

Upper Barataria Basin, Louisiana Feasibility Report



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1.1 INTRODUCTION

This document provides a summary of the plan formulation process used to develop compensatory mitigation measures for the Upper Barataria Basin Feasibility Study and Environmental Impact Statement (UBB FS/EIS) project's environmental impacts to wetlands. In order to be consistent with the concepts and principles of SMART Planning, proposed compensatory mitigation measures were based on existing available data sources and focused on scaling the measures or features based on the mitigation needs laid out in Environmental Appendix C, Section 2.2, Impacts to Wetlands.

1.2 **PROPOSED ACTION**

The proposed action is to provide compensatory mitigation for unavoidable impacts to habitat in the project area. During planning for the UBB project, measures to avoid and minimize impacts to significant resources were employed to the extent practicable. Table 1 provides a general summary of mitigation sequence of actions to avoid and minimize impact to significant resources associated with the final array of alternatives discussed in Section 4.6 of the main report. Nonetheless, unavoidable impacts to freshwater emergent marsh, swamp, and BLH habitat would occur from construction of the project and would be offset through compensatory mitigation.

Table 1. S	ummary of N	Mitigation	Sequence	Actions
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	Avoid	Minimize	Mitigate/Compensate
No Action	n/a	n/a	n/a
Alternative 1 - Highway	Measure: Portions of the alignment	Measure: Portions of the alignment	Measure: Purchase credits from a
90 - Segment 1	utilized existing levees and upland	utilized existing levees however	mitigation bank.
Extension (Final Array)	 corridors and no additional impacts were incurred; Create tidal exchange structures. Objective: Avoid impacts to wetlands and maintain access and exchange. Impact Addressed: Prevents construction work from impacting wetlands and other fish and wildlife habitats. Avoiding borrow sites with swamp or marsh and look towards local farm lands. Preserves hydrology and fishery access. Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act, Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act 	 additional impacts did occur Objective: Minize impoundment of wetlands and waterbodies. Impact Addressed: Prevents loss of fish habitat and access to habitat. Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act, Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act 	 Objective: Compensate for unavoidable impacts to fish and wildlife habitats. Impact Addressed: Replaces lost functions and values of wetlands impacted by project construction. Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act, Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act

	Avoid	Minimize	Mitigate/Compensate
Alternative 2 - Highway 90 - Full Alignment (Final Array)	Measure: Create tidal exchange structures.	Measure: Portions of the alignment utilized existing levees however additional impacts did occur; Chose	Measure: Purchase credits from a mitigation bank.
	Objective: Avoid impacts to wetlands. Maintain access and exchange.	alighment to reduce impacts to marsh Objective: Minize impoundment of wetlands and waterbodies.	Objective: Compensate for unavoidable impacts to fish and wildlife habitats.
	Impact Addressed: Prevents construction work from impacting wetlands and other fish and wildlife habitats. Avoiding borrow sites with swamp or marsh and look towards local farm lands. Preserve hydrology	Impact Addressed: Prevents loss of fish habitat and access to habitat.Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act,	 Impact Addressed: Replaces lost functions and values of wetlands impacted by project construction. Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act,
	and fish access. Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act, Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act	Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act	Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act

	Avoid	Minimize	Mitigate/Compensate
Alternative 10 - 1% AEP Open Basin (eliminated)	 Measure: Did not concider a crossbasin alignment Objective: Avoid impacts to wetland to the maximum extent Impact Addressed: Prevents construction work from impacting wetlands and other fish and wildlife habitats. Avoiding borrow sites with swamp or marsh and look towards local farm lands. Preserve hydrology and fishery access. Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act, Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act 	 Measure: Entire alignment utilized existing levees however additional impacts did occur; Reduce reaches that cross open water without an existing strucuture. Objective: Minize impoundment of wetlands and waterbodies on the flood side of the alignment. Impact Addressed: Prevents loss of fish habitat and access to habitat. Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act, Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act 	 Measure: Purchase credits from a mitigation bank. Objective: Compensate for unavoidable impacts to fish and wildlife habitats. Impact Addressed: Replaces lost functions and values of wetlands impacted by project construction. Relevant laws: Clean Water Act, Fish and Wildlife Coordination Act, Magnuson Stevens Fishery Conservation and Management Act, Water Resources Development Act
Non-Structural - NS1 (eliminated)	n/a	n/a	n/a

1.3 PRIOR REPORTS

Numerous studies and reports regarding mitigation for water resources development projects in the study area have been prepared by CEMVN, other federal, state, and local agencies, research institutes, and individuals. The CEMVN HSDRRS website provides additional information of studies and construction:

https://www.mvn.usace.army.mil/Missions/Environmental/NEPA-Compliance-Documents/HSDRRS-Projects/ [accessed 3 June 2021]

Previous mitigation plans have identified and modified mitigation projects for various habitat types impacted. The original mitigation projects associated with HSDRRS are discussed in:

<u>Programmatic Individual Environmental Report #37 West Bank and Vicinity (WBV) Hurricane and Storm Damage Risk</u>. <u>Reduction System (HSDRRS) Mitigation, PIER #371, signed Decision Record 13 June 2014.</u>¹

PIER #37 described and evaluated its proposed mitigation plan to compensate for unavoidable habitat losses caused by the construction of the WBV HSDRRS. The mitigation plan set forth in the PIER was comprised of both constructible and programmatic features. In the Decision Record, the constructible feature of the selected plan was recommended for implementation, which included purchase of BLH-Wet mitigation bank credits with no particular mitigation bank identified, while the programmatic features were recommended for further evaluation and design.

Supplemental PIER Mitigation for Protected Side Bottomland Hardwoods Dry WBV HSDRRS, SPIER #37a2, February 2016.²

SPIER #37a described and evaluated substitute projects for the protected side BLH-dry feature of the mitigation plan found in PIER #37 and provided an assessment of the revised compensatory mitigation plan for the WBV HSDRRS impacts using the selected replacement projects.

Environmental Assessment #543 New Right of Way and Mitigation for the New Orleans to Venice Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude and New Orleans to Venice Federal Hurricane Protection Levee, Plaquemines Parish, Louisiana, EA #5433, signed FONSI 12 December 2017.³

EA #543 described and evaluated its proposed mitigation plan to compensate unavoidable habitat losses caused by the proposed construction to BLH-Wet habitat. The proposed mitigation alternative was to purchase mitigation bank credits to offset impacts to BLH-Wet. Other mitigating alternatives with a public land option were considered but were not selected due to cost, risk, and reliability.

Draft Supplemental Environmental Assessment SEA #543a⁴.

SEA 543a described and evaluated its proposed mitigation plan to compensate unavoidable habitat losses caused by proposed construction. A mitigation project at 05a.1 was described and evaluated;

¹ Available online at: <u>https://www.mvn.usace.army.mil/Missions/Environmental/NEPA-Compliance-Documents/HSDRRS-Projects/PIER-37-WBV-HSDRRS-Mitigation/;</u> accessed on July 2021

² Available online at: <u>https://www.mvn.usace.army.mil/Portals/56/Users/194/42/2242/SPIER%2037a%20Final%20Document.pdf;</u> accessed on July 2021

³ Available online at:

https://www.mvn.usace.army.mil/Portals/56/docs/Projects/NOV%20NFL/Final%20EA%20%23543%20and%20Signed%20FONSI.pd f?ver=2017-12-14-092922-763; Accessed on July 2021

⁴ Available online at: <u>https://www.mvn.usace.army.mil/projects/NOV/</u>; Accessed on 2 July 2021

however, this alternative was not selected. The tentatively selected plan alternative for SEA #543a is the purchase of mitigation swamp credits.

<u>Final Supplemental Environmental Assessment – West Bank and Vicinity Hurricane and Storm Damage Risk Reduction</u> <u>System Flood Side BLH-Wet and Swamp Mitigation, Lafourche Parish, Louisiana SEA #572⁵ (Signed FONSI 24 July 2019).</u>⁵

SEA #572 was needed since many of the earlier identified mitigation projects were determined not to be implementable. SEA #572 evaluated 5 additional projects and carried two forward for further analysis (Hwy 307 and Mitigation Banks), the remaining considered projects were not moved forward due to cost, additional impacts that would require mitigation, or unacceptable schedule delays related to obtaining right of entry (ROE). Appendix E of SEA #572 is hereby incorporated by reference for a monitoring plan and success criteria.

Supplemental Project Description Document No. 4. West Bank and Vicinity (WBV), Highway 307 Mitigation Hurricane and Storm Damage Risk Reduction System. February 2020. (Approved 17 April 2020).

The purpose of the supplemental project description document was to provide a brief and concise summary of the current plan for the mitigating WBV HSDRRS General Flood Side (FS) Bottomland Hardwood-Wet impacts and General FS Swamp impacts as presented in the Supplemental Environmental Assessment #572, and as revised from those plans originally described in the 2014 WBV HSDRRS Mitigation for mitigating the cited impacts.

<u>Tiered Environmental Assessment to Programmatic Individual Environmental Report (PIER) 37 Jean Lafitte National</u> <u>Historical Park and Preserve Mitigation Features, West Bank and Vicinity, Hurricane and Storm Damage Risk Reduction</u> <u>System Mitigation Jefferson Parish, Louisiana, PIER 37, TIER 1 EA (Approved December 17, 2016)</u>

PIER 37, TIER 1 EA was needed to evaluate the potential impacts associated with implementing the proposed projects of the approved mitigation plan in PIER 37 situated within Jean Lafitte National Historical Park and Preserve (JELA or Park). These projects mitigated for impacts incurred through construction of the WBV HSDRRS to: general fresh marsh (i.e., fresh marsh that was not located in the Park or in the Environmental Protection Agency- (EPA) designated Clean Water Act (CWA) Section 404(c) area); fresh marsh located within the Park; Swamp located within the Park; BLH-Wet located within the Park; and BLH-Wet and Swamp located within the 404(c) area through the restoration of said habitat types on JELA. Appendix D: Planting Guidelines, Monitoring Plan, and Success Criteria of SEA #572 is hereby incorporated by reference for the planting guidelines, monitoring plan, and success criteria for general fresh marsh.

2.0 MITIGATION PROCEDURES

The mitigation procedures follow Appendix C of the Planning Guidance Notebook dated 01 April 2019.

⁶ Available online at:

⁵ Available online at: <u>https://www.mvn.usace.army.mil/Portals/56/Users/194/42/2242/Draft%20SEA%20572%20Document.pdf;</u> accessed on July 2021

 $[\]label{eq:https://www.mvn.usace.army.mil/Portals/56/Users/194/42/2242/PIER%2037, %20TIER%201\%20EA\%20Final.pdf \ ; \ accessed \ on \ 3 \ July \ 2021$

2.1 INVENTORY AND CATEGORIZE ECOLOGICAL RESOURCES

An ecological resources inventory within the study area is documented in Section 3 of the UBB FS/EIS. Environmental Appendix C identifies the location and extent of the impacted environmental resources that were quantified using Wetland Value Assessment (WVA) models (a habitat-based analyses) for Fresh Marsh, Open Water, BLH-Wet and Swamp. The results, expressed as Average Annual Habitat Units (AAHU), underwent Agency Technical Review are presented in table 1.

	Alternative 1	
Habitat Type	Acres	AAHU*
Wetland Bottomland Hardwood Forest	291.32	-94.94
Cypress-Tupelo Swamp	167.28	-111.40
Fresh Marsh	266.79	-119.79
Total	725.39	
Open Water**	95	-6.85
		-332.98

Table 2.	Impacted	Resources.

*Calculated using the Intermediate SLR scenario

**Open water is mitigated through marsh creation

2.2 DEFINE MITIGATION PLANNING GOALS AND OBJECTIVES

Consistent with a watershed approach, the planning process used existing mitigation measures and locations in the Barataria Basin within the Louisiana Coastal Zone to formulate plans to compensate for impacts the UBB project could not avoid. Consideration of mitigation banks, consistent with Section 1163 of WRDA 2016 is also included in the analysis. Identification and justification of the recommended mitigation plan was based on cost-effectiveness and incremental cost analysis. The following planning goal was developed to guide the development of the compensatory mitigation sites:

Selecting a mitigation plan that meets mitigation objectives and reasonably maximizes environmental benefits while passing tests of cost effectiveness and incremental cost analyses, acceptability, completeness, efficiency, and effectiveness.

The objective of the proposed mitigation is to compensate for habitat losses, as measured by AAHU, that are expected to occur during the construction of the proposed actions for Marsh, Swamp, and BLH. The proposed compensatory mitigation would replace the lost functions and services of the impacted Marsh, Swamp, and BLH habitat.

2.3 DETERMINE UNIT OF MEASUREMENT

The output of the mitigation plan increments would be measured by AAHU.

2.4 IDENTIFY AND ASSESS THE POTENTIAL MITIGATION STRATEGIES

2.4.1 Mitigation Plan Formulation Strategies and Management Measures

Lessons learned from these efforts were considered for this mitigation planning effort. Measures considered for mitigation planning are outlined below:

Marsh, Swamp, or BLH Enhancement/Restoration: This measure would enhance or restore marsh, cypress forest, or BLH-Wet forest in the basin through site preparation (clearing, leveling, etc.) and planting. Only sites that could achieve a long-term success criterion would be selected.

Marsh, Swamp, or BLH Creation: This measure would develop new areas that would support Fresh Marsh, Swamp, or BLH habitats. Typically this would be achieved through the raising or degrading of existing landforms or the filling of shallow open water to elevations conducive to the establishment of Fresh Marsh, Swamp or BLH-Wet habitats followed by the planting of desired target habitat type species.

Marsh, Swamp, or BLH Credits: Purchase of mitigation bank Marsh, Swamp, and BLH credits approved by OCM to offset coastal zone impacts from a bank with perpetual conservation servitude.

2.4.2 Mitigation Project Considerations

The following factors were considered during the mitigation project development:

- 1) In accordance with the USACE Implementation Guidance of Section 2036 of the WRDA 2007 (which amended WRDA 1986, Section 906), Mitigation for Fish and Wildlife and Wetlands Losses, compensatory mitigation was formulated to occur within the same watershed or hydrologic basin as the impacts and to replace the functions and services of each impacted habitat type with functions and services of the same habitat type. The UBB FS/EIS Mitigation Basin boundaries coincide with the watershed boundaries except for the southern boundary. The southern boundary for planning purposes was limited to the intermediate/brackish marsh interface at 6 part per thousand (ppt) because the UBB FS/EIS work only impacted freshwater Marsh, Swamp, and BLH-Wet habitat and the functions and services of freshwater wetland could not be replaced in areas with salinity greater than those found in intermediate wetland systems.
- 2) In accordance with WRDA 1986, Section 906 as amended (33 U.S.C. 2283(d)), mitigation measures were required to either restore or enhance the same habitat types that would be impacted (e.g. "habitat type for habitat type") by proposed UBB FS/EIS construction.
- 3) Because the impacts would occur within the Louisiana Coastal Zone (CZ), bank credits would need to be approved by the Louisiana Department of Natural Resources, Office of Coastal Management (OCM) to offset impacts within the CZ.

2.4.3 Considered Mitigation Alternatives

No Action Alternative: NEPA requires that in analyzing alternatives to proposed action, a federal agency consider an alternative of "No Action". The No Action alternative evaluates not implementing the UBB FS/EIS proposed action and associated mitigation and represents the future-without-project (FWOP) scenario by which alternatives considered in detail are compared. The FWOP provides a baseline essential for impact assessment and alternative analysis. This section presents the No Action Alternative as not implementing mitigation for UBB FS/EIS construction impacts. Compensatory mitigation for unavoidable habitat losses due

to the construction of the proposed UBB FS/EIS is required by law (e.g., Clean Water Act, WRDAs of 1986, 2007, and 2016), and the CEMVN does not consider the No Action Alternative to be a reasonable or legally viable alternative that could be chosen.

The analysis for the No Action Alternative considers previous, current, and reasonably foreseeable future projects, which could impact the resources evaluated in the UBB FS/EIS. For this analysis, a project is considered "reasonably foreseeable" if it meets one of the following criteria:

- USACE authorized ecosystem restoration, hurricane and storm damage risk reduction, flood risk reduction, and/or navigation project with an anticipated Tentatively Selected Plan;
- CWPPRA project authorized at a Phase 2 construction status;
- Coastal Impact Assistance Program ecosystem restoration or hurricane and storm damage risk reduction or flood risk reduction project which is funded for construction;
- State of Louisiana Surplus-funded ecosystem restoration or hurricane and storm damage risk reduction or flood risk reduction project funded for construction; or
- Louisiana Levee District permitted hurricane and storm damage risk reduction or flood risk reduction project.

Wetland or ecosystem restoration activities considered part of the No Action Alternative could counter, to a degree, the current land loss trends throughout the basin and progressions of wetlands to open water. In addition to these ecosystem restoration projects, a number of hurricane and storm damage risk reduction projects, flood risk reduction, projects, and navigation projects would continue to influence the hydrodynamics within the basin.

Alternative 1: Purchase of Mitigation Bank Credits

725.39 Average Annual Habitat Units (AAHU) of Marsh, Swamp, and BLH-Wet impacts would be mitigated through the purchase of mitigation bank Marsh, Swamp, and BLH credits approved by OCM to offset coastal zone impacts from a bank with perpetual conservation servitude. The purchase would occur prior to or concurrent with construction impacts.

No particular bank is proposed for use at this time. The bank(s) from which credits would be purchased would be selected through a solicitation process, through which any mitigation bank meeting eligibility requirements and having the appropriate resource type of credits could submit a proposal to sell credits. If appropriate and cost-effective, the Corps may choose to purchase mitigation bank credits from more than one bank to fulfill the compensatory mitigation requirements for Marsh, Swamp, and BLH-Wet habitat type. The solicitation for mitigation bank bids will include requirements that the banks are OCM-approved, and within the same or adjacent CWPPRA-defined hydrologic basin as the impacts.

The purchase of credits is dependent on receipt of acceptable, cost-effective proposals from eligible banks. Currently, there are insufficient in-kind mitigation bank credits in the watershed to implement this alternative; however, CEMVN anticipates future banks and/or future credit releases may be approved prior to construction of the proposed action for the UBB FS/EIS. No new cumulative impacts to any resource would be incurred from the purchase of credits from a previously approved mitigation bank credits would occur at approved banks, which perform in accordance with schedules contained in their respective mitigation banking instruments. No physical impacts at a bank would occur with the purchase of credits.

Depending on the amount of mitigation bank credits available in the basin at the time of credit purchase for the UBB mitigation, UBB use of mitigation credits may reduce the number of credits available to permittees to compensate for Marsh, Swamp, and BLH impacts authorized by Department of Army Section 10/404 permits. Following the UBB purchase, in the event sufficient credits are not available to offset impacts associated with

a proposed permit, the district engineer would determine appropriate compensatory mitigation based on the factors described in 33 CFR Part 332.3(b)⁷.

If purchase of mitigation bank credits were approved as the UBB FS/EIS Mitigation Plan and if an acceptable, cost-effective bid to sell credits is received, then all Marsh, Swamp, and BLH-Wet impacts would be mitigated through the purchase of Marsh, Swamp, and BLH-Wet credits equaling 126.64, 111.4, and 94.94 AAHU respectively. The same version of the WVA model that was used to assess the impacts of constructing the proposed action would be run on the mitigation banks to ensure that the assessment of the functions and services as the impacted by the mitigation bank match the assessment of the lost functions and services as the impacted site.

Alternative 2: Corps-Constructed:

Consistent with the principles of SMART Planning, the team also developed an array of mitigation plans by reviewing existing studies and plans to determine if they would contain alternatives that would match the management measures layout. Most of these studies and plans have been technically reviewed. Below is a list of the source of data used:

- **CWPPRA PPL** Existing Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Priority Project List (PPL) Information. The CWPPRA program yearly contains ecosystem projects that have had WVA and engineering analyses conducted. Project not selected for authorization were reviewed for mitigation planning.
- **2012 and 2017 State of Louisiana Master Plans** The 2012 and the 2017 State of Louisiana Master Plans include various restoration projects throughout the Barataria Basin.
- **UBB Mitigation -** Projects not selected in the final UBB mitigation planning documentation could be a source for additional mitigation projects. Mitigation sites from the recommended plan already constructed could be expanded upon or any of the sites in the final array that were not recommended for construction could be used. For example, in Figure 1 many of the sites shown within the red circles could be evaluated for implementation as mitigation for UBB impacts.

⁷ Available online at: <u>https://www.law.cornell.edu/cfr/text/33/332.3</u>. Accessed on July 2021



Figure 1. Selected array of sites under the UBB efforts

- <u>Highway 307 Mitigation Project Expansion</u>: If implemented, this mitigation project would involve expanding this existing mitigation effort to restore the mitigation requirements for UBB FS/EIS. This site is located in Lafourche Parish along Highway 307 between Raceland and Des Allemandes. The current footprint consists of approximately 521 acres of agricultural fields. Within the 521 acres, approximately 133 acres are BLH-Wet restoration. Elevations within this portion of this site where BLH-Wet would be restored are either at or above the elevation conducive to BLH-Wet establishment (+2.5 feet to 3.25 feet NAVD88); therefore, no outside borrow would be required for this proposed restoration. Additional mitigation plan details for this site are provided in SEA #572. This site is actively being used to mitigate impacts to BLH-Wet due to HSDRRS construction.
- b. <u>05a.1 Mitigation Project</u>: If implemented, this mitigation project would consider a Corps Constructed mitigation project to restore the mitigation requirements for UBB FS/EIS within existing agricultural fields. This site is located west of the Mississippi River between miles 63.0 and 64.0 in Plaquemines Parish. The description of this mitigation site is provided in SEA # 543a; however, it would be adapted to construct BLH-Wet or Swamp habitat.
- c. <u>Combination of Hwy 307 and 05a.1 Mitigation Project Expansion</u>: If implemented, this mitigation project would involve using both sites to restore the mitigation requirements for UBB FS/EIS.
- d. <u>BA-34-2 Swamp Restoration Project</u>: With a project area of 2,394 acres, this project is located west of Lac des Allemands in St. James Parish, Louisiana, south of the town of South Vacherie, bordered to the south by Bayou Chevreuil, and on the east by LA Highway 20. This project enhanced 2,394 acers of Swamp habitat that would have continued to degrade without the project.
- e. <u>CWPPRA Sites</u>: Over the recent years various marsh creations sites have been proposed for the Barataria Basin. If implemented, this mitigation project would review those sites an implement site to meet the Marsh needs

Alternative 3: Corps constructed and mitigation bank purchases

This would involve constructing all or part of HWY 307, 05a.1, or BA-34-2 and purchasing available or some mitigation bank credits to meet the BLH-Wet compensatory mitigation need.

2.5 DEFINE AND ESTIMATE COSTS OF MITIGATION PLAN INCREMENTS

A qualitative cost estimate for Marsh, Swamp, and BLH-Wet mitigation is based on previous estimates for Marsh, Swamp, and BLH-Wet mitigation in the area. The cost of mitigation was estimated per AAHU and applied in the project cost estimates in the UBB FS/EIS.

2.6 DISPLAY INCREMENTAL COSTS

Cost effectiveness and incremental cost analysis (CE/ICA) can provide decision-makers with relative outputcost relationships of various mitigation alternatives and help decision-makers identify a recommended mitigation plan to pursue in more detail. The Institute for Water Resources Planning Suite II was used to complete the CE/ICA of the mitigation alternatives to evaluate and compare the monetary cost estimates and non-monetary outputs. Cost-effective alternatives are plans that have the greatest output of all alternatives for that cost. A secondary analysis on the subset of cost-effective alternatives identifies superior financial investments, called "Best Buys", through an incremental cost analysis. Best Buy alternatives provide the greatest increase in output for the least increase in cost.

The mitigation cost estimates are provided per AAHU and are based on costs from recent CEMVN projects. All cost were indexed to FY21 dollars. The Alternatives were broken into individual habitat categories; BLH, Swamp, and Fresh Marsh.

BLH:

Actual costs of \$121,385 per AAHU were used from the Highway 307 project. Other historical project had similar cost. For the purchase of BLH-Wet mitigation bank credits, an average cost of \$92,072 per AAHU was used based on multiple recent mitigation bank credit purchases. For the combination alternative of using bank credits and constructed, a 50/50 split per AAHU and associated costs was used. All BLH alternatives had the same output of 94.94 AAHU.

Swamp:

Costs of \$107,039 per AAHU were used for corps-constructed alternative. Due to the historical varying measures used for corps constructed swamp sites an average construction cost was used. For the purchase of swamp mitigation bank credits, an average cost of \$99,374 per AAHU was used based on recent mitigation bank credit purchases. For the combination alternative of using bank credits and constructed, a 50/50 split per AAHU and associated costs was used. All Swamp alternatives had the same output of 111.4 AAHU.

Freshwater Marsh:

Costs of \$468,138 per AAHU were used for corps-constructed alternative. Due to the historical varying measures used for corps constructed freshwater marsh sites an average construction cost was used. For the purchase of freshwater marsh mitigation bank credits, an average cost of \$385,027 per AAHU was used based on multiple recent mitigation bank credit purchases and historical research in purchases of private credits⁸. For the combination alternative of using bank credits and constructed, a 50/50 split per AAHU and associated costs was used. All freshwater marsh alternatives had the same output of 111.4 AAHU.

Table 3 displays the incremental costs for each mitigation plan. The No Action and mitigation bank alternatives were Best Buys, while the other alternatives were non-cost effective. From this analysis, purchase of mitigation bank credits was selected as the recommended mitigation plan.

Alternative	Cost*	Output (AAHU)	Cost Effective
BLH-Wet			
No Action	\$0	0	Best Buy
Mitigation Bank (BLH-Wet)	\$8,741,316	94.94	Best Buy
Bank + Constructed (BLH-Wet)	\$10,132,812	94.94	Non-Cost effective
Constructed (BLH-Wet)	\$11,524,307	94.94	Non-Cost Effective
Swamp			
No Action	\$0	0	Best Buy
Mitigation Bank (Swamp)	\$11,070,264	111.4	Best Buy
Bank + Constructed (Swamp)	\$11,497,204	111.4	Non-Cost effective
Constructed (Swamp)	\$11,924,144	111.4	Non-Cost Effective
Fresh Marsh*			
No Action	\$0	0	Best Buy
Mitigation Bank (Fresh Marsh)	\$6,332,000	126.64	Best Buy
Bank + Constructed (Fresh Marsh)	\$8,231,600	126.64	Non-Cost effective
Constructed (Fresh Marsh)	\$10,131,200	126.64	Non-Cost Effective

Table 3. Incremental Cost Comparison for Considered Mitigation Alternatives

2.7 ELEMENTS OF THE RECOMMENDED MITIGATION PLAN

CEMVN has assessed the impacts of the no action alternative and the proposed mitigation credit purchase on relevant resources in the study area, including air quality, water quality, terrestrial habitat, aquatic habitat, fish and wildlife, wetlands, threatened and endangered species, recreational resources, aesthetic resources, cultural resources, farmland, and socioeconomic resources through the UBB FS/EIS. Section 3 of the UBB FS/EIS provides the details of the existing conditions within the study area and are not repeated here. Section 5 of the UBB FS/EIS describes the environmental impacts, including direct, indirect, and cumulative effects of the proposed action including mitigation on relevant resources and are not repeated here.

The proposed action in this mitigation plan consists of purchasing mitigation bank credits to mitigate 332.98 AAHU to offset Marsh, Swamp, and BLH-Wet impacts.

Since the proposed action recommended for implementation at this time consists of purchasing mitigation credits, CEMVN has concluded that there would be no new direct, indirect, or cumulative impacts to any relevant resources from that action. Any changes to the proposed mitigation plan would be fully evaluated in future NEPA documents if needed. Future NEPA documents would further evaluate the impacts of Alternative 2 (Corps Constructed).

a. Description of Physical Action – None. Purchase of mitigation credits does not involve any physical action. The mitigation bank that sells the credits will continue to operate in accordance with its mitigation banking instrument.

b. Type, amount, and characteristics of the habitat to be restored – Sufficient OCM-approved bottomland hardwood forest credits will be purchased from a mitigation bank in the Barataria Hydrologic Basin or, if necessary, an adjacent basin, to offset impacts to 332.98 AAHU of Marsh, Swamp, and BLH-Wet. The same WVA model that was used to determine impacts will be used to determine the number of bank credits required to offset the bottomland hardwood forest losses.

c. Ecological Success Criteria – The selected mitigation bank must be in compliance with its Mitigation Banking Instrument, which sets forth the bank's ecological success criteria and the timeline for the bank's achievement of its ecological success milestones.

d. Monitoring Plan – The purchase of mitigation bank credits relieves the USACE and the NFS from monitoring to ensure ecological success.

e. Adaptive Management – The selected mitigation bank must be in compliance with its Mitigation Banking Instrument, including relevant success criteria. Purchase of credits relieves USACE and the NFS of the responsibility to ensure ecological success.

d. Real Estate Required – None.

3.0 DATA GAPS AND UNCERTAINTIES

Mitigation Bank Credit Availability. Whether in-basin mitigation banks within the CZ may be capable of supplying the credits needed to meet any of the mitigation requirements at the time of solicitation is uncertain. Banks currently able to meet the mitigation requirements may not be able to do so at the time of solicitation. If mitigation credits are not available in the future, then a Corps-constructed mitigation project would be needed. In addition, new banks able to meet the mitigation requirement may become approved by the time the solicitation is released. Accordingly, identification of particular banks that could be used to meet the mitigation requirement cannot occur with any degree of certainty and has not been done for the UBB FS/EIS. Since the bank(s) that may ultimately be selected to provide the necessary mitigation credits is(are) unknown, the existing conditions present at the bank site(s) are similarly unknown. Existing bank habitat quality varies depending on the success criteria met, as specified in the bank's Mitigation Banking Instrument (MBI). Typically, as mitigation success criteria are met and the quality of the habitat increases within the bank, more credits are released for purchase.

If, based on credit availability or following evaluation of the mitigation bank proposals, it becomes apparent that purchasing bank credits is not cost effective or feasible (including due to lack of satisfactory bids), CEMVN will complete its evaluation of Mitigation Plan Alternative 2 which would evaluate Corps-constructed mitigation projects within the UBB watershed in the CZ, possibly in combination with a credit purchase. Construction of a mitigation project involves identification of a site, planning, design, acquisition of real estate, construction, monitoring, adaptive management, and ongoing operation and maintenance by the NFS. In that event, environmental compliance would be achieved through the following evaluation, coordination, and analysis:

- 1) Endangered Species Act Section 7 Consultation with the USFWS;
- 2) Coordination under the Louisiana Coastal Resources Program with Louisiana Department of Natural Resources;

- 3) Receipt of a Water Quality Certification from the State of Louisiana;
- Public review of the Section 404(b)(1) Public Notice and signature of the Section 404(b)(1)
 Evaluation; Coordination with Louisiana Department of Environmental Quality (LDEQ) on the air quality impact analysis;
- 5) Coordination with National Marine Fisheries Services on Essential Fish Habitat recommendations;
- 6) Completion of the National Historic Preservation Act Section 106 consultation pursuant to the Programmatic Agreement; and
- 7) Preparation of and issuance of a supplemental NEPA document evaluating the proposed Corpsconstructed project for 30-day public review and comment.

Tropical Storms. Tropical storm events can directly and indirectly contribute to coastal land loss through erosion from increased wave energies, removal and/or scouring of vegetation from storm surge, and saltwater intrusion into estuaries and interior wetlands. Wetland loss and degradation of large areas can occur over a short period of time as a result of storms. There is a risk that a single storm event, or multiple storms over a short period of time, could significantly reduce or eliminate anticipated benefits of mitigation plans in areas susceptible to storm surge and shearing. The extent of potential damage is dependent upon several unknown variables, including the track and intensity of the storm, the development stage of the project, changes in future conditions in the study area, and variability of project performance from forecast conditions due to other factors of risk and uncertainty.

Increased Sea Level Rise and Subsidence. Increased sea level rise coupled with subsidence could convert emergent wetlands to shallow open water and shallow open water to deep water habitat, reducing or eliminating the effectiveness of mitigation plans. Relative sea level rise is taken into account with the valuation of credits for approved mitigation banks and design of constructed mitigation projects.

Climate Change. Extreme changes in climate (temperature, rain, evaporation, wind) could result in conditions that cannot support the types of habitat restored, reducing the effectiveness of the mitigation plan. Extreme climate change could essentially eliminate the benefits of vegetative plantings, if the change resulted in plant mortality. The monitoring plan for all USACE constructed projects would monitor the success of any vegetative plantings and includes provisions for replanting if mortalities become such that meeting the required success criteria is in jeopardy.

Errors in Analysis. Future conditions are inherently uncertain. The forecast of future conditions is limited by existing science and technology. Future conditions described in the UBB FS/EIS are based on an analysis of historic trends and the best available information. Some variation between forecast conditions and reality is certain. Mitigation features were developed in a risk-aware framework to minimize the degree to which these variations would affect planning decisions. However, error in analysis or discrepancies between forecast and actual conditions could affect plan effectiveness.

All of the models used in the UBB FS/EIS are abstract mathematical representations of reality. Models simulate complex systems by simplifying real processes into expressions of their most basic variables. These tools assist with finding optimal solutions to problems, testing hypothetical situations, and forecasting future conditions based on observed data. No model can account for all relevant variables in a system. The interpretation of model outputs must consider the limitations, strengths, weaknesses, and assumptions inherent in model inputs and framework. Inaccurate assumptions or input errors could change benefits predicted by models used in the UBB FS/EIS. The potential for significant changes due to errors has been reduced through technical review,

sensitivity analyses, and quality assurance procedures. However, there is inherent risk in reducing complex natural systems into the results of mathematical expressions driven by the simplified interaction of key variables.

WVA Model Uncertainties. WVA models were run using site-specific data collected at project sites and through assumptions made based on aerial photography and field data from similar projects. There is reasonable confidence that these data are representative of actual site conditions and that the WVA has produced results representative of what would be found for the sites within UBB FS/EIS. The final mitigation requirements will be included in the Final Fish and Wildlife Coordination Act Report.

Implementation. The timing for implementation is an uncertainty that must be considered. If the plan is not implemented in a timely fashion, the conditions in the study area could change. The impact of the uncertainties associated with the future condition of the study area could increase mitigation costs, decrease mitigation benefits, or both.

If the proposed mitigation project becomes infeasible due to difficulties in implementation or changed conditions, the CEMVN will take appropriate action to ensure satisfaction of its mitigation requirement. If a proposed mitigation project could not be implemented, the CEMVN would default to another alternative or to a combination of Corps-constructed project and credit purchase to meet the need.

Mitigation for Coastal Zone Impacts. Louisiana Department of Natural Resources (LDNR) administers the Federal Coastal Zone Management Act in Louisiana through its Louisiana Coastal Resources Program (LCRP). Depending on the projects implemented (i.e., depending on whether the mitigation bank or Corpsconstructed project is located in the Coastal Zone), LDNR may determine that, in its view, such projects do not mitigate for coastal zone impacts. If deemed necessary, additional mitigation for coastal zone impacts may be required and would

4.0 MITIGATION SUCCESS CRITERIA, MONITORING, REPORTING & ADPATIVE MANAGEMENT

The purpose of adaptive management activities in the life-cycle of the project is to address ecological and other uncertainties that could prevent successful implementation of a project. Adaptive Management (AM) also establishes a framework for decision making that utilizes monitoring results and other information, as it becomes available, to update project knowledge and adjust management/mitigation actions. Hence, early implementation of AM and monitoring allows for a project that can succeed under a wide range of conditions and can be adjusted as necessary. Furthermore, careful monitoring of project outcomes both advances scientific understanding and helps adjust operations changes as part of an iterative learning process.

If credits are purchased from a mitigation bank, the mitigation bank must be in compliance with the requirements of the USACE Regulatory Program and its MBI, which specifies the management, monitoring, and reporting required to be performed by the bank.

The proposed mitigation action solely includes the purchase of mitigation bank credits. Purchase of credits relieves the CEMVN and non-federal sponsor of the responsibility for monitoring and of demonstrating mitigation success.

4.1 BANK CREDITS (RECOMMENDED MITIGATION PLAN)

Due to the relatively few AAHU's of Marsh, Swamp, and BLH habitat that would be lost and the time and resources that would be required to design and implement a Corps-constructed mitigation project, purchase of mitigation bank credits is the most timely, efficient, and cost-effective alternative.

4.2 CORPS-CONSTRUCTED (CONTINGENCY)

Once final designs for all UBB FS/EIS contracts are complete, the mitigation team, along with resource agencies, would revisit the impacts to all habitat types from the UBB FS/EIS construction. Completion of this effort would result in a final computation of impacts and may necessitate an increase in the amount of UBB FS/EIS mitigation in order to fully mitigate all impacts. An increase in the amount of mitigation bank credits purchased would be the first option considered. If mitigation bank credits were not available, Corps-constructed mitigation would be considered. Any expansion, and alternatives to that expansion, would be presented to the public through a supplemental NEPA document. This implementation risk has also been captured in the final overall cost include in engineering appendix. As stated in the engineering appendix, the final mitigation cost, was part of the full Cost and Schedule Risk Analysis (CSRA) to develop contingencies. Based on that analysis the final cost of the mitigation plan for bank credits was \$93,257,000, when including contingences.

If appropriate mitigation bank credits are not available or are too costly, then consistent with WRDA 2007, Section 2036(a), a monitoring and adaptive management plan for proposed Corps-constructed mitigation projects would be developed with success criteria targets identified. The original general guidelines for plantings, success criteria, and monitoring were included as Appendix L in PIER #37 and are here incorporated by reference. If Corps-constructed mitigation is needed in the future, refined project specific monitoring, reporting and success criteria for the mitigation features would be required. See Appendix E of SEA #572 as an example of what would be required. For Corps-constructed mitigation projects, the CEMVN would monitor the complete mitigation site, on a cost-shared basis with the NFS, to determine whether additional construction, invasive species control and/or plantings would be necessary to achieve mitigation success. The CEMVN would undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds.

5.0 COORDINATION AND CONSULTATION

5.1 **PUBLIC INVOLVEMENT**

Two 45 - day public comment and review periods occurred to solicit additional public input on the proposed UBB Draft FS/EIS and associated mitigation plan.

5.2 AGENCY COORDINATION

Preparation of the UBB FS/EIS has been coordinated with appropriate Congressional, federal, state, and local interests, as well as environmental groups and other interested parties. The following agencies, as well as other interested parties, received copies of the UBB Draft FS/EIS:

- U.S. Department of the Interior, Fish and Wildlife Service
- U.S. Environmental Protection Agency, Region VI
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NMFS
- Natural Resources Conservation Service
- Louisiana Advisory Council on Historic Preservation
- Governor's Executive Assistant for Coastal Activities
- Louisiana Department of Wildlife and Fisheries
- Louisiana Department of Natural Resources, Coastal Management Division
- Louisiana Department of Environmental Quality
- Louisiana State Historic Preservation Officer
- Coastal Protection and Restoration Authority Board

At the time of construction, if USACE determines mitigation bank credits are unavailable, then the Corpsconstructed mitigation project would be necessary and additional coordination would be required.

6.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Section 8 of the UBB FS/EIS summarizes the status of compliance with environmental laws and regulations for the proposed action.

7.0 CONCLUSION

7.1 RECOMMENDED DECISION

Recommend approval of the UBB FS/EIS Mitigation Plan, which fulfills the Marsh, Swamp, and BLH-Wet, mitigation requirement for UBB FS/EIS: purchase of mitigation bank credits.

7.2 PREPARED BY

The point of contact for this mitigation plan for the UBB FS/EIS is Travis Creel, USACE New Orleans District, CEMVN-PD-PFR.