Mississippi River Valley Division,
Regional Planning and Environment Division South

Amite River and Tributaries Study East of the Mississippi River, Louisiana (ART)

Appendix C-5 – General Mitigation Plan

November 2019

Preparation and Approval of Mitigation Plans

1.1 COMPONENT 1. OBJECTIVES

The components of this general mitigation plan apply to Corps-constructed mitigation projects.

The objective of this mitigation plan is to evaluate potential mitigation options that could satisfy the mitigation requirement for the Combined Darlington Dam and Nonstructural Measures (TSP). This general mitigation plan is based on a site visit and preliminary habitat analysis conducted in coordination with Fish and Wildlife Service. A more detailed mitigation plan will be developed in coordination with the Interagency Team during development of the final IFR and EIS and prior to signing of the ROD.

During a preliminary aerial survey of Darlington Dam, CEMVN identified approximately 1,332 AAHUs of bottomland hardwoods within the Darlington Dam footprint of the occasionally inundated reservoir. For the embankment dam footprint, a 100-foot buffer of impacts for approximately 300 acres, CEMVN identified approximately 255 acres of bottomland hardwoods (220 AAHUs). In addition, there will likely be impacts within the staging areas and borrow excavation sites; however, because those locations have not yet been determined, their impacts will be discussed in the more detailed mitigation plan for the final IFR and EIS.

1.2 COMPONENT 2: SITE SELECTION

Plan selection criteria would be considered when ranking and selecting the mitigation projects. These include:

- Risk & Reliability
- Environmental
- Time
- Cost Effectiveness
- Other Cost Considerations
- Watershed & Ecological Site Considerations

Risk & Reliability:

Risk is defined as probability multiplied by consequences. An example of risk would be a calculation of the relative chance of saltwater intrusion during the 50-year period of analysis multiplied by magnitude of anticipated plant mortality. Actions can be implemented to reduce risk, but because risk can never be completely eliminated, *residual risk* will remain.

Reliability refers to the chance that a component of the system will fail to perform its intended purpose as a function of the forces placed upon it. Reliability is often displayed using a fragility curve which describes the probability of failure as a function of an applied force. Many separate system components can be combined in an event tree to represent the reliability of a system.

Since these two factors are similar, it is best to consider them as one criterion: Risk & Reliability.

The below risk and reliability subcriteria (see Table C5-1) would be applied to each mitigation alternative.

Table C5-1: Risk and Reliability

Issue	Explanation
Uncertainty Relative to Achieving Ecological Success/Potential Need for Adaptive Management (Contingency) Actions	Sources of *uncertainty relative to achieving ecological success* include: (1) incomplete understanding of the system (environmental or engineering) to be managed or restored (e.g. hydroperiod, water depth, water supply, substrate, nutrient levels, toxic compounds)

Issue	Explanation
	(2) imprecise estimates of the outcomes of alternative management actions (e.g. proven methodology, project complexity). *Evaluation of Potential Need for Adaptive Management (Contingency) Actions:* (1) Is there sufficient flexibility within project design and operation to permit adjustments to management actions? (2) Is the system (or components) to be restored or managed well understood (e.g. hydrology and ecology) and are management outcomes accurately predictable? (3) Do participants generally agree on the most effective design and operation to achieve project goals and objectives? (4) Are the goals and objectives for restoration understood and agreed upon by all parties?
Uncertainty Relative to Implementability	Includes implementability issues that are not captured under other selection criteria. Implementability means that the alternative is feasible from technical, environmental, economic, financial, political, legal, institutional, and social perspectives. If it is not feasible due to any of these factors, then it cannot be implemented, and therefore is not acceptable. An infeasible plan should not be carried forward for further consideration. However, just because a plan is not the preferred plan of a non-Federal sponsor does not make it infeasible or unacceptable *ipso facto*.
Adaptability	Ability to expand (or otherwise adapt) the measure to achieve/maintain ecological success
Long-Term Sustainability of Project Benefits	For Forested Habitat: Measured by the Habitat Suitability Index Value at TY50, which incorporates the suitability index of all WVA variables in the WVA model.
Self-Sustainability of Project Once Ecological Success Criteria Linked to Notice of Construction Completion are Achieved	(1) Does the project utilize active engineering features (e.g., pumps)? (2) Anticipated OMRR&R Activities (3) Relative difficulty of OMRR&R

Issue	Explanation
Risk of Exposure to Stressors/ Reliability & Resiliency of Design	(1) To what stressors will a given alternative be exposed (e.g. sea level rise, subsidence, saltwater intrusion during storm or drought, long-term salinity shift, herbivory, invasive species, inundation from storm surge, damage from storm-induced wave action, runoff from adjacent property which could alter chemical or nutrient balance of soils, altered hydrologic regime which could change habitat type or stress vegetation, non-storm wave energy)? (2) How is the project, as designed, likely to perform relative to stressors and/or how well is the project expected to return to functionality after exposure to stressors?

Environmental: The National Environmental Policy Act (NEPA) and other environmental laws require federal agencies to consider the environmental impacts in their decision-making, identify unavoidable environmental impacts and make this information available to the public. All evaluated alternatives should be investigated with respect to environmental consequences. The NEPA document records this investigation. However, since a recommended alternative needs to be selected prior to being released for public review and comment, the PDT must attempt to analyze the impacts qualitatively using preliminary information, for those resources which could be impacted to differing degrees by each of the alternatives, focusing only on noteworthy differences between the alternatives. This detailed analysis will be included in the final IFR and EIS.

Time: The PDT must analyze the likely implementation schedules for mitigation alternatives. Time metrics account for engineering and design, real estate acquisition, construction, and period to project turn-over. Time metrics include:

- Estimated time to construction contract award (measured from TSP milestone)
- Estimated time to Notice of Construction Complete milestone (measured from TSP milestone)

Cost Effectiveness: Cost effectiveness analysis seeks to answer the question: given an adequately described objective, what is the least-costly way of attaining the objective?

Other Cost Considerations: In most cases, a contract's Current Working Estimate

(CWE) is based on the Programmatic Cost Estimate (PCE), which includes the additional request for funds received in the President's Budget. PDTs should not expect additional appropriations. Therefore, alternatives' costs, excluding escalation and contingency, should not exceed the Current Working Estimate. Life cycle costs are a consideration when evaluating alternatives, but should not drive plan selection. Cost calculations for projects should include construction, engineering and design, construction supervision and administration, Lands, Easements, Rights-of-way, Relocations, & Disposal Areas (LERRDs), and Operation Maintenance Repair Replacement & Rehabilitation (OMRR&R). Monitoring and adaptive management costs should be added for mitigation projects. Cost containment is an important consideration and PDTs should not only analyze an alternative's ability to stay within CWE, but also determine the least-cost alternative. Cost metrics include Total Project Cost and Average Annual Cost (and components thereof).

For alternative comparison purposes, minimal OMRR&R activities are assumed for both the WVA modeling and for cost development. These are limited to: monitoring, invasive/nuisance plant eradication, maintenance/replacement of weirs and culverts, and channel maintenance. Once the TSP is identified, assumptions may be changed for the TSP elements to include adaptive management, additional OMRR&R activities, major rehabilitation, etc. in order to sustain ecological success or to address uncertainty. These new assumptions would be reflected in the advanced project design, revised WVA modeling for the TSP, and revised TSP cost estimates,

Watershed & Ecological Site Considerations: The PDT has added this selection criterion to address unique factors that apply to environmental mitigation projects that were not addressed in the above listed selection criteria. Guidance from 40 CFR Part 230 discusses consideration of a mitigation site's role in the larger landscape and other ecological conditions. The two items below aim to capture this guidance. These subcriteria would be considered for each alternative:

Watershed Considerations/Significance within the Watershed:

- Consistency with watershed plans (e.g. Coast 2050, LCA, LaCPR, State Master Plan 2017). 40 CFR Part 230 Compensatory Mitigation for Losses of Aquatic Resources includes guidance regarding the siting of mitigation projects. This guidance directs that mitigation should consider existing watershed plans within the project area. Therefore, the selection criteria considers how a given alternative relates to existing watershed plans within the project area. Coast 2050 is a strategic plan for coastal Louisiana, sponsored by the Louisiana State Wetlands Conservation and Restoration Authority and the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Task Force. It was adopted in 1999 The Coast 2050 report evolved into the Louisiana Coastal Area (LCA) Ecosystem Restoration Plan of 2004. In 2007, the Corps of Engineers, in partnership with the State of Louisiana, developed a preliminary report

entitled The Louisiana Coastal Protection and Restoration (LaCPR) Preliminary Technical Report, which identified a range of coastal restoration and flood control measures for South Louisiana. Also in 2017, the state officially adopted Louisiana's Comprehensive Master Plan for a Sustainable Coast, which complements the LaCPR report.

- Contiguous with or within resource managed area (i.e. Federal, state, private mitigation bank or other restoration projects considered under Future Without Project condition)
- Located in parish of impact by habitat-type
- Critical features
    - critical geomorphic structures for ecosystem stability (critical geomorphic structures in the coastal ecosystem are those above sea level that protect lower elevation features and in many instances represent the first line of defense against marine influences and tropical storm events (i.e. restoration or preservation of natural ridges, lake rims, land bridges, gulf shoreline barrier islands, barrier headlands, and Chenier ridges)
    - LaCPR critical landscape features for storm damage risk reduction identified in Figure 7-17, Louisiana Coastal Protection and Restoration Final Technical Report and Comment Addendum, August 2009
- Habitat Linkages (e.g. wildlife corridors)

Ecological Site Considerations not captured in WVA:

- Fragmentation within site boundary (swamp and marsh alternatives only)
- Site habitat connectivity to larger surrounding project area considering future land use trends (swamp and marsh alternatives only)

1.3 COMPONENT 3. SITE PROTECTION INSTRUMENT

In an effort to satisfy this component as well as satisfy US Fish and Wildlife concerns, in the draft Fish and Wildlife Coordination Act Report dated 30 October 2019 (Appendix C-4), the Non-Federal Sponsor would commit to fully undertaking the monitoring, operation, and maintenance responsibilities for the mitigation project. Fee interest will be acquired in the land for Corps constructed mitigation projects, thus ensuring that no human activities will be allowed that could result in adverse effects to the constructed BLH habitat.

1.4 COMPONENT 4. BASELINE INFORMATION

Bottomland hardwood forests (BLH) in the study area are dominated by water oak, nuttall oak, green ash, red maple, and pignut hickory. Swamps in the Lower Amite River Basin are dominated by bald cypress and water tupelo, which have regenerated since extensive logging of virgin forest more than 70 years ago. The Louisiana swamps generally lack a mature canopy as was present in the forests before logging occurred and have lower productivity where isolated from riverine influences (Shaffer et al., 2003). Economically important natural resources associated with these swamps include fisheries of crawfish, blue catfish, and channel catfish, as well as logging. The following link contains the classification of wetlands habitat from the US Fish and Wildlife National Wetlands Inventory (https://www.fws.gov/wetlands/).

1.5 COMPONENT 5. DETERMINATION OF CREDITS

If the project proposes to secure credits from an approved mitigation bank, the Government will include the number and resource type of credits to be secured and how these were determined. In the main report, see Section 5.3.1.1. Wetland Resources.

Approximately 1,332 AAHUs of BLH credits from mitigation banks are needed to offset impact, not including AAHUs that have not yet been calculated for impacts arising from borrow excavation and staging area.

1.6 COMPONENT 6. MITIGATION WORK PLAN

The following mitigation measures may be considered in the following order:

1) Purchase of BLH mitigation bank credits

At the time of screening, mitigation banks in Lake Pontchartrain Basin existed that had BLH credits available for purchase. Many of these banks also had in-kind credits that could be released in the future. It is not known which banks would be available when the decision whether to purchase bank credits or not is made: some banks may not have enough credits remaining, some banks may be closed, and additional mitigation banks may be approved. As such, a general mitigation bank for BLH habitat, including in and out of coastal zone options, was assumed for the next step of the mitigation project analysis using information obtained from existing banks in the basin and no specific banks were identified. The Regulatory In lieu fee and Bank Information Tracking System (RIBITS) (https://ribits.usace.army.mil/) has information on all currently approved banks in the basin including their credit availability.

2) Potential BLH Corps Constructed Mitigation Sites

A preliminary investigation for potential BLH mitigation sites within and outside of the Lake Pontchartrain Basin yielded approximately 3,700 acres (1,500 AAHUs). Those mitigation sites within the Lake Pontchartrain Basin would be considered before selecting mitigation sites outside of the basin.

Mitigation for the TSP could include creation and restoration and enhancement of bottomland hardwoods (BLH) habitat as compensatory mitigation for some of the BLH impacts resulting from construction of the Darlington Dam, borrow sites, and staging area. The BLH restoration and enhancement areas (mitigation areas) would be located in agriculture, scrub/shrub, pasture, and other non-forested areas of lower habitat value.

Required earthwork for each mitigation site would mainly consist of removal (excavation; scraping; degrading) of remnant spoil material (sand, sediments, gravel) in various portions of each of the mitigation sites in an effort to establish an appropriate hydroperiod for BLH plant species.

Earthwork would also include grading to ensure appropriate drainage, establishment of dirt access roads around the perimeter of the mitigation areas, establishment of dirt access roads within some of the mitigation areas, and tillage of soil in the mitigation areas. Any existing drainage features (drainage ditches, etc.) within or adjacent to the mitigation areas and within the property boundary would likely be removed to help assure appropriate site hydrology, unless doing so would adversely affect drainage on off-site lands.

Native canopy and midstory plants typical of BLH habitats would be installed in the mitigation areas following completion of the initial earthwork. Note that the planted acreage of a few mitigation areas would be reduced by the impacts of the staging areas, roadways, and borrow sites within the mitigation area.

1.7 COMPONENT 7. MAINTENANCE PLAN

Maintain all areas of the project area such that the total average vegetative cover accounted for by invasive and nuisance species constitute less than 5% of the total average plant cover throughout the 50-year project life.

If drainage ditches are required, they would be maintained to provide necessary hydrology for established species.

1.8 COMPONENT 8. PERFORMANCE STANDARDS

The Corps would ensure that the following performance standards are met:

1. General Construction

A. Complete all necessary initial earthwork and related construction activities in accordance with the mitigation work plan as well as the final project plans and specifications. These requirements classify as initial success criteria.

2. Native Vegetation[1]

A. Initial Success Criteria (at end of first growing season following the year planting meets construction requirements) –

1. Achieve a minimum average survival of 50% of planted canopy species (i.e. achieve a minimum average canopy species density of 269 seedlings/ac.).
2. The surviving plants must approximate the species composition and percentages specified in the initial plantings component of the final planting plan[2].
3. These criteria will apply to the initial plantings, as well as any subsequent re-plantings necessary to achieve this initial success requirement.

B. Intermediate Success Criteria (3 growing seasons following attainment of Native Vegetation 2.A.) –

1. Achieve a minimum average density of 269 living individuals that are native canopy species per acre (planted trees and/or naturally recruited native canopy species).
2. Achieve a minimum average density of 135 (50% of 269) living individuals that are hard-mast producing species in the canopy stratum (planted trees and/or naturally recruited native canopy species). The remaining trees in the canopy stratum must be comprised of soft-mast producing native species.
3. This hard mast criteria will thereafter remain in effect for the duration of the overall monitoring period. Modifications to these criteria could be necessary for reasons such as avoidance of tree thinning if thinning is not warranted and the long-term effects of sea level rise on tree survival. Proposed modifications must first be approved by the USACE in coordination with the Interagency Environmental Team (IET).

C. Long-Term Success Criteria (Within 6 growing seasons following attainment of 2.B. and maintained for the duration of the remaining 50-year monitoring period)[3] --

1. Attain a minimum average canopy cover of 80% by planted and/or naturally recruited native canopy species.
2. Achieve a minimum average density of 135 (50% of 269) living individuals that are hard-mast producing species in the canopy stratum (planted trees and/or naturally recruited native canopy species). The remaining trees in the canopy stratum must be comprised of soft-mast producing native species.

Notes:
[1]There are no success criteria for midstory or understory species; however, data will be collected concurrently with scheduled monitoring throughout the 50-year project life.
[2] Greater flexibility for species composition may be allotted after multiple years of not meeting initial success criteria.
[3]The requirement that the above criteria remain in effect for the duration of the overall monitoring period may need to be modified later due to factors such as the effect of sea level rise on vegetative cover. Proposed modifications must first be approved by the USACE in coordination with the IET.
If the project doesn't meet 80% canopy cover success criteria 6 Years Following Completion of 2.C, the IET would meet and discuss path forward. Greater flexibility for species composition may be allotted after multiple years of not meeting initial success criteria.

- **Invasive and Nuisance Vegetation**

A. Initial, Intermediate, and Long-term[1] Success Criteria

1. Maintain all areas of the project area such that the total average vegetative cover accounted for by invasive and nuisance species constitute less than 5% of the total average plant cover throughout the 50-year project life. The list of invasive and nuisance species is found in Appendix C-1, Wetlands and will be tailored to reflect specific site needs.

Note:
[1]Yearly inspections to determine the need for invasive/nuisance control would be conducted until the long term success criteria for vegetation is achieved. After it is achieved, the frequency of inspections to determine the need for invasive/nuisance control would be adjusted based on site conditions.

5. Thinning of Native Vegetation (Timber Management)

The USACE, in cooperation with the IET, may determine that thinning of the canopy and/or mid-story strata is warranted to maintain or enhance the ecological value of the site. This determination will be made approximately 15 to 20 years following successful completion of plantings. If it is decided that timber management efforts are necessary, the NFS will develop a Timber Stand Improvement/Timber Management Plan, and associated long-term success

criteria, in coordination with the USACE and IET. Following approval of the plan, the NFS will perform the necessary thinning operations and demonstrate these operations have been successfully completed. Timber management activities will only be allowed for the purposes of ecological enhancement and maintenance of the mitigation site.

1.9 COMPONENT 9. MONITORING REQUIREMENTS

Baseline Monitoring Report

Within 90 days of completion of all final construction activities (e.g. eradication of invasive and nuisance plants, planting of native species, completion of earthwork, grading, surface water management system alterations/construction, etc.) associated with applicable general construction requirements, a "baseline" monitoring report will be prepared. Information provided will typically include the following items:

- A detailed discussion of all mitigation activities completed.

- A description of the various features and habitats within the mitigation site. Various qualitative observations will be made to document existing conditions and will include, but not be limited to, potential problem zones, general condition of native vegetation, and wildlife utilization as observed during monitoring.

- A plan view drawing and shapefiles of the mitigation site showing the approximate boundaries of different mitigation features including planted areas, planted rows, areas involving eradication of invasive and nuisance plant species, surface water management features, access rows, proposed monitoring transects locations, sampling plot locations, photo station locations, and if applicable, piezometer and staff gage locations.

- Initial and final construction surveys for areas having had topographic alterations, including elevations of all constructed surface water drainage features, drainage culverts, and/or water control structures. The initial and final construction surveys should also include cross-sectional surveys of topographic alterations involving the removal of existing linear features such as berms/spoil banks, or the

filling of existing linear ditches or canals. The number of cross-sections must be sufficient to represent elevations of these features. The initial and final construction surveys must include areas where existing berms, spoil banks, or dikes have been breached.

- A detailed inventory of all canopy and midstory species planted, including the number of each species planted and the stock size planted. In addition, provide an itemization of the number of each species planted and correlate this itemization to the various areas depicted on the plan view drawing of the mitigation site.

- Photographs documenting conditions in the project area will be taken at the time of monitoring and at permanent photo stations within the mitigation site. At least two photos will be taken at each station with the view of each photo always oriented in the same general direction from one monitoring event to the next. The number of photo stations required and the locations of these stations will vary depending on the mitigation site. The USACE will make this determination in coordination with the IET and will specify the requirements in the project-specific Mitigation Monitoring Plan. At a minimum, there will be 4 photo stations established. For mitigation sites involving habitat enhancement/earthwork only, permanent photo stations will primarily be established in areas slated for planting of canopy and mid-story species, but some may also be located in areas where plantings are not needed.

- Multiple baseline reports may need to be submitted if additional plantings are required by the contractor to meet planting survival acceptance criteria. Each revision will be updated to incorporate information regarding the re-planting.

Additional Monitoring Reports

All monitoring reports generated after the Baseline Monitoring Report will be called Initial, Intermediate or Long-Term Success Criteria Monitoring Reports and shall be numbered sequentially based on the year in which the monitoring occurred (i.e. Initial Success Criteria Monitoring Report 2019). All Monitoring Reports shall provide the following information unless otherwise noted:

- All items listed for the Baseline Monitoring Report with the exception of: (a) the topographic/construction surveys, although additional topographic surveys are required for specific monitoring reports (see below); and (b) the inventory and location map for all planted species.

- A brief description of maintenance and/or management and/or mitigation work performed since the previous monitoring report along with a discussion of any other significant occurrences.

- Quantitative plant data collected from (1) permanent monitoring plots measuring approximately 90 feet X 90 feet in size or from circular plots having a radius of approximately 53 feet, or (2) permanent transects sampled using the point-centered quarter method with a minimum of 20 sampling points established along the course of each transect, or; (3) permanent belt transects approximately 50 feet wide and perpendicular to planted rows. The number of permanent monitoring plots and transects, as well as the length of each transect will vary depending on the mitigation site. The USACE will make this determination prior to the first monitoring event in coordination with the IET and will specify the requirements in the Mitigation Monitoring Plan. Data recorded in each plot or transect will include:

<u>First monitoring report after a planting event</u>

  - number of living planted canopy species (excluding recruited) present and the species composition;
  - number of living planted midstory species present and the species composition
  - average density of living planted canopy species (i.e., the total number of each species present per acre) and the species composition (transect methods)
  - average density of all native species in the midstory stratum, the total number of each species present, and the wetland indicator status of each species;
  - average percent cover by native species in the midstory stratum;

- average percent cover accounted for by invasive plant species (all vegetative strata combined); average percent cover accounted for by nuisance plant species (all vegetative strata combined).

Subsequent monitoring reports

- number of living native canopy trees by species;
- average density of all native species in the canopy stratum, and the wetland indicator status of each species;
- average percent cover by native species in the canopy stratum;
- average diameter at breast height (DBH) for trees (measured 10 years after successful completion of plantings) in the midstory and upper strata;
- number of living native midstory species present and the species composition
- average density of all native species in the midstory stratum, the total number of each species present, and the wetland indicator status of each species;
- average percent cover by native species in the midstory stratum;
- average percent cover accounted for by invasive plant species (all vegetative strata combined); average percent cover accounted for by nuisance plant species (all vegetative strata combined).

- Quantitative data concerning plants in the understory (ground cover) stratum and concerning invasive and nuisance plant species will be gathered from sampling quadrats. These sampling quadrats will be established either along the axis of the belt transects discussed above, or at sampling points established along point-centered quarter transects discussed above, depending on which sampling method is used. Each sampling quadrat will be approximately 2 meters X 2 meters in size. The total number of sampling quadrats needed along each sampling transect will be determined by the USACE with the IET and will be specified in the Mitigation Monitoring Plan. Data recorded from the sampling quadrats will include: average percent cover by native understory species; composition of native understory species and the wetland indicator status of each

species; average percent cover by invasive plant species; and average percent cover by nuisance plant species.

- Photographs will be taken to document conditions at each permanent monitoring plot and along each permanent monitoring transect. Two photos at each station will be taken, one facing north and one facing south.

- In addition, various qualitative observations will be made in the mitigation site to help assess the status and success of mitigation and maintenance activities. These observations will include: general estimates of the average percent cover by native plant species in the canopy, midstory, and understory strata; general estimate of the average percent cover by invasive and nuisance plant species;

    - general estimates concerning the growth of planted canopy and mid-story species;
    - general observations concerning the colonization by volunteer native plant species;
    - general observations made during the course of monitoring will also address potential problem zones, general condition of native vegetation, trends in the composition of the plant communities, wildlife utilization as observed during monitoring, and other pertinent factors.

- A summary assessment of all data and observations along with recommendations as to actions necessary to help meet mitigation and management/maintenance goals and mitigation success criteria.

- A brief description of anticipated maintenance/management work to be conducted during the period from the current monitoring report to the next monitoring report.

Monitoring Reports Involving Timber Management Activities

In cases where timber management activities (thinning of trees and/or shrubs in the canopy and/or mid-story strata) have been approved by the USACE in coordination with the IET, monitoring will be required in the year immediately preceding and in the year following completion of the timber management activities (i.e. pre-timber management and post-timber management reports). These reports must include data and information that are in addition to the typical monitoring requirements. The NFS's proposed Timber Stand Improvement/Timber Management Plan must include the proposed monitoring data and information that will be included in the pre-timber management and post-timber management monitoring reports. The proposed monitoring plan must be approved by the USACE in coordination with the IET prior to the monitoring events and implementation of the timber management activities.

Monitoring Reports Following Re-Planting Activities

Re-planting of certain areas within the mitigation site may be necessary to ensure attainment of applicable native vegetation success criteria. Any monitoring report submitted following completion of a re-planting event must include:

- an inventory of the number of each species planted and the stock size used;
- a depiction of the areas re-planted, cross-referenced to a listing of the species and number of each species planted in each area;
- documented GPS coordinates for the perimeter of the re-planted area. If single rows are replanted, then GPS coordinates should be taken at the end of the transect; and
- all requirements listed under "Additional Monitoring Reports" of the Mitigation Monitoring Guidelines.

1.10 COMPONENT 10. LONG-TERM MANAGEMENT PLAN

The non-Federal Sponsor (i.e. LADOTD) shall commit to prevent damage to the mitigation site and be responsible for maintaining the mitigation site(s) in perpetuity.

1.11 COMPONENT 11. ADAPTIVE MANAGEMENT PLAN

1.11.1 Introduction

This Adaptive Management (AM) Plan is for the Amite River and Tributaries East of Mississippi River feasibility study (ART) included in the draft IFR and EIS and is designed to mitigate for bottomland hardwood impacts from the tentatively selected plan (TSP). The Water Resources Development Act (WRDA) of 2007, Section 2036(a) and U.S Army Corps of Engineers (USACE) implementation guidance for Section 2036(a) (CECW-PC Memorandum dated August 31, 2009: "Implementation Guidance for Section *2036 (a) of the Water Resources Development* Act of 2007 (WRDA 2007) – Mitigation for Fish and Wildlife and Wetland Losses") require adaptive management be included in all mitigation plans for fish and wildlife habitat and wetland losses. Full descriptions of the mitigation projects will be included in the final IFR and EIS, due to the current lack of information.

It should be noted that even though the proposed mitigation actions under the draft IFR and EIS include the potential purchase of credits from a mitigation bank, this section only details the Adaptive Management planning for constructible mitigation features for the feasibility study. In the event that mitigation bank credits are purchased the mitigation management and maintenance activities for the mitigation bank credits will be set forth in the Mitigation Banking Instrument (MBI) for each particular bank. The bank sponsor (bank permittee) will be responsible for these activities rather than the USACE and/or the local Sponsor. USACE Regulatory staff reviews mitigation bank monitoring reports and conducts periodic inspections of mitigation banks to ensure compliance with mitigation success criteria stated in the MBI.

1.11.2 Adaptive Management Planning

Adaptive management planning would be conducted. Adaptive management planning elements would include: 1) development of a Conceptual Ecological Model (CEM), 2) identification of key project uncertainties and associated risks, 3) evaluation of the mitigation projects as a candidate for adaptive management and 4) the identification of potential adaptive management actions (contingency plan) to better ensure the mitigation project meets identified success criteria. The adaptive management plan is a living document and will be refined as necessary as new mitigation project information becomes available.

1.11.3 Conceptual Ecological Model (CEM)

A conceptual CEM (Table C5-2) identify the major stressors and drivers affecting the proposed mitigation projects under ART. For BLH, these can include sea level rise, vegetative invasive species, herbivory, etc. The CEM does not attempt to explain all possible relationships of potential factors influencing the mitigation sites; rather, the CEM presents only those relationships and factors deemed most relevant to obtaining the required acres/average annual habitat units (AAHUs). Furthermore, this CEM represents the current understanding of these factors and will be updated and modified, as necessary, as new information becomes available.

Table C5-2. Conceptual Ecological Model

Alternatives/Issues/Drivers	BLH Mitigation Sites	Mitigation Banks
Freshwater Input	+	*
Sea Level Change	-	*
Runoff	-	*
Vegetative Invasive Species	-	*
Herbivory	-	*

Key to Cell Codes: - = Negative Impact/Decrease

+ = Positive Impact/Increase

+/- = Duration Dependent

*Issues and drivers assumed to be addressed in the Mitigation Bank Instrument

1.10.4 Sources of Uncertainty and Associated Risks

A fundamental tenet underlying adaptive management is decision making and achieving desired project outcomes in the face of uncertainties. There are many uncertainties associated with habitat restoration projects. The project delivery team identified the following uncertainties during the planning process.

A. Climate change, such as relative sea level rise, drought conditions, and variability of tropical storm frequency, intensity, and timing

B. Uncertainty Relative to Achieving Ecological Success:

- Water, sediment, and nutrient requirements for BLH
- Magnitude and duration of wet/dry cycles for BLH
- Nutrients required for desired productivity for BLH
- Growth curves based on hydroperiod and nutrient application for BLH
- Tree litter production based on nutrient and water levels for BLH
- Tree propagation in relation to management/regulation of hydroperiod for BLH

C. Loss rate of vegetative plantings due to herbivory

D. Long-Term Sustainability of Project Benefits

1.10.5 Adaptive Management Evaluation

As part of ART, the mitigation sites will be further evaluated and planned using the screening criteria to develop a project with minimal risk and uncertainty. The items listed below were incorporated into the mitigation project implementation plan and Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) plans to minimize project risks.

- Specified success criteria (i.e., mitigation targets)
- Detailed planting guidelines for BLH
- Invasive species control
- Supplementary plantings as necessary (contingency)
- Corrective actions to meet topographic and hydrologic success as required (contingency)

Subsequently, as part of the adaptive management planning effort the mitigation project features will be re-evaluated against the CEM and sources of uncertainty and risk will be identified to determine if there is any need for additional actions and costs under the adaptive management plan to ensure that the project meets the required success criteria. Based on the uncertainties and risks associated with the project implementation, contingency actions may be identified for implemention if needed to ensure the required AAHUs are met.

Potential Action #1. Additional vegetative plantings as needed to meet identified success criteria.

Uncertainties addressed (from Section 2.2): A,B,C,D, E

Potential Action #2. Additional earthwork at mitigation sites (by adding sediment or degrading) to obtain elevations necessary for BLH vegetative establishment and maintenance.

Uncertainties addressed: A,B,C,E

Potential Action #3. Invasive species control to ensure survival of native species and meet required success criteria.

Uncertainties addressed: E

Actions 1 and 3 are not recommended as separate adaptive management actions since they are already built into the mitigation plan and success criteria identified in Section 1.7. In the event that monitoring reveals the project does not meet the identified vegetation, or hydrologic success criteria, additional plantings or construction activities are already accounted for and would be conducted under the mitigation project. Specific measures to implement Action 2, if determined necessary to achieve project benefits, would be coordinated with the NFS and other agencies to determine the appropriate course of action. If it is determined that the project benefits are significantly compromised because of improper elevation, additional fill material may need to be pumped into or removed from the project area. Due to the impact the addition of fill to the

mitigation projects once they have been planted would incur, lifts to the projects are not currently considered as a viable remedial action. Instead, increasing the size of the existing mitigation project or mitigating the outstanding balance of the mitigation requirement elsewhere or through the purchase of mitigation bank would be options that could be considered through additional coordination with the NFS and the IET. However, such options would have to undergo further analysis in a supplemental NEPA document.

Action 2 is potentially a very costly action. Before implementing such an action, the Corps would coordinate with the NFS and other agencies to determine if other actions, such as purchasing of credits in a mitigation bank or building additional mitigation elsewhere, would be more cost-effective options to fulfill any shortfalls in the overall project success. The USACE would be responsible for performing any necessary corrective actions subject to availability of funding, but the overall cost would be shared with the NFS according to the project cost-share agreement.

The USACE would be responsible for the proposed mitigation construction and would monitor the project until the initial success criteria are met. Initial construction and monitoring would be funded in accordance with all applicable cost-share agreements with the NFS. The USACE would monitor (on a cost-shared basis) the completed mitigation to determine whether additional construction, invasive/nuisance plant species control, and/or plantings are necessary to achieve initial mitigation success criteria. Once the USACE determines that the mitigation has met the initial success criteria, monitoring would be performed by the NFS as part of its OMRR&R obligations. If after meeting initial success criteria, the mitigation fails to meet its intermediate and/or long-term ecological success criteria, the USACE would consult with other agencies and the NFS to determine the appropriate management or remedial actions required to achieve ecological success. The USACE would retain the final decision on whether or not the project's required mitigation benefits are being achieved and whether or not remedial actions are required. If structural changes are deemed necessary to achieve ecological success, the USACE would implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost-sharing requirements, availability of funding, and current budgetary and other guidance.

1.12 COMPONENT 12. FINANCIAL ASSURANCES

Financial assurances are required to ensure that the compensatory mitigation project would be successful. In this case, the NFS obligation would be reflected in the Project Partnership Agreement, in which the NFS must operate and maintain the mitigation project at no cost to the Government.