resources assessment has not yet been conducted for this Site. Prior to submitting the draft and final mitigation plans, a preliminary cultural resources site file search and literature review will be conducted. Depending on the results of the site file search and the nature of the restoration work being proposed, a phase I cultural resources survey may also be conducted in areas of proposed significant ground disturbance to locate and identify cultural resources within the project's APE and assess resource significance based on National Register of Historic Places (NRHP) criteria [36CFR Part 60.4]. These assessments will be included in Appendix E of the draft and final mitigation plans.

## **9.9 Potential Environmental Hazards**

A Phase I Environmental Site Assessment has not been conducted for this Site. Based on historical photographs and current conditions, the Site has been primarily in timber management for over 50 years, and as such use does not typically result in the presence of hazardous or toxic materials. During recent site investigations, no evidence of past or present adverse environmental conditions or hazards were identified on-site or adjacent to the property. Should adverse environmental conditions or hazards be identified during the construction phase of the Project, the Project Sponsor will cease all activities and notify the USACE immediately to determine the appropriate course of action.

## **10.0 Summary of Proposed Mitigation Activities; Target Functions**

Based on preliminary assessment and analysis of the Site, the primary methods of stream mitigation will include restoration of the historic flow regime along an approximate 2,364 lf section of Upedee Creek and 11,948 lf of associated riparian buffer preservation (Figure 12). Currently, the proposed restoration section of Upedee Creek is cut-off from its original channel resulting in reduced base flow through the relic channel, abandonment of its floodplain, and loss of suitable habitat (i.e., woody debris, fibrous roots, etc.). The cut-off channel was formed as a result of former land management practices which have created soil/floodplain instability along this section. Over time, the original stream channel began to migrate and eventually cut through the bank forming the cut-off channel. Previous land management practices, in an effort to contain the flow of water, further straightened and channelized the cut-off channel to reduce flood flows across portions of the Site. The resulting cut-off channel now parallels the natural channel and is incised, unstable, has a lack of geomorphic features, and is disconnected from the floodplain. The restoration approach will restore base flow and reconnect the relic channel to the floodplain. Providing the channel access to a floodplain will help reduce sheer stress and as a result would

decrease erosion and subsequent downstream sedimentation and increase floodplain function by providing nutrient cycling with riparian buffer areas.

This approach to stream restoration is aimed at reversing the negative effects of the cut-off channel on stream geomorphology and function, water quality, and biological communities. Table 10-1 identifies the stream functions compromised and/or lost, proposed restored functions, and success criteria associated with the proposed Project and the stream restoration.

<b>Functions Compromised/ Lost on Site<sup>1</sup></b>	<b>Proposed Restored Functions and Methods</b>	<b>Success Criteria and Measurements<sup>2</sup></b>
Stream Dynamics → <i>Stream Evolutionary Process</i>	Restore hydrologic flow regime to natural channel in order to maintain appropriate energy levels in system; maintain diversity and succession	Stability assessments; vegetation distribution and abundance
Hydrologic Balance → <i>Surface/Subsurface Water Connections and Processes</i>	Provide bi-directional flow; adequate exchange of chemicals, nutrients, and water; provide habitat pathways for organisms; maintain subsurface capacity to store water; maintain base flow, seasonal flow, and soil moisture	Stream baseflow; flow duration
Sediment Processes and Character → <i>Sediment Continuity</i>	Appropriate erosion, transport, and deposition processes; nutrient cycling; natural channel supporting diverse habitats and biotic communities	Bed materials analysis; geomorphic feature distribution
Biological Support → <i>Biological Communities and Processes</i>	Provide for diverse assemblages of native species; maintain healthy biotic communities and sustain appropriate habitat	Aquatic species diversity; habitat assessments
Chemical Processes and	Regulation of chemical	Water quality

<b>Table 10-1 Target Functions Lost and Proposed Restored Functions for Stream Restoration</b>		
<b>Functions Compromised/ Lost on Site<sup>1</sup></b>	<b>Proposed Restored Functions and Methods</b>	<b>Success Criteria and Measurements<sup>2</sup></b>
Pathways → <i>Water and Soil Quality and nutrient cycling</i>	and nutrient cycles; restore chemical equilibrium necessary to sustain diverse aquatic ecosystems	measurements; sediment deposition rates; soil profile integrity
<sup>1</sup> from ERDC TN-EMRRP-SR-52 <sup>2</sup> Specific success criteria is provided in Section 12.0		

## 11.0 Stream Mitigation Plan

### 11.1 Stream Channel Restoration

For Upedee Creek, the proposed priority 1 approach to natural channel design is the highest level of restoration feasible given the valley type, stream type, and constraints. Selection of restoration type follows Rosgen's priority restoration approaches for incised streams (Rosgen, 1997) with the over-riding objective of re-establishing contact between the channel and its floodplain. The restoration approach is described in more detail below.

#### Project Design Selection Criteria

A combination of approaches will be used to develop design criteria for channel dimension, pattern and profile. These approaches range from identifying upstream reference reaches, offsite reference reach searches, gauge station surveys, utilizing reference reach databases, regime equations, and comparison to past projects.

The best option for developing design criteria is to locate a reference reach adjacent to the Project. A reference reach channel should be stable (neither aggrading nor degrading) and is of the same morphological type as the channel under consideration for restoration. The reference reach should also have a similar valley slope and drainage area as the project reach. Both the upstream and downstream preservation sections of Upedee Creek are stable and would be considered an appropriate reference reach. The upstream preservation reach of Upedee Creek will be used as a reference reach to aid in the development of design parameters for this Project.

Specific design parameters have not yet been developed for the Project but will use a combination of reference reach data, gauge station data, past project experiences, and best professional judgment. The design philosophy for the Project is to use conservative values for the selected stream types and to allow natural variability in stream dimension, facet slope, and bed features to form over long periods of time under the processes of flooding, re-colonization of vegetation, and watershed influences.

The final stream restoration approach will be developed following further examination and assessment of data collected at the Site. This will include: (1) selecting an appropriate stream type for the existing valley type, (2) further refining the design based on the channel evolution sequence exhibited by the stream after examination of existing conditions survey data and other field observations, and (3) conditions observed on reference streams under similar conditions. Available belt width and channel incision parameters will be considered as well. Based on the initial preliminary assessments at the Site, the proposed stream type for the project is summarized in Table 11-1.

<b>Table 11-1 Project Design Stream Type</b>		
<b>Reach</b>	<b>Proposed Stream Type</b>	<b>Rationale</b>
Upedee Creek	C	Restoration of baseflow conditions and channel dimension, pattern, and profile will restore the reach to a stable stream type with access to a fully functioning floodplain.

Based on all existing and currently available information, priority 1 restoration is proposed for Upedee Creek (Figure 12). Once complete, final design parameters for Upedee Creek will be calculated and included in Table 11-2. The design parameters will detail the channel dimension, pattern, and profile morphology. The dimension data describes the cross-sectional shape of the channel including bankfull area, depth, and width. The pattern data will detail the meander geometry of the proposed channels including beltwidth, radius of curvature, and meander length. The Project Sponsor will provide 60% and 100% design plans for this Project that will be included as part of the final approved mitigation plan.

<b>Table 11-2 Project Stream Design Parameters</b>			
<b>Upedee Creek Design Parameters</b>	<b>Design Stream Values</b>		
<b>Parameter</b>	<b>MIN</b>	<b>MAX</b>	<b>MEAN</b>
Drainage Area, DA (sq mi)			
Stream Type (Rosgen)			

<b>Table 11-2 Project Stream Design Parameters</b>			
<b>Upedee Creek Design Parameters</b>	<b>Design Stream Values</b>		
	<b>MIN</b>	<b>MAX</b>	<b>MEAN</b>
Manning's Roughness Coeff., "n"			
Bankfull Discharge, Q <sub>bkf</sub> (cfs)			
Bankfull Riffle XSEC Area, A <sub>bkf</sub> (sq ft)			
Bankfull Mean Velocity, V <sub>bkf</sub> (ft/s)			
Bankfull Riffle Width, W <sub>bkf</sub> (ft)			
Bankfull Riffle Mean Depth, D <sub>bkf</sub> (ft)			
Width to Depth Ratio, W/D (ft/ft)			
Width Floodprone Area, W <sub>fpa</sub> (ft)			
Entrenchment Ratio, W <sub>fpa</sub> /W <sub>bkf</sub> (ft/ft)			
Riffle Max Depth @ b <sub>kf</sub> , D <sub>max</sub> (ft)			
Riffle Max Depth Ratio, D <sub>max</sub> /D <sub>bkf</sub>			
Max Depth @ tob, D <sub>max</sub> tob (ft)			
Bank Height Ratio, D <sub>tob</sub> /D <sub>max</sub> (ft/ft)			
Meander Length, L <sub>m</sub> (ft)			
Meander Length Ratio, L <sub>m</sub> /W <sub>bkf</sub> *			
Radius of Curvature, R <sub>c</sub> (ft)			
R <sub>c</sub> Ratio, R <sub>c</sub> /W <sub>bkf</sub> *			
Belt Width, W <sub>blt</sub> (ft)			
Meander Width Ratio, W <sub>blt</sub> /W <sub>bkf</sub> *			
Sinuosity, K			
Valley Slope, S <sub>val</sub> (ft/ft)			
Channel Slope, S <sub>chan</sub> (ft/ft)			
Slope Riffle, S <sub>rif</sub> (ft/ft)			
Riffle Slope Ratio, S <sub>rif</sub> /S <sub>chan</sub>			
Slope Pool, S <sub>pool</sub> (ft/ft)			
Pool Slope Ratio, S <sub>pool</sub> /S <sub>chan</sub>			
Pool Max Depth, D <sub>max</sub> pool (ft)			
Pool Max Depth Ratio, D <sub>max</sub> pool/D <sub>bkf</sub>			
Pool Width, W <sub>pool</sub> (ft)			
Pool Width Ratio, W <sub>pool</sub> /W <sub>bkf</sub>			
Pool-Pool Spacing, L <sub>ps</sub> (ft)			
Pool-Pool Spacing Ratio, L <sub>ps</sub> /W <sub>bkf</sub>			
d16 (mm)			
d35 (mm)			

<b>Table 11-2 Project Stream Design Parameters</b>			
<b>Upedee Creek Design Parameters</b>	<b>Design Stream Values</b>		
<b>Parameter</b>	<b>MIN</b>	<b>MAX</b>	<b>MEAN</b>
d50 (mm)			
d84 (mm)			
d95 (mm)			

Site Stabilization/Re-vegetation Plan

If needed, a wetland/riparian seed mix may be used to stabilize and supplement any areas where there is significant ground disturbance as a result of restoration construction activities. In all areas of exposed earth, a temporary seed mix will be immediately sown to stabilize the Site. Upon temporary vegetation establishment a permanent seed mixture may be used to enhance the wetland/riparian vegetation and provide more deep rooted herbaceous species to establish. Table 11-3 includes both temporary and permanent vegetation seed mixes that may be used within the stream restoration areas.

<b>Table 11-3 Permanent and Temporary Seed Mixture for Stream Restoration</b>				
<b>Scientific Name</b>	<b>Common Name</b>	<b>Seeding Density (lbs./Acres)</b>	<b>Percent Mix (%)</b>	<b>EMP Wetland Indicator</b>
<b>Permanent Seed Mixture</b>				
<i>Elymus riparius</i>	Riverbank-Wild Rye	1.5	10	FACW
<i>Bidens frondosa</i>	Beggar's Ticks	2.25	15	FACW
<i>Panicum hemitomon</i>	Maiden-Cane	0.75	5	FACW
<i>Carex vulpinoideae</i>	Fox Sedge	0.75	5	OBL
<i>Sorghastrum nutans</i>	Indian Grass	2.25	15	FACU
<i>Schizachyrium scoparium</i>	Little Bluestem	2.25	15	FACU
<i>Agrostris exarata</i>	Spiked Bent	0.75	5	FACW
<i>Juncus effusus</i>	Soft Rush	1.5	10	FACW
<i>Panicum virgatum</i>	Switchgrass	1.5	10	FAC
<i>Elymus virginicus</i>	Virginia Wild Rye	1.5	10	FACW
<b>Totals</b>		<b>15</b>	<b>100</b>	

<b>Table 11-3 Permanent and Temporary Seed Mixture for Stream Restoration</b>				
<b>Scientific Name</b>	<b>Common Name</b>	<b>Seeding Density (lbs./Acres)</b>	<b>Percent Mix (%)</b>	<b>EMP Wetland Indicator</b>
<b>Temporary Seed Mixture</b>				
<i>Lolium multiflorum</i>	Annual Rye	10	40	NI
<i>Avena sativa</i>	Oats	10	40	UPL
<i>Panicum ramosum</i>	Browntop Millet	5	20	NI
<b>Totals</b>		<b>20</b>	<b>100</b>	

## 11.2 Riparian Buffer Preservation

Riparian buffers along all proposed stream reaches were visually inspected to assess their current condition and potential for restoration and/or preservation. Buffer vegetation within the Site and along Upedee Creek is either in a forested/shrub wetland or mixed hardwood-pine condition with a well-established overstory, shrub, and herbaceous layer generally comprising greater than 90% of the Site. Therefore, there is no proposed riparian buffer restoration as part of this Project. The Project is proposing to preserve a minimum fifty (50) foot buffer along both sides of Upedee Creek and associated tributaries as part of this Project. Representative photographs of proposed riparian buffer preservation areas are included in Appendix B.

The proposed stream and riparian buffer preservation meet the preservation threshold criteria as required in 33 CFR 332.3(h). This criteria includes: (1) the resources provide important physical, chemical, and biological functions for the watershed, (2) the resources contribute significantly to the ecological sustainability of the watershed, (3) preservation is determined to be appropriate and practical, (4) the resources are under threat of destruction or adverse modification, and (5) the preserved Site will be permanently protected.

Preservation of the buffers along Upedee Creek is important to the overall health and quality of not only the Site, but for a large portion of the surrounding watershed as well. Stream and buffer preservation areas encompass approximately 9,696 lf of stream and approximately 28 acres of associated riparian buffer preservation within the Site (Figure 12). Stream and riparian buffer preservation areas will protect the most viable and ecologically self-sustaining areas of the Site. The current condition of the proposed riparian buffers consist primarily of well-established, vegetated, deep-rooted native vegetation. From a physical standpoint, the associated stream banks along the preservation reaches of Upedee Creek are very stable with little to no erosion with good vertical and lateral stability and have full access to adjacent floodplains.

The proposed riparian preservation areas throughout the Site could potentially be impacted by future development, land clearing, agriculture, and future logging and clear-cutting activities. Protecting these areas not only increases the ecological viability of the Site and overall watershed, but also protects valuable wildlife and aquatic habitat from future impacts. Preserving this area also provides valuable wildlife corridors and serves as a migration source for fish and benthic macroinvertebrates. Preserved stream and riparian systems across the Site will be preserved and protected in perpetuity with a Restrictive Covenant.

### 11.3 Construction Plans, Timeline, and As-Built

#### Construction Plans

The Project Sponsor will develop preliminary (60%) and final (100%) construction plans for the proposed stream restoration (Appendix F). The plans will include title sheet, general notes and symbols, stream restoration plan, and a certified erosion and sediment control plan with appropriate details. The final set of construction plans will be submitted to the IRT prior to implementation.

#### Construction Timeline

The Project plans to begin stream restoration construction immediately following Project approval and issuance of NWP 27 and other applicable permits (i.e., Stream Buffer Variance, Land Disturbance Permit, etc.), provided the timing of the permits, contractor availability, and season of construction is appropriate. Any areas disturbed cleared and/or graded will be immediately vegetated with temporary and permanent seeding following final excavation and setting of final grades. It is anticipated that the stream restoration construction will last approximately 3 months. The proposed restoration construction timeline is shown in Table 11-4 below.

Action	Month		
	1	2	3
Equipment Mobilization	X	X	
Harvest Materials	X	X	
E&S Control	X	X	
Construction Stakeout	X	X	
Clearing & Grubbing		X	
Grading		X	
Install Structures		X	

<b>Table 11-4 Proposed Restoration Activity Timeline</b>			
<b>Action</b>	<b>Month</b>		
	1	2	3
Temp. & Perm. Seeding		X	
Stabilization		X	
Site Cleanup		X	
Demobilization		X	
Final As-Built Survey		X	X

A project manager from Corblu will provide construction observation during all construction phases of the Project. The Project Sponsor will utilize a qualified contractor with experience in stream restoration and working in wet environments. The construction sequence in Table 11-5, outlines the construction sequence proposed for implementation of the stream restoration plan.

<b>Table 11-5 Summary of Construction Sequence</b>	
<b>Phase</b>	<b>Construction Sequence</b>
<b>Mobilization</b>	1. Contractor shall prepare construction entrances and access
	2. Contractor will mobilize equipment, materials, prepare staging areas, and stockpile materials
	3. Construction traffic will be limited to "limits of disturbance" as shown on plans and as directed by project manager/engineer.
	4. Contractor shall install all temporary rock check dams, silt fence, tree save, and mulching around all staging and stockpile areas.
	5. If needed, temporary stream crossings will be installed. Streams will be left open during initial stages of construction for drainage and to allow for site access
<b>Construction</b>	6. Contractor to begin clearing, filling of ditches, and grading at upstream end of restored reach. Only as much area that can be stabilized in a day will be disturbed at any time
	7. Any in-stream structures and matting shall be installed following clearing and grading sequence
	8. Any in-stream structures shall be installed from the upstream section working downstream

<b>Table 11-5 Summary of Construction Sequence</b>	
<b>Phase</b>	<b>Construction Sequence</b>
	9. Once a stream work phase is complete, the contractor will apply temporary and permanent seeding and mulch to disturbed areas
<b>Demobilization</b>	10. All seeding and mulching shall be completed before the contractor leaves the project site along with removal of temporary stream crossings and check dams
	11. The contractor shall ensure that the site is free of trash and leftover materials prior to demobilization of equipment from the site

As-Built Survey

Within 30 days after completion of the stream restoration construction, the Project Sponsor will provide an as-built survey to the IRT. The as-built survey will verify actual length of stream restoration and identify any areas of Site stabilization and seeding. The as-built survey will be in CAD or other similar format and provide a graphical representation verifying successful completion of the mitigation work plan.

**12.0 Determination of Credits**

Corblu has preliminarily evaluated the Site between December 2013 and November 2014. A contiguous area of approximately 12,060 lf (2.28 miles) was identified that had the potential for stream restoration and preservation. To determine mitigation credits, the Project will follow the currently accepted SOP guidelines as indicated in the *Savannah District's March 2004 Standard Operating Procedure*. Stream credit SOP worksheets are included in Appendix G. The following stream SOP credit factors were used in the determination of proposed credits for the Project.

**12.1 Stream Channel Restoration**

Net Benefit. Priority 1 restoration is proposed where baseflow of the stream channel will be returned to a historic (relic) channel thereby reconnecting the stream to the existing floodplain. This will be accomplished by restoring a Rosgen class C channel to replace an existing Rosgen class F channel. The proposed credit factor is 8.0.

Monitoring and Contingencies Plan. An excellent level of monitoring and contingencies are proposed with at least 7 years of monitoring including aquatic

community and habitat monitoring in conjunction with suitable baseline data collection and comparison to a reference site. The proposed credit factor is 1.0.

Priority Area. Secondary priority area is being proposed. Upedee Creek is high priority stream that is a direct tributary to the Alapaha River. The proposed credit factor is 0.2.

Control. The Site will be perpetually protected by a restrictive covenant. The proposed credit factor is 0.1. Should a conservation easement be placed over Site, the control credit factor will be raised from 0.1 to 0.3 and credit generation will be amended to reflect the increased protection on the property.

Mitigation Timing. Schedule 3 for non-banks where mitigation will be completed after the impacts occur is proposed. The proposed credit factor is 0.

## **12.2 Stream/Riparian Buffer Preservation**

Net Benefit. Preservation of the minimum fifty foot buffers along both sides of Upedee Creek and associated tributaries is proposed. Preservation buffers consist of well-vegetated buffers along all proposed stream reaches. The proposed credit factor is 0.

Monitoring and Contingencies Plan. An excellent level of monitoring and contingencies are proposed to include collection of basic vegetation data in the buffer with at least 7 years of monitoring. The proposed credit factor is 0.3.

Priority Area. Secondary priority area is being proposed. Upedee Creek is high priority stream that is a direct tributary to the Alapaha River. The proposed credit factor is 0.2.

Control. The Site will be perpetually protected by a restrictive covenant. The proposed credit factor is 0.1. Should a conservation easement be placed over Site, the control credit factor will be raised from 0.1 to 0.3 and credit generation will be amended to reflect the increased protection on the property.

## **12.3 Credits Generated**

Tables 12-1 and 12-2 show the proposed stream credits generated by the Project based on the credit factors described in this section. Table 12-3 shows the stream mitigation outputs for the Project that were used to calculate credits. The Project has the potential to generate additional stream credits based on placing a conservation easement over the Site in addition to the restrictive covenant. Should a conservation easement be placed over the Site, the control credit factor would be raised from 0.1 (as currently proposed) to 0.3. Subject to approval by the USACE and IRT, subsequent credit generation on all mitigation units would be amended to reflect the increase in credit generation due to additional site

protections and control. Based on current SOP stream lengths and credit factors, the credit increase associated with placing a conservation easement over the Site in addition to the restrictive covenant would be 2,299 stream credits. Table 12-1 shows the mitigation credit generated by the Project as currently proposed. Table 12-2 shows the mitigation credit generated once a conservation easement has been put into place.

<b>Table 12-1 Stream Credit Generation Without Conservation Easement</b>			
<b>Mitigation Type</b>	<b>Linear Feet (lf)</b>	<b>Stream Credits</b>	<b>Design Approach</b>
Stream Restoration	2,364	21,985	Priority I restoration by replacing entrenched F channel with restored C channel and restoring baseflow to relic channel
Riparian Preservation	9,584	8,717	Preservation of well-vegetated riparian buffers
<b>Total</b>	<b>11,948</b>	<b>30,702</b>	<b>Stream restoration and riparian buffer preservation</b>

<b>Table 12-2 Stream Credit Generation With Conservation Easement</b>			
<b>Mitigation Type</b>	<b>Linear feet (lf)</b>	<b>Stream Credits</b>	<b>Design Approach</b>
Stream Restoration	2,364	22,458	Priority I restoration by replacing entrenched F channel with restored C channel and restoring baseflow to relic channel
Riparian Preservation	9,584	10,543	Preservation of well-vegetated riparian buffers
<b>Total</b>	<b>11,948</b>	<b>33,001</b>	<b>Stream restoration and riparian buffer preservation</b>

Channel Work			Riparian Buffer Work					
Stream Reach	Design Approach	Linear Feet	Buffer Section	Linear Feet	Mitigation Type		Minimum Buffer Width	
					LB	RB	LB	RB
Upedee Creek	Priority 1	2,364	1	2,364	Preservation	Preservation	1X	1X
Upedee Creek	Preservation	8,901	1	8,901	Preservation	Preservation	1X	1X
UT1	Preservation	524	1	492	Preservation	Preservation	1X	1X
UT 2	Preservation	271	1	191	Preservation	Preservation	1X	1X

## 13.0 Monitoring and Performance and Success Standards

To ensure the success of the mitigation Project, monitoring of the Site shall occur for a period of seven years from the date of completion of channel restoration activities. Monitoring shall continue at the Site until specific success criteria outlined in the Mitigation Plan are met. Annual monitoring reports will be submitted to each member of the IRT by December 31<sup>st</sup> of each required monitoring year. The monitoring period may be shortened if the IRT determines that the monitoring requirements have been fulfilled in less than five years.

The Project will follow current SOP guidelines as indicated in the Savannah District's *March 2004 Standard Operating Procedure*. In order to ensure the highest level of success, the Project will utilize and develop an 'excellent' level of monitoring and contingency plans which includes at least seven years of geomorphic and biological monitoring, collection of suitable baseline data, and reference site comparison monitoring. Additionally, the proposed monitoring plan and performance and success criteria will follow components of the more recently developed Appendix 10 standards as outlined in the Savannah District's *Draft Guidelines to Establish and Operate Mitigation Banks in Georgia (2011)*. Proposed monitoring stations/locations for all criteria is indicated on Figure 8.

### 13.1 Stream Physical Variables

#### Channel Dimension

*Restoration:* Four (4) permanent cross sections will be installed within the restored portion of Upedee Creek; two (2) located at representative riffles and

two (2) located at a representative pools. Channel cross-sections will be monitored before restoration is implemented (baseline) and during years 1, 3, 5, and 7 of the monitoring period.

*Preservation:* Permanent cross sections will be installed on each stream preservation reach, with one (1) located at a representative riffle and one (1) located at a representative pool cross section. Channel cross-sections in preservation reaches will be monitored before restoration is implemented (baseline) and again at year 7 of the monitoring period.

Each cross section will be marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be consistently used to facilitate comparison monitoring over the course of the monitoring period. The cross section survey will include points measured at all breaks in slope, including top of bank, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross sections will be classified for stream type using the Rosgen stream classification system. Bankfull width, bankfull mean depth, cross sectional area, width/depth ratio, bankfull max depth, floodprone area width, bank height ratio, entrenchment ratio, max pool depth, and pool width will be calculated from cross section surveys.

#### Success Criteria:

*Restoration:* There should be little change in as-built cross sections and geomorphic dimension in the restored channel should exhibit the max/min design range as compared to the as-built survey. If changes do take place they will be evaluated to determine if they represent a movement toward a more unstable condition (down-cutting, erosion) or are minor changes that represent an increase in stability (settling, vegetative changes, deposition along the banks, decrease in width/depth ratio and/or cross sectional area).

*Preservation:* A stable channel dimension should exist as compared to baseline. The preserved channel exhibits no significant bank failures for the valley and stream type.

#### Longitudinal Profile

*Restoration:* A representative longitudinal profile will be surveyed on the restored section of Upedee Creek. The longitudinal profile will be monitored before restoration is implemented (baseline) and during years 1, 3, 5, and 7 of the monitoring period.

*Preservation:* A representative longitudinal profile will be surveyed on each stream preservation reach. Longitudinal profiles will be monitored when before mitigation activities are implemented (baseline) and again at year 7 of the monitoring period.

The length of the longitudinal profile will be determined largely by stream size and bankfull width and conducted on a length appropriate to adequately represent as-built profile conditions. Profile measurements will include thalweg, water surface, inner berm, bankfull, and top of low bank. Each of these measurements will be taken at the head of a feature (e.g., riffles and pools). The survey will be tied to a permanent benchmark and its start and end points permanently marked for easy future comparison monitoring. Pool to pool spacing and channel sinuosity will be calculated from longitudinal profile surveys. For each monitoring year longitudinal profiles are required, they should be plotted against the as-built or baseline survey as well as previous year's profiles to develop comparison overlays.

### Success Criteria

*Restoration:* Channel pattern and profile should exhibit appropriate max/min design range criteria as compared to the as-built survey. The longitudinal profiles should show that the bedform features are remaining stable, i.e. they are not aggrading or degrading. The pools should remain deep with flat water surface slopes and the riffles should remain steeper and shallower than the pools. There should be little or no change in pattern over the monitoring period. If changes do take place they will be evaluated to determine if they represent a movement toward a more unstable condition (down valley meander migration) or are minor changes that do not have an impact on stream stability.

*Preservation:* A stable channel pattern and profile shall be evident based on comparisons with baseline data. The preserved channel exhibits no significant headcuts for the valley and stream type.

### Streambank Stability

*Restoration:* For the Upedee Creek stream restoration section, an evaluation of bank stability shall occur before restoration is implemented and once annually through year 7 of the monitoring period after mitigation activities are implemented. BEHI will be used for the evaluation. The streambank stability assessment will be conducted for the entire length of the restored stream reach.

*Preservation:* An evaluation of bank stability using BEHI shall occur along a representative reach (to be determined by overall stream length) for each stream preservation reach at baseline (year 0) and again at year 7 of the monitoring period after mitigation activities are approved and implemented. The preservation BEHI assessment will be in a location as to best determine changing conditions to the overall preservation networks and to identify any areas of potential instability (i.e. headcuts, severe bank erosion, down valley migration of meanders, etc.).

## Success Criteria

For restored and preserved stream reaches, the BEHI or bank stability assessment shall indicate that streambanks are stable, excluding normal underbank cutting.

### **13.2 Stream Biological Variables**

#### **Benthic Macroinvertebrate Site Index**

*Restoration:* Biologic monitoring of restored streams shall include surveys for macroinvertebrates before mitigation is implemented (baseline) and during years 1, 3, 5, and 7 after mitigation activities are implemented. Macroinvertebrate sampling will be conducted during the same season as baseline sampling to facilitate comparison monitoring.

*Preservation:* Biologic monitoring of preserved streams shall include surveys for macroinvertebrates before mitigation is implemented (baseline) and during years 1, 3, 5, and 7 after mitigation activities are implemented. Macroinvertebrate sampling will be conducted during the same season as baseline sampling to facilitate comparison monitoring.

#### Success Criteria

*Restoration:* In order to demonstrate success, the macroinvertebrate site index should increase by 10% for year 1 over baseline, 5% for year 3 over baseline, 10% for year 5 over baseline, and 15% for year 7 over baseline. Any deficiencies in the macroinvertebrate site index scores over the course of the monitoring period may be evaluated with the IRT prior to determining the overall success of macroinvertebrate monitoring.

*Preservation:* Sustain Site Index Score in preservation reaches. Any deficiencies in the macroinvertebrate site index scores over the course of the monitoring period may be evaluated with the IRT prior to determining the overall success of macroinvertebrate monitoring.

#### **Fisheries Index of Biotic Integrity**

*Restoration:* Biologic monitoring of restored streams (greater than 1 square mile drainage area) shall include surveys for fisheries before mitigation is implemented (baseline) and during years 1, 3, 5, and 7 after mitigation activities are implemented. Fisheries sampling will be conducted during the same season as baseline sampling to facilitate comparison monitoring.

*Preservation:* Biologic monitoring of preserved streams (greater than 1 square mile drainage area) shall include surveys for fisheries before mitigation is

implemented (baseline) and during years 1, 3, 5, and 7 after mitigation activities are implemented. Fisheries sampling will be conducted during the same season as baseline sampling to facilitate comparison monitoring.

### Success Criteria

*Restoration:* For baseline IBI scores falling in the very poor, poor, and fair integrity class, the Site Index score must increase over baseline by 5% at year 3, 10% at year 5, and 15% at year 7. For baseline IBI scores falling in the good integrity class, the Site Index score must increase over baseline by 3% at year 3, 5% at year 5, and 10% at year 7. For baseline IBI scores falling in the excellent integrity class, the Site Index score must increase over baseline at years 3, 5, and 7.

*Preservation:* Sustain Site Index Score in preservation reaches. Any deficiencies in the fisheries site index scores over the course of the monitoring period may be evaluated with the IRT prior to determining the overall success of fisheries monitoring.

### Physical Habitat Assessment

*Restoration:* Biologic monitoring of restored streams shall include a physical habitat assessment in the restored channel before mitigation is implemented (baseline) and at years 1, 3, 5 and 7 after mitigation activities are implemented.

*Preservation:* A physical habitat assessment shall be performed at the downstream location of all stream preservation drainage networks at baseline and at years 1, 3, 5, and 7 of the monitoring period after mitigation activities are implemented. Physical habitat assessment will be conducted during the same season as baseline sampling to facilitate comparison monitoring.

### Success Criteria

*Restoration:* An increase of the physical habitat score over baseline conditions should occur prior to the end of the monitoring period.

*Preservation:* Sustain the physical habitat assessment score in preservation reaches as compared to baseline.

### Riparian Buffer Vegetation Structure

*Preservation:* For riparian preservation areas, vegetation monitoring for structure will be conducted in six (6) permanent 0.10-acre circular sampling plots. Vegetation monitoring will consist of permanent photo stations and documentation of dominant species, percent non-native species, percent hard and soft mast stems, and percent of native shrubs within the permanent sampling

plot. Riparian preservation monitoring will occur at baseline (year 0) and at years 1, 3, 5, and 7.

Success Criteria

Preservation areas should remain stable and sustain existing riparian vegetative structure from baseline through the seven year monitoring period.

**13.3 Performance Standards**

Stream metrics will assess physical and biological factors. Success for each variable outlined in the above success criteria will be measured based upon a pass/fail approach. The percentage of variables with a passing score will be used to determine if the Project is meeting the specified performance standards and associated target functions.

For streams the cumulative score for all factors (physical and biological) must minimally achieve a total mean score of 60%. If this minimum score is not obtained in any one year, no credits will be released until remediation measures have been employed. If the total mean score is between 60 and 79% then 50% of the total stream credits scheduled for release during that monitoring period will be released. Once site adjustments or remediation activities are performed the withheld credits will become available. If the total mean score is between 80 and 100%, then 100% of the total stream credits scheduled for release during that monitoring period will be released. The following table 13-1 will be used to report and determine interim and final success criteria for credit release:

<b>Table 13-1 Interim and Final Success Criteria</b>			
<b>Stream Metrics: Physical</b>			
<b>Variable</b>		<b>Score (+/-)</b>	<b>Total (%)</b>
Channel Dimension			
Channel Pattern and Profile			
Streambank Stability			
<b>Totals</b>			

<b>Stream Metrics: Biological</b>			
<b>Variable</b>		<b>Score (+/-)</b>	<b>Total (%)</b>
Riparian Vegetation Structure and Composition			
Macroinvertebrate Site Index			
Physical Habitat Assessment			
<b>Totals</b>			

<b>Stream Performance Standards Summary</b>	<b>%</b>
Physical Score	
Biological Score	
<b>Total Mean Score</b>	

## 14.0 Annual Reporting

The Project Sponsor will be responsible for all annual monitoring and reporting at the Site until specific success criteria outlined within the final approved mitigation plan are met. A monitoring report shall be provided to the USACE, not less than annually, on the performance and status of the Site and restoration activities. In general, the annual monitoring report will be submitted to the USACE by December 31<sup>st</sup> of each year for seven years or until the last credit is released at the end of the performance period, whichever is the greater time period. The annual report will be consistent with RGL 08-03 and include the following information:

1. Plans, maps, and/or photographs to illustrate site conditions;
2. A narrative summarizing the condition of the Project;
3. Monitoring results with comparison to performance standards, and;
4. Recommendations for adaptive management at the Site.

The monitoring report(s) may include information relating to: site design and construction; vegetation, soil, and hydrology data; fixed-point snapshot data of the mitigation area; maintenance activities performed; and recommended corrective measures, if any, to design standards, specifications, and maintenance protocols. A summary of the proposed mitigation monitoring plan and schedule is provided in Table 14-1.

<b>Required Monitoring</b>	<b>Year</b>							
	<b>0*</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Stream Channel Restoration</b>								
Cross Sections	X	X		X		X		X
Longitudinal Profiles	X	X		X		X		X
Streambank Stability	X	X	X	X	X	X	X	X
Macroinvertebrates	X	X		X		X		X
Fisheries	X	X		X		X		X
Habitat	X	X		X		X		X

<b>Table 14-1 Mitigation Monitoring Plan and Schedule</b>								
<b>Required Monitoring</b>	<b>Year</b>							
	<b>0*</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Stream Channel Restoration</b>								
Assessment								
Site Photographs	X	X	X	X	X	X	X	X
<b>Stream/Riparian Preservation</b>								
Cross Sections	X	X						X
Longitudinal Profiles	X	X						X
Streambank Stability	X	X						X
Macroinvertebrates	X	X		X		X		X
Fisheries	X	X		X		X		X
Habitat Assessment	X	X		X		X		X
Vegetation Structure & Composition	X	X		X		X		X
Site Photographs	X	X	X	X	X	X	X	X
<b>Annual Site Visits and Reporting</b>								
IRT Site Visit	X	X	X	X	X	X	X	X
Annual Reporting	N/A	X	X	X	X	X	X	X
*Baseline Data								

Annual monitoring reports will be submitted to each regulatory agency by June 30<sup>th</sup> of each monitoring year. The monitoring period may be shortened if the USACE determines that the monitoring requirements have been fulfilled in less than seven years.

## 15.0 Maintenance, Contingencies, and Adaptive Management Plan

In the event that the Site fails to meet any success criteria during the monitoring period, the cause of the failure will be determined and a remedial action and/or adaptive management plan will be developed and submitted to the IRT within 45 days of discovery and failure. The remedial action/adaptive management plan must outline the corrective measures to be taken. The Site will continue to be evaluated and any necessary maintenance will be performed until the performance standards are met. Maintenance activities shall seek to maintain the stream and riparian functions and values consistent with the standards and criteria set forth in the performance and success criteria of the final mitigation plan.

### Stream Geomorphology

There should be little change in as-built cross sections and channel profile over the monitoring period. If changes do take place they should be evaluated to determine if they represent a movement toward a more unstable condition (e.g., down-cutting, erosion, channel aggradation or degradation, unnatural channel migration, etc.). Should such a condition exist, the cause of instability will be assessed and appropriate remedial and corrective actions will be prescribed.

### Streambank Stability

Post restoration streambank stability assessments should show an immediate reduction in overall stream sedimentation rates and then stabilize over the course of the monitoring period as stream banks and riparian buffer areas become stabilized and establish deep rooted woody vegetation. In the event the restored reaches do not stabilize and reduce bank erosion and sedimentation to a significant level, the restored channels will be further assessed for deficiencies/failures and corrective actions will be recommended and implemented. Preserved reaches should remain stable, excluding normal underbank cutting and channel adjustments. In the event that the preserved reaches begin to have excessive bank erosion and sedimentation, the channels will be further assessed for deficiencies/failures and corrective actions will be recommended and implemented.

### Biological Parameters

Macroinvertebrate and fisheries monitoring should show gradual increases in overall biodiversity including species richness and abundance scores over the course of the monitoring period. Improvements in biodiversity are not expected to significantly increase immediately following implementation of construction activities as restored channels will need time to stabilize, flush, and establish vegetative cover over time. Should biological parameters not gradually increase over time, an assessment of the restored reaches and buffers will be performed to determine the need for remedial or corrective actions.

### Preservation Reaches

If preservation reaches are degrading and are not comparable to baseline conditions, an evaluation will be conducted to determine the source of degradation within the Project. If degradation is identified within the Project, the Project Sponsor will evaluate the cause of degradation and whether or not it is attributable to changing conditions within the watershed and that are outside of the Project Sponsor's control. Should failures occur as a result of the Project Sponsor's activities, additional assessments of preservation reaches will be

performed to determine the need for and location and type of remedial or corrective actions.

### Exotic/Invasive Species

In the event that any invasive species exceeds, on average, ten percent (10%) of the vegetation structure and composition as reported in the vegetation monitoring plots, mechanical and/or chemical (herbicide) control may be required. Prior to prescribing specific treatments, the Project Sponsor will consult with the IRT to determine the extent of the problem and determine an appropriate and achievable method of control.

### Site Prescription and Credit Adjustments

It is not anticipated that the site prescription (stream design) will change significantly following mitigation plan approval through construction. However, minor changes to the restoration design and/or total linear feet may result as more detailed data is assessed during the final design process. Slight adjustments to the restoration plan may need to be made in the field during construction to ensure the Project's success. Following construction, credit amounts may be adjusted based on the final as-built survey of restored linear feet of stream, as appropriate.

### Protection from Human Impacts

Alapaha River Mitigation Partners, LLC will own a permanent easement on the Site prior to approval of the final mitigation plan and Project implementation. This easement will include direct ownership of the Mitigation Use Rights associated with the property. Therefore, the Project Sponsor will have full control of the Site and will be able to control access to the Site including trespass. By controlling and limiting unwanted access, the Site will be protected from human impacts such as trespass, fire, ATV use, etc.

## **16.0 Adaptive Management Funding Mechanisms; Financial Assurances**

The Project Sponsor is proposing an appropriate amount financial assurances in the form of escrowed funds to ensure the Project's overall success. 80% of escrowed funds (\$\_\_\_\_\_) would be immediately available to the Project Sponsor following successful completion of the stream restoration construction and approval of the as-built survey. The remaining 20% of the funds (\$\_\_\_\_\_) will be set aside in escrow and released as follows: (1) 15% of the funds (\$\_\_\_\_\_) would be released following successful year 5 annual monitoring, and (2) the final 5% of funds (\$\_\_\_\_\_) would be released following successful year 7 annual monitoring and receipt of a final compliance

statement from the USACE. Escrowed funds will only be released upon written approval by the ILF Program Sponsor and/or the USACE. These financial assurances will ensure the Project is properly implemented, monitored, and maintained until final success criteria are met. In the event the Project does not perform as anticipated or replacement mitigation is required, escrowed funds may be withheld in order to correct, remediate, replace, or purchase additional mitigation at the direction of the USACE. The approved escrow agreement to be used for the Project will be included in Appendix I of the final mitigation plan.

## 17.0 Requested Funding and Credit Release Schedule

In order to properly implement the Project Mitigation Plan and maximize stream credit generation for the Site as currently proposed, the Project Sponsor requests a total of \$\_\_\_\_\_ from the GLT for the delivery of 30,702 stream credits. This request for Project funding is based upon stream credit generation from the proposed Project in order to meet the specific mitigation requirements of the ILF program. The requested funding will ensure adequate funds are available for development and operation of the Project including permitting, implementation, construction, annual monitoring, oversight, and maintenance and management of the Site. Funds will become available to the Project Sponsor according to the release schedule as shown in Table 17-1 below.

<b>Action/Milestone</b>	<b>Standard Credits<sup>1</sup></b>		<b>Advanced Credits<sup>2</sup></b>		<b>Funding<sup>3</sup></b>	
	<b>% Standard Release</b>	<b>Standard Credits</b>	<b>% Advance Release</b>	<b>Advance Credits</b>	<b>% Funding Release</b>	<b>Funding Release</b>
Mitigation Plan Approval; Recording of RC	0%	0	0%	0	0%	\$0
Construction Completion	40%	6,548.12	100%	14,331.7	80%	\$_____
Successful Monitoring Year 1	10%	1,637.03	0%	0	0%	\$0
Successful Monitoring Year 2	10%	1,637.03	0%	0	0%	\$0
Successful Monitoring Year 3	5%	818.52	0%	0	0%	\$0
Successful Monitoring Year 4	5%	818.52	0%	0	0%	\$0

Successful Monitoring Year 5	5%	818.52	0%	0	15%	\$_____
Successful Monitoring Year 6	5%	818.52	0%	0	0%	\$0
Successful Monitoring Year 7	20%	3,274.04	0%	0	5%	\$_____
<b>Totals</b>	<b>100%</b>	<b>16,370.3</b>	<b>100%</b>	<b>14,331.7</b>	<b>100%</b>	<b>\$_____</b>
<b>Total Project Credits/Funding</b>	<b>30,702</b>				<b>\$_____</b>	

<sup>1</sup>Additional credits generated from Project beyond what is needed to satisfy advanced credit requirement

<sup>2</sup>Advanced credits previously used to satisfy project impacts in Withlacoochee service area; from RIBITS as of 11/25/2014

<sup>3</sup>Funding being requested by Project Sponsor to deliver immediate advanced credits and additional standard credits for future ILF use

## 18.0 Short and Long-term Ownership; Additional Sites

The Project Sponsor will own a perpetual easement including the Mitigation Use Rights of the Site over the initial monitoring period and the life of the Project through final Project compliance. The Project Sponsor reserves the right to sell, transfer, assign, or donate the Mitigation Use Rights of the Site following final Project compliance and at their sole discretion provided it conforms to all applicable contractual obligations, mitigation guidelines and regulations at such time. The Project Sponsor also reserves the right to present adjacent wetland and stream restoration, enhancement and/or preservation properties to the Site. Any areas will be subject to the same guidelines outlined in the final approved mitigation plan and will be submitted to the IRT as an addendum to the final project mitigation plan.

## 19.0 Long-term Management Plan; Funding

Alapaha River Mitigation Partners, LLC, or other affiliate company, will be the manager/operator of the Site. A mitigation site management team may be established to provide the day-to-day administration of the Project. The management team maintains the right to seek the support of certified private consultants, contractors, non-profits, and/or federal, state, and local governmental agencies to aid in the long-term management of the Site. This will include all accounting procedures and tracking of credits, scheduling mitigation improvements, remediation, and adaptive management activities, monitoring the performance and success of the Project, and submitting the annual report to the IRT and/or other Project partners.

Project management, or its affiliates under the direction of the management team, will be expected to control long-term management/operation of the Site.

Alapaha River Mitigation Partners, LLC will provide the necessary financial resources for the development and long-term management of the Project. Long-term monitoring of the overall condition of the Project shall be made annually following the required monitoring period.

Long term management is to ensure that the protected habitats within the Project are maintained in good conditions such that they continue to support the flora and fauna and overall ecosystem stability of the streams, wetlands, and riparian habitats, and that these resources maintain stability, in perpetuity. It is anticipated that the perpetual long term management of the Project will be accomplished by Alapaha River Mitigation Partners, LLC. Alapaha River Mitigation Partners, LLC will be responsible for periodic maintenance activities. These activities are anticipated to include, but are not limited to, maintaining fences and/or gates where appropriate, ensuring no vandalism or trespass occurs, trash removal, and submittal of a brief annual summary report. The cost for these services will be set aside into a long term endowment fund, or similar account, that will be managed by an appropriate third party with experience managing long-term endowments. This account will be funded by Alapaha River Mitigation Partners, LLC after the sixth successful year of annual monitoring and prior to final seventh year of annual monitoring and final Project compliance.

The endowment principal shall be in an amount equal to \$28,506. This amount is sufficient to fully provide for the financial requirements of the long-term management of the Project in accordance with the Long-term Management Plan and the endowment fund analysis and schedule (Appendix H). The amount proposed for the endowment was calculated using the cost of land management on specific project inputs, goals, and final outcomes in perpetuity. Cost estimates are based on tasks implemented by a third party in present day dollars and are projected in perpetuity. Funding to perform the long term management as described above will be released yearly on an as needed basis. Funds for long term management will not be available until all success criteria have been met and final Project compliance has been achieved.

The account for the long-term endowment shall be held in a special deposit fund. The Project Sponsor shall fund the endowment principal through deposits according to the schedule below. At minimum, the endowment principal shall be funded as follows:

1. A minimum of 100% of the endowment principal shall be funded following the sixth successful year of annual monitoring.

The Project Sponsor may elect to incrementally fund the endowment prior to the sixth year of annual monitoring. The Project Sponsor shall notify the ILF Program Sponsor and each member of the IRT of each escrow deposit made within 30 days of such deposit and also the cumulative balance of the account until fully funded.

## **20.0 Project Sponsor/Consultant Qualifications and Acquisition Funding**

The Project Sponsor is Alapaha River Mitigation Partners, LLC. The Project Sponsor has successfully developed other mitigation banks in the Savannah District and within the Withlacoochee service area, including the existing and approved Cherry Creek wetland and stream mitigation bank located Lowndes County, GA. Additionally, the Project Sponsor is also involved with other mitigation banks across the southeast, including the recently approved North Florida Saltwater Mitigation Bank located in the Jacksonville District. Adequate funding for the acquisition of the Site, permitting, development, construction, monitoring, maintenance and financial assurances has been secured by Alapaha River Mitigation Partners, LLC for this Project.

The agent for the Project is Corblu Ecology Group, LLC. Corblu is a leader in the Southeast in ecosystem restoration and the establishment of wetland and stream mitigation banks and sites. Corblu has successfully developed, permitted, designed, constructed, implemented, and managed over 50 large scale stream and wetland restoration projects, mitigation banks, and permittee responsible mitigation sites throughout Georgia and the southeast. Additionally, Corblu has recently developed and successfully implemented another similar ILF wetland mitigation site in Pickens County, GA. Overall, Corblu has successfully designed and implemented over 11,000 acres of wetland and 100 miles of stream mitigation across the southeast.

## **21.0 Force Majeure**

The Site is vulnerable to acts of nature such as wildfires, climatic instability, depredation by wildlife (e.g., beaver, deer, voles, etc.), and disease, adverse flooding, fluviogeomorphic change, and gross vandalism such as arson that are beyond the control of the Project Sponsor to prevent or mitigate. The occurrence of any such act may necessitate changes to the Site, including revision of the mitigation Plan, performance goals or other management objectives to allow for activities that would offset and/or counteract the negative environmental impacts of that act. Depending upon the circumstances, it may be appropriate to let nature take its course, particularly when acceptable environmental conditions would be expected to eventually reestablish. If any such act occurs, then the IRT, in consultation with the Project Sponsor, shall determine what changes will be in the best interest of the Site. Any change to the Site necessitated by an act of nature or gross vandalism, beyond the control of the Project Sponsor, shall be specified in an appropriate document and require the approval of the IRT or other appropriate resource agency.

## 22.0 Default and Closure

In the event the Project Sponsor defaults (i.e. fails to meet performance milestones, perform necessary repair and maintenance, provide timely monitoring reports, or any other responsibility identified in the Mitigation Plan), the USACE will notify the Project Sponsor in writing that the Site is out of compliance and request a response within 30-days detailing how the discrepancies will be corrected. If no satisfactory resolution is reached, the USACE may close the Site and all remaining credits, either released or not, will be null and void. The Site will no longer be an acceptable source of compensatory mitigation for Department of the Army permits. If the default and closure clause is activated, the USACE will make a determination as to what additional work or repair needs to take place to achieve the mitigation Plan's objective. If additional work is deemed necessary, the financial assurance will be employed to fund the necessary work. In the event of non-compliance that cannot be resolved, the USACE may direct that remaining funds held in escrow be used to provide alternative compensatory mitigation.

## 23.0 Literature Cited

Department of Defense and Environmental Protection Agency. April 10, 2008. Compensatory Mitigation for Losses of Aquatic Resources. Final rule. Federal Register. Vol. 73, No. 70: pp. 19594-19705.

Fischenich, J.C. (2006). Functional objectives for stream restoration. EMRRP Technical Notes Collection (ERDC TN-EMRRP-SR-52). Vicksburg, MS: U.S. Army Corps of Engineer Research and Development Center. [www.wes.army.mil/el/emrp](http://www.wes.army.mil/el/emrp).

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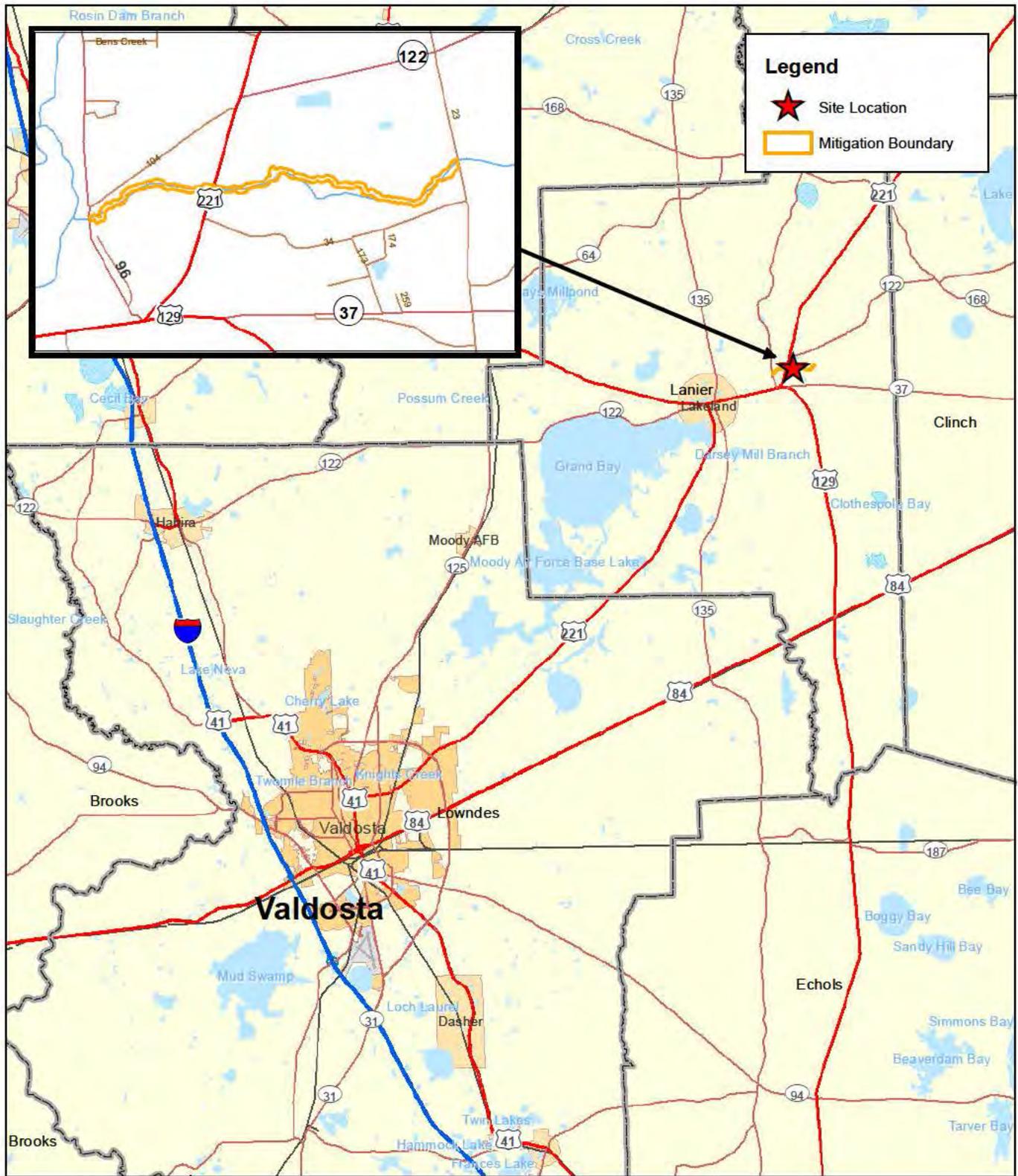
Rosgen, D.L., 1997. A geomorphological approach to restoration of incised rivers. In: Wang, S.S.Y, E.J. Langendoen, and F.D. Shields, Jr. (Eds.). Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision. pp. 12-22.

U.S. Army Corps of Engineers. 2004. March 2004 Standard Operating Procedure. United States Army Corps of Engineers, Savannah District Regulatory Division, Savannah, Georgia.

U.S. Army Corps of Engineers. 2011. Savannah District, US Army Corps of Engineers, Guidelines to Establish and Operate In-Lieu Fee Programs in Georgia. United States Army Corps of Engineers, Savannah District Regulatory Division, Savannah, Georgia.

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## FIGURES



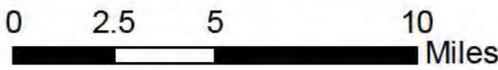
**Legend**

-  Site Location
-  Mitigation Boundary



**Upedee Creek Stream Mitigation Site  
Lanier County, Georgia**

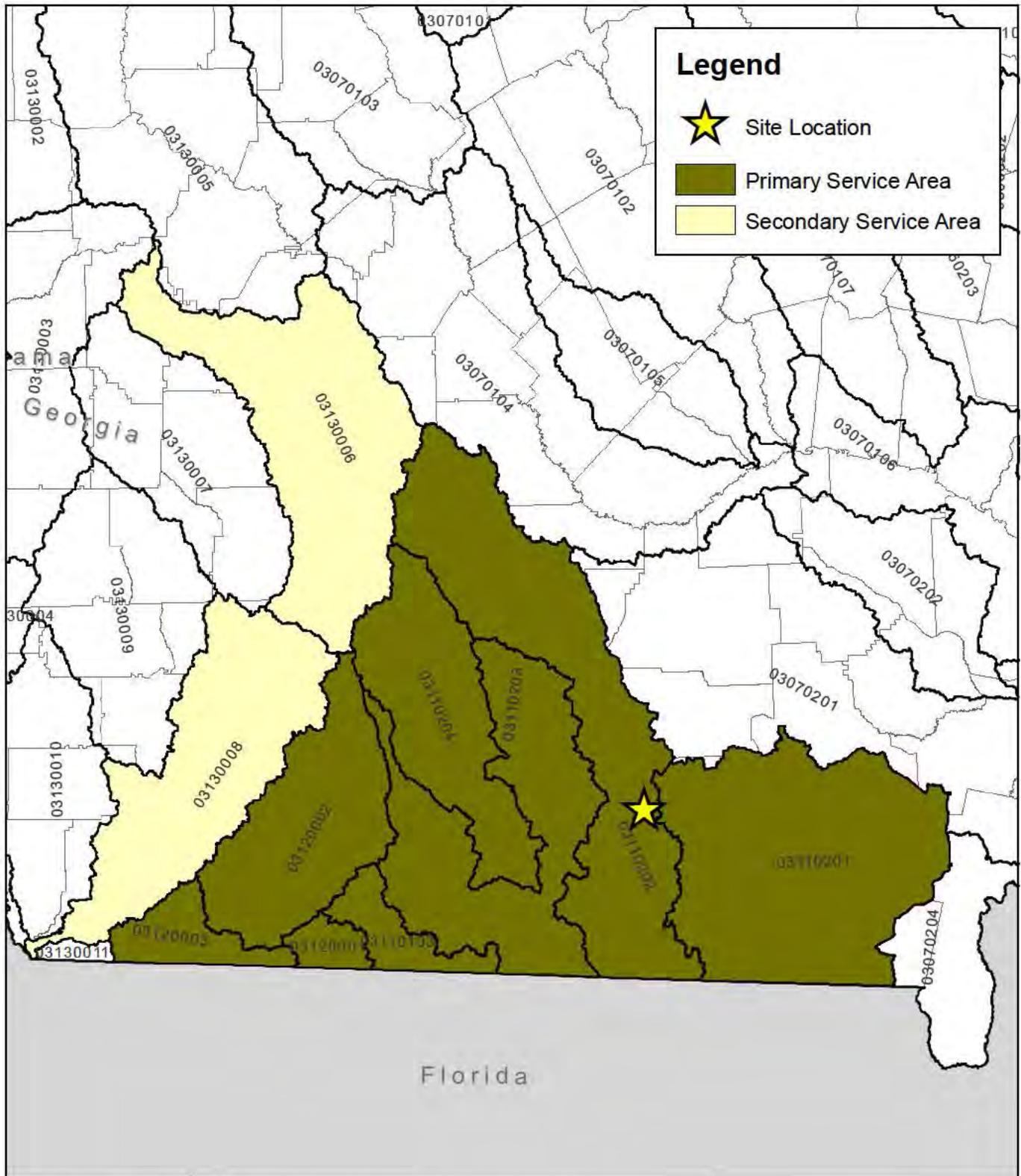
**Figure 1  
Location Map**



1 inch = 5 miles



Corblu Project No.:  
04-111414



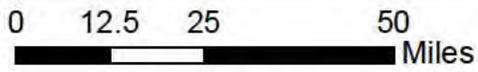
**Legend**

-  Site Location
-  Primary Service Area
-  Secondary Service Area



Upedee Creek Stream Mitigation Site  
Lanier County, Georgia

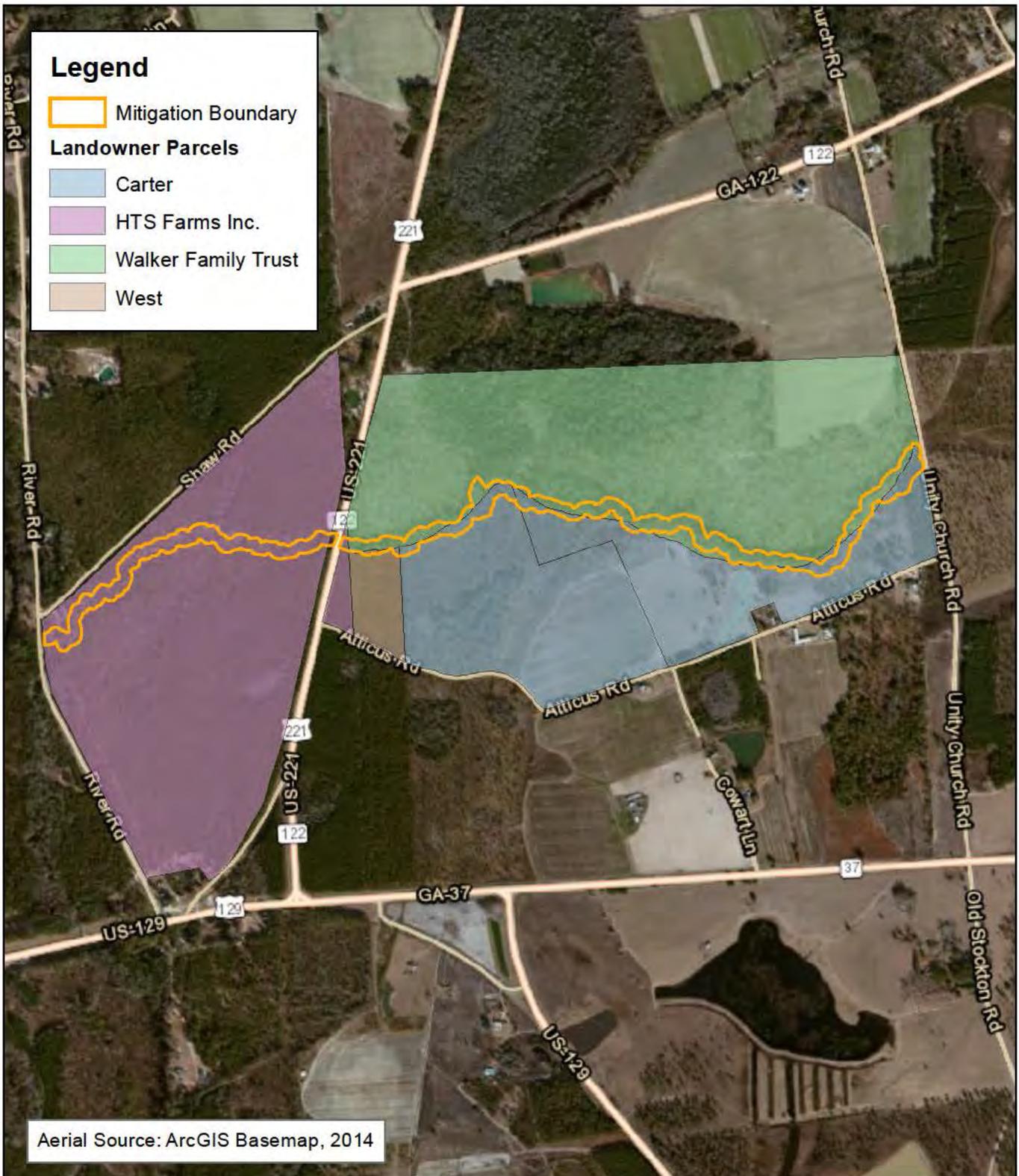
Figure 2  
Service Area Map



1 in = 25 miles



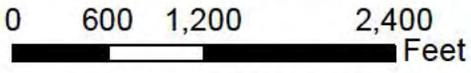
Corblu Project No.:  
04-111414



**Legend**

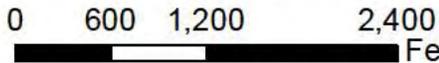
-  Mitigation Boundary
- Landowner Parcels**
-  Carter
-  HTS Farms Inc.
-  Walker Family Trust
-  West

Aerial Source: ArcGIS Basemap, 2014

		<p>Upedee Creek Stream Mitigation Site Lanier County, Georgia</p>		<p>Figure 3 Landowner Parcel Map</p>	
		 <p>0 600 1,200 2,400 Feet</p> <p>1 inch = 1,200 feet</p>			

Corblu Project No.:  
04-111414



	<p>N</p> 	<p>Upedee Creek Stream Mitigation Site Lanier County, Georgia</p>	<p>Figure 4 Aerial Map</p>
<p>0 600 1,200 2,400 Feet</p>  <p>1 inch = 1,200 feet</p>			<p>Corblu Project No.: 04-111414</p>

**Legend**

-  Mitigation Boundary
-  NWI Wetlands

**Wetland Key**

- PFO1C - Freshwater Forested/Shrub Wetland
- PFO1/4C - Freshwater Forested/Shrub Wetland
- PFO1F - Freshwater Forested/Shrub Wetland
- PFO1Fd - Freshwater Forested/Shrub Wetland
- PFO2F - Freshwater Forested/Shrub Wetland
- PFO4B - Freshwater Forested/Shrub Wetland
- PUBHh - Freshwater Pond
- PUBHx - Freshwater Pond



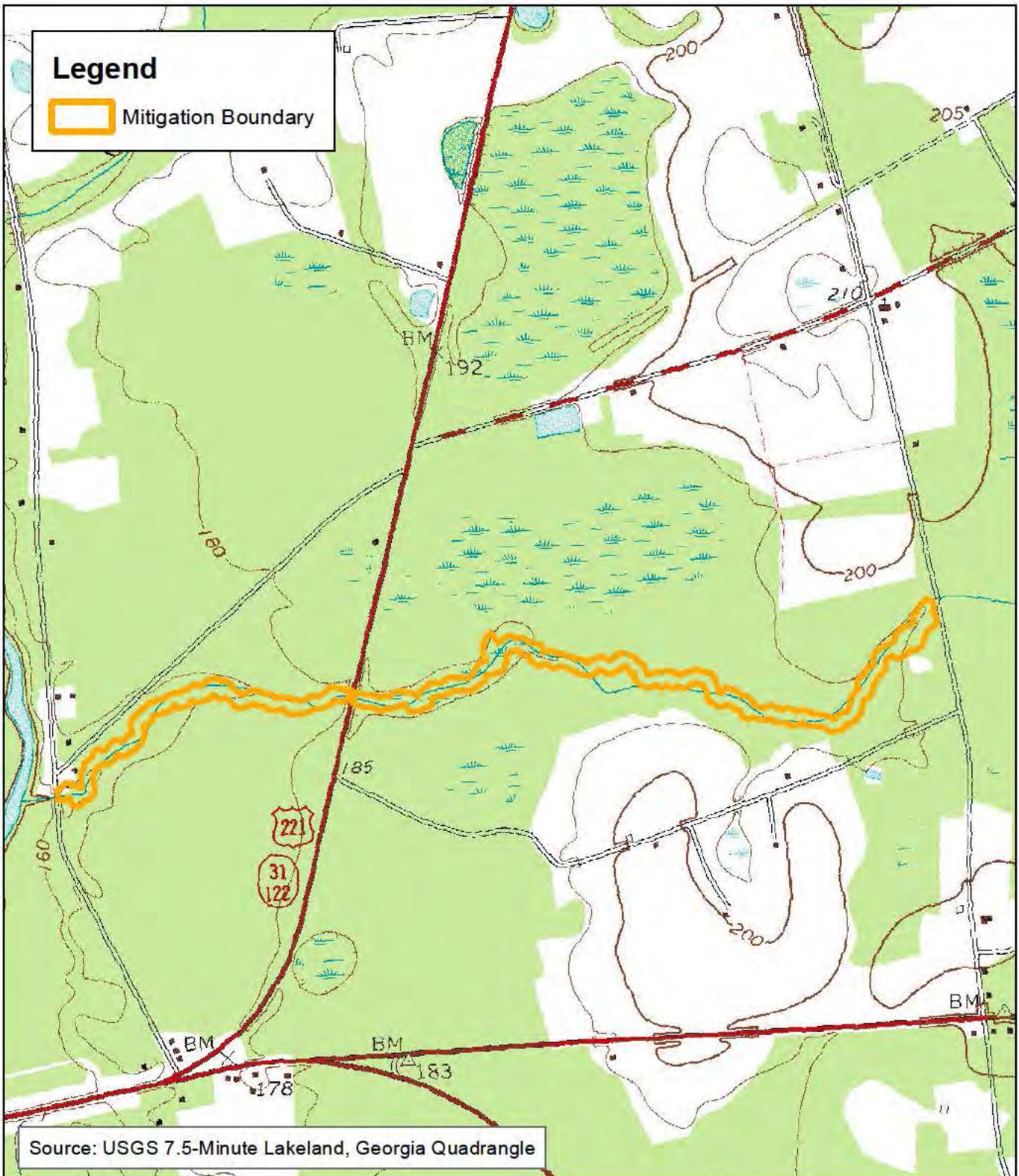
Aerial Source: ArcGIS Basemap, 2014

		<p>Upedee Creek Stream Mitigation Site Lanier County, Georgia</p>		<p>Figure 5 NWI Map</p>	
		<p>0 600 1,200 2,400 Feet</p> <p>1 inch = 1,200 feet</p>			

Corblu Project No.:  
04-111414

**Legend**

 Mitigation Boundary

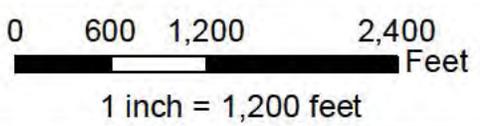


Source: USGS 7.5-Minute Lakeland, Georgia Quadrangle

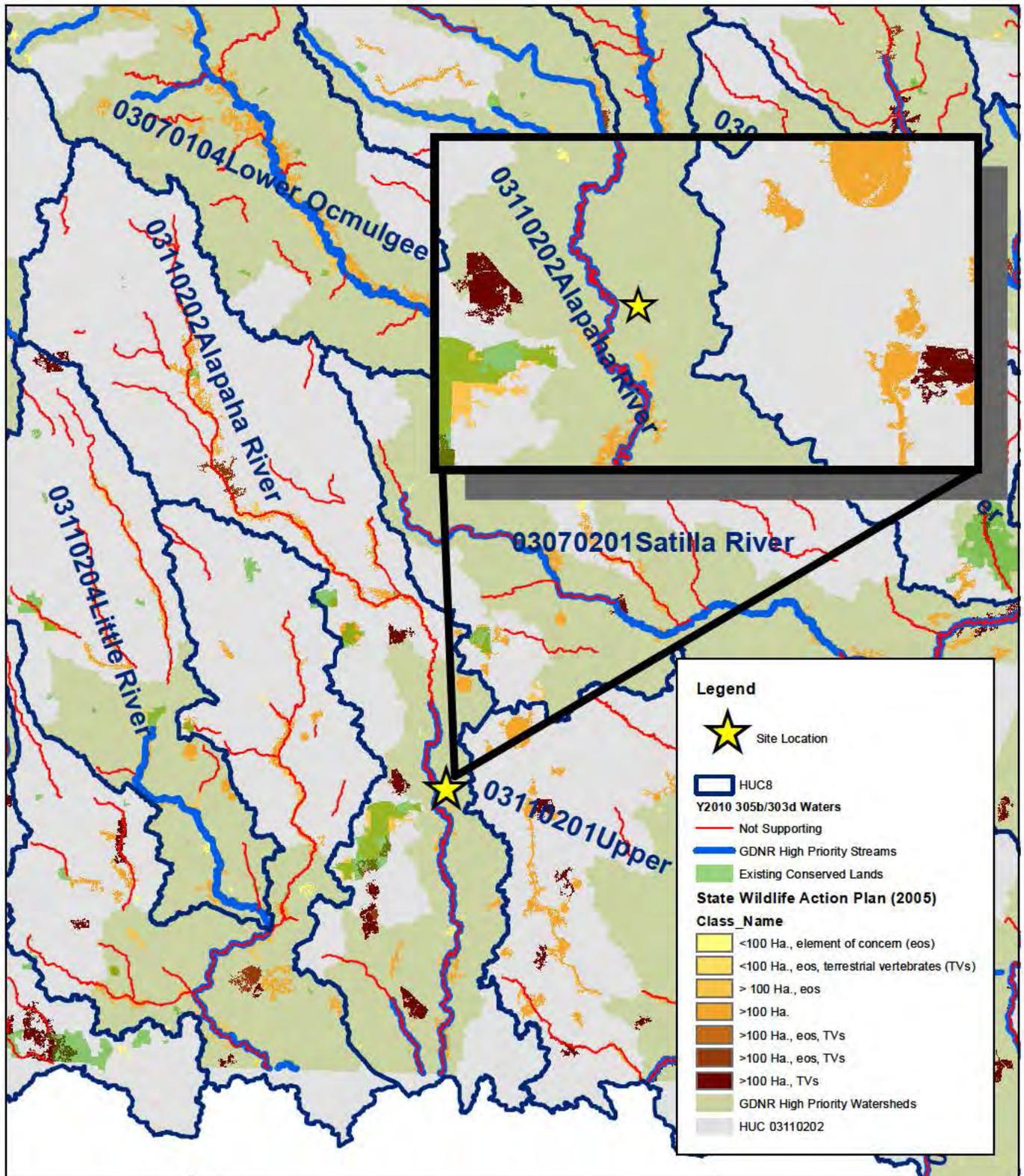


Upedee Creek Stream Mitigation Site  
Lanier County, Georgia

Figure 6  
USGS Topographic Map



Corblu Project No.:  
04-111414



Upedee Creek Stream Mitigation Site  
Lanier County, Georgia

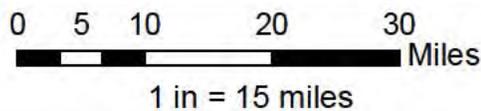


Figure 7  
Watershed Characterization  
Map



Corblu Project No.:  
04-111414

### Legend

-  Mitigation Boundary
  -  Longitudinal Profile and BEHI
  -  Cross Sections
  -  Fisheries, Benthic and Habitat Assessment
  -  Riparian Vegetation Plots
- Mitigation Units**
-  Restoration
  -  Preservation



Aerial Source: ArcGIS Basemap, 2014



Upedee Creek Stream Mitigation Site  
Lanier County, Georgia

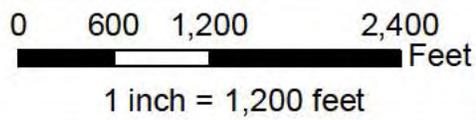


Figure 8  
Baseline Sampling Plan  
and Annual Monitoring Map

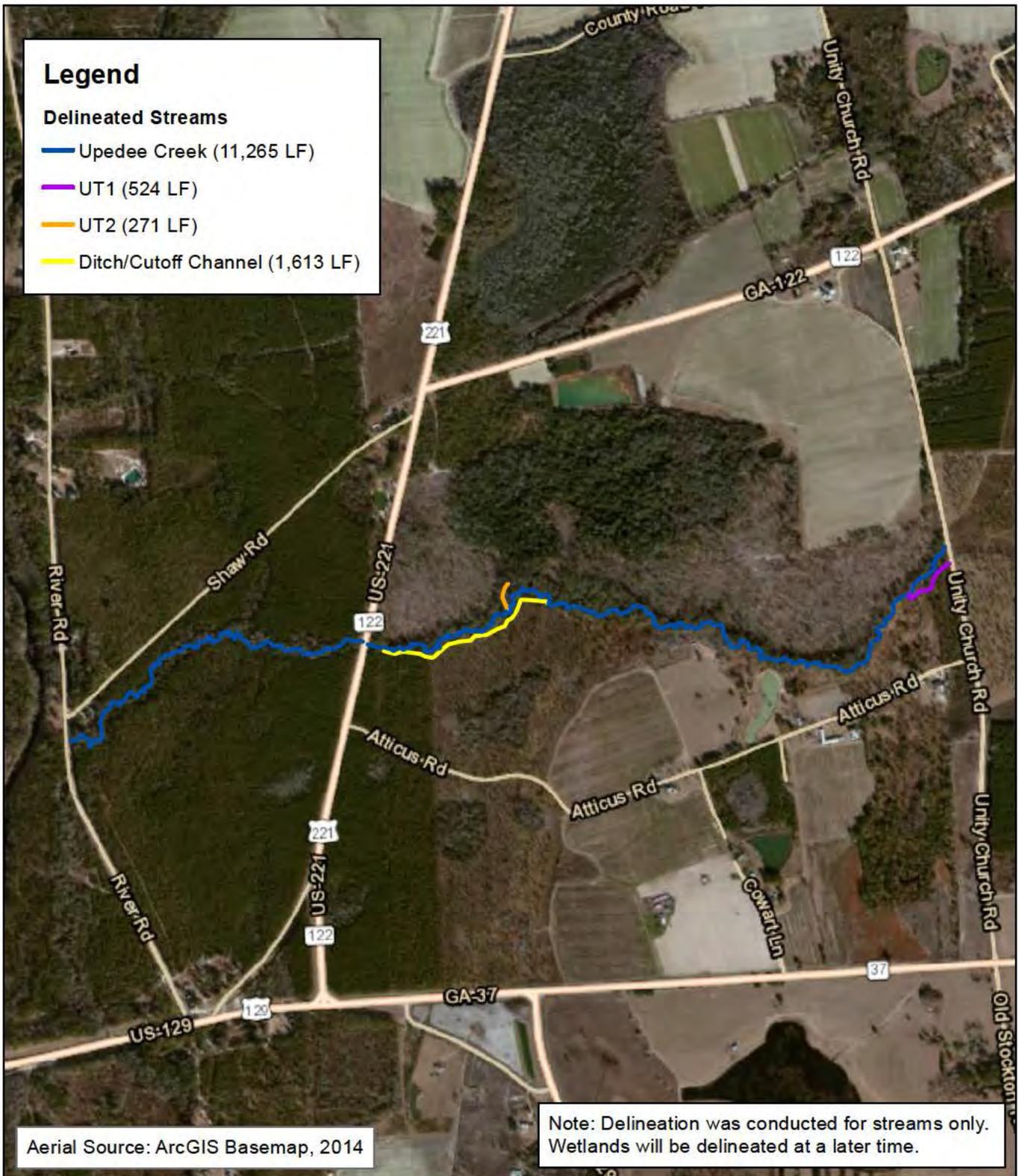


Corblu Project No.:  
04-111414

### Legend

#### Delineated Streams

- Upedee Creek (11,265 LF)
- UT1 (524 LF)
- UT2 (271 LF)
- Ditch/Cutoff Channel (1,613 LF)



Aerial Source: ArcGIS Basemap, 2014

Note: Delineation was conducted for streams only. Wetlands will be delineated at a later time.

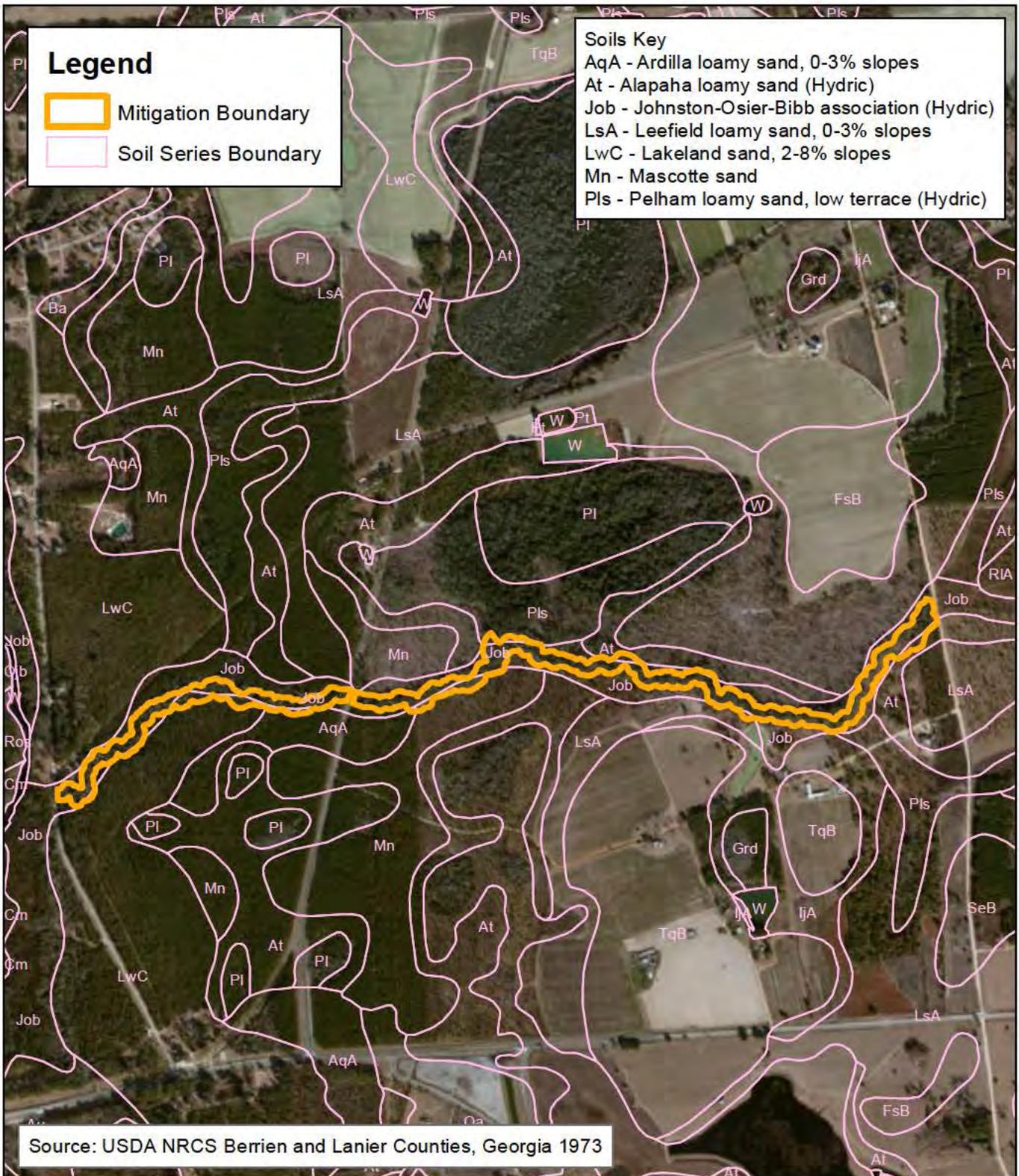
		<p><b>Upedee Creek Stream Mitigation Site</b> Lanier County, Georgia</p>	<p><b>Figure 9</b> Jurisdictional Areas Map</p>	
		<p>0    600    1,200    2,400                Feet</p> <p>1 inch = 1,200 feet</p>		<p>Corblu Project No.: 04-111414</p>

### Legend

-  Mitigation Boundary
-  Soil Series Boundary

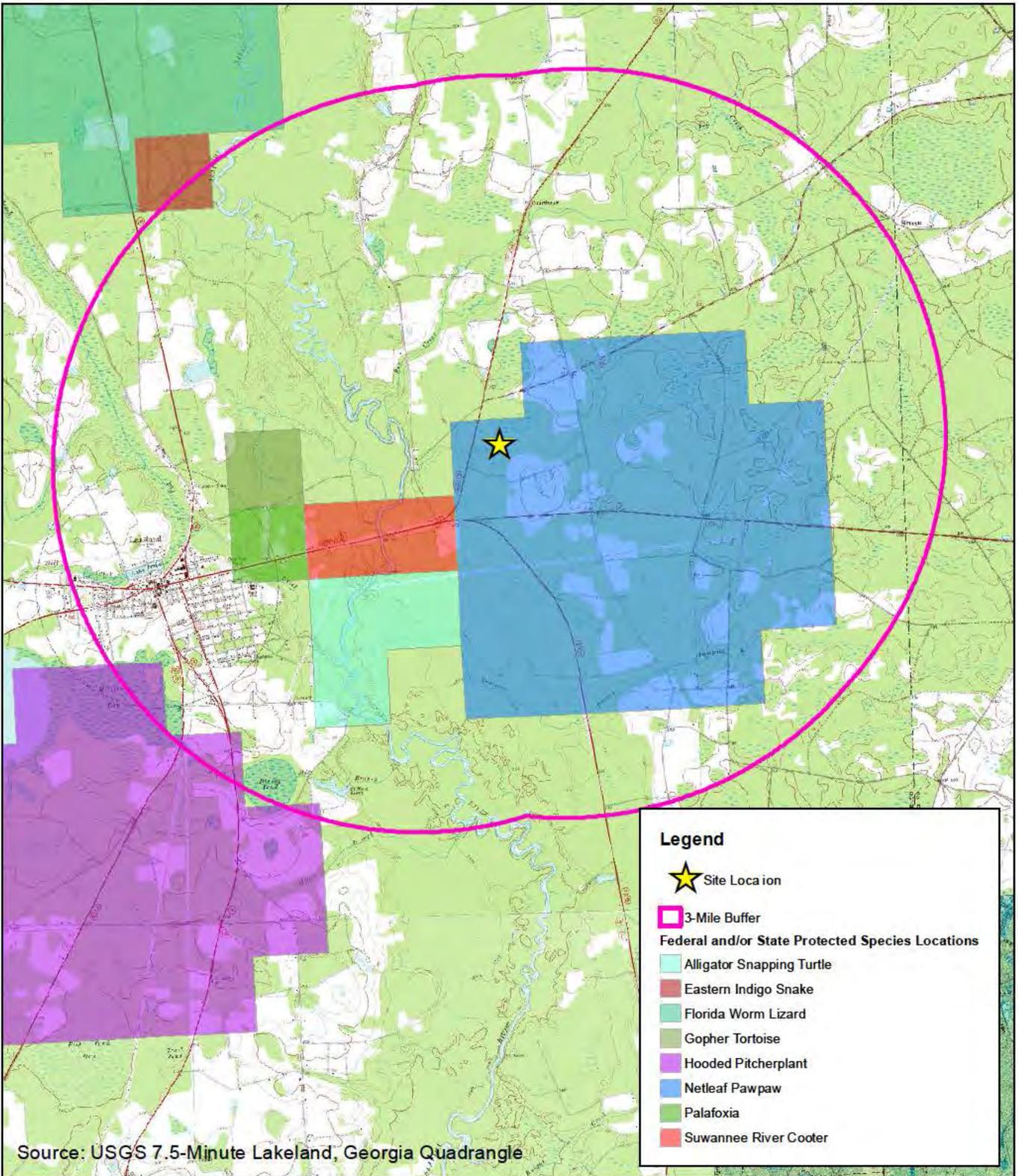
### Soils Key

- AqA - Ardilla loamy sand, 0-3% slopes
- At - Alapaha loamy sand (Hydric)
- Job - Johnston-Osier-Bibb association (Hydric)
- LsA - Leefield loamy sand, 0-3% slopes
- LwC - Lakeland sand, 2-8% slopes
- Mn - Mascotte sand
- Pls - Pelham loamy sand, low terrace (Hydric)



Source: USDA NRCS Berrien and Lanier Counties, Georgia 1973

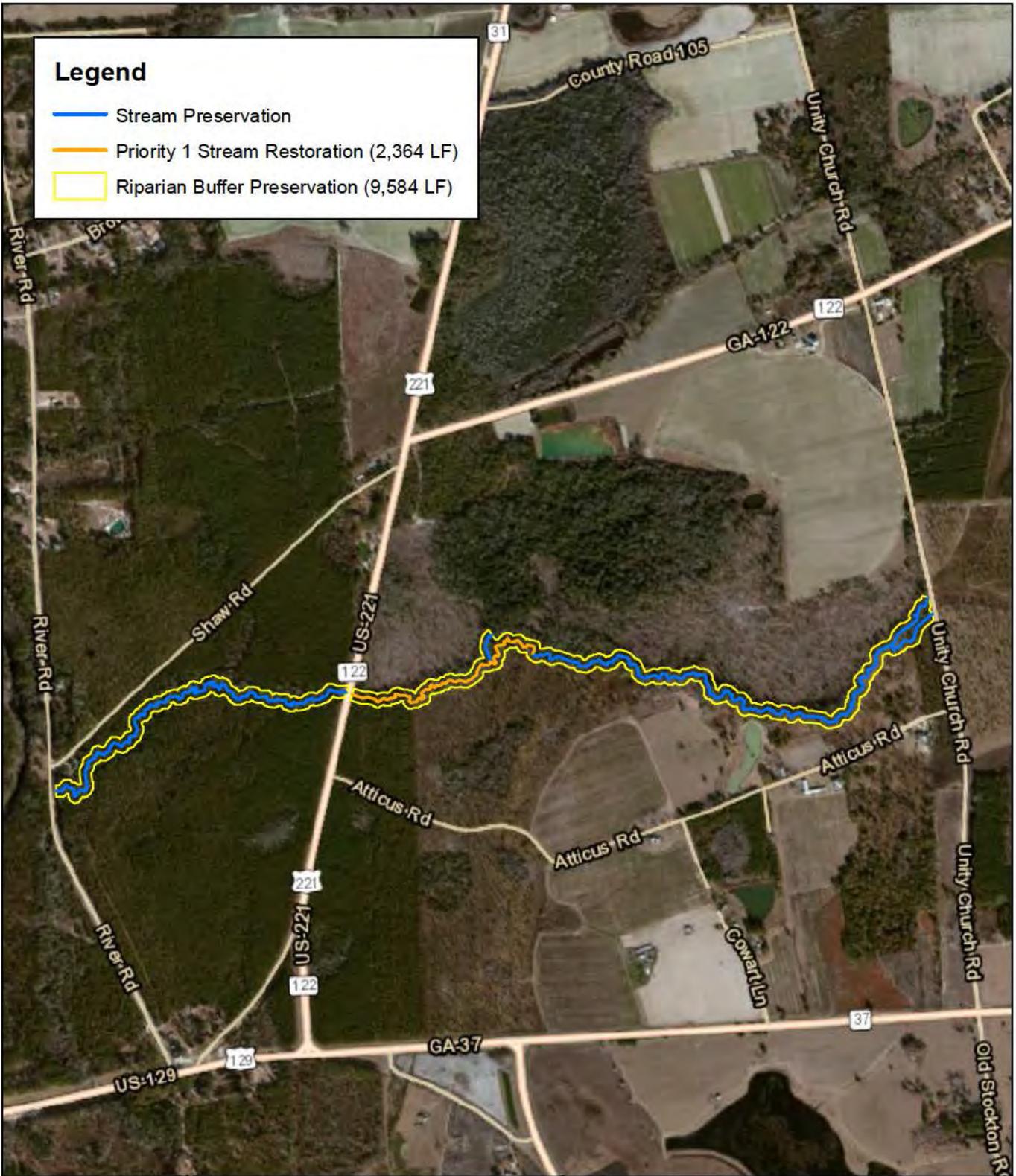
		<p><b>Upedee Creek Stream Mitigation Site</b> Lanier County, Georgia</p>	<p><b>Figure 10</b> Soils Map</p>	
		<p>0    600    1,200    2,400   Feet</p> <p>1 inch = 1,200 feet</p>		<p>Corblu Project No.: 04-111414</p>



		<b>Upedee Creek Stream Mitigation Site Lanier County, Georgia</b>		<b>Figure 11 T&amp;E Locations Map</b>	
		<p>0 3,125 6,250 12,500 Feet</p> <p>1 inch = 6,250 feet</p>			

### Legend

-  Stream Preservation
-  Priority 1 Stream Restoration (2,364 LF)
-  Riparian Buffer Preservation (9,584 LF)



### Upedee Creek Stream Mitigation Site Lanier County, Georgia

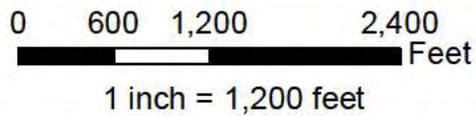


Figure 12  
Mitigation Concept Map



Corblu Project No.:  
04-111414

**APPENDIX A –  
Real Property Requirements**

**[To Be Included in Draft and Final Project Mitigation  
Plans]**

**APPENDIX B –  
Representative Site Photographs**



Photograph 1. Beginning of Upedee Creek preservation reach at Unity Church Road



Photograph 2. Upedee Creek preservation reach



Photograph 3. Upedee Creek preservation reach



Photograph 4. Transition from wetland to upland riparian buffer Upedee Creek preservation reach



Photograph 5. Typical riparian buffer section along Upedee Creek preservation reach



Photograph 6. Upedee Creek preservation reach



Photograph 7. Upedee Creek preservation reach



Photograph 8. Typical forested/shrub wetland along Upedee Creek preservation reach



Photograph 9. Upedee Creek preservation reach



Photograph 10. Upedee Creek preservation reach



Photograph 11. Upedee Creek preservation reach



Photograph 12. Relic channel where baseflow has been cut-off



Photograph 13. Relic channel where baseflow has been cut-off



Photograph 14. Relic channel where baseflow has been cut-off



Photograph 15. Entrenched cut-off channel



Photograph 16. Entrenched cut-off channel



Photograph 17. Entrenched cut-off channel



Photograph 18. Entrenched cut-off channel



Photograph 19. Typical shrub/herbaceous wetland buffer



Photograph 20. Typical forested wetland buffer



Photograph 21. Upedee Creek preservation reach



Photograph 22. Upedee Creek preservation reach



**Representative Site Photographs  
Upedee Creek Stream Mitigation Site  
Lanier County, Georgia**

**Photographs**

**APPENDIX C –  
Baseline Data**

**[To Be Included in Draft and Final Project Mitigation  
Plans]**

**APPENDIX D –  
Jurisdictional Area Request for Verification**

**[To Be Included in Draft and Final Project Mitigation  
Plans]**

**APPENDIX E –  
Cultural Resources**

**[To Be Included in Draft and Final Project Mitigation  
Plans]**

**APPENDIX F –  
Construction Plans**

**[To Be Included in Draft and Final Project Mitigation  
Plans]**

**APPENDIX G –  
Standard Operating Procedure (SOP) Worksheets**

**UPEDEE CREEK MITIGATION SITE  
 STREAM CHANNEL RESTORATION, STREAM RELOCATION, AND STREAMBANK RESTORATION  
 WORKSHEET**

Net Benefit	All proposals must include at least a 25' riparian buffer on both banks Buffers $\geq 50'$ +2'/%slope also may generate riparian credit (use <del>see</del> buffer worksheet)			
	Streambank Stabilization	Structure Removal	Stream Channel Restoration and Stream Relocation	
	2.0	4.0 to 8.0	Priority 4 1.0	Priority 3 4.0
Monitoring/Contingency	Minimal (Required) 0	Moderate 0.3	Substantial 0.4	Excellent 1.0
Priority Area	Tertiary 0.05	Secondary 0.2	Primary 1.0	
Control	RC on restored channel and 25' buffer (Required) 0.1	Required RC + CE or GPP 0.3	Required RC + CE + GPP 0.5	
Mitigation Timing	Schedule 3 0	Schedule 2 (Use for all banks) 0.1	Schedule 1 0.5	

Factors	Reach 1	Reach 2	Reach 3	Reach 4
	<b>Upedee Creek</b>			
Net Benefit	8.0			
Monitoring/Contingency (at least minimal M&C required)	1.0			
Priority Area	0.2			
Control (at least a RC required)	0.1			
Mitigation Timing	0.0			
Sum of Factors      M =	9.3			
Feet Stream in Reach (do not count each bank separately)      LF =	2,364			
M X LF =	21,985.20			

**Total Channel Restoration/Relocation Credits Generated = (M X LF) = 21,985.20**

**UPEDEE CREEK MITIGATION SITE  
RIPARIAN RESTORATION AND PRESERVATION WORKSHEET**

Net Benefit - select value for each stream side	Riparian Restoration/Habitat Improvement/Preservation Factors – MBW = Minimum Buffer Width = 50'+2'/% slope Select Values from Table 1			
System Credit Condition 1	Condition 1: MWB restored or protected on both streambanks To Calculate Value: Average of the Net Benefit values for Stream Side A and Stream Side B			
System Credit Condition 2	RC Placed on Channel 0.05		RC and CE Placed on Channel 0.1	
M&C - select value for each stream side	Mimimal (Required) 0	Moderate 0.2	Substantial 0.25	Excellent 0.3
Priority Area	Tertiary 0.05		Secondary 0.2	Primary 0.7
Control	RC on restored channel and 25' buffer (Required) 0.1	Required RC + CE or GPP 0.3	Required RC + CE + GPP 0.5	
Mitigation Timing - select value for each stream side	Schedule 3 0	Schedule 2 (Use for all banks) 0.05	Schedule 1 0.15	

Riparian Reaches		Reach 1	Reach 2	Reach 3	Reach 4
Simon Channel Evolution Stage		TBD	TBD	TBD	
Rosgen Stream Type/D50		TBD	TBD	TBD	
Criteria for Selecting Existing Condition for Each Reach		TBD	TBD	TBD	
Bankfull Width and Depth		Width: TBD Depth: TBD	Width: TBD Depth: TBD	Width: TBD Depth: TBD	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)		TBD	TBD	TBD	
Factors		Reach 1	Reach 2	Reach 3	Reach 4
		Upedee Creek	UT1	UT2	
Net Benefit	Stream Side A	0	0	0	
	Stream Side B	0	0	0	
System Credit: Condition 1 Met		0	0	0	
System Credit: Condition 2 met (applicable only if Condition 1 met)		0	0	0	
M&C (at least minimal M&C required)	Stream Side A	0.3	0.3	0.3	
	Stream Side B	0.3	0.3	0.3	
Priority Area		0.2	0.2	0.2	
*Control (at least a RC required)		0.1	0.1	0.1	
*Mitigation Timing (none for riparian preservation)	Stream Side A	0	0	0	
	Stream Side B	0	0	0	
Sum of Factors M =		0.9	0.9	0.9	
Linear Feet of Stream Buffered (do not count each bank separately) LF =		8,907	492	191.2	
M X LF =		8,010.90	442.80	172.08	

**Total Riparian Restoration Credits Generated = (M X LF) = 8,716.78**

**APPENDIX H –  
Long-term Endowment Calculation Spreadsheet**

**Long-Term Management (LTM) Endowment Calculator**  
**SECTION 1 - ONGOING TASKS AND COSTS**

**Date:** 11/24/2014  
**Project:** Upedee Creek Stream Mitigation Site for ILF Credits  
**Total Acres:** 28

<b>Task</b>	<b>Description</b>	<b>Unit</b>	<b># Units</b>	<b>Cost/Unit</b>	<b>Annual Cost</b>	<b>Recurrence (Years)</b>	<b>Total Cost</b>
<b>ACCESS</b>							
Access Control	Inspect for Trespass	Labor Hours	2	\$25.00	\$50.00	1	\$50
Signage	Boundary Signs	Item	50	\$2.50	\$125.00	15	\$8
Maintenance	Inspect & Repair Signage	Labor Hours	2	\$25.00	\$50.00	1	\$50
Travel	Direct Expense	Mileage	25	\$0.56	\$14.00	1	\$14
<b>SITE MAINTENANCE</b>							
Sanitation	Collect & Dispose Trash	Labor Hours	4	\$25.00	\$100.00	1	\$100
<b>REPORTING</b>							
Annual Report	Summary Report	Labor Hours	8	\$55.00	\$440.00	1	\$440
Travel	Direct Expense	Mileage	500	\$0.56	\$280.00	1	\$280
<b>SUB-TOTAL</b>							<b>\$942</b>
<b>CONTINGENCY &amp; ADMIN</b>							
Contingency	10% of Annual Costs	N/A					\$94
Administrative	10% of Annual Costs	N/A					\$104
<b>SUB-TOTAL</b>							<b>\$198</b>
<b>TOTAL ANNUAL LTM COST</b>							<b>\$1,140</b>

**Long-Term Management (LTM) Endowment Calculator**  
**SECTION 2 - FINANCIAL SUMMARY**

**Date: 11/24/2014**

**Project: Upedee Creek Stream Mitigation Site - ILF Credits**

**Total Acres: 25**

**ANNUAL ONGOING FINANCIAL REQUIREMENTS**

<b>Item</b>	<b>Rate (%)</b>	<b>Total (\$)</b>
Ongoing Costs		\$942
Contingency	10%	\$94
Total Ongoing Management Costs		\$1,037
Ongoing Admin Costs of Total	10%	\$104
<b>Total Ongoing Costs</b>		<b>\$1,140</b>

**ENDOWMENT REQUIREMENTS FOR LONG TERM STEWARDSHIP**

<b>Item</b>	<b>Rate (%)</b>	<b>Total (\$)</b>
Capitalization Rate	4.00%	
Endowment to Provide Annual Income of \$1,460		\$28,506

<b>TOTAL LTM ENDOWMENT PRINCIPAL</b>	<b>\$28,506</b>
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**APPENDIX I –  
Escrow Agreement**

**[To Be Included in Draft and Final Project Mitigation  
Plans]**