2021

Lake Pontchartrain & Vicinity GRR
Appendix K – Mitigation Plan

US Army Corps of Engineers®
New Orleans District

U.S. Army Corps of Engineers, New Orleans District

Non-Federal Sponsor: Coastal Protection and Restoration Authority

July 2021

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LAKE PONTCHARTRAIN & VICINITY GRR
APPENDIX K – MITIGATION PLAN

1. INTRODUCTION

1.1 PROPOSED ACTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), prepared an Environmental Impact Statement (EIS) and General Re-Evaluation Report (GRR) to evaluate the impacts associated with the proposed construction of the Lake Pontchartrain and Vicinity (LPV) project. See Section 1.3 and 1.6 of the LPV GRR/EIS for study authority and study description, respectively.

The flood side shifts would impact approximately 20.3 acres of bottomland hardwood-wet habitat along the co-located LPV and Mississippi River Levees (MRL). It is anticipated that LPV levees or floodwalls would need to be placed on top of the Mississippi River and Tributaries (MR&T) levees (raising elevation 2-2.5 feet) between river miles 81 and 90 (Figure 1). River mile 90.5 has been identified as the design grade crossover point with an intermediate relative sea level rise scenario (1.8 feet).

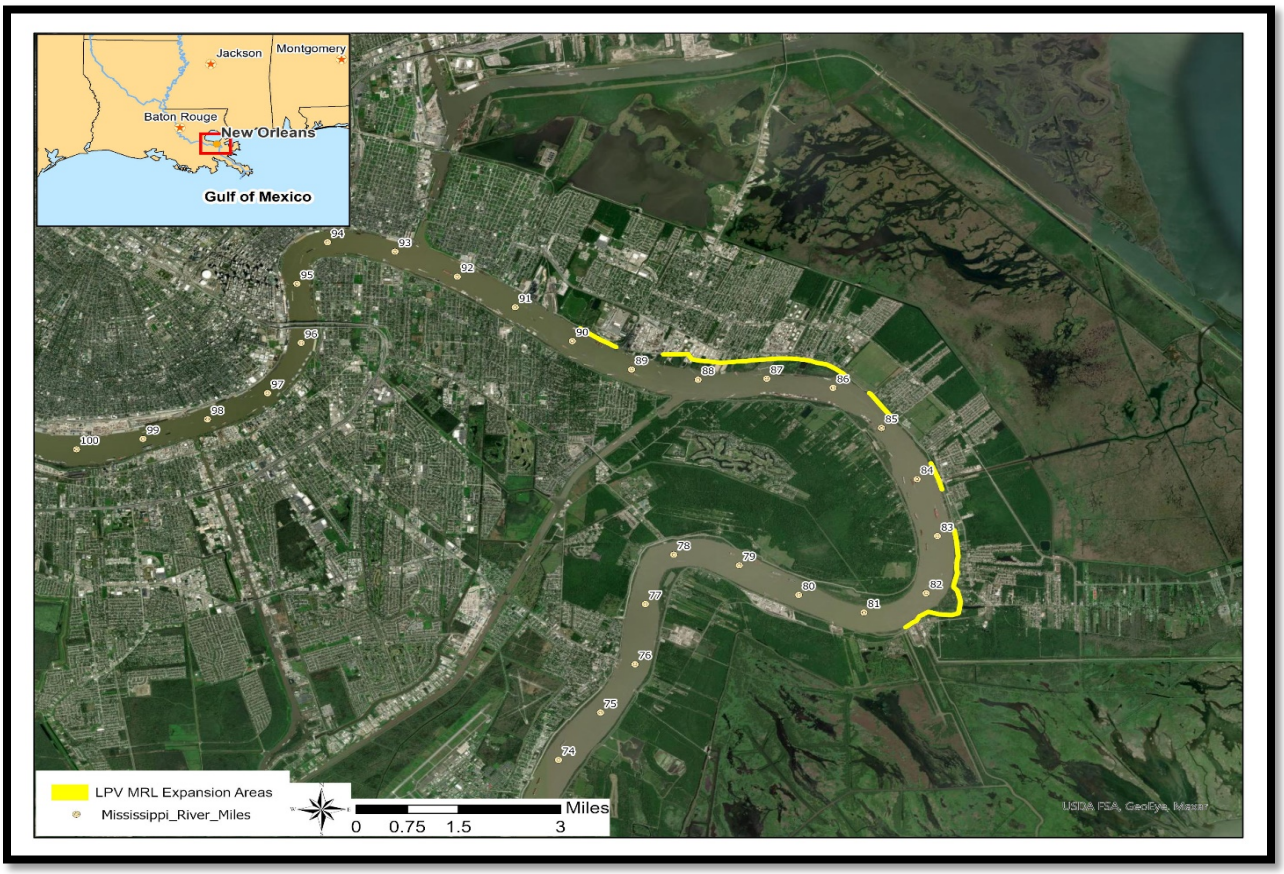

Figure 1. Location of potential impacts

1.2 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 on studies and construction:

https://www.mvn.usace.army.mil/Missions/Environmental/NEPA-Compliance-Documents/HSDRRS-Projects/ [accessed 2 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:

Programmatic Individual Environmental Report #36 Lake Pontchartrain and Vicinity (LPV) Hurricane and Storm Damage Risk Reduction System (HSDRRS) Mitigation, PIER #36[1], signed Decision Record 22 November 2013.

PIER #36 described and evaluated its proposed mitigation plan to compensate for unavoidable habitat losses caused by the construction of the LPV 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 and swamp mitigation bank credits with no particular mitigation bank identified, while the programmatic features were recommended for further evaluation and design.

Supplemental to PIER #36, Bayou Sauvage, Turtle Bayou & New Zydeco Ridge Restoration Project, Saint Tammany & Orleans Parishes, Louisiana, SIER 1[2], signed Decision Record 20 October 2015.

SIER 1 described and evaluated proposed changes to the recommended mitigation plan described in PIER #36.

Final Supplemental Environmental Assessment – West Bank and Vicinity Hurricane and Storm Damage Risk Reduction System Flood Side BLH-Wet and Swamp Mitigation, Lafourche Parish, Louisiana SEA #572[3] (Signed FONSI 24 July 2019).

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. Appendix H of SEA #572 is hereby incorporated by reference for mitigation planting guidelines.

[1] Available online at https://www.mvn.usace.army.mil/Missions/Environmental/NEPA-Compliance-Documents/HSDRRS-Projects/PIER-36-Bayou-Sauvage-Turtle-Bayou-and-New-Zydeco-Ridge-Restoration/; accessed on 3 June 2021
[2] Available online at https://www.mvn.usace.army.mil/Missions/Environmental/NEPA-Compliance-Documents/HSDRRS-Projects/PIER-36-Bayou-Sauvage-Turtle-Bayou-and-New-Zydeco-Ridge-Restoration/; accessed on 3 June 2021
[3] Available online at: https://www.mvn.usace.army.mil/Portals/56/Users/194/42/2242/Draft%20SEA%20572%20Document.pdf; accessed on 3 November 2020

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.

2. MITIGATION PROCEDURES

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

2.1 INVENTORY AND CATEGORIZE ECOLOGICAL RESOURCES

An ecological resources inventory within the study area is documented in Chapter 4 of the LPV GRR/EIS.

2.2 DETERMINE SIGNIFICANT NET LOSSES

This section describes the methods used to evaluate the quality of BLH-Wet habitat and to determine the quantity of like-quality, in-kind mitigation habitat required.

2.2.1 WVA MODEL ANALYSES

The WVA Bottomland Hardwood Community Model used for the LPV Mitigation was certified in accordance with EC 1105-2-412 and was re-approved for regional use on December 6, 2018.

The WVA methodology operates under the assumption that optimal conditions for general fish and wildlife habitat within a given coastal wetland type can be characterized and that existing or predicted conditions can be compared to that optimum level to provide an index of habitat quality. Habitat quality is estimated or expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat; 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values; and 3) a mathematical formula that combines the Suitability Index for each variable into a single value for wetland habitat quality. That single value is referred to as the Habitat Suitability Index, or HSI. The following WVA model was used for the LPV GRR/EIS mitigation effort:

- Wetland Value Assessment Bottomland Hardwoods Community Model for Civil Works (Version 1.2)

The WVA models assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. The standardized, multi-species, habitat-based methodology facilitates the assessment of project-induced impacts on fish and wildlife resources. The Bottomland Hardwood Community Model, which was used for BLH-Wet features, consists of 7 variables: 1) tree species composition; 2)

stand maturity; 3) understory/midstory; 4) hydrology; 5) size of contiguous forested area; 6) suitability and traversability of surrounding land uses; and 7) disturbance.

Values for variables used in the model are derived for existing conditions and are estimated for conditions projected into the future if no mitigation efforts are applied (i.e., future without project) and for conditions projected into the future if the proposed mitigation project is implemented (i.e., future with project), providing an index of habitat quality, or habitat suitability, for the period of analysis. The HSI is combined with the acres of habitat to generate a number that is referred to as "habitat units". Expected project impacts/benefits are estimated as the difference in habitat units between the future with project scenario and the future-without-project scenario. To allow comparison of WVA benefits to costs for overall project evaluation, total benefits are averaged over a 50-year period, with the result reported as Average Annualized Habitat Units (AAHUs). WVA assumptions used and full calculations for the LPV GRR/EIS Mitigation Plan are provided in Enclosure 1 below. Table 1 summarizes the calculation of mitigation requirements for LPV GRR/EIS. Detailed HSI calculations are available upon request.

Table 1. Summary of Impacted BLH-Wet Habitat and Mitigation Requirement

Location	Existing Conditions of BLH-Wet Impacted		Mitigation Requirement
	Acres	AAHUs Impacted	AAHUs
River Mile 81-90	20.27	12.12	12.12

The Planning Guidance Notebook (ER 1105-2-100) requires that "Mitigation plans shall ensure that adverse impacts to bottomland hardwood forests are mitigated in-kind, to the extent possible."

2.3 DEFINE MITIGATION PLANNING OBJECTIVES

The mitigation project area consists of the LPV study area in St. Charles, Jefferson, Orleans and St. Bernard Parishes and the Mississippi River Levee on the east bank in St. Bernard Parish and associated right-of-way. The goal is to mitigate for impacts to approximately 20.3 acres of bottomland hardwood forest Section 404 jurisdictional wetlands (BLH-Wet). The required mitigation would offset the unavoidable loss of this habitat type, which is already limited in the vicinity of the study area.

The objective of the proposed mitigation is to compensate for habitat losses, as measured by AAHUs, that are expected to occur during the construction of the proposed actions for flood side (FS) BLH-Wet. This is the only habitat type expected to be impacted by the FS shift of the MRL levees. All other features of the recommended plan for LPV are not expected to require compensatory mitigation since those actions are proposed within the existing, previously-disturbed ROWs. The proposed compensatory mitigation would replace the lost functions and services of the impacted FS BLH-Wet habitat.

2.4 DETERMINE UNIT OF MEASUREMENT

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

2.5 IDENTIFY AND ASSESSS THE POTENTIAL MITIGATION STRATEGIES

2.5.1 MITIGATION PLAN FORMULATION STRATEGIES

LPV HSDRRS Mitigation plan formulation efforts (e.g., PIER #36, SIER 1) are herein incorporated by reference into this mitigation plan. Lessons learned from these efforts were considered for this mitigation planning effort. The project delivery teams collaborated with the sponsor and resource agencies to develop the strategies for delivering the mitigation requirements. The strategies entailed in-basin and in-kind habitat restoration work to be performed at mitigation banks or in appropriate sites for work by the government.

Details of the previous screening process are not repeated here. Further details of specific alternatives are provided below.

2.5.2 MITIGATION PROJECT CONSIDERATIONS

The following factors were considered during the mitigation project development:

1) In accordance with the Planning Guidance Notebook, 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 LPV GRR/EIS Mitigation Basin boundaries coincide with the Lake Pontchartrain watershed boundaries except for the southern boundary. The southern boundary for planning purposes was limited to the intermediate/brackish marsh interface at 6 parts per thousand (ppt) because the LPV GRR/EIS work only impacts freshwater BLH-Wet habitat and the functions and services of freshwater wetland could not be replaced in areas with salinities greater than those found in intermediate wetland systems.
2) 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.

2.5.3 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 LPV GRR/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 LPV GRR/EIS construction impacts. Compensatory mitigation for unavoidable habitat losses due to the construction of the proposed LPV GRR/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 GRR/EIS. For the purpose of 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. 12.12 Average Annual Habitat Units (AAHUs) of flood side BLH-Wet impacts would be mitigated through the purchase of mitigation bank BLH credits approved by OCM and USACE 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 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 Coastal Wetlands Planning, Protection, and Restoration Act 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 LPV GRR/EIS. No new cumulative impacts to any resource would be incurred from the purchase of credits from a previously approved mitigation bank for the LPV GRR/EIS mitigation under the proposed mitigation plan. The purchase of mitigation bank credits would occur at existing 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 LPV mitigation, LPV use of mitigation credits may reduce the number of credits available to permittees to compensate for BLH impacts authorized by Department of Army Section 10/404 permits. Following the LPV 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).

If purchase of mitigation bank credits were approved as the GRR/EIS Mitigation Plan and if an acceptable, cost-effective bid to sell credits is received, then all BLH-Wet impacts would be

mitigated through the purchase of BLH-Wet credits equaling 12.12 AAHUs. 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 provided by the mitigation bank match the assessment of the lost functions and services as the impacted site.

Alternative 2: Corps-Constructed. Construction of a new or expansion of an existing Corps-constructed mitigation project within LPV watershed.

Alternative 3: Combination. Combination of Corps-constructed mitigation project and mitigation bank credits.

2.6 DEFINE AND ESTIMATE COSTS OF MITIGATION PLAN INCREMENTS

An average cost estimate for BLH-Wet mitigation is based on previous estimates for BLH-Wet mitigation in the area. The cost of mitigation was estimated per AAHU and applied in the project cost estimates in the main report.

2.7 DISPLAY INCREMENTAL COSTS

Cost effectiveness and incremental cost analysis (CE/ICA) can provide decision-makers with relative output-cost 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. An average cost of $256,625 per AAHU based on multiple recent BLH-Wet mitigation projects was used for Corps-constructed mitigation. For the purchase of BLH-Wet mitigation bank credits, an average cost of $99,663 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 alternatives had the same output of 12.12 AAHUs.

Table 3 displays the incremental costs for each mitigation plan. The No Action and mitigation bank alternative were Best Buys, while the other alternatives were non-cost effective.

Table 3. Incremental Cost Comparison for Considered Mitigation Alternatives

Alternative	Cost*	Output (AAHUs)	Cost Effective
No Action	$0	0	Best Buy
Mitigation Bank	$1,207,916	12.12	Best Buy
Constructed	$3,110,295	12.12	Non-Cost Effective
Bank + Constructed	$2,159,105	12.12	Non-Cost effective

* Estimates based on range of recent projects in the area.

Due to the relatively few AAHUs of 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. From this analysis, purchase of mitigation bank credits was selected as the recommended mitigation plan.

2.8 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 LPV GRR/EIS. Chapter 4 of the LPV GRR/EIS provides the details of the existing conditions within the study area and are not repeated here. Chapter 7 of the LPV GRR/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 12.12 AAHUs of 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. Future NEPA documents would further evaluate the impacts of Alternative 2 (Alternative Projects to Mitigation Bank).

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 Lake Pontchartrain watershed to offset impacts to 12.12 AAHUs of bottomland hardwood forests located on the floodside of the Mississippi River Levee in St. Bernard Parish within the Louisiana Coastal Zone. 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.

f. Real Estate Required – None.

3. 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 LPV GRR/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 LPV 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;
4) 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 Service 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 Corps-constructed 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 LPV GRR/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 LPV GRR/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 LPV GRR/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 LPV GRR/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 Corps-constructed 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 be assessed and coordinated in subsequent NEPA documents.

4. MITIGATION SUCCESS CRITERIA, MONITORING, REPORTING & ADPATIVE MANAGEMENT

4.1 BANK CREDITS (RECOMMENDED MITIGATION PLAN)

If credits are purchased from a mitigation bank, the mitigation bank must comply 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. The required reporting of mitigation bank performance to resource agencies and USACE Regulatory will satisfy monitoring requirements.

4.2 CORPS-CONSTRUCTED (CONTINGENCY)

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 J in PIER #36 and are hereby 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. COORDINATION AND CONSULTATION

5.1 PUBLIC INVOLVEMENT

A 55-day public comment and review period occurred to solicit additional public input on the proposed LPV Draft GRR/EIS and associated mitigation plan.

5.2 AGENCY COORDINATION

Preparation of the LPV GRR/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 LPV Draft GRR/EIS:

- U.S. Department of the Interior, Fish and Wildlife Service
- U.S. Department of the Interior, National Park Service
- U.S. Environmental Protection Agency, Region VI
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service
- 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 Natural Resources, Coastal Restoration Division
- Louisiana Department of Environmental Quality
- Louisiana State Historic Preservation Officer
- Coastal Protection and Restoration Authority Board

6. COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Section 7.22 of the LPV GRR/EIS summarizes the status of compliance with environmental laws and regulations for the proposed action.

7. FUTURE MITIGATION NEEDS

Once final designs for all LPV GRR/EIS contracts are complete, the mitigation team, along with resource agencies, would revisit the impacts to all habitat types from the LPV GRR/EIS construction. Completion of this effort would result in a final computation of impacts and may necessitate an increase or decrease in the amount of LPV GRR/EIS mitigation to fully mitigate all impacts. A change in the amount of mitigation bank credits purchased would be the first option considered.

8. CONCLUSION

8.1 RECOMMENDED DECISION

Recommend approval of the LPV GRR/EIS Mitigation Plan, which fulfills the general BLH-Wet mitigation requirement for LPV GRR/EIS: purchase of mitigation bank credits.

8.2 PREPARED BY

The point of contact for this mitigation plan for the LPV GRR/EIS is Mr. Kip Runyon, USACE St. Paul District, CEMVP-PD-P.

9. ENCLOSURE 1: WETLAND VALUE ASSESSMENT MODEL ASSUMPTIONS AND CALCULATIONS

9.1 PROJECT SPECIFIC ASSUMPTIONS

- Aerial imagery used to delineate impacted area along the LPV-MRL
- 25 feet from existing right-of-way was used to calculate the area impacted by flood side levee shifts required.
- Acreage estimated via GIS
- WVA conducted with previously collected data (2010) and with newly collected data (2020)
- Approximately 20.3 acres impacted by proposed action

9.2 WETLAND VALUE ASSESSMENT FOR LPV

- Analysis was based on data collected in 2010 and on data collected in 2020. The existing BLH-Wet on the flood side of the existing levees is primarily black willow and of generally poor quality.
- Future Without Project: For the FWOP it was assumed that the area would remain in some form of BLH-Wet for the period-of-analysis (50 years, end year 2073), with gradual increases in tree maturity.
- Future With Project: For the FWP it was assumed all BLH-Wet habitat that is present today would be converted to a turfed levee by year 1 and was determined to not provide any bottomland hardwood habitat values.

Figure 2. Locations of impact sites

Table 2. AAHUs by site

Site	Acres	AAHUs
LPVMRL 1.1	1.88	-0.95
LPVMRL 1.2	8.44	-4.68
LPVMRL 1.3	1.51	-0.77
LPVMRL 1.4	1.44	-0.81
LPVMRL 1.5	7.00	-4.91
Total	20.27	-12.12

9.3 WVA MODEL GENERAL ASSUMPTIONS AND RELATED GUIDANCE

PREFACE

Several of the assumptions set forth in this document are based on mitigation implementation schedules. Many sections include specified WVA model target years (TYs) and calendar years applicable to assumptions, and a few sections outline anticipated mitigation construction (*i.e.,* mitigation implementation) schedules. It is critical for the WVA analyst to understand that this document has not been revised to account for changes to the mitigation implementation/construction schedule for a particular mitigation project from CEMVN prior to running WVA models. The analyst may then need to modify some of the WVA model assumptions and guidelines presented herein to account for differences between the present mitigation implementation/construction schedule and the schedules(s) that were assumed in generating this document.

This document should be applied when conducting WVA analyses for the GRR/EIS and the Recommended Plan selected for meeting the LPV mitigation needs.

BOTTOMLAND HARDWOOD MODEL – GENERAL ASSUMPTIONS

V1 – Tree Species Associations/Composition (in canopy stratum – percentage of trees that are hardmast or other edible-seed producing trees and their percentage that are soft mast, non-mast/inedible seed producing trees)

Of the total trees initially planted, 60% will be hard-mast producing species and 40% will be soft-mast producing species. Assume this species composition ratio (*i.e.*, 60% of trees are hard mast-producing and 40% are soft mast-producing) will remain static over the entire period of analysis (*i.e.*, remains the same from time of planting throughout all subsequent model target years).

General Notes: Do not classify Chinese Tallow as a “mast or other edible-seed producing tree”. Consider it a non-mast producing tree. Although it is an invasive species, one must still include this species regarding its contribution to percent cover in the canopy, midstory, and ground cover strata when it is present on a site (applicable to FWP scenario and applicable to FWOP scenario)

V2 – Stand Maturity (average age or density breast height (dbh) of dominant and co-dominant canopy trees)

Guidance as to how factors like subsidence and sea level rise might affect this variable (especially if the mitigation sites becomes flooded for long durations, since the growth of the trees may be adversely affected and certain tree species could die): If the mitigation feature (polygon) is designed such that flooding at the end of the period of analysis will not impact tree survival, (*i.e.*, flooding is <12% of the growing season (33 days) and is no more than 20% to 30% of the non-growing season, then trees should not be adversely affected. However, if the site design does not achieve this goal, then adjust the tree growth spreadsheet such that typical growth is reduced by at least 10% once flooding exceeds 20-30% of the non-growing season or as 12% or more of the growing season.

General Notes: Include the dbh of Chinese tallow when working with this variable. The same guidance would apply to other invasive species in the canopy stratum. For planted trees, you

can use the age of the trees in lieu of their dbh when running the model. Assume trees planted will be approximately 1 year old when they are first installed.

V3 – Understory/Midstory (percent cover)

Assumptions applicable to restoration features that do not require the deposition of fill to achieve target grades:

TY	Year (tentative)	Assumption
0	2022	Understory = 0%//Midstory = 0%
1	2023	Understory = 100%//Midstory = 0%
10	2033	Understory = 50%//Midstory = 50%
25	2048	Understory = 25% //Midstory = 60%
50	2073	Understory = 35% // Midstory = 30%

Values for cover in the understory and midstory strata must be based on site-specific conditions existing prior to the start of construction. The specified values are based on the assumptions that normal flooding conditions are present (*i.e.,* desirable depth and duration of inundation). These values will need to be adjusted if sea-level rise is anticipated to increase flooding of the particular mitigation polygon to a degree whereby growth and/or survival of plant species in the understory and/or midstory strata are adversely impacted.

General Notes: Cover accounted for by Chinese tallow and other invasive and nuisance plant species must be included in the percent cover data. Changes in hydrology could result from factors such as sea level rise and subsidence. An increase in the duration of flooding will typically decrease the understory cover and, to a lesser degree, decrease the midstory cover.

V4 – Hydrology (flooding duration and water flow/exchange)

Assumptions applicable for restoration features that do not require deposition or fill to achieve target grades and to the BLH-Wet enhancement features where hydrologic enhancements is a component of the mitigation design:

TY	Year (tentative)	Assumption
0	2023	Baseline conditions (score based on existing hydrology)
1	2024	Duration = temporary
10	2033	Duration = temporary
25	2048	Duration = temporary
50	2073	Duration = temporary

Scoring of water flow/exchange component of hydrology must be based on site-specific conditions anticipated. The specified value for flooding duration is based on the assumption that normal flooding conditions are present (*i.e.*, desirable depth and duration of inundation). This value will need to be adjusted if sea-level rise is anticipated to significantly increase the duration of flooding in the particular mitigation polygon. In many case, it is probably that the duration may shift from temporary to season. For BLH-Wet enhancement features that do not include

measures to enhance existing hydrology as part of the mitigation design, the scoring of variable V4 must be based on site-specific conditions hence no general assumptions are applicable.

V5 – Size of Contiguous Forested Area

Do not consider the mitigation polygon to classify as “forested” until the planted trees are 20 years old. Remember that trees will be 1 year old when they are first installed, hence the mitigation polygon would classify as forested 19 years following the year of initial planting. Prior to this target year, the trees initially planted in the mitigation polygon will be considered as either understory or midstory cover. For the target year when the planted trees reach 20 years old and for all model target years thereafter, the planted trees will be considered large enough for the mitigation polygon to be considered a forest. Hence at the target year planted trees reach 20 years old and all target years thereafter, the mitigation polygon can be included in the calculation of forested acreages (along with contiguous forested areas outside the mitigation polygon).

For areas outside the mitigation polygons, assume the conditions present at TY0 will remain unchanged throughout the period of analysis of the mitigation project. As used here, the term “mitigation polygon” refers to all proposed mitigation polygons regardless of the target habitat proposed. Under the FWOP scenario, existing conditions would prevail in the mitigation polygon and areas outside the limits of these polygons throughout the period of analysis.

General Notes: When scoring this variable for the FWP scenario, the area within the mitigation polygon itself as well as the adjacent “non-mitigation” areas are combined to generate the total forested acreage. However, remember the assumption that planted trees in restoration features will not be considered large enough for the feature to classify as forest until the planted trees are 20 years old. When evaluating the size of contiguous forested areas, non-forested corridors <75 feet wide will not constitute a break in the forest area contiguity.

V6 – Suitability and Tranversability of Surrounding Land Uses (within 0.5 miles of site perimeter)

When scoring a given BLH-Wet mitigation polygon, include the nearby or adjacent mitigation polygons in your assessment of land use types by assuming their land use type is the habitat type proposed (*i.e.*, the target habitat type). However, one must consider the TY that the nearby/adjacent mitigation polygon will actually shift from its existing habitat type to the target habitat type.

When evaluating this variable, typically assume the land uses in lands outside the mitigation polygons will score the same under the FWP and FWOP scenario. In other words, typically assume that the existing conditions present in TY0 will remain unchanged over the period of analysis of the mitigation project. One would typically not consider potential future land development rates when scoring this variable due to the uncertainty of long-term development trends. Exceptions to this general approach would include: (1) situations where there is a high level of confidence that a particular area is slated for significant change in land use; or (2) situations where it is anticipated that the “land use” (habitat type) will significantly change over time due to the effects of sea level rise and land loss.

V7 – Disturbance (sources of disturbance vs. distance from site perimeter to disturbance source)

For consistency purposes, assume baseline conditions affecting the scoring of this variable will not change over time. In other words, typically assume that the existing conditions present in TY0 will remain unchanged over the period of analysis of the mitigation project.

General Notes: When scoring this variable, all distances are measured from the perimeter of the BLH-Wet mitigation polygon itself.

NOTES REGARDING CONSTRUCTION & PLANTING OF BLH-WET MITIGATION AREAS

The following is a typical estimated project construction timeline:

All projects: begin construction in Year X

For BLH-Wet restoration areas that do not require deposition of fill as part of the construction process:

- June Year X – Begin construction
- Nov. Year X – End construction (but could be as late as March or April of Year X+1 if much earthwork is required)
- Dec. Year X+1 – Install plants (earliest scenario for site requiring minimal earthwork)
- Sept. Year X+2 – Install plants (earliest scenario for site requiring substantial earthwork).

For BLH enhancement area:

- June Year X – Begin construction (includes start of invasive plant eradication)
- Oct. Year X – End construction
- Dec. Year X – Install Plants

All of these above timelines are preliminary and are subject to refinement as plans as refined for a particular mitigation site. Planting of canopy and midstory species in March should be avoided if possible since conditions could be adversely dry, thereby decreasing survival of plantings. Chemical eradication of invasive/nuisance hardwood species such as Chinese tallow should be done during the growing season. Greatest effectiveness may be realized if chemical treatment is applied from August through October when most energy is being used for root development.

Planting of BLH-Wet Restoration Areas:

Initial plantings should be:

- Canopy species: plant on 9-ft centers (538 trees/acre) , of total trees planted, 60% will be hard mast-producing species and 40% will be soft mast-producing species.
- Midstory species (shrubs and small trees): plant on 20-ft centers (109 seedlings/acre)
- Stock size (canopy and midstory species): 1 year old, 1.5 ft tall (minimum)

Planting of BLH-Wet Enhancement Areas:

Initial plantings should follow the same guidelines as for BLH-Wet restoration areas regarding the general density of installed plants and the stock used. Where initial enhancement activities include the eradication of invasive/nuisance plants, a significant number of native canopy and/or midstory species may remain, but in spatial distribution that leaves relatively large “gaps” in the canopy stratum and/or the midstory stratum. In such cases, areas measuring approximately 25 feet by 25 feet that are devoid of native canopy species should be planted and areas measuring approximately 45 feet by 45 feet that are devoid of native midstory species should be planted.

The typical guideline of having 60% of the canopy species planted be hard mast-producing and 40% of the canopy be soft mast-producing species may be altered in situations where several native trees remain after eradicating invasive/nuisance species. The objective would be to have the ultimate canopy composition (planted trees after reaching canopy strata plus existing trees) be close to 60%:40% ratio of hard mast to soft mast species.

BOTTOMLAND HARDWOOD-WET WVA MODEL – TARGET YEARS FOR MODELS FOR PROPOSED CORPS CONSTRUCTED MITIGATION PROJECTS (IF NEEDED)

Use the target years specified below when analyzing BLH-Wet restoration polygons:

TY	Year (tentative)	
0	2023	Baseline conditions, assumes construction starts
1	2024	Initial construction activities begin and are completed. Initial eradication of invasive and nuisance plants is started and completed
2	2025	Restoration feature settles to desired target grade Any associated perimeter containment dikes are degraded or gapped. Plants installed. Temporary flooding duration (target flooding duration/target hydroperiod) acheived
11	2034	Class 5 is achieved for V1.
20	2043	For V3, Understory = 25%//Midstory = 60%. Planted areas Class as Forested for V5
50	2073	End of period of analysis for a GRR-LPV mitigation feature

The user of these general guidelines is cautioned that the construction schedule for proposed mitigation features may not follow the construction schedule assumed in the preceding sections. If this is the case, the model target years and their associated model assumptions may have to be adjusted accordingly.