APPENDIX D

AE PLAN SELECTION CRITERIA

In brief, plan selection criteria reflect project goals. For instance, if the mission is to buy a car, goals may be to have a low start-up and operating cost. This scenario would have the criteria of retail cost and gas mileage. Note that constraints are not considered criteria (i.e. the retail cost of the car must be under $20K) because alternatives cannot be compared based on this information. Selection criteria vary widely depending on the problem, and can even vary within the umbrella of Civil Works. But for the purposes of BBA Construction Project Mitigation, the Project Delivery Team has identified the following plan selection criteria:

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

Risk & Reliability: One of the Chief's 4 priorities is to "employ risk-based concepts in planning, design, construction, operations, and major maintenance." Analysis of alternatives with regard to their risk and reliability is a paradigm shift from deterministic methodologies (e.g. National Economic Development, Benefit/Cost ratios, etc.) to more statistical, probabilistic terms. Though the policy and even the science is still in its nascent stages, enough is usually known to begin making risk-informed decisions, at least qualitatively

AEs conducted to determine the type of hurricane and storm damage risk reduction features that would be built in a given polder defined risk and reliability primarily in terms of flood risk. The environmental mitigation AE process has adapted this definition to better capture the risk-based decisions to be made for mitigation projects, such as project sustainability.

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

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

Since these two factors are similar, it is best to consider them as one criterion: Risk & Reliability. Moreover, PDTs are only expected to perform Risk & Reliability analysis qualitatively. It is unlikely that PDTs will have fragility curves or event trees when analyzing alternatives. Instead, PDTs should analyze alternatives comparatively. For example, "Alternative 1 is *much more* reliable than Alternative 2, but only *slightly more* reliable than Alternative 3."

The below risk and reliability subcriteria (see Table C-1) were applied to each mitigation alternative, and qualitative and quantitive data for each alternative under each of the subcriteria are provided in Appendix B, table 2.

Table C-1: Risk and Reliability

Issue	**Explanation**
Uncertainty Relative to Achieving Ecological Success/Potential Need for Adaptive Management (Contingency) Actions	Sources of *uncertainty relative to achieving ecological success* include: (1) incomplete understanding of the system (environmental or engineering) to be managed or restored (e.g. hydroperiod, water depth, water supply, substrate, nutrient levels, toxic compounds) (2) imprecise estimates of the outcomes of alternative management actions (e.g. proven methodology, project complexity). *Evaluation of Potential Need for Adaptive Management (Contingency) Actions:* (1) Is there sufficient flexibility within project design and operation to permit adjustments to management actions? (2) Is the system (or components) to be restored or managed well understood (e.g. hydrology and ecology) and are management outcomes accurately predictable? (3) Do participants generally agree on the most effective design and operation to achieve project goals and objectives? (4) Are the goals and objectives for restoration understood and agreed upon by all parties?
Uncertainty Relative to Implementability	Includes implementability issues that are not captured under other selection criteria. Implementability means that the alternative is feasible from technical, environmental, economic, financial, political, legal, institutional, and social perspectives. If it is not feasible due to any of these factors, then it cannot be implemented, and therefore is not acceptable. An infeasible plan should not be carried forward for further consideration. However, just because a plan is not the preferred plan of a non-Federal sponsor does not make it infeasible or unacceptable *ipso facto*.

Issue	Explanation
Long-Term Sustainability of Project Benefits	For marsh: Measured by % emergent marsh remaining in TY50, as calculated for Variable 1 in the Marsh WVA model. For Forested Habitat: Measured by the Habitat Suitability Index Value at TY50, which incorporates the suitability index of all WVA variables in the WVA model.
Self-Sustainability of Project Once Ecological Success Criteria Linked to NCC are Achieved	(1) Does the project utilize active engineering features (e.g., pumps)? (2) Anticipated OMRR&R Activities (3) Relative difficulty of OMRR&R
Risk of Exposure to Stressors/ Reliability & Resiliency of Design	(1) To what stressors will a given alternative be exposed (e.g. sea level rise, subsidence, saltwater intrusion during storm or drought, long-term salinity shift, herbivory, invasive species, inundation from storm surge, damage from storm-induced wave action, runoff from adjacent property which could alter chemical or nutrient balance of soils, altered hydrologic regime which could change habitat type or stress vegetation, non-storm wave energy)? (2) How is the project, as designed, likely to perform relative to stressors and/or how well is the project expected to return to functionality after exposure to stressors?

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

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

- Estimated time to construction contract award.
- Estimated time to NCC milestone.

Cost Considerations: The PDT considered the estimated costs of construction, real estate, and operations and maintenance for each project per acre.
Watershed & Ecological Site Considerations: The PDT has added this selection criterion to address unique factors that apply to environmental mitigation projects that were not addressed in the previously listed selection criteria. Guidance from 40 CFR Part 230 discusses consideration of a mitigation site's role in the larger landscape and other ecological conditions. The first two bullets below aim to capture this guidance. These subcriteria are considered for each alternative, and the outcome of this consideration is shown in the Watershed & Ecological Site Considerations data matrix in Appendix B, table 3.

Watershed Considerations/Significance within the Watershed:

- Consistency with watershed plans (LaCPR and State Master Plan 2017). 40 CFR Part 230 Compensatory Mitigation for Losses of Aquatic Resources includes guidance regarding the siting of mitigation projects. This guidance directs that mitigation should consider existing watershed plans within the project area. Therefore, the selection criteria considers how a given alternative relates to existing watershed plans within the project area. The two watershed plans considered are LaCPR and the 2017 State Master Plan. In 2009, the Corps of Engineers, in partnership with the State of Louisiana, developed The Louisiana Coastal Protection and Restoration (LaCPR) Final Technical Report, which identified a range of coastal restoration and flood control measures for South Louisiana. In 2017, the state officially adopted Louisiana's Comprehensive Master Plan for a Sustainable Coast, which complements the LaCPR report.Contiguous with or within resource managed area (i.e. Federal, state, private mitigation bank or other restoration projects considered under Future Without Project condition)
- Located in parish of impact by habitat-type
- Habitat Linkages (e.g. wildlife corridors)

Ecological Site Considerations not captured in WVA:

- Proximity to Coastal Zone
- Fragmentation within site boundary
- Site habitat connectivity to larger surrounding project area considering future land use trends