US Army Corps of Engineers

Draft Integrated Design and Implementation Report and Environmental Assessment #559

Louisiana Coastal Area
Beneficial Use of Dredged Material Program
Calcasieu Sabine Project
Cameron Parish, Louisiana

April 2018
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1.0 Introduction

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN) has prepared this draft Integrated Design and Implementation Report and Environmental Assessment (DIR/EA) to evaluate the proposed action for the LCA BUDMAT Project at Calcasieu Sabine (Calcasieu Sabine Project). The preparation of an integrated document is consistent with 40 CFR 1506.7, which provides that any environmental document in compliance with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.) may be combined with any other agency document.

The Calcasieu Sabine Project would be implemented as part of the LCA BUDMAT Program (Program). The proposed action would be to use dredged material removed during routine maintenance dredging of the lower portion of the Calcasieu Ship Channel (CSC) (Figure 1) for the creation and restoration of marsh habitat at specific sites within the Sabine National Wildlife Refuge (SNWR) in Cameron Parish, Louisiana (Figure 2). The CSC, a 68-mile long deep draft Federal navigation channel, is located in southwest coastal Louisiana (Figure 1). The northern boundary of the CSC is located at

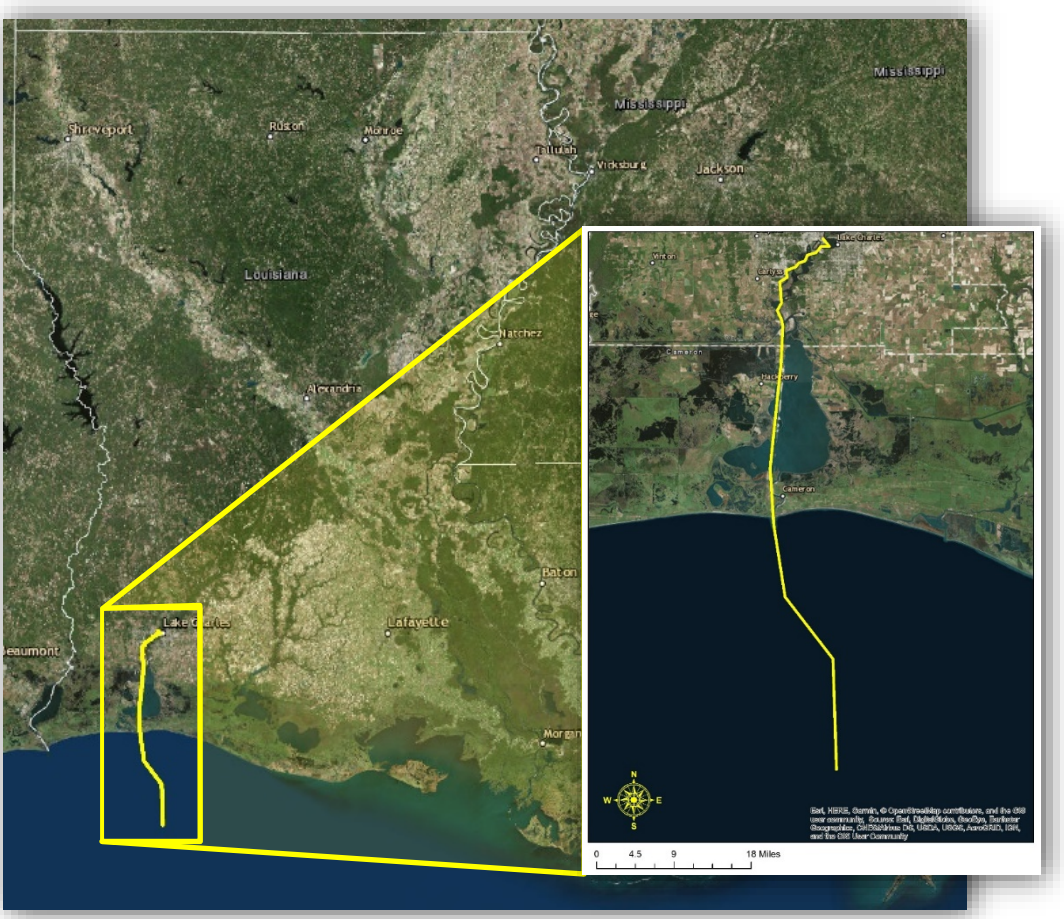

Figure 1. Calcasieu Ship Channel

Mile 36.0, just south of Interstate 10 in Lake Charles, Louisiana. The southern boundary extends to CSC Mile (-32.0) in the Gulf of Mexico.

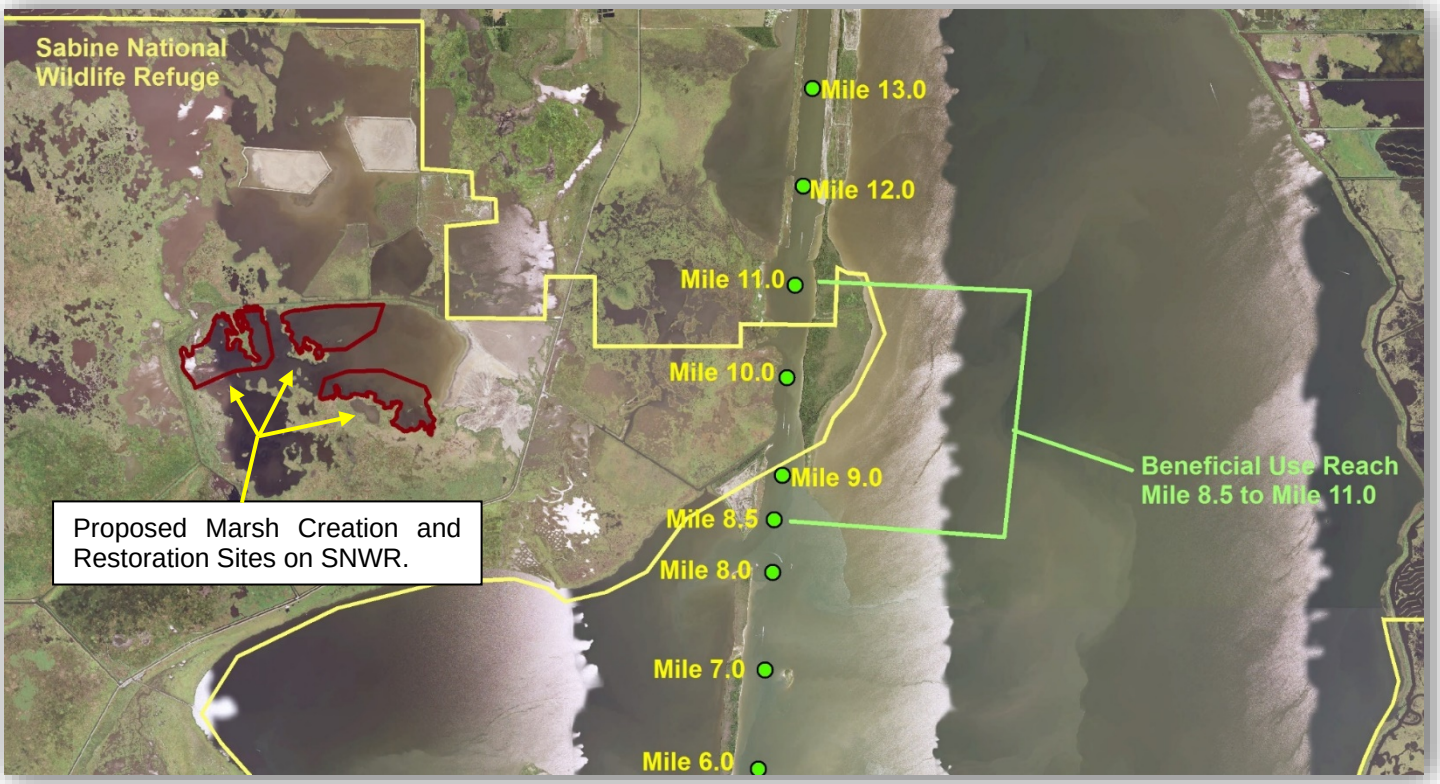

Figure 2. Proposed LCA BUDMAT Marsh Creation and Restoration Sites within the Sabine National Wildlife Refuge (SNWR).

Alternative plans for individual Program projects are developed with the level of detail necessary to select a justified, acceptable, and implementable plan that is consistent with applicable law and policy and meets the goals and objectives of the Calcasieu Sabine Project. The description of the evaluation of the alternative plans in this draft integrated DIR/EA demonstrates the 1983 *Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G) four evaluation criteria (acceptability, completeness, effectiveness, and efficiency) specified in Paragraph 1.6.2(c) of the P&G.

Benefit and cost, risk and uncertainty, cost effectiveness, and incremental cost analyses are undertaken using procedures that are most appropriate for the scope and complexity of this project. Opportunities to avoid or minimize adverse environmental impacts, and to mitigate for those impacts that cannot reasonably be avoided, are considered in formulation of the proposed action. The Project Delivery Team (PDT) relied on existing data from other USACE projects that are located within the study area to help expedite the completion of this draft Integrated DIR/EA. Appropriate National Ecosystem Restoration (NER) benefits were used and appropriate environmental considerations were taken into account by the PDT in formulating a proposed action (See Section 3.0).

The objective of ecosystem restoration is to restore degraded ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. However, partial restoration may also be possible, with significant and valuable improvements made

to degraded ecological resources. The needs for improving or re-establishing both the structural components and the functions of the natural area should be examined. Under the Program this objective is met by restoring (or partially restoring) degraded distributary ridges, marsh habitat, or both if possible, of coastal Louisiana through beneficial use of material dredged from Federal navigation channels to restore or preserve critical geomorphic features and stall future land loss. This would be measured through the establishment of a variety of native plants and animals in the study area (see Section 2.0).

After this draft Integrated DIR/EA is reviewed and comments are incorporated as appropriate, a Recommended Plan (RP) will be identified. Once the final Integrated DIR/EA, which defines the RP, is approved, USACE would proceed with the execution of Project Partnership Agreements (PPAs), as specified herein, with the non-Federal Sponsor (NFS) and the implementation of the RP.

1.1 Project Authority

Restoration strategies presented in the 1998 Report entitled "Coast 2050:Toward a Sustainable Coastal Louisiana," which evolved into the LCA 905(b) Reconnaissance Report, formed the basis for the broader-scale 2004 Louisiana Coastal Area Ecosystem Restoration Study Report and Programmatic Environmental Impact Statement (2004 LCA Study). The 2004 LCA Study was developed to identify cost-effective, near-term (ten year implementation period) restoration features to reverse the degradation trend of the coastal ecosystem of Louisiana. The Near-Term Plan that resulted from the 2004 LCA Study focused on restoration strategies that would reintroduce historical flows of river water, nutrients, and sediments; restore hydrology to minimize saltwater intrusion and maintain structural integrity of coastal ecosystems. The 2004 LCA Study identified critical projects, multiple programmatic authorizations, and ten additional required feasibility studies. The Report of the Chief of Engineers dated January 31, 2005 (2005 Chief's Report) recommended the Near-Term Plan substantially in accordance with the 2004 LCA Study and a Record of Decision signed November 18, 2005. The 2004 LCA Study and its accompanying Programmatic Environmental Impact Statement are available at the main LCA website, http://www.lca.gov.

Title VII of the Water Resources Development Act of 2007 (WRDA 2007), Public Law No. 110-114, authorized an ecosystem restoration program for the LCA substantially in accordance with the Near-Term Plan identified in the 2005 Chief's Report, and Section 7006(d) specifically authorizes the LCA BUDMAT Program for the beneficial use of material dredged from federally maintained waterways in the coastal Louisiana ecosystem a total cost of $100,000,000. The Final Programmatic Study Report and Environmental Impact Statement dated January 2010 (2010 Report) was approved by the Assistant Secretary of the Army for Civil Works (ASA (CW)) on August 13, 2010.

Page 4 of the 2005 Chief's Report describes the Program as follows:

"6. Beneficial Use of Dredged Material Program. The reporting officers recommend a program to place dredged material to build and nourish vital coastal wetlands. At November 2004 price levels, the estimated cost of the Beneficial Use of Dredged Material program is $100,000,000."

Title VII, Section 7006(d) of WRDA 2007 provides as follows:

SEC. 7006. CONSTRUCTION.

(d) BENEFICIAL USE OF DREDGED MATERIAL.—

(1) IN GENERAL.—The Secretary, substantially in accordance with the restoration plan, shall implement in the coastal Louisiana ecosystem a program for the beneficial use of material dredged from federally maintained waterways at a total cost of $100,000,000.

The LCA restoration plan referenced in Title VII, Section 7006(d)(1) above was also authorized by WRDA 2007 in Title VII, Section 7003 which contains the following language:

SEC. 7003. LOUISIANA COASTAL AREA.

(a) IN GENERAL.—The Secretary may carry out a program for ecosystem restoration, Louisiana Coastal Area, Louisiana, substantially in accordance with the report of the Chief of Engineers, dated January 31, 2005.

CECW-P Memorandum dated December 19, 2008, SUBJECT: Implementation Guidance for Section 7006(d) of the Water Resources Development Act of 2007 –Louisiana Coastal Area – Construction, recognized the recommendation of the 2005 Chief's Report that the LCA BUDMAT Program be cost shared in accordance with Section 204 of the WRDA 1992. Section 204 of WRDA 1992, Public Law No. 102-580, was later modified by Section 2037 of WRDA 2007, requiring all construction work under the LCA Program be cost shared at 65% Federal and 35% non-Federal. In 2014, the cost share requirements of Section 2037 of WRDA 2007, were amended by Section 1030(d) of the Water Resources Reform and Development Act of 2014 (WRRDA 2014) to provide that the WRDA 2007 cost sharing amendment does not apply to any beneficial use of dredged material project authorized in WRDA 2007 if a report of the Chief of Engineers for the project was completed prior to the date of enactment of WRDA 2007. For those projects (specifically including the LCA BUDMAT, Louisiana, authorized by Section 7006(d) of WRDA 2007), the cost sharing for the beneficial use of dredged material is now 75% Federal and 25% non-Federal. (See Appendix A).

By memorandum dated August 13, 2010, the ASA (CW) delegated approval authority to the MVD Commander, subject to a per-project limit on the federal investment for the delegation to $15 million (See Appendix A. Legislation, Reports, and Guidance). The authorized Program includes $100 million in programmatic authority to allow for the extra

cost needed for beneficial use of dredged material over a 10-year period. Funds from the Program are used for disposal activities associated with separate, cost-shared, individual ecosystem restoration beneficial use projects that are above and beyond routine disposal activities that are covered under the USACE Operations and Maintenance (O&M) dredging Federal Standard. The Federal Standard for dredged material disposal is the least costly alternative, consistent with sound engineering and scientific practices and meeting applicable federal environmental statutes. Of the $100 million recommended for the Program, the 2010 Report provided that approximately 15 percent (approximately $15 million) would be used for planning, engineering, and design activities, and real estate acquisition for beneficial use projects implemented under the Program, and the remaining $85 million would be used for placement of dredged material for beneficial use.

The 2010 Report envisioned that the Coastal Protection and Restoration Authority Board (CPRAB) of Louisiana would serve as the primary NFS for the implementation of the Program. Subsequently, the CPRAB declined to serve as the primary NFS for the Program in its entirety, electing instead to serve as the NFS on individual Program projects. It became apparent that there was no willing primary NFS to cost share the implementation of the entire Program. Therefore, individual projects in the Program are designed and implemented by CEMVN where a NFS is identified as a willing cost-share partner. This enables CEMVN to still fulfill the intent of the Program to achieve ecosystem restoration objectives in coastal Louisiana using sediment resources generated by the maintenance of authorized federal navigation channels. The NFS for the Calcasieu Sabine Project outlined in this draft Integrated DIR/EA is the Lake Charles Harbor and Terminal District.

See Appendix A for applicable legislation, reports, and guidance related to the LCA BUDMAT Program and Project authority.

1.2 Non-Federal Sponsor

The NFS for this Project is the Lake Charles Harbor and Terminal District. The Project Management Plan (PMP) was executed on August 16, 2016 by the CEMVN District Commander. The Integral Determination Report for the Project was approved on March 16, 2017. The Design Agreement between the Department of the Army and the NFS was executed on May 16, 2017.

Title VII of WRDA 2007 contained specific crediting provisions for work-in-kind performed by the NFS under the Program. Section 7007 of WRDA 2007, Public Law No. 110-114, provides authority to afford credit for work in-kind contributions provided by the NFS for a design that is determined to be integral to a project. The NFS can elect to perform in-kind services related to the design and will provide cash to satisfy the balance of its 25% cost share of the total project cost for construction. Section 1019 of the WRRDA 2014 amended Section 7007 of WRDA 2007, to authorize credit, in accordance with Section 221 of the Flood Control Act of 1970, as amended. Credit is afforded for the cost of in-kind contributions for a study or project authorized by Title VII of WRDA 2007 that is

carried out in the Louisiana coastal ecosystem by a non-Federal interest before, on, or after the execution of the partnership agreement for the study or project.

As a result of the foregoing crediting provisions, the NFS has specific cost sharing considerations that are reflected in project cost tables contained in this draft Integrated DIR/EA. For this Calcasieu Sabine Project, the in-kind contributions may include cultural resource analysis coordination, project management, design documentation report support, plans and specifications, field investigations, and monitoring for the project, as generally described in the Integral Determination Report for the Project, which was approved on March 16, 2017. All work-in-kind contributions performed by the NFS must meet federal standards, and be performed in accordance with ER 1110-2-1150, reviewed in accordance with ER 1110-1-12, and subject to peer review guidance.

Although the Project will be constructed in three cycles, the design and construction will be treated as one single project. The Project description, location, cycled implementation, acres created per cycle, and other details of the proposed action are set forth in this draft Integrated DIR/EA. Once the final Integrated DIR/EA is approved, the Recommended Plan contained therein will serve as the decision document for the Project Participation Agreements (PPAs). A PPA will be required for the implementation of each of the three cycles of the Project. If there is a lack of funding or a sufficient quantity or quality dredged material, or there is any other impediment and reason on the part of the NFS or USACE to not to implement cycle 2, cycle 3, or both, a PPA will not be executed for one of more of the two remaining cycles.

1.3 Design and Implementation Report Scope

The 2005 Chief's Report, as authorized by WRDA 2007, recommended implementation of the Program through a one-step planning and design procedure modeled upon the process for projects implemented under Section 204 of WRDA 1992 pursuant to the Continuing Authorities Program (CAP 204) for the protection, restoration, and creation of aquatic and ecologically related habitats in connection with O&M dredging of an authorized navigation project, using procedures appropriate for the scope and complexity of the project to allow for the appropriate level of planning and design for the project. Simplified evaluation procedures are allowed for low risk/low cost projects and when the consequences of failure are minimal and do not pose a threat to human life or safety. This Calcasieu Sabine Project is very similar in its limited scope, complexity, and scale to a CAP 204 beneficial use project. The planning and design of this Project and preparation of this draft Integrated DIR/EA have been prepared in accordance with all applicable laws and USACE regulations, policies, and guidance, including but not limited to, the implementation guidance for CAP 204 projects.

1.4 Selection of the Calcasieu Sabine Project

The Program goals are:

- to cost effectively increase the beneficial use of material dredged from federally maintained waterways at a total cost of $100 million over a 10-year period.

- to address the critical needs of the Program by soliciting, selecting, planning, designing, and constructing individual ecosystem restoration projects that use material dredged from the federally maintained waterways to:

    - restore and create coastal landscape features such as, but not limited to, marshes, ridges, and islands that provide wildlife and fisheries habitat with emphasis on ecological and hydrologic functions that support the ecosystem of coastal Louisiana;

    - reduce the loss of existing coastal landscape features such as, but not limited to, marshes, ridges, and islands to help sustain the ecosystem of coastal Louisiana; and

    - provide protection to Louisiana's coastal infrastructure.

In order to meet these goals, there are two major considerations which often act as constraints in identifying and selecting projects to be implemented under the Program: (1) the need for a willing and eligible cost share partner to serve as the NFS; and (2) the ability to link a proposed project to the O&M dredging of an existing Federal navigation project. The overlap of these requirements frequently limits the potential projects under the Program that can be considered for implementation by USACE.

With respect to the two major considerations mentioned above to be considered in the selection of a project under the Program, the Calcasieu Sabine Project satisfies both considerations. First, this Calcasieu Sabine Project is consistent with the ecosystem restoration goals and objectives of the *Louisiana's Comprehensive Master Plan for a Sustainable Coast* (State Master Plan) effective June 2, 2017, which is a plan for protecting, conserving, enhancing, and restoring coastal areas through the construction and management of integrated coastal protection projects and programs. The State Master Plan expressly articulates support for the implementation of beneficial use of dredged material projects, stating that the State acting through the CPRAB "fully supports beneficial use of dredged material and has financed many beneficial use projects in the past, including projects utilizing sediment from the CSC, the Mississippi River Navigation Channel, the Houma Navigation Canal, and the Atchafalaya River. As the state implements the large-scale marsh creation projects laid out in the State Master Plan, it is imperative that we use the sediment from all applicable dredging activities." (See State Master Plan at page 144 available at http://coastal.la.gov/wp-content/uploads/2017/04/2017-Coastal-Master-Plan_Web-Book_CFinal-with-Effective-Date-06092017.pdf).

Although the CPRAB does not desire to be the primary NFS for the entire Program, the CPRAB does participate on a project-by-project basis. However, the requirement for a NFS for this Calcasieu Sabine Project is met because the willing and eligible cost sharing

partner is the Lake Charles Harbor and Terminal District. In addition, the NFS also has the financial resources to cost share the Calcasieu Sabine Project and to fulfill all of the other requirements of local cooperation pursuant to the PPAs to be executed once a Recommended Plan is approved. This Calcasieu Sabine Project meets the second consideration in that it will utilize dredged material sourced from the routine O&M of the CSC, which is a federally authorized and maintained channel that receives funding for dredging on a regular basis.

1.5 Calcasieu Sabine Study Area

The Program (planning) Area, is divided into 4 subprovinces along coastal Louisiana by the 2004 LCA Study (Figure 3). The Study Area for the Calcasieu Sabine Project is located within subprovince 4 of the Program Area; which is largely coextensive with the Calcasieu Sabine (coastal) Basin (Figure 4).

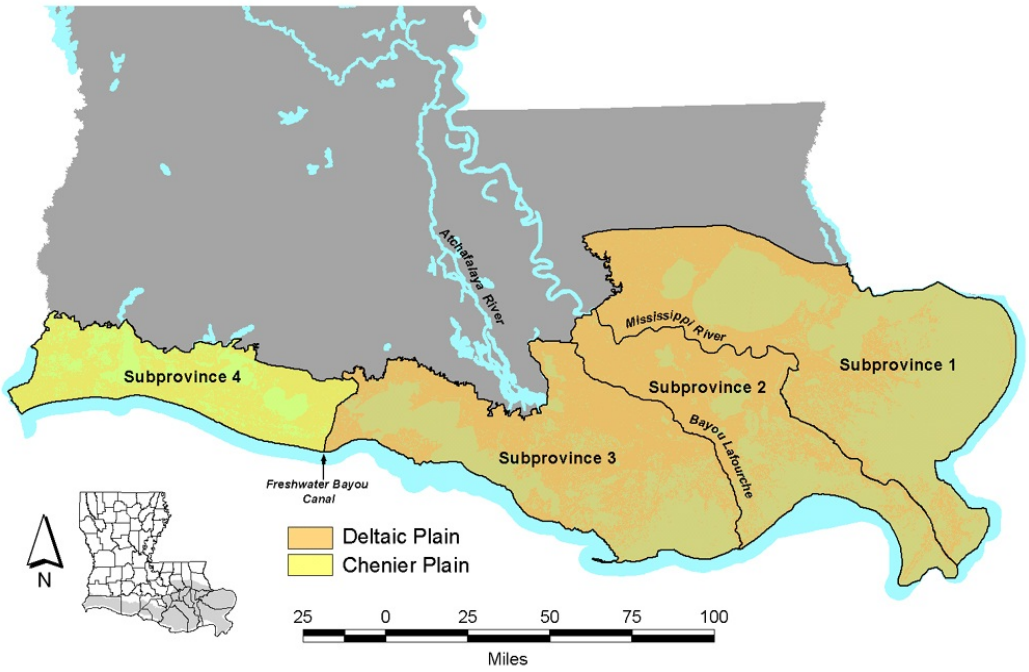

Figure 3. LCA Subprovinces, LCA BUDMAT Project Area.

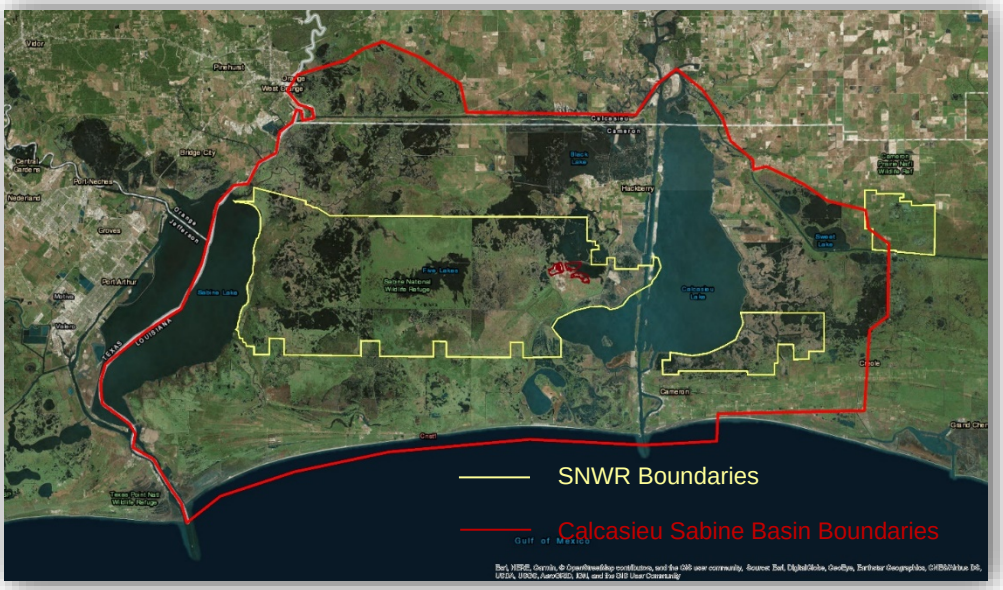

Figure 4. Calcasieu Sabine Basin

1.6 Calcasieu Sabine Project Area

The proposed Calcasieu Sabine Project Area (Project Area) is located within the Sabine National Wildlife Refuge (SNWR) (Figure 4). The SNWR is located in Cameron Parish, which is in the Chenier Plain of southwestern Louisiana.

1.7 Prior Beneficial Use Studies and Projects

A number of studies, reports, and environmental documents on water resources development in the planning area have been prepared by USACE, other Federal, state, and local agencies, research institutes, and individuals. The more relevant prior studies, reports, and projects are described as follows in Table 1. Additional information on other BUDMAT activities in the vicinity of this project is available online at: http://www.mvn.usace.army.mil/About/Offices/Operations/BeneficialUseofDredgedMaterial.aspx

Table 1. Prior Studies and Environmental Documents

Project Year	Study/Report/Environmental Document Title	Document Type
1977	Continued Operation and Maintenance of Calcasieu River and Pass (Including Salt Water Barrier); Coon Island; Devil's Elbow; Calcasieu River, Louisiana	Environmental Impact Statement
1992	Lake Charles Ship Channel, Cameron and Calcasieu Parishes, Louisiana Marsh Creation	EA #155
2000	Sabine Refuge Marsh Creation, Cameron Parish, Louisiana	EA #319

Project Year	Study/Report/Environmental Document Title	Document Type
2001	Sabine Refuge Marsh Creation, Cameron Parish, Louisiana	EA #319a
2004	Sabine Refuge Marsh Creation, Cameron Parish, Louisiana	EA #319b
2005	Louisiana Coastal Area, Louisiana, Ecosystem Restoration Program, November 2004	Programmatic Feasibility Report and EIS
2006	Sabine Refuge O&M Beneficial Use Marsh Creation Disposal Area, Cameron Parish, Louisiana	EA #435
2010	Calcasieu River and Pass, Louisiana, Dredged Material Management Plan and Supplemental Environmental Impact Statement	2010
2010	LCA, Beneficial Use of Dredged Material Program	Programmatic Study Report and Programmatic EIS
2015	LCA, Beneficial Use of Dredged Material at West Bay	Design and Implementation Report and EA #535
2016	LCA, Beneficial Use of Dredged Material at Tiger Pass 1	Design and Implementation Report and EA #542
2018	LCA, Beneficial Use of Dredged Material at the Houma Navigation Canal	Integrated Design and Implementation Report and EA #533

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2.0 Affected Environment (NEPA Required)

NEPA requires an analysis of the environmental effects from taking FWOP. The No Action Alternative is the future condition without action and is considered the "future without project" (FWOP) condition. The No Action Alternative is not without impacts from preexisting ongoing forces that affect the study area. The FWOP reflects the "impacts of taking no action", which for purposes of alternative analysis are compared with the effects of implementing the proposed action.

The difference between the impacts of taking an action and the no action provides the basis from which alternative plans are evaluated. This analysis provides a benchmark, enabling decision makers to compare the magnitude of environmental effects of implementing a proposed action.

Under the Civil Works Planning process, an inventory of the critical resources (physical, demographic, economic, social, natural, etc.) relevant to the problems and opportunities under consideration in the planning area is developed. Then, a forecast of the inventory's condition at the future date of the 50-year period of analysis is performed. Those changes in conditions are determined by the impact of all ongoing actions, man-made or natural, upon the resources if no alternatives are implemented as part of this evaluation. Sections 2.1 to 2.3 of this Report describe the historic and existing conditions of the affected environment; Section 2.4 forecasts and reflects the future conditions expected during the 50-year period of analysis if no action is taken. The description of the affected environment establishes the environmental baseline and thresholds of environmental change against which to measure the direct, indirect, and cumulative effects of an alternative necessary to support a fully informed decision-making process.

2.1 Description of the Calcasieu-Sabine Study Area

The Study Area and the affected environment have been described in detail in several previous NEPA documents (Table 1) which are incorporated by reference herein, including but not limited to, the following: the 1977 EIS entitled "*Continued Operation and Maintenance of Calcasieu River and Pass (Including Salt Water Barrier); Coon Island; Devil's Elbow; Calcasieu River, Louisiana";* the 2010 *Final Dredged Material Management Plan And Supplemental Environmental Impact Statement (DMMP/SEIS) Calcasieu River And Pass, Louisiana;* and EAs #155, #319, #319a, #319b, and #435. Additionally, the U.S. Fish and Wildlife Service's (USFWS) Comprehensive Conservation Plan (USFWS 2007) and Habitat Management Plan (USFWS 2013) for the SNWR describes the environmental setting and background regarding important resources within the refuge and has been utilized as an important reference.

The Study Area is located within the Calcasieu-Sabine Basin, which lies in the western portion of the Chenier Plain in Cameron and Calcasieu Parishes. The Chenier Plain is a physiographic province and geomorphologic extension of the Mississippi Deltaic Plain (Penland and Suter 1989) formed by alternating suspended sediment deposition and wave erosion controlled by the Mississippi River (Owen 2008).

The Project Area is south of Hackberry, an unincorporated community in Cameron Parish, Louisiana and includes the SNWR and the adjacent reach of the CSC located between Channel Miles 5.0 and 17.0. The SNWR covers an area of about 125,000 acres which include 40,403 acres of open water and 91,173 acres of fresh, intermediate, and brackish marshes interspersed with low prairie ridges, man-made levees, meandering bayous, and canals. Additional information about the refuge may be found at https://www.lacoast.gov/new/About/Basin_data/cs/Default.aspx#summary

The Calcasieu-Sabine Basin is bounded on the east by State Highway 27, on the west by the Sabine River and Sabine Lake, and on the south by the Gulf of Mexico. About 24 percent of the basin land is publicly owned as Federal refuges. The north end of the basin is a shallow coastal wetland system with freshwater input and a north-south flow through Calcasieu and Sabine Lakes, and some east-west water movement through the Gulf Intracoastal Waterway and interior marsh canals.

The Chenier Plain includes a variety of habitat types including scrub-shrub, brackish and saline marshes, and open water. The vegetation along the pipeline access corridor (West Cove Canal and Back Ridge Canal) includes marsh species such as marshhay cord grass (*Spartina patens*), saltgrass (*Distichlis spicata*), hogcane (*Arundinaria gigantean*), Roseau cane (*Phragmites australis*), black needle rush (*Juncus roemerianus*), and leafy three-square grass (*Schoenoplectus americanus*).

Soils include Aquents dredged (occasionally flooded), Bellpass muck (frequently flooded), Scatlake muck (tidal), and Timbalier muck (tidal). The muck soils support saline marsh. This community typically has the lowest plant species diversity of any marsh type.

Three main physiographic surfaces exist in Cameron Parish: wooded alluvial valleys, (swamplands); marshlands and lakes; and abandoned beach ridges. The alluvial valleys in the area are very swampy and merge with the marshlands to the south.

Landforms and accompanying habitats within the Calcasieu-Sabine Basin, like the rest of the Chenier Plain, are the result from the complex interaction, through time of geological, hydrological, and meteorological processes (Gosselink et al. 1979).

Marshes within the Calcasieu-Sabine Basin began forming about 3,500 years ago. Whenever the Mississippi River established a westerly course, large quantities of reworked riverine sediment were deposited along the gulf shore, resulting in southerly growth of the shoreline. When the Mississippi River shifted to an easterly course, the sediment supply decreased and erosive forces were greater than sediment deposition due to littoral drift. As a result, the shoreline converted to a more typical beach-like nature and gradually retreated. The repetitive occurrence of these pulses of sediment due to change in the Mississippi Rivers course helped to build the systems of cheniers (oak ridges) in the basin.

The progradation process served to establish an undulating land form along the gulf coast. The areas between the cheniers were collecting points for water and, over time, built up by decomposition and regeneration of plant materials to form low salinity marshes. These interior marsh areas would occasionally receive pulses of mineral sediment input due to storm tides.

Recent analyses by the U.S. Geological Survey (USGS; Couvillion et al. 2017) show the land area in the Calcasieu-Sabine Basin (within subprovince 4, Figure 2) has changed from 527,992 acres in 1932 to 400,066 acres in 2016 for a net change of about 127,926 acres. This net change in land area amounts to a decrease of approximately 24% of the 1932 land area.

2.2 Description of the Watersheds

The Calcasieu River Basin watershed is located in southwestern Louisiana and is positioned in a north-south direction. The drainage area of the Calcasieu River Basin comprises approximately 4,105 square miles. The river flows south for about 215 miles to the Gulf of Mexico where it empties at a point approximately 30 miles east of the Texas-Louisiana state line. The CSC passes through the coastal prairie and coastal marshes, which have an elevation ranging from 1-2 feet above mean sea level. The flood plains are extremely flat with little relief and average 2-3 feet above mean sea level. The CSC also flows through the following lakes: Lake Charles, Prien Lake, Moss Lake and Calcasieu Lake. Dominant features include oxbow lakes, natural levees and the surrounding Pleistocene Uplands (Weston 1974).

The Calcasieu and Sabine Lakes are the major water bodies within the Calcasieu-Sabine (coastal) Basin. Freshwater inflow to the basin occurs primarily through these lakes via the Calcasieu and Sabine Rivers. Marshes within the Calcasieu-Sabine Basin historically drained into these two lakes. Over time, the natural drainage process has been altered by mineral activities and the construction of channels to enhance navigation. The hydrology of the marshes between Sabine and Calcasieu Lakes has also been altered by numerous, small access canals. Consequently, marshes between Sabine and Calcasieu Lakes have become a large interlinked system with water draining and circulating to the northern, eastern, and western portions of the Calcasieu-Sabine Basin.

(http://www.wlf.louisiana.gov/sites/default/files/pdf/document/32897-calcasieu-basin/calcasieu.pdf)

The Calcasieu-Sabine Basin watershed contains four principal physiographic areas. These are the Benthy Terrace in the upland areas, the Montgomery Terrace in the rolling hill area between the uplands and the prairie, the Prairie Terrace between the rolling hills and coastal marsh area, and the Chenier Plain in the coastal area.

Land use in the Calcasieu-Sabine Basin watershed is extremely varied due to the natural resources of the watershed. The city of Lake Charles lies in the southern portion of the watershed, an area heavily industrialized by petro-chemical plants. Sulphur and oil

deposits, timber and port facilities have encouraged industrialization of the community. The majority of the rest of the area is rural.

2.2.1 Sea Level Rise

ER 1100-2-8162 states potential relative sea level change (SLC) must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence. In coastal Louisiana, relative sea level rise (RSLR) is the term applied to the difference between the change in eustatic (global) sea level and the change in land elevation. According to United Nations Intergovernmental Panel on Climate Change (IPCC), the global mean sea level rose at an average rate of about 1.7 mm/yr during the 20th Century. Recent climate research has documented global warming during the 20th Century, and has predicted either continued or accelerated global warming for the 21st Century and possibly beyond (IPCC, 2007).

Land elevation change can be positive (accreting) or negative (subsiding). Land elevations decrease due to natural causes, such as compaction and consolidation of Holocene deposits and faulting, and human influences such as sub-surface fluid extraction and drainage for agriculture, flood protection, and development. Forced drainage of wetlands results in lowering of the water table resulting in accelerated compaction and oxidation of organic material. Areas under forced drainage can be found throughout coastal Louisiana. Land elevations increase as a result of sediment accretion (riverine and littoral sources) and organic deposition from vegetation. Vertical accretion in most of the area, however, is insufficient to offset subsidence, causing an overall decrease in land elevations. The combination of subsidence and eustatic sea level rise is likely to cause the landward movement of marine conditions into estuaries, coastal wetlands, and fringing uplands (Day and Templet, 1989; Reid and Trexler, 1992).

Benefits for the Project were calculated using the Wetland Valuation Assessment (WVA) and incorporated the “intermediate” sea-level change scenario to determine benefit outcomes over the 50-year period of analysis. The “low” and “high” sea level change rates were not run. Under the “low” sea-level change scenario, any alternative would likely underperform very soon after construction since the wetland portion of the Project Area would be inundated beyond wetland vegetation tolerances as sea-level changes. This would be a result of not enough material being placed initially to compensate for sea-level change over time. However, under the “high” sea-level change scenario, alternatives would likely not perform, or the benefits would be minimal, for an extended period post-construction until sea-level change reaches a point that is conducive for wetland function, growth, and sustainability. This would be a result of placing so much material initially, the marsh creation and restoration areas would not functionally be a wetland until the dredged material is deposited at appropriate elevations conducive for function, growth, and sustainability. The design was optimized to the medium SLC rate but the timing of the benefits to occur is uncertain and dependent on future SLC. A beneficial use disposal event using only the “intermediate” sea-level change scenario presents the most reasonable expectation for calculating benefits over the 50 year period of analysis.

2.2.2 Climate

The climate in the Study Area is humid, subtropical with a strong maritime character. Warm, moist southeasterly winds from the Gulf of Mexico prevail throughout most of the year, with occasional cool, dry fronts dominated by northeast high pressure systems. The influx of cold air occurs less frequently in autumn and only rarely in summer. Tropical storms and hurricanes are likely to affect the area 3 out of every 10 years, with severe storm damage approximately once every 2 or 3 decades. The majority of these storms occur between early June and November. The largest recent hurricanes were Katrina, which impacted most of southeast Louisiana, and Rita in 2005, which caused damage in the Project Area. Summer thunderstorms are common, and tornadoes strike occasionally. Average annual temperature in the area is 67°F, with mean monthly temperatures ranging from 82°F in August to 52°F in January. Average annual precipitation is 57.0 inches, varying from a monthly average of 7.5 inches in July, to an average of 3.5 inches in November.

The 2014 USACE Climate and Resiliency Policy Statement states the "USACE shall continue to consider potential climate change impacts when undertaking long-term planning, setting priorities, and making decisions affecting its resources, programs, policies, and operations." The Program is not intended to construct ecosystem restoration projects that last in perpetuity. A healthy and resilient coastal complex is dynamic, not static, and is subject to the ebb and flow of the various effects, adverse or beneficial, that impact conditions at any given point in time. The most significant adverse potential impact on a coastal wetland as a product of climate change is sea level change, as addressed above.

2.2.3 Geology

The following summary of the geologic setting and depositional history of the Study Area is adapted from Bernier et al. (2011). The Study Area is located within the Chenier Plain of southwestern coastal Louisiana which consists of a thin wedge of Holocene sediments overlying stiff over-compacted Pleistocene sediments that were sub-aerially exposed during the late Pleistocene sea-level lowstand. The near surface, muddy sediments above the Pleistocene-Holocene layer range in thickness from less than a meter to about six meters, with thickness generally increasing toward the Gulf of Mexico. The Chenier Plain was constructed by progradation of the gulf shoreline as the coastal plain advanced seaward with the addition of broad mudflats and intervening narrow, sandy beach ridges (cheniers). In general, the direction of sediment supply for the Chenier Plain was parallel to the gulf shoreline because sediment transport by coastal plain rivers was trapped in Sabine and Calcasieu Lakes. As a result of the alongshore processes of sediment progradation and aggradation, only a few tidal channels were constructed within the Chenier-Plain wetlands, and vast continuous meadows of dense wetland grasses were the natural setting before they were altered by human activities.

<u>Soils</u>

Deltaic processes have played a significant role in the types of soil present in the Calcasieu-Sabine Basin. The Calcasieu River flows from the upland hills with elevations generally being around 260 feet above mean sea level (a maximum of 400 feet above mean sea level). The river flows through the coastal prairie and coastal marshes, which have an elevation ranging from 1-2 feet above mean sea level. The flood plains are extremely flat with little relief and average 2-3 feet above mean sea level. Lakes traversed include Lake Charles, Prien Lake, Moss Lake, and Calcasieu Lake. Dominant features include oxbow lakes, natural levees and the surrounding Pleistocene Uplands.

The dynamic and episodic deltaic building processes alternate between periods of seaward progradation of deltas (regressive deposition) and the subsequent landward retreat of deltaic headlands as deltas are abandoned, reworked, and submerged by marine waters (transgressive deposition). The types of soils present today in much of the project area are characterized by the depositional environments associated with both of these phases of the deltaic cycle.

Soil surveys have been conducted throughout Cameron Parish. Detailed soil surveys were published by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS). A 1995 survey was conducted by the USDA and other federal, state, and local agencies (1995 USDA). These surveys involved the excavation of pits throughout the county and characterization of the soils and subsoils. Soil maps of Cameron Parish were produced as a result of these surveys. The NRCS has geographically referenced soil survey data for the Project Area located at http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

The NRCS classifies the soils in the Calcasieu-Sabine Basin mainly as Bancker muck, 0 to 0.2 percent slopes, very frequently flooded; Creole mucky clay; Gentilly muck, 0 to 5 percent slopes, very frequently flooded; Hackberry-Mermentau complex, gently undulating; Mermentau clay; and Udifluvents, 1 to 20 percent slopes. These soils are listed in Table 2. Bancker muck; Creole mucky clay; Hackberry-Mermentau complex, gently undulating; and Mermentau clay soils are classified as hydric (i.e., typical of wetlands). Hydric soil designations are based on the NRCS *National Hydric Soils List by State*, March 2014.

Table 2: Soils Classification for Calcasieu-Sabine Basin (USDA, NRCS)

Soil Unit Name	Soil Unit Symbol	Hydrologic Group	Hydric (Yes/No)
Bancker muck, 0 to 0.2 percent slopes, very frequently flooded	BA	D	Yes
Creole mucky clay	CR	D	Yes
Gentilly muck, 0 to 5 percent slopes, very frequently flooded	GC	D	Yes
Hackberry-Mermentau complex, gently undulating Hm B Yes	Hm	B	Yes
Mermentau clay ME D Yes	ME	D	Yes
Udifluvents, 1 to 20 percent slopes	UA		No

Hydrologic soil groups refer to soils grouped according to their runoff-producing characteristics. The primary consideration is the inherent capacity of bare soil to permit infiltration. The slope and ground cover are not considered, but are separate factors in predicting runoff. The groups range from A to D. In Group A, soils have a high infiltration rate when thoroughly wet and have a low runoff potential. These soils are mainly deep, well drained, and sandy or gravelly. In Group D, soils have a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material.

Hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation, or plants that have adapted to and thrive in oxygen-deficient substrates. Hydric soil forms under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part.

2.3 Relevant Resources

This section contains a description of relevant resources that could be impacted by the implementation of the proposed action. The important resources described in this Section are those recognized by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. Important resources identified that could be potentially affected include wetlands, aquatic resources/fisheries, essential fish habitat, wildlife, endangered species, water quality, air quality, cultural resources, recreational resources, and aesthetic resources. Table 3 provides a summary of information of the institutional, technical, and public importance of these resources.

Table 3: Relevant Resources and their Institutional, Technical, and Public Importance

Resource	Institutionally Important	Technically Important	Publicly Important
Navigation	Rivers and Harbors Act of 1899 and River and Harbor Flood Control Act of 1970 (PL 91-611).	The Corps provides safe, reliable, efficient, and environmentally sustainable waterborne transportation systems (channels, harbors, and waterways) for movement of commerce, national security needs, and recreation	Navigation concerns affect area economy and are of significant interest to community.

Resource	Institutionally Important	Technically Important	Publicly Important
Wetlands	Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968., EO 11988, and Fish and Wildlife Coordination Act.	They provide necessary habitat for various species of plants, fish, and wildlife; they serve as ground water recharge areas; they provide storage areas for storm and flood waters; they serve as natural water filtration areas; they provide protection from wave action, erosion, and storm damage; and they provide various consumptive and non-consumptive recreational opportunities.	The high value the public places on the functions and values that wetlands provide. Environmental organizations and the public support the preservation of marshes.
Aquatic Resources/ Fisheries	Fish and Wildlife Coordination Act of 1958, as amended; Clean Water Act of 1977, as amended; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968.	They are a critical element of many valuable freshwater and marine habitats; they are an indicator of the health of the various freshwater and marine habitats; and many species are important commercial resources.	The high priority that the public places on their esthetic, recreational, and commercial value.
Soils and Water Bottoms	Farmland Protection Policy Act; Fish and Wildlife Coordination Act, Marine Protection, Research, and Sanctuaries Act of 1990; Estuary Protection Act of 1968.	State and Federal agencies recognize the value of lessening the effect of conversion activities on farmlands, and of water bottoms for the production of benthic organisms.	Environmental organizations and the public support the preservation of water quality and fishery resources.
Essential Fish Habitat (EFH)	Magnuson-Stevens Fishery Conservation and Management Act of 1996, Public Law 104-297	Federal and state agencies recognize the value of EFH. The Act states, EFH is “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.”	Public places a high value on seafood and the recreational and commercial opportunities EFH provides.
Wildlife	Fish and Wildlife Coordination Act of 1958, as amended and the Migratory Bird Treaty Act of 1918	They are a critical element of many valuable aquatic and terrestrial habitats; they are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources.	The high priority that the public places on their esthetic, recreational, and commercial value.
Threatened and Endangered Species	The Endangered Species Act of 1973, as amended; the Marine Mammal Protection Act of 1972; and the Bald Eagle Protection Act of 1940.	USACE, USFWS, National Marine Fisheries Service (NMFS), NRCS, EPA, LDWF, and LDNR cooperate to protect these species. The status of such species provides an indication of the overall health of an ecosystem.	The public supports the preservation of rare or declining species and their habitats.

Resource	Institutionally Important	Technically Important	Publicly Important
Cultural Resources	National Historic Preservation Act of 1966, as amended; the Native American Graves Protection and Repatriation Act of 1990; and the Archeological Resources Protection Act of 1979	State and Federal agencies document and protect sites. Their association or linkage to past events, to historically important persons, and to design and construction values; and for their ability to yield important information about prehistory and history.	Preservation groups and private individuals support protection and enhancement of historical resources.
Recreation Resources	Federal Water Project Recreation Act of 1965 as amended and Land and Water Conservation Fund Act of 1965 as amended	Provide high economic value of the local, state, and national economies.	Public makes high demands on recreational areas. There is a high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana; and the large per-capita number of recreational boat registrations in Louisiana.
Aesthetics	USACE ER 1105-2-100, and National Environmental Policy Act of 1969, the Coastal Barrier Resources Act of 1990, Louisiana's National and Scenic Rivers Act of 1988, and the National and Local Scenic Byway Program.	Visual accessibility to unique combinations of geological, botanical, and cultural features that may be an asset to a study area. State and Federal agencies recognize the value of beaches and shore dunes.	Environmental organizations and the public support the preservation of natural pleasing vistas.
Air Quality	Clean Air Act of 1963, Louisiana Environmental Quality Act of 1983.	State and Federal agencies recognize the status of ambient air quality in relation to the NAAQS.	Virtually all citizens express a desire for clean air.
Water Quality	Clean Water Act of 1977, Fish and Wildlife Coordination Act, Coastal Zone Management Act of 1972, and Louisiana State & Local Coastal Resources Act of 1978.	USACE, USFWS, NMFS, NRCS, EPA, and State DNR and wildlife/fishery offices recognize value of fisheries and good water quality and the national and state standards established to assess water quality.	Environmental organizations and the public support the preservation of water quality and fishery resources and the desire for clean drinking water.

The objectives of Executive Order 11988 (Floodplain Management) were considered in plan formulation; however, USACE has determined that floodplain impacts, if any, from the implementation of the Project alternatives would be mainly positive (i.e., improving the adjacent flood plain and associated habitats, and thus, maintaining their natural and beneficial values). Additionally, there is no way to reasonably avoid for Project construction outside the 100-year floodplain. No prime or unique farmlands, as defined and protected by the Farmland Protection Policy Act, would be affected by implementation of the proposed project. No portion of the project area has been designated a Louisiana Natural and Scenic River; therefore, a Scenic Rivers permit is not warranted.

Important resources identified that are known to, or which could potentially be, affected by the implementation of the proposed project are listed in Table 4. These resources include: navigation, wetlands, aquatic resources/fisheries, essential fish habitat, wildlife, threatened and endangered species, water and sediment quality, air quality, cultural resources, recreational resources, and aesthetic resources.

Table 4: Relevant Resources In and Near the Project Area

Relevant Resource	Impacted	Not Impacted
Navigation	X	
Wetlands	X	
Scrub-Shrub		X
Soils and Water Bottoms	X	
Aquatic	X	
Wildlife	X	
Essential Fish Habitat	X	
Threatened and Endangered Species		X
Water Quality	X	
Air Quality	X	
Cultural[1]		X
Recreational		X
Visual		X
HTRW[2]		X
Noise	X	

[1] Although not impacted, cultural resources are addressed to comply with the National Historic Preservation Act.
[2] Hazardous, Toxic, and Radioactive Waste. Although the area has been determined to have a low probability of containing HTRW, it is assessed in this document to comply with USACE policy.

2.3.1 Relevant Resources Not Evaluated

2.3.1.1 Aesthetics

The proposed marsh creation and restoration areas are located in a primarily open water Project Area that has not been institutionally designated as having scenic qualities and it contains no unique visual qualities that would make it technically significant. Additionally, there are no static viewpoints into the Project Area and no known public visual preference. The environmental assessments and impact statements for USACE planning studies are required to focus on significant environmental considerations as recognized by institutional, technical and public sources. Therefore, visual resources were not evaluated in plan formulation.

2.3.1.2 100-year Floodplain

The objectives of Executive Order 11988 (Floodplain Management) were considered in plan formulation; however, USACE has determined that floodplain impacts, if any, from the implementation of the proposed action would be mainly positive (i.e., improving the adjacent flood plain and associated habitats, and thus, maintaining their natural and beneficial values). Additionally, there is no practicable alternative for project construction outside the 100-year floodplain. No prime or unique farmlands, as defined and protected by the Farmland Protection Policy Act, would be affected by implementation of the

proposed project. No portion of the project area has been designated a Louisiana Natural and Scenic River; therefore, a Scenic Rivers permit is not warranted.

2.3.2 Relevant Resources Evaluated

Navigation

Historic and Existing Conditions

The CSC provides deep draft access to the Port of Lake Charles, which is currently the 11th largest port in the nation based on tonnage. It provides deep-water access for maritime commerce; dozens of industrial plants along the channel, primarily refineries and petrochemical companies, bringing raw materials in, and shipping products out via the channel; many more facilities that rely on the channel are planned, and some are already under construction.

The CSC navigation project is authorized to -42 feet MLG by 800 feet from the jetties to Mile -32.0 in the Gulf of Mexico (bar channel), and -40 feet MLG by 400 feet from the jetties to Mile 36.0 in Lake Charles, Louisiana. The inland reaches between CSC Mile 5.0 and 28.0 require maintenance dredging every other year, alternating between CSC Mile 5 and Mile 17 and Mile 17 and Mile 28 every other year, and the uppermost reaches between Mile 28.0 and 36.0 require dredging every 5 to 8 years. Dredging records dating back to 1949 indicate that maintenance of discontinuous reaches of the inland reach and bar channel occurred on an annual basis from 1953 to 1962. Dredged material from construction and all maintenance events within the inland reach (CSC Mile 34.1 to Mile 0.0) was placed in confined disposal facilities or placed unconfined/ semi-confined in open water in Calcasieu Lake. Material from the bar channel was placed in open water off the right-descending bank of the CSC.
(http://www.mvn.usace.army.mil/About/Projects/Calcasieu-River-Pass-LA/).

Wetlands

This resource is institutionally important because of The Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968. Wetlands are technically important because they provide necessary habitat for various species of plants, fish, and wildlife; they serve as groundwater recharge areas; they provide storage areas for storm and flood waters; they serve as natural water filtration areas; they provide protection from wave action, erosion, and storm damage; and they provide various consumptive and non-consumptive recreational opportunities. Wetlands are publicly important because of the high value the public places on the functions and values that wetlands provide.

Historic and Existing Conditions

Existing grounds within the Calcasieu-Sabine Basin area boundaries are a mixture of shallow open-water and fragmented marsh. The wetland community in the Project Area is saline marsh. Saltmeadow cordgrass (*Spartina patens*) is the predominant vegetation. Large aggregations of decaying organic material accumulate along the fringes and are the primary basis of the detrital food chain. The banks of the canals and bayous are slightly elevated and often support smooth cordgrass (*Spartana alterniflora*), sea ox-eye (*Borrichia frutescens*), and marsh elder (*Iva frutescens*). Shrubs are occasionally covered with the parasitic vine common dodder (*Cuscuta gronovii*).

In pockets of high salinity, the succulent saltwort (*Batis maritima*), the creeping glasswort (*Salicornia virginica*), and the dwarf saltwort (*Salicornia bigelovii* Torr) are common. These areas are intermittently flooded due to slightly higher elevations. In these higher areas, the salt-tolerant salt grass (*Distichlis spicata*) and black rush (*Juncus roemarianus*) are frequently present). In the slightly elevated marsh ridges, seaside goldenrod (*Solidago sempervirens*) and groundsel bush (*Baccharis halimifolia*) are often present.

Tidal currents and wave action in open bodies of water such as brackish bays and estuaries exert dominant erosional processes on coastal wetlands in the area. The rates of these processes accelerate as barrier islands are significantly reduced by coastal erosion. The effects of tides and wind-driven waves are lessened in bays which are well protected by barrier islands.

Aquatic Resources /Fisheries

The national significance of freshwater and tidal fisheries is recognized by the Fish and Wildlife Coordination Act of 1958, as amended. Fisheries resources are ecologically and economically significant because: they are a critical element of many valuable freshwater and marine habitats; they are an indicator of the health of various freshwater and marine habitats; and many species are important commercial resources. Fisheries are publicly important because of the high priority that the public places on their aesthetic, recreational, and commercial benefits.

Historic and Existing Conditions

The study area contains a variety of aquatic habitats including ponds, bayous, shallow open water, and embayments. The Project Area consists of open water and surrounding marsh within Unit 1A of the SNWR. Salinity conditions range from intermediate to saline. Much of the open water area has been generated at the expense of emergent marsh and open water is becoming the dominant habitat type. The water quality in the area is generally considered nutrient rich and turbid (i.e., low visibility).

Marsh classifications for nearby Coastwide Reference Monitoring System stations (CRMS) ranged from intermediate to saline in 2018. CRMS0685 was the closest gauge where data was available and classified the area as brackish marsh. An October 10, 2017, site visit conducted by the Corps, National Marine Fisheries Services (NMFS), and

USFWS personnel determined that the marsh within the project area could be classified as brackish.

Fish are highly mobile, and seasonal movements of fish populations are widespread. The result is that marine fish penetrate inland fresh water habitats, while fresh water species are sometimes found in environments that are more saline. The lower reaches of fresh water streams generally serve as nursery areas for a variety of fish and shellfish from the Gulf of Mexico. Estuaries represent some of the most productive habitats in the world.

The Gulf of Mexico Fishery Management Council lists the following federally managed species or species groups as being potentially found in coastal Louisiana: brown shrimp *(Cragnon cragnon)*, white shrimp *(Litopenaeus setiferus)*, red drum *(Sciaenops ocellatus)*, and Spanish mackerel *(Scomberomorus maculatus)*. The commercial fishery resources in the Calcasieu-Sabine Basin are primarily estuarine and marine in nature. Commercially important species include the American oyster *(Crassostrea virginica)*, brown shrimp (*Farfantepenaeus aztecus),* white shrimp (*Litopenaeus setiferus*), blue crab *(Callinectes sapidus)*, Gulf menhaden *(Brevoortia patronus*), and striped mullet *(Mugil cephalus)*. Finfish harvest in the area has been severely reduced since the Louisiana Marine Resources Conservation Act of 1995 restricted gillnet use in Louisiana. The area supports rich populations of phytoplankton, zooplankton, benthos, macro invertebrates, and numerous small fishes. These organisms constitute vital components of the aquatic food chain.

Finfish species occurring or expected in the estuaries include bay anchovy, striped anchovy, Gulf menhaden, striped mullet, white mullet, black drum, red drum, banded drum, spotted drum, star drum, spot, spotted seatrout, sand seatrout, Atlantic croaker, silver perch, pinfish, sea catfish, blue catfish, gafftopsail catfish, southern flounder, summer flounder, Atlantic stingray, scaled sardine, Spanish mackerel, inland silverside, rough silverside, inshore lizardfish, bull shark, ladyfish, Atlantic needlefish, diamond killifish, rainwater killifish, longnose killifish, marsh killifish, Gulf killifish, saltmarsh topminnow, sheepshead minnow, fat sleeper, bay whiff, hogchoker, blackcheek tonguefish, offshore tonguefish, naked goby, darter goby, sharptail goby, green goby, skilletfish, seabob, speckled worm eel, least puffer, lined sole, chain pipefish, gulf pipefish, and gizzard shad. Major economically important finfish species include red drum, black drum, bay anchovy, spotted seatrout, gulf menhaden, striped mullet, blue catfish, and southern flounder.

Shellfish in the area include blue crab, white shrimp, brown shrimp, gulf stone crab, grass shrimp, mysid shrimp, mud crab, roughneck shrimp, seabob, and pink shrimp. Commercially and recreationally important species include brown and white shrimp, blue crab, American oyster, and Gulf stone crab.

The landings of shellfish are subject to year-to-year variations dictated by environmental conditions in the estuaries. Different species use the same location in different seasons, and different life stages of the same species use different locations

in and out of the estuaries. Species diversity peaks in the spring and summer, and is typically low in the winter. Some marine species have estuarine-dependent life stages, typically larval and juvenile stages, which use estuaries as nursery habitat. Larvae or juveniles immigrate on incoming tides and take advantage of the high productivity of the estuary.

Gulf crabs are benthic omnivores, feeding on various crustaceans, mollusks, fish, and detritus. Juveniles are most abundant from November to May and occur in the northern portions of the estuaries. The juveniles prefer areas with soft, mud substrate. After 1-1.5 years, the crabs then move from shallow areas into larger bays and bayous as adults where they will live for at least one more year.

Wildlife

The national importance of wildlife resources is recognized by the Fish and Wildlife Coordination Act of 1958, as amended; the Migratory Bird Treaty Act of 1918; and the Bald and Golden Eagle Protection Act. Wildlife species are ecologically and economically significant because: they are a critical element of many valuable aquatic and terrestrial habitats; they are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources. Wildlife species are publicly significant because of the high priority the public places on their ecological aesthetic, recreational, and commercial benefits.

Historic and Existing Conditions

Coastal and especially estuarine wildlife are taxonomically diverse with distributions shaped by landforms, climate, salinity, tides, vegetation, other animals and human activities (Day et al. 1989). The Study Area contains a great variety of mammals, birds, reptiles, and amphibians.

Birds

Estuarine wetlands, cheniers and barrier habitats have historically provided many different species of birds and other wildlife with shelter, nesting, feeding, roosting, cover, nursery, and other life requirements. These habitats provide neotropical migrants with essential staging and stopover habitat (after Stoffer and Zoller 2004, Zoller 2004). Cheniers attract thousands of trans-Gulf migrant birds during their peak migratory months of April to May and August through October. The majority of these birds fly to and from parts of Mexico, and the cheniers offer the birds an important stop-over on their migration. Millions of ducks and geese also use the area from September through February. Over 300 species of birds have been recorded in the area, making this region a popular destination for visiting birders, wildlife photographers, and hunters. However, climate and seasonal availability of resources affect the ways estuaries are used by birds and other wildlife (Day et al. 1989). Vegetated habitats within urban and suburban areas, such as bottomland hardwood (BLH) and swamp habitats along streams, lakes and other waterways, provide critical breeding bird habitats (Wakeley and Roberts 1996).

Various raptors such as bald eagles, osprey barred owls, red shouldered hawks, northern harriers, American kestrels utilize the area and feed on fish, rabbits, waterfowl, seabirds, and carrion (Ehrlich et al. 1988). The bald eagle and brown pelican have increased populations resulting in de-listing as endangered species. Colonial nesting waterbird rookeries (e.g., herons, egrets, ibis, nightherons, and roseate spoonbills) are found throughout and generally show stable or increasing populations (LCWCRTF & WCRA 1999)), however no known nests were identified within 1,500 feet of the proposed marsh creation and restoration areas during recent field investigations.

Mammals

Most estuarine mammals show distributions or behaviors that are related to salinity patterns (Day et al. 1989). Large herbivores and carnivores include manatee, coyote, red wolf, ringtail, and river otter; smaller herbivores include swamp rabbit, fulvous harvest mouse, eastern wood rat, and nutria. Populations of furbearers (nutria, muskrat, mink, otter, and raccoon) and game mammals (rabbits, squirrels, and white-tailed deer) have been stable or increasing (LCWCRTF & WCRA 1999)).

Prior to the introduction of nutria to Louisiana in 1930s (USGS 2000, Baroch et al. 2002), no invasive wildlife species were known to be present. A substantial population increase of nutria is attributed to the decline in the price of pelts in 1989 (USGS 2000, Baroch et al. 2002). Areas of extensive nutria damage, or “eat outs,” alter the composition and habitat type of wetland communities (USGS, 2000). Aerial surveys estimated 80,000 acres of marsh in the State of Louisiana were damaged by nutria (Keddy et al. 2007).

Amphibians and Reptiles

Common species of amphibians and reptiles include the Gulf coast salt marsh snake, Gulf coast toad, pig frog, American alligator, diamondback terrapin, Mediterranean gecko, and Texas horned lizard. The LADNR (2009) observed the following reptiles within the cheniers: the American alligator; turtles (e.g., musk turtle, pond slider, and red-eared slider); snakes (e.g., plain-bellied water snake, banded water snake). Various lizards, and skinks (LADNR 2009). Little is known about amphibian or reptile populations with the exception of the American alligator whose population continues to remain stable. Numerous terrestrial invertebrates are found throughout the project area. The most notable are insects such as mosquitos, deer flies, horseflies, and biting midges.

Essential Fish Habitat

Historic and Existing Conditions

Louisiana’s coastal estuaries are the most productive in the nation. Louisiana has historically been an important contributor to the nation’s domestic fish and shellfish production, and one of the primary contributors to the nation’s food supply for protein. Landings in 2007 for commercial fisheries in coastal Louisiana, estimated at 951 million

pounds, were the largest for any state in the contiguous U.S. and second only to Alaska (NMFS, 2008). These landings represent over 10% of the total landings in the U.S., with a value of approximately $259.6 million.

Specific categories of Essential Fish Habitat (EFH) include all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), including the sub-tidal vegetation (seagrasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). The project is located in an area identified as EFH for post-larval and juvenile brown shrimp, white shrimp, and red drum. Categories of EFH in the project vicinity include estuarine emergent wetlands, mud substrates, and estuarine water column. Table 5 shows the EFH for the managed species expected in the study area.

Table 5: Essential Fish Habitat for Species within the Study Area

Species	Life Stage	EFH in Project Area
Brown shrimp	postlarvae/juvenile	Estuarine emergent wetlands, mud substrates, and estuarine water column
White shrimp	postlarvae/juvenile	Estuarine emergent wetlands, mud substrates, and estuarine water column
Red drum	postlarvae/juvenile	Estuarine emergent wetlands, mud substrates, and estuarine water column

Threatened and Endangered Species

The national importance of endangered or threatened species is recognized by the Endangered Species Act of 1973 (ESA), as amended and the Marine Mammal Protection Act of 1972. Endangered (E) or threatened (T) species are ecologically significant because the status of such species provides an indication of the overall health of an ecosystem. These species are publicly significant because of the desire of the public to protect them and their habitats.

Historic and Existing Conditions

Federally listed species and/or their designated critical habitat that may occur in Cameron Parish include five species of threatened or endangered sea turtles, the West Indian manatee (E), the bald eagle (de-listed) (T), the piping plover (T) and its critical habitat, the rufa red knot (T) and the brown pelican (de-listed) (E). Of these, only the brown pelican may occur in the Project Area. Brown pelicans have nested on Rabbit Island in West Cove in Cameron Parish. Although no brown pelican nesting sites are known to occur in the Project Area, they may use the Project Area for feeding and/or loafing. Brown pelicans feed in shallow estuarine waters, using sand pits and offshore sand bars as rest and roost areas. Water control structures between the Project Area and Calcasieu Lake most likely prevent sea turtles or the manatee from entering the Project Area, and habitats preferred by the bald eagle, rufa red knot and piping plover do not occur in the Project Area. Likewise, designated critical habitat for the piping plover is not located in the Project Area.

Water and Sediment Quality

This resource is institutionally significant because of the National Environmental Policy Act of 1969; the Clean Water Act; the Coastal Zone Management Act; and the Estuary Protection Act. This resource is technically significant because the water quality supports most physical, chemical, geological, and biological processes throughout the entire estuarine system. This resource is publicly significant because the public demands clean water and healthy wildlife and fisher species for recreational and commercial use.

Historic and Existing Conditions

Historic and current water quality issues for rivers and streams in coastal Louisiana include the transport of nutrients, pesticides, synthetic organic compounds, trace elements, suspended sediment, and bacteria. The Louisiana Department of Health and Hospitals coordinates with the Louisiana Department of Environmental Quality (LDEQ), the LDWF, and the Louisiana Department of Agriculture and Forestry to issue water body advisories aimed at protecting the public's health.

Water quality is influenced by Chenier Plain elevations and geomorphologic processes, surface water, land cover and use, and regional weather. The Project Area consists of low relief topography to the north and estuary to the south, with increasing estuary salinity gradients to the south. Hydromodification has occurred as a result of the construction of water control structures, canals, and embankments (Demcheck et al. 2004). The Sabine River is the dominant influence across most of the Calcasieu-Sabine Basin in moderating gulf salinity and tidal fluctuations. Observations by USFWS personnel reveal that strong and prolonged south and southeast winds result in large volumes of Gulf of Mexico water being pushed into Calcasieu and Sabine lakes, which causes the water level in the marshes to rise (Paille 1996). A similar effect on marsh water level has been observed during periods of low barometric pressure in the region (LADNR 2002; Paille 1996).

In general, water quality concerns are related to urbanization to the north, oil and gas activities and saltwater intrusion in the Calcasieu-Sabine Basin. The primary saltwater barrier in the Calcasieu-Sabine Basin is the Calcasieu Lock, located approximately two miles east of the CSC. This sector-gated lock, which opened in 1950, was designed to prevent saltwater intrusion into the Mermentau Basin, and is operated primarily for navigation. During flooding events, the structure is often operated for drainage of the Mermentau Basin to the east.

The most commonly suspected causes of impairments to water quality were low dissolved oxygen, elevated total suspended solids, mercury, elevated turbidity, nitrate/nitrite, carbofuran, and total phosphorus, while the most commonly suspected sources were unknown, agriculture, natural, atmospheric deposition, flow alteration, urban runoff, and on-site treatment systems. In a 2012 305(b) assessment performed by the LDEQ, the most frequently cited suspected causes of impairment included fecal coliform, low dissolved oxygen, turbidity, mercury, total suspended solids, and carbofuran, while most

frequently cited suspected sources of impairment include unknown, agriculture, natural, on-site treatment systems, atmospheric deposition, and drought-related effects (LDEQ 2013). Information and analysis for water quality monitoring will be developed for the Proposed Action following sampling, analysis, and evaluation of water quality and sediment to be conducted in later project phases.

Air Quality

This resource is considered institutionally significant because of the Louisiana Environmental Quality Act of 1983, as amended, and the Clean Air Act of 1963, as amended. Air Quality is technically significant because of the status of regional ambient air quality in relation to the National Ambient Air Quality Standards (NAAQS). It is publicly significant because of the desire for clean air expressed by virtually all citizens.

Historic and Existing Conditions

National air quality standards have been set by the EPA for six common pollutants (also referred to as criteria pollutants) including: ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. States are required by the law and regulations to report to the USEPA annual emissions estimates for point sources (major industrial facilities) emitting greater than, or equal to, 100 tons per year of volatile organic compounds, nitrogen dioxide, sulfur dioxide, particulate matter less than 10 microns in size; 1,000 tons per year of carbon monoxide; or 5 tons per year of lead. Since ozone is not an emission, but the result of a photochemical reaction, states are required to report emissions of volatile organic compounds (VOC), which are compounds that lead to the formation of ozone. Cameron Parish is currently classified as attainment to ozone of all NAAQS. This classification is the result of area-wide air quality modeling studies.

Cultural Resources

The Project Area is part of an eroded Chenier Plain. The vast majority of the area is submerged and covered with water, and defines the need for the use of dredged material to restore land surfaces. A cultural resources literature search, records review, and research design report was completed for the USACE Dredged Material Management Plan for Calcasieu and Cameron Parishes in 2008 (Ryan and Pearson 2008; State Report 22-2957). This report did not find the Project Area to have a high probability of containing any cultural resources, as would be expected from its subsided nature. A field survey of the Project Area, conducted by CEMVN archeologist Noah Fulmer on October 10, 2017, did not identify any intact lands that may contain an unidentified cultural resource. Sediment utilized for the implementation of the Project will be sourced from the routine authorized dredging of the CSC and transported via pipeline placed within existing canals and passing over artificial dikes. No cultural resources are known or expected to exist within any of the marsh creation and restoration areas, dredging areas, access corridors, staging areas, transport areas, or other areas to be used in the implementation of the Proposed Action.

Recreational Resources

This resource is institutionally significant because of the Federal Water Project Recreation Act of 1965, as amended, and the Land and Water Conservation Fund Act of 1965, as amended. Recreational resources are technically significant because of the high economic value of recreational activities and their contribution to local, state and national economies. Recreational resources are publicly significant because of the high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana; and the large per-capita number of recreational boat registrations in Louisiana.

Historic and Existing Conditions

The Project Area is located within the SNWR. According to the Fish and Wildlife Service, the SNWR occupies the marshes between Calcasieu and Sabine lakes in southwest Louisiana, and encompasses 125,790 acres, consisting of 40,403 acres of open water and 85,387 acres of marsh grassland. This area contains a diversity of habitat including freshwater impoundments, wooded ridges and levees, canals, ponds, lakes, and bayous. Some of the largest wetland management efforts in Louisiana occur at the SNWR. The SNWR is managed to provide habitat for migratory waterfowl and other birds and to preserve and enhance coastal marshes for wildlife and fish.

Recreational activities that historically and currently are popular in the vicinity of the Calcasieu and Sabine marshes, include motor boating for pleasure, ingress and egress to numerous private camps accessible only by water, fishing, crabbing, shrimping, hunting, and passive recreational activities, such as observation of wildlife and nature study. Hunting and fishing are the primary recreational activities of the region due to the varied and unique fish and wildlife and natural resources. Along the CSC, numerous intersecting channels exist, providing sportspeople water access into the adjacent marshes and lakes.

2.4 Future without Project Conditions

In the FWOP, or No-Action Alternative, the proposed action would not be implemented and the predicted additional environmental gains would not be achieved. The Project Area generally consists of open water and remnant marsh habitat. The FWOP condition is likely to continue a path of general habitat and resource degradation, except in those areas where dredged material from the CSC maintenance events is placed in a manner conducive to coastal habitat creation and restoration. Dredged material would continue to be disposed within the Federal Standard as described in Section 1.1 of this Report.

Section 2.2, entitled "*Existing and Future without Project or No Action Conditions*" of the 2010 Report, provides a comprehensive discussion of the FWOP conditions of various coast wide resources that remain applicable to this draft Integrated DIR/EA. See Section 2.2.1.2, page 21 of the 2010 Report and the 2004 LCA Study, Volume 1, pages 2-41-42; 2010, Report, pages 46-47, which are incorporated herein by reference:

> "Soil erosion and land loss would continue into the future. Natural and man-made levees would continue to subside and organic soils would not be able to maintain their elevations due to subsidence, decreased plant productivity, and wave erosion. Delta formation would continue at the mouth of the Mississippi and Atchafalaya Rivers. As erosion continued, there would be a continued loss in primary productivity due to loss of vegetated wetlands. Water-bodies would grow larger and wave erosion would accelerate causing further land loss, thus making coastal communities more vulnerable to tropical storms. In addition to land loss in coastal Louisiana, a large percentage of the nation's wetlands would continue to disappear with accompanying impacts to wildlife, fisheries, coastal communities, and socioeconomic resources.

Net primary productivity within the Study Area would continue to decline and existing wetland vegetation would continue to diminish. The ongoing conversion of existing fragmented emergent wetlands to shallow open water would continue with associated indirect impacts on coastal vegetation, fish and wildlife resources, EFH, recreation, aesthetic, and socioeconomic resources. Other indirect adverse impacts that would result from the loss of important and essential vegetated habitats used by fish and wildlife are the loss of shelter, nesting, feeding, roosting, cover, nursery, and other life requirements for fish and wildlife; loss of productivity; loss of transitional habitat between estuarine and marine environments; and increased inter- and intraspecific competition between resident and migratory fish and wildlife species for decreasing wetland resources. This would also reduce the availability of important stopover habitats used by migrating Neotropical birds.

The 2004 LCA Study estimated that coastal Louisiana would continue to lose land at a rate of approximately 6,400 acres per year (10 square miles per year) over the next 50 years. It is estimated that an additional net loss of approximately 328,000 acres (513 square miles) may occur by 2050, which is almost 10 percent of Louisiana's remaining coastal wetlands. However, the 2004 LCA Study noted that these wetland soil losses would be offset to some extent by other federal, state, local, and private restoration efforts across coastal Louisiana, including approximately 2,650 net acres of wetland soils that would be restored through the beneficial use of dredged material within CEMVN's O&M program or with additional funding sources such as Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA); Section 204; or the Coastal Impact Assistance Program (CIAP).

Without implementation of the proposed action, other federal, state, local, and private restoration efforts within or near the project area, the Louisiana state coastal area, and the nation's coastal areas might still occur. Some of these other efforts include the following:

- The 2004 LCA Study recommends 15 near term measures aimed at addressing the critical restoration needs. The components recommended for authorization include five critical near-term ecosystem restoration measures, a demonstration program consisting of a series of demonstration projects, a BUDMAT Program, and a science and technology program. The five critical near-term ecosystem

restoration measures, demonstration projects, and BUDMAT projects are all subject to the approval of feasibility level of detail decision documents by the Secretary of the Army. The 2005 Chief's Report approved the Near-Term Plan substantially in accordance with the 2004 LCA Study. Title VII of the Water Resources Development Act of 2007 (WRDA 2007) (P.L. 110-114) authorized an ecosystem restoration program for the Louisiana Coastal Area substantially in accordance with the Near-Term Plan.

- The 2017 Louisiana's Comprehensive Master Plan for a Sustainable Coast (source: http://issuu.com/coastalmasterplan/docs/coastal_master_plan-v2?e=3722998/2447530; accessed 2 March 2018) has been approved by the State of Louisiana and is partially funded.

- The 2017 State Master Plan indicates that the CPRAB has, since 2007, completed or funded for construction 135 projects resulting in:

    - Over 36,000 acres of land benefited
    - 282 miles of levee improvements
    - Over 60 miles of barrier islands and berms constructed or under construction

- CWPPRA Program – There are currently 153 active CWPPRA projects. In September 2016, 108 projects were completed, benefiting over approximately 100,000 acres. 17 projects are currently under active construction with 23 additional projects approved and in the engineering and design phase of development. (Source: https://lacoast.gov/new/About/FAQs.aspx; accessed March 2, 2018).

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3.0 Plan Formulation

The intent of the proposed action is to the maximize beneficial use of dredged material from routine O&M dredging of the CSC Federal navigation channel in the vicinity of the SNWR and Lake Charles, LA. Dredged material removed from the Federal navigation channel would be deposited in a manner to maximize habitat output above current limitations imposed on the Federal navigation project by the navigation project's Federal Standard. The period of analysis for this Project is 50 years.

3.1 Programmatic Planning Problems, Needs, and Opportunities

3.1.1 Planning Problems

The problems in the Project Area include, but are not limited to:

- Loss of natural sediment transport to, and retention in, coastal marshes;
- Loss of critical coastal geomorphic features due to erosion, subsidence, and sea level change;
- Loss of coastal marshes due to erosion, subsidence, saltwater intrusion, and sea level change.

Land loss in the Project Area, due to subsidence, SLR, and erosion would likely continue at the current rate, estimated at approximately 0.1 square miles per year (Couvillion et al. 2011). As written in Section 2.1, recent analyses by the U.S. Geological Survey (USGS; Couvillion et al. 2017) show the land area in the Calcasieu-Sabine Basin has changed from 528,992 acres in 1932 to 400,066 acres in 2016 for a net change of about 128,926 acres. This net change in land area amounts to a decrease of approximately 24% of the 1932 land area. Furthermore, while recent trends have shown a reduction in the rate of wetland loss, it is important to note that past trends are not necessarily indicative of future change. Future disturbance events such as a major hurricane impact could change the trajectory of the rates. Sea-level rise is projected to increase at an exponential rate, and that would also expedite the rate of wetland loss. (IPCC, 2013; Doyle and others, 2015).

3.1.2 Planning Needs

3.1.2.1 *LCA BUDMAT Program Needs*

The 2004 LCA Study identified the following "Critical Needs" in coastal Louisiana which were reiterated in the 2010 Report and led to opportunities typical of ecosystem restoration projects:

<u>Prevent future land loss where predicted to occur</u>:

> "Addressing this need would create and sustain diverse coastal habitats, sustain wildlife and plant diversity, and sustain socio-economic resources. Effective measures to reverse coastal land loss should affect plant communities, in their root

zone, in such a way as to promote healthy growth and reproduction, plant succession, or revegetation of denuded surfaces. Increasing nutrients and sediment in the estuarine area would increase the growth of marsh vegetation and slow the rate of land loss. Increased plant growth would result in greater production of organic detritus that is essential for a high rate of fisheries and wildlife production. Production of phytoplankton and zooplankton would increase in areas where turbidity is not limiting, and, as a result, the harvest of sport and commercial finfish and shellfish that depend on these microorganisms would increase."

Restore or preserve endangered critical geomorphic features:

"Addressing this need would restore geomorphic features, such as natural levee ridges, lake rims, land bridges, gulf shoreline barrier islands, barrier headlands, and chenier ridges. These features are essential to maintaining the integrity of coastal ecosystems because they are an integral part of the overall system and in many instances represent the first line of defense against marine influences and tropical storm events."

Protect vital local, regional, and national socio-economic resources:

"Addressing this need would reduce the increased risk of damage to cultures, communities, infrastructure, business and industry, and flood protection. Accelerated land loss and ecosystem degradation places over $100 billion of infrastructure at increased risk to damage as a result of storm events. This need could be met by increasing the coastal wetland's capacity to buffer hurricane-induced flooding through wetland creation, wetland sustenance, and retention of barrier island systems."

3.1.2.2 *Project Specific Needs*

The 2004 LCA Study and the 2010 Report identify broadly recognized specific needs within the Louisiana coastal area. In the Project Area, the specific needs are sustaining the complex of degraded distributary ridges and marsh habitat in order to restore or preserve critical geomorphic features and prevent future land loss. Coastal Louisiana wetlands make up the seventh largest delta on Earth, contain about 37 percent of the estuarine herbaceous marshes in the conterminous United States, and support the largest commercial fishery in the lower 48 States. Louisiana currently undergoes about 90 percent of the total coastal wetland loss in the continental United States (USGS 2011). Wetlands within Cameron Parish have undergone substantial loss due to subsidence, sea-level rise, and salt-water intrusion. The current trend of wetlands loss was compounded by hurricanes in 2005. Over a 4 year period from 2004 to 2008, hurricanes Katrina and Rita transformed a significant amount of marsh to open water. The estuarine nature of the area provides a dynamic aquatic environment where freshwater and saltwater meet, providing a transitional zone between the two aquatic ecosystems. The marshes and waterways provide important spawning and nursery habitat and a food source for a wide variety of fresh and saltwater fish species. Vegetation and marsh loss degrades the utility of the area as a nursery habitat and food source. The area contains

a variety of birds, mammals, and other wildlife. Both migratory and resident birds occur in or near the project area. There is widespread public support of projects intended to restore coastal habitats and avert further coastal land loss. The objective of the Calcasieu Sabine Project is to create and restore marsh in open waters of the SNWR.

3.1.3 Planning Opportunities

3.1.3.1 LCA BUDMAT Program Opportunities

Restoration of barrier islands[1]:

> "Placement of sand to restore or nourish barrier islands could sustain these geomorphic features. Doing so would provide additional protection from hurricane storm surges and protect the ecology of estuarine bays and marshes by reducing gulf influences, as well as protect nationally important water bird nesting areas."

Restoration of other geomorphic features [1]:

> "Reestablishing ridges or natural banks can help restore salinity and marsh inundation patterns and provide fishery access in previously unavailable habitats."

Restoration of Wetlands [1]:

> "The LCA Study also identified the use of sediment from dedicated dredging or maintenance dredging (e.g., beneficial use) to create a marsh platform which can create large amounts of coastal habitat quickly."
>
> Annually, there is reasonable potential to beneficially use an additional 30 million cubic yards (CYS) of material coast wide, depending on funding levels. The Federal Standard for maintenance of a federal navigation project is the least cost, environmentally compliant alternative that is consistent with sound engineering standards and meets all Federal environmental standards including the environmental standards established by Section 404 of the Clean Water Act of 1972 or Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended. The Program will optimize the beneficial use, for ecosystem restoration purposes, of dredged materials resulting from the maintenance of federally maintained navigation channels as a separable element from the Federal Standard.

3.1.3.2 Project Specific Opportunities

[1] January 2010, LCA BUDMAT, Final Programmatic Study Report and Programmatic Environmental Impact Statement, page 48.

The rationale for identifying planning opportunities are provided in the 2004 LCA Study[2] and are reiterated in the 2010 Report. The Project opportunities also align with critical needs as originally proposed in the State of Louisiana's 2017 Coastal Master Plan (http://coastal.la.gov/our-plan/2017-coastal-master-plan/). This Project will create and restore valuable wetland habitat in coastal Louisiana in the SNWR.

3.2 Project Specific Planning Goals, Objectives, and Constraints

3.2.1 Planning Goals

1) Restore critical coastal geomorphic landscape features in order to reduce impacts to remaining coastal habitat and critical infrastructure (i.e., coastal ridges, hurricane and storm damage risk reduction features).

2) Increase wetland habitat by creating, restoring, or both, coastal marsh.

3.2.2 Planning Objectives

Maximize beneficial use of dredged material from a federally maintained navigation channel to restore and create coastal habitat that provide wildlife and fisheries habitat with emphasis on ecological and hydrologic functions that support the ecosystem of coastal Louisiana, for a period of analysis of at least 50 years. The quality of restored coastal habitat will be measured using the WVA[3] in terms of Average Annual Habitat Units (AAHUs) and quantity is simply measured by acres created.

1) Increase or restore critical coastal geomorphic landscape and habitat.

2) Increase or restore coastal wetland habitat.

3.2.3 Planning Constraints

The constraints identified in the 2004 LCA Study and the 2010 Report remain applicable for this Project and include those associated with restrictions to operate within existing authorized federal navigation channels, funding limitations, sediment transport limitations, dredge source material type, hazardous, toxic, and radioactive waste concerns, unidentified cultural resource materials, and threatened and endangered species.

1) Availability of O&M Funding and Dredged Material.

   Disposal of dredged material would continue under the routine O&M dredging of the CSC. Utilization of the Program allows for a more specific plan of action

[2] November 2004, Louisiana Coastal Area (LCA), Louisiana, Ecosystem Restoration Study, Final, Volume 1: LCA Study - Main Report, pages 2 – 41-42; January 2010, LCA BUDMAT, Final Programmatic Study Report and Programmatic Environmental Impact Statement, pages 46-47.
[3] see section 3.6.1 Wetland Valuation Assessment for more information on WVAs

for the placement of dredged material in a manner that attains environmental benefits beyond those that could be realized during routine disposal within the Federal Standard of dredged material removed during O&M of federal navigation channels. This Project will be implemented in conjunction with routine O&M of the CSC. Funding available for O&M varies from year to year; therefore, the ability to implement this Project is dependent on the availability of funding for the O&M.

2) Project Life

It is not the intent of the Program to construct ecosystem restoration projects that would exist in perpetuity. Coastal habitat, whether wetland, ridge, or other type of coastal feature, is ephemeral in nature. The material available from routine O&M dredging for a beneficial use and placement project is suitable for building a marsh platform that is capable of persisting for at least 50-years.

3.3 Formulation of Alternative Plans

3.3.1 Identifying Management Measures

A Management Measure is, potentially, a piece or part of the solution to resolve a problem, satisfy a need, or take advantage of an opportunity. A Management Measure, as defined by Yoe and Orth (IWR Report 96-R-21, November 1996, page 134), is "a means to an end; an act, step, or proceeding designed for the accomplishment of an objective. The definition of a management measure (or "measure") is a feature or activity that can be implemented at a specific geographic site to address one or more planning objectives. Measures are the building blocks of which alternative plans are made…."

In formulating alternatives to maximize the benefits for the Calcasieu Sabine Project, the following Management Measures were identified to address coastal habitat degradation in the Project Area.

Management Measure 1: Creation and restoration of coastal chenier habitat.

This Management Measure involves the construction of land, above water and above typical wetland elevation, along the footprint of a degraded coastal chenier (i.e., ridge). The ridge would be constructed using material dredged during Federal O&M navigation channel maintenance dredging activities. Dredged material would be deposited to an elevation conducive to the establishment of representative vegetation for chenier habitat.

- Coastal chenier habitat is unique to southwestern coastal Louisiana and is a critical component of the coastal wetland complex. Habitat provides refuge, resting and nesting habitat necessary for terrestrial and avian wildlife species and essential habitat for Neotropical migrants. These

areas tend to be high enough above water that they lack wetland characteristics and are usually colonized by hardwood species. In most cases, a chenier is a remnant of historic sediment deposition of material carried by east to west long-shore currents from the Atchafalaya and Mississippi Rivers. Cheniers are impacted due to coastal erosion, sediment mining, habitat degradation, and to some degree – subsidence or any combination thereof.

Management Measure 2: Creation and restoration of coastal wetland habitat.

This Management Measure involves the construction of marsh in areas of open water to create and restore previously existing marsh habitat. Marsh would be constructed using material dredged during Federal O&M navigation channel maintenance dredging activities. Dredged material would be deposited to an elevation conducive for wetland development.

- The entire Louisiana coast is losing valuable coastal wetland habitat. In some areas the rate of wetland loss is as high as 25 square miles per year. Wetlands provide diverse habitat between the open waters of the Gulf of Mexico and upland habitat or coastal ridges. Numerous fisheries species and aquatic and non-aquatic wildlife species utilize wetlands as refuge, nursery grounds, and a source of food.

Management Measure 3: Creation and restoration of a chenier and wetland complex.

This Management Measure involves the construction of a coastal chenier and wetland simultaneously in the same location. The coastal chenier would be constructed above water and above typical marsh elevation, along the footprint of a degraded coastal ridge. The marsh would be constructed in areas of open water to restore previously existing marsh habitat parallel and adjacent to the coastal ridge habitat. The coastal chenier and marsh would be constructed using material dredged during Federal O&M navigation channel maintenance dredging activities. Dredged material would be deposited to an elevation conducive to the establishment of representative vegetation for coastal ridge habitat and to an elevation conducive for wetland development.

- Coastal chenier habitat can be associated with wetland habitat in the low areas between the cheniers or on the landward side of a chenier away from the coast-line in low lying areas. Cheniers and wetlands create a mosaic of diverse habitats in close proximity to one another with upland habitat adjacent to wetlands. The cheniers of southwestern coastal Louisiana are unique features that provide critical habitat to many species of aquatic and non-aquatic wildlife. These areas provide refuge, resting and nesting habitat as well as a food source. The cheniers also provides protection to wetland habitat, which provide fish and wildlife habitat, by reducing storm surge and protecting the estuary behind it from

dynamic tidal fluctuations, waves, and (depending on location) salinity intrusion.

Management Measure 4: Planting of wetland habitat feature.

This Management Measure involves the construction of marsh platforms in areas of open water to restore previously existing or degraded marsh habitat. Marsh would be restored using material dredged during Federal O&M navigation channel maintenance dredging activities. Dredged material would be deposited to an elevation conducive for wetland development and planting of native vegetation shall occur post construction.

- The entire Louisiana coast is losing valuable coastal wetland habitat. In some areas the rate of wetland loss is as high as 25 square miles per year. Wetlands provide diverse habitat between the open waters of the Gulf of Mexico and upland habitat or coastal ridges. Numerous fisheries species and aquatic and non-aquatic wildlife species utilize wetlands as refuge, nursery grounds, and a source of food.

Management Measure 5: Planting of chenier habitat feature.

This Management Measure involves the planting of restored chenier habitat with representative native vegetation post-construction of a chenier.

- This feature can provide nesting, resting, and foraging habitat for numerous types of wildlife.

Management Measure 6: Creation and restoration of colonial nesting and wading bird habitat.

This Management Measure involves the passive construction of shallow open water areas for the establishment of tidally influenced sub-tidal flats adjacent to the wetland restoration sites. The flats would be passively constructed by letting dredged material overflow low-lying earthen dikes or weirs into the surrounding shallow open waters.

- Shallow open water, mud flats, or both, can provide nesting, resting, and foraging habitat for numerous wetland dependent avian during low tide or north wind events. They also provide refuge from predators and foraging space for aquatic dependent species during times when the shallow water is deeper or the mud flat is covered by water.

Management Measure 6 would be implemented passively as a result of allowing dredged material to flow over low-level containment dikes, or weirs, into the shallow waters surrounding each marsh restoration site. This measure is a technique that has been coordinated with the SNWR and has been carried out with previous restoration events on the SNWR.

Management Measure 7: Temporary discharge pipeline

This Management Measure involves the use of an existing canal, the West Cove Canal (Figure 5), for the placement of temporary discharge pipeline from the CSC into the marsh creation and restoration sites within the SNWR. The entire length of discharge pipeline from the dredge to the marsh creation and restoration sites would be temporary because the discharge pipeline would only be in place during dredging and disposal operations from routine O&M of the CSC.

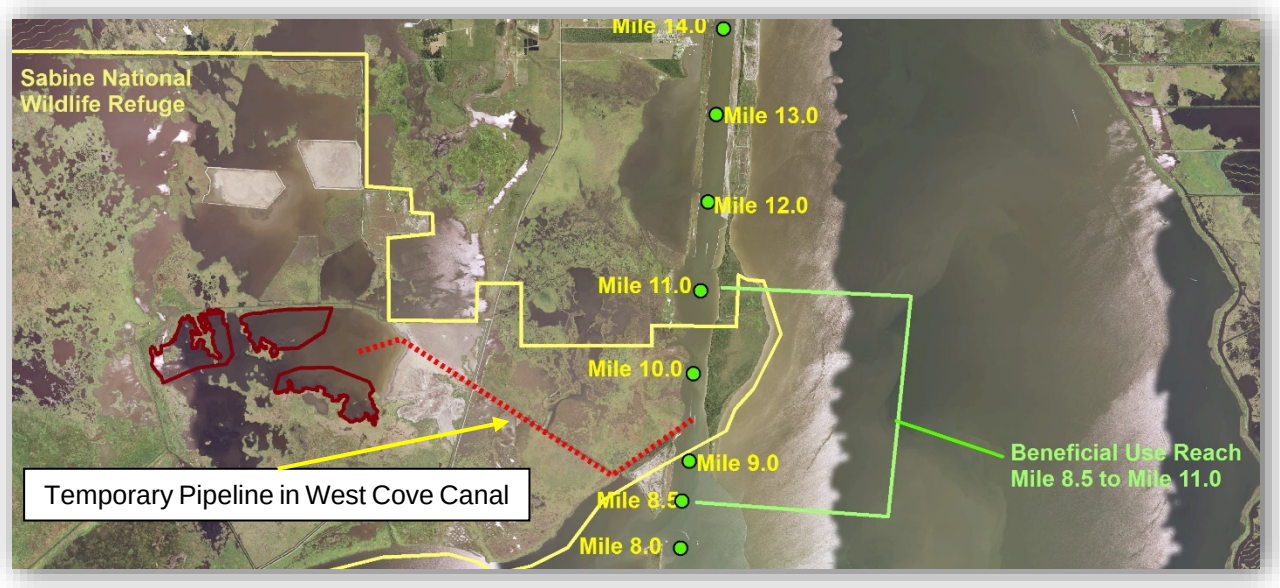

Figure 5. Management Measure 7: Temporary discharge pipeline

Management Measure 8: Permanent discharge pipeline

This Management Measure involves the use of an existing permanent dredged material discharge pipeline (Figure 6) in conjunction with a temporary dredged material discharge pipeline. The temporary discharge pipeline would be used to connect the dredge in the CSC to the permanent discharge pipeline. A temporary pipeline from the terminus of the permanent pipeline on the SNWR would be temporarily placed to pump dredged material from routine O&M of the CSC to the marsh creation and restoration sites on the SNWR.

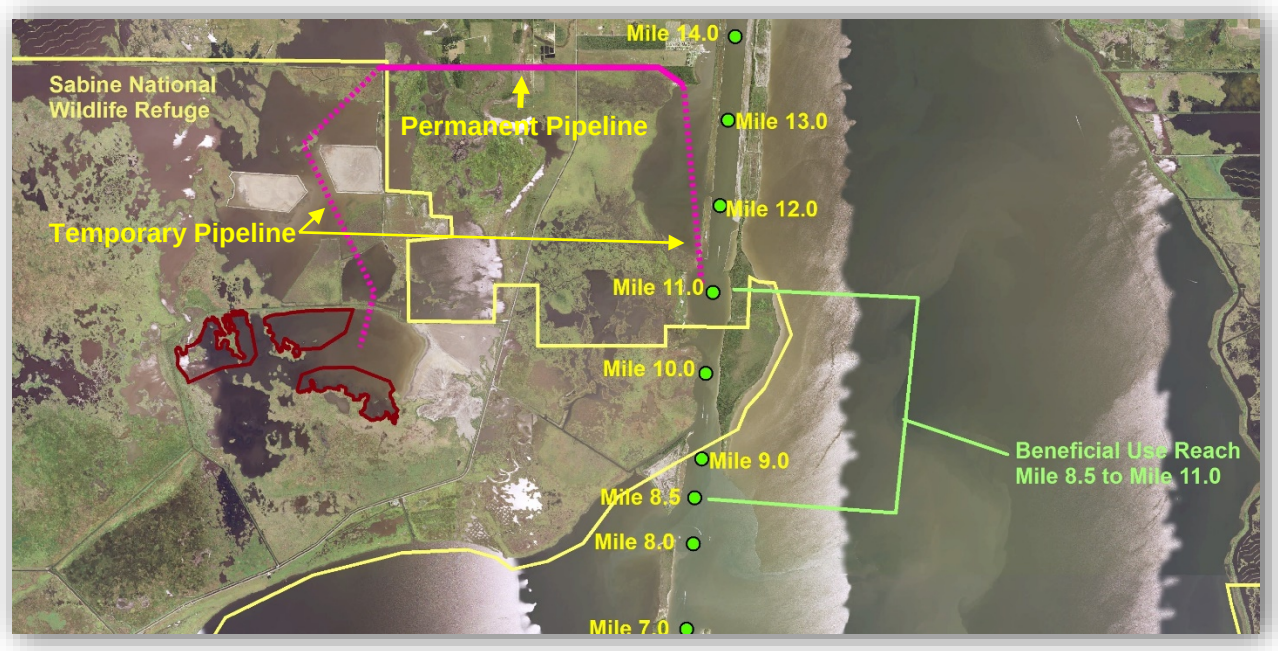

Figure 6. Management Measure 8: Permanent discharge pipeline

3.3.2 Screening of Management Measures

Measures 1, 3 - 5 were screened from further consideration based on the following rationale:

Management Measure 1: Although technically feasible, this Management Measure was screened based on utility as a standalone feature in relation to its surroundings. A more typical coastal geomorphic feature, similar to ridges found in southeastern coast Louisiana, that is found in southwestern Louisiana are "cheniers" which run perpendicular and along the coastline. A chenier is a relatively high piece of land, usually several appear together, perpendicular to the coast line resulting from historic deposition of sediment from the Atchafalaya and Mississippi Rivers due to prevailing east to west long-shore currents along the Louisiana coast. While a chenier is significant in terms of being an important component of the coastal wetland complex in this area of Louisiana, chenier features in the SNWR are not present. This project is not proposing to restore any ridge or coastal chenier habitat.

Management Measure 3: Although technically feasible, this Management Measure was screened since the chenier component (as described in Measure 1) is not a critical feature found in the SNWR.

Management Measure 4: Screened because experience and lessons learned demonstrate that under most conditions a marsh restoration site would be colonized through natural recruitment of wetland species in proximity to the creation and restoration site.

Management Measure 5: Screened because there will be no chenier restoration feature.

After the screening of Management Measures, only 2, 6, 7, and 8 were carried forward.

3.4 Initial Array of Alternatives

Through coordination between the USACE, the NFS, the SNWR, and natural resource agencies, the following list of Alternatives, including the FWOP condition (the No Action Alternative), were developed from the management measures. Management Measures 2, 6, 7, and 8 were carried forward. Management Measures 2, 6, and 7 are combinable, as well as Management Measures 2, 6, and 8. Management Measures 7 and 8 are independent and are not combinable. Management Measure 6 is essentially a component of Management Measure 2 since it relies on allowing dredged material to flow over low level weirs into shallow open water surrounding the marsh creation and restoration sites. Management Measure 6 is listed as a separate action since it is a part of the management of the SNWR.

The following describes the initial array of Alternatives, including a future without project condition, that were developed for comparison and selection of a Proposed Action.

No Action Alternative: **Future Without Project Conditions**.

In the FWOP, or No-Action Alternative, the proposed action would not be implemented and the predicted additional environmental gains would not be achieved. The Project Area generally consists of open water, highly degraded remnant ridge features, and remnant marsh habitat. The FWOP condition is likely to continue a path of general habitat and resource degradation, except in those areas where dredged material from CSC O&M events is placed in a manner conducive to coastal habitat creation and restoration. The FWOP is essentially the implementation of the Federal Standard which constitutes the base disposal plan for a Federal navigation project of placing the maintenance dredged material on the existing and previously approved disposal sites.

Section 2.2, entitled "*Existing and Future Without Project or No Action Conditions*" of the 2010 Report, provides a comprehensive discussion of the FWOP conditions of various coast wide resources that remain applicable to this draft Integrated DIR/EA. See Section 2.2.1.2, page 21 of the 2010 Report and the 2004 LCA Study, Volume 1, pages 2-41-42; 2010, Report, pages 46-47, which are incorporated herein by reference:

> "Soil erosion and land loss would continue into the future. Natural and man-made levees would continue to subside and organic soils would not be able to maintain their elevations due to subsidence, decreased plant productivity, and wave erosion. Delta formation would continue at the mouth of the Mississippi and Atchafalaya Rivers. As erosion continued, there would be a continued loss in primary productivity due to loss of vegetated wetlands. Water-bodies would grow larger and wave erosion would

> accelerate causing further land loss, thus making coastal communities more vulnerable to tropical storms. In addition to land loss in coastal Louisiana, a large percentage of the Nation's wetlands would continue to disappear with accompanying impacts to wildlife, fisheries, coastal communities, and socioeconomic resources."

In addition, net primary productivity within the Project Area would continue to decline and existing wetland vegetation would continue to diminish. The ongoing conversion of existing fragmented emergent wetlands to shallow open water would continue with associated indirect impacts on coastal vegetation, fish and wildlife resources, Essential Fish Habitat, recreation, aesthetic, and socioeconomic resources. Other indirect adverse impacts that would result from the loss of important and essential vegetated habitats used by fish and wildlife are the feeding, roosting, cover, nursery, and other life requirements for fish and wildlife; loss of productivity; loss of transitional habitat between estuarine and marine environments; and increased inter- and intraspecific competition between resident and migratory fish and wildlife species for decreasing wetland resources. This would also reduce the availability of important stopover habitats used by migrating Neotropical birds.

The 2004 LCA Study estimated that coastal Louisiana would continue to lose land at a rate of approximately 6,400 acres per year (10 square miles per year) over the next 50 years. It is estimated that an additional net loss of approximately 328,000 acres (513 square miles) may occur by 2050, which is almost 10 percent of Louisiana's remaining coastal wetlands. However, these wetland soil losses may be offset to some extent by other federal, state, local, and private restoration efforts across coastal Louisiana including approximately 2,650 net acres of wetland soils that would be restored through the beneficial use of dredged material within MVN's O&M program or with additional funding sources.

Alternative 1: 3 Cycles of Marsh Creation and Restoration of marsh habitat at the SNWR using a temporary pipeline

The Proposed Action for Alternative 1 is linked to routine O&M dredging of a reach of the CSC between channel miles 5.0 to 17.0. For each dredging cycle, O&M dredging is separated into three smaller dredging reaches as follows: Mile 5.0 to Mile 8.5; Mile 8.5 to Mile 11.0; and Mile 11.0 to Mile 17.0. Only dredged material removed between Mile 8.5 to Mile 11.0 would be used for the creation and restoration of marsh on the SNWR. Material dredged from the other two reaches are placed in CDFs (confined disposal facilities) located near the CSC channel. The proposed action within the SNWR would entail the placement of dredged material at three (3) different sites during the course of three (3) dredging cycles of the CSC. The three (3) sites that have been identified, sites 1E, Site 1C, and Site 1D as shown in, are planned to be constructed from East to West starting with site 1E. However, the order of construction may be altered as determined to be practicable on a per dredging cycle basis. The order of construction of the marsh creation and restoration sites would not alter the assessment of environmental impacts. There would be two (2) years between each dredging cycle. Approximately 1,000,000 cubic yards (CYS) of material would be dredged during each cycle, from between approximately mile 8.5 and approximately mile 11.5 of the CSC, and deposited at one of

these three (3) sites via a temporary pipeline through West Cove Canal. During each dredging cycle dredged material would be placed as evenly as practical to the elevation specified for the area. To improve the functional values of the created marshes for fish and wildlife usage, tidal creeks may be constructed within the unvegetated marsh platform. Typical tidal creeks range from 3 to 8 feet wide, and no more than 1 to 2 feet deep at low tide. The location and design of the tidal creeks will be finalized in coordination with USFWS after settlement and dewatering of the marsh platform.

Figure 7. Alternative 1.

Alternative 2: 3 Cycles of Marsh Creation and Restoration of marsh habitat at the SNWR using a combination of temporary and permanent discharge pipeline

The proposed action for Alternative 2 is also linked to routine O&M dredging of a reach of the CSC between channel miles 5.0 to 17.0. For each dredging cycle, O&M dredging is separated into three smaller dredging reaches as follows: Mile 5.0 to Mile 8.5; Mile 8.5 to Mile 11.0; and Mile 11.0 to Mile 17.0. Only dredged material removed between Mile 8.5 to Mile 11.0 would be used for the creation and restoration of marsh on the SNWR. Material dredged from the other two reaches are placed in CDFs (confined disposal facilities) located near the CSC channel. The proposed action within the SNWR would entail the placement of dredged material at three (3) different sites during the course of three (3) dredging cycles of the CSC. The three (3) sites that have been identified, sites 1E, Site 1C, and Site 1D as shown in (Figure 8), are planned to be constructed from East to West starting with site 1E. However, the order of construction may be altered as determined to be practicable on a per dredging cycle basis. The order of construction of the marsh creation and restoration sites would not alter the assessment of environmental impacts. There would be two (2) years between each dredging cycle. Approximately 1,000,000 cubic yards (CYS) of material would be dredged during each cycle, from between approximately mile 8.5 and approximately mile 11.5 of the CSC, and deposited at one of these three (3) sites via a combination of temporary pipeline from the dredge to a permanent pipeline located at the northeast corner of the SNWR. From the terminus of the permanent pipeline, a temporary pipeline would be placed to pump dredged material to the marsh creation and restoration sites. During each dredging cycle dredged material would be place as evenly as practical to the elevation specified for the area. To improve the functional values of the created marshes for fish and wildlife usage, tidal creeks may be constructed within the unvegetated marsh platform. Typical tidal creeks range from 3 to 8 feet wide, and no more than 1 to 2 feet deep at low tide. The location and design of the tidal creeks will be finalized in coordination with USFWS after settlement and dewatering of the marsh platform.

Figure 8. Alternative 2.

3.4.1 Screening Criteria

Typically, the initial list of alternatives would be screened based on the ability of the alternative to meet the project purpose and need, planning constraints, technical feasibility, and likelihood for implementation. Both Alternative 1 and 2 are technically feasible and meet the project purpose. The benefits and impacts are the same for both alternatives; however, the significantly higher cost of Alternative 2 would impact planning constraints and the likelihood of implementation. Because both alternatives are technically feasible and meet program objectives, all alternatives were carried forward for plan formulation and comparison purposes.

3.4.2 Initial Screening of Alternatives

All alternatives were compared based on the estimated acres of marsh that could be created and parametric cost estimates (Table 6), to determine if there was any apparent benefit in eliminating one alternative from further consideration. While it is readily apparent that one action alternative is preferable based on costs alone, since the Project benefits are the same, all alternatives were carried forward for further analysis resulting in a final array of alternatives as listed in Section 3.5.

Table 6. Initial Comparison of Alternatives

Alternative	Site(s)	Size of placement Area (acres)	Total BUDMat Cost/Cycle
No-Action	None	0	0
Alternative 1			
Cycle 1	1E	228	$4,497,875
Cycle 2	1D	229	$3,898,100
Cycle 3	1C	233	$4,640,720
Alternative 2			
Cycle 1	1E	228	$9,205,375
Cycle 2	1D	229	$7,023,100
Cycle 3	1C	233	$8,791,970

3.5 Final Array of Alternatives

The Final Array of alternatives, as stated previously, includes the No Action Alternative as well as Alternatives 1 and 2. These Alternatives were carried forward for comparison of benefits and cost.

- No Action Alternative
- Alternative 1 – 3 Cycles of marsh creation and restoration of marsh habitat at the SNWR using a temporary pipeline
- Alternative 2 – 3 Cycles of Marsh Creation and Restoration of marsh habitat at the SNWR using a combination of a temporary and a permanent discharge pipeline

3.6 Comparison of Final Array Alternatives

The Final Array of alternatives was carried forward for a comparison of the costs and benefits of the FWOP along with the two alternatives. Benefits were calculated by the United States Fish and Wildlife Service (USFWS) for the MVN using Wetland Value Assessment (WVA) methodologies.

3.6.1 Wetland Value Assessment

Evaluations of the effects of the Alternatives to fish and wildlife resources were conducted using the WVA methodology. Implementation of the WVA requires that habitat quality and quantity (acreage) are measured for baseline conditions and predicted for future without-project and future with-project conditions. Each WVA model utilizes an assemblage of variables considered important to the suitability of that habitat type to support a diversity of fish and wildlife species.

The WVA provides a quantitative estimate of project-related impacts to fish and wildlife resources. Although the WVA may not include every environmental or behavioral variable that could limit populations below their habitat potential, it is widely acknowledged to provide a cost-effective means of assessing creation and restoration measures in coastal wetland communities.

The WVA models operate under the assumption that optimal conditions for 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 to provide an index of habitat quality. Habitat quality is estimated and 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 community-level fish and wildlife habitat values; (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 Indices for each variable into a single value for wetland habitat quality, termed the Habitat Suitability Index (HSI).

The product of an HSI value and the acreage of available habitat for a given target year is known as the Habitat Unit (HU) and is the basic unit for measuring project effects on fish and wildlife habitat. HUs are annualized over the project life to determine the Average Annual Habitat Units (AAHUs) available for each habitat type. The change (increase or decrease) in AAHUs for each future with-project scenario, compared to future without-project conditions, provides a measure of anticipated impacts. A net gain in AAHUs indicates that the project is beneficial to the fish and wildlife community within that habitat type; a net loss of AAHUs indicates that the Proposed Action would adversely impact fish and wildlife resources. Table 7 provides details on acres and net and total marsh AAHUs.

Because all of the alternatives include placement of dredged material in shallow water bottoms, they would impact benthic and slower moving aquatic demersal organisms; however shallow water bottom habitat area is increasing relative to emergent marsh area and coastal islands in most of coastal Louisiana. The construction of the Proposed Action and the other Alternatives would impact remnant degraded marsh but they would create new and nourish existing emergent marsh with greater refugia and forage benefits than open water bottoms and would increase the overall net habitat value of the area.

Table 7. LCA BUDMAT at Calcasieu Sabine Alts with Acres & Net Restore AAHUs

Alternative	Site(s)	Marsh Acres Restored	Net Marsh AAHUs	Total AAHUs
No-Action	None	0	0	0
Alternative 1				
Cycle 1	1E	228	109	65
Cycle 2	1D	229	104	62
Cycle 3	1C	233	104	63
Alternative 2				
Cycle 1	1E	228	109	65
Cycle 2	1D	229	104	62
Cycle 3	1C	233	104	63

See the WVA model results and summary of assumptions in the U.S. Fish and Wildlife Coordination Act Report (CAR) dated 21 September 2017 (See Appendix G. US Fish and Wildlife Draft Coordination Report).

3.6.2 Cost Effective and Incremental Cost Analyses

For environmental planning, where traditional benefit-cost analysis is not possible because costs and benefits are expressed in different units, two analytical methods are used to assist Corps planners in the decision process. First, cost effectiveness (CE) analysis is conducted to ensure that the least cost solution is identified for each possible level of environmental output. Subsequent incremental cost analysis (ICA) of the cost effective solutions is conducted to reveal changes in costs for increasing levels of environmental outputs. In the absence of a common measurement unit for comparing the non-monetary benefits with the monetary costs of environmental plans, cost effectiveness and incremental cost analysis are valuable tools to assist in decision making.

It is important to keep in mind that the most useful information developed by these two methods is what it tells decision makers about the relative relationships among solutions – that one will likely produce greater output than another, or one is likely to be more costly than another – rather than the specific numbers that are calculated. Furthermore, these analyses will usually not lead, and are not intended to lead, to a single best solution (as in economic cost-benefit analysis); however, they will improve the quality of decision making by ensuring that a rational, supportable approach is used in considering and selecting alternative methods to produce environmental outputs.

To perform the CE/ICA, use was made of the IWR Planning Suite Decision Support Software developed by the US Army Corps of Engineers Institute for Water Resources (IWR). IWR Planning Suite has been developed to assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are the best financial investments (“Best Buys”), and displaying the effects of each on a range of decision variables. The software is available via the IWR Planning Suite Internet. The latest version (2.0.6.1) has been certified for use by USACE Headquarters, meaning

that it has been reviewed and certified by the appropriate Planning Center of Expertise (PCX) and represents a corporate approval that the model is sound and functional.

3.6.2.1 *Cost Effective Solutions (CE)*

In cost effectiveness analysis, it is necessary to filter out plans that produce the same output level as another plan, but cost more; or cost the same amount or more than another plan, but produces less output. This CE analysis was performed by the IWR planning model.

Tables 8, 9, and 10 display the expected environmental outputs in terms of habitat units along with the total cost and average annual cost for each of the restoration alternatives and no action plans. For each marsh creation and restoration site for each dredging cycle, Alternative 1 is cost effective; but Alternative 2 is non cost effective.

Table 8. Cycle 1, Site 1E - Summary of Outputs and Costs

Name of Alternative	Total Cost	Average Annual Cost	Average Annual Habitat Units (AAHUs)	Cost Effective
No Action	$0	$0	0	-
Alternative 1 Cycle 1 - 1E	$4,497,875	$162,146	62.20	Yes
Alternative 2 Cycle 1 - 1E	$9,205,375	$331,850	62.20	No

Costs are shown at the 2018 price level and were annualized using the current FY18 Federal discount.

Table 9. Cycle 2, Site 1D - Summary of Outputs and Costs

Name of Alternative	Total Cost	Average Annual Cost	Average Annual Habitat Units (AAHUs)	Cost Effective
No Action	$0	$0	0	-
Alternative 1 Cycle 2 - 1D	$3,898,100	$133,103	62.36	Yes
Alternative 2 Cycle 2 - 1D	$7,023,100	$239,809	62.36	No

Costs are shown at the 2018 price level and were annualized using the current FY18 Federal discount.

Table 10. Cycle 3, Site 1C - Summary of Outputs and Costs

Name of Alternative	Total Cost	Average Annual Cost	Average Annual Habitat Units (AAHUs)	Cost Effective
No Action	$0	$0	0	-
Alternative 1 Cycle 3 - 1C	$4,640,720	$150,092	64.57	Yes
Alternative 2 Cycle 3 - 1C	$8,791,970	$284,354	64.57	No

Costs are shown at the 2018 price level and were annualized using the current FY18 Federal discount.

3.6.2.2 *Cost Effective and Incrementally Justified (Best Buy Plans)*

The final step in the analysis is to determine which subset of the cost effective solutions is also incrementally justified. These solutions, also known as Best Buy Plans or Best Buy Alternatives, are those plans that provide increases in benefits at the lowest average cost (per habitat unit). The IWR Planning model was run to make the necessary calculations producing the results shown in Tables 11, 12, and 13. In this case, all the cost effective plans are also Best Buy Plans.

Included in Tables 11, 12, and 13 are the incremental costs per habitat unit for the Best Buy Plans. Incremental cost is calculated by dividing the difference between the

solution's costs by the difference between the solution's outputs. Reviewing this table with the incremental cost information now allows the decision maker to make the following comparisons of alternative restoration plans and to progressively ask "Is it worth it?"

As noted previously, neither cost effectiveness analysis nor incremental cost analysis will tell the decision maker what choice to make. However, the information developed by both analyses will help the decision maker make a more-informed decision and, once a decision is made, better understand its consequences in relation to other choices. Figure 9 (Section 3.6.2.3) shows the full range of solutions and highlights the non-cost effective solutions and the incrementally justified (Best Buy) solutions.

Table 11. Cycle 1, Site 1E - Best Buy Plans and Incremental Costs

Name of Alternative	Total Cost	Average Annual Cost	Average Annual Habitat Units (AAHUs)	Average Annual Cost per AAHU	Additional Output (AAHUs)	Additional Average Annual Cost	Incremental Cost (per Habitat Unit)
No Action	$0	$0	0	$0	0	$0	$0
Alt 1 (Cycle 1 - 1E)	$4,497,875	$162,146	62.20	$2,607	62.2	$162,146	$2,607

Costs are shown at the 2018 price level and were annualized using the current FY18 Federal discount rate of 2.75 percent over a 50-year period of analysis.

Table 12. Cycle 2, Site 1D - Best Buy Plans and Incremental Costs

Name of Alternative	Total Cost	Average Annual Cost	Average Annual Habitat Units (AAHUs)	Average Annual Cost per AAHU	Additional Output (AAHUs)	Additional Average Annual Cost	Incremental Cost (per Habitat Unit)
No Action	$0	$0	0	$0	0	$0	$0
Alt 1 (Cycle 2 - 1D)	$3,898,100	$133,103	62.36	$2,134	62.36	$133,103	$2,134

Costs are shown at the 2018 price level and were annualized using the current FY18 Federal discount rate of 2.75 percent over a 50-year period of analysis.

Table 13. Cycle 3, Site 1C - Best Buy Plans and Incremental Costs

Name of Alternative	Total Cost	Average Annual Cost	Average Annual Habitat Units (AAHUs)	Average Annual Cost per AAHU	Additional Output (AAHUs)	Additional Average Annual Cost	Incremental Cost (per Habitat Unit)
No Action	$0	$0	0	$0	0	$0	$0
Alternative 1 (Cycle 3 - 1C)	$4,640,720	$150,092	64.57	$2,324	64.57	$150,092	$2,324

Costs are shown at the 2018 price level and were annualized using the current FY18 Federal discount rate of 2.75 percent over a 50-year period of analysis.

3.6.2.3 *Cost Analysis*

A cost effective/incremental cost analysis was run on the final array of Alternatives including the No-Action Alternative. Alternative 1is the "Best Buy" plan. The no-action alternative, technically, is always a "Best Buy" plan, but does not meet the goals or objectives of Project. Alternative 2 is non-cost effective so it was screened from further consideration.

As noted previously, neither cost effectiveness analysis nor incremental cost analysis will tell the decision maker what choice to make. However, the information developed by both analyses will help the decision maker make a more-informed decision and, once a decision is made, better understand its consequences in relation to other choices. Figure 9 shows Alternatives 1 and 2 and highlights the incrementally justified (Best Buy) solutions and the non-cost effective alternative solution. Figure 9 illustrates the cost analysis graphically.

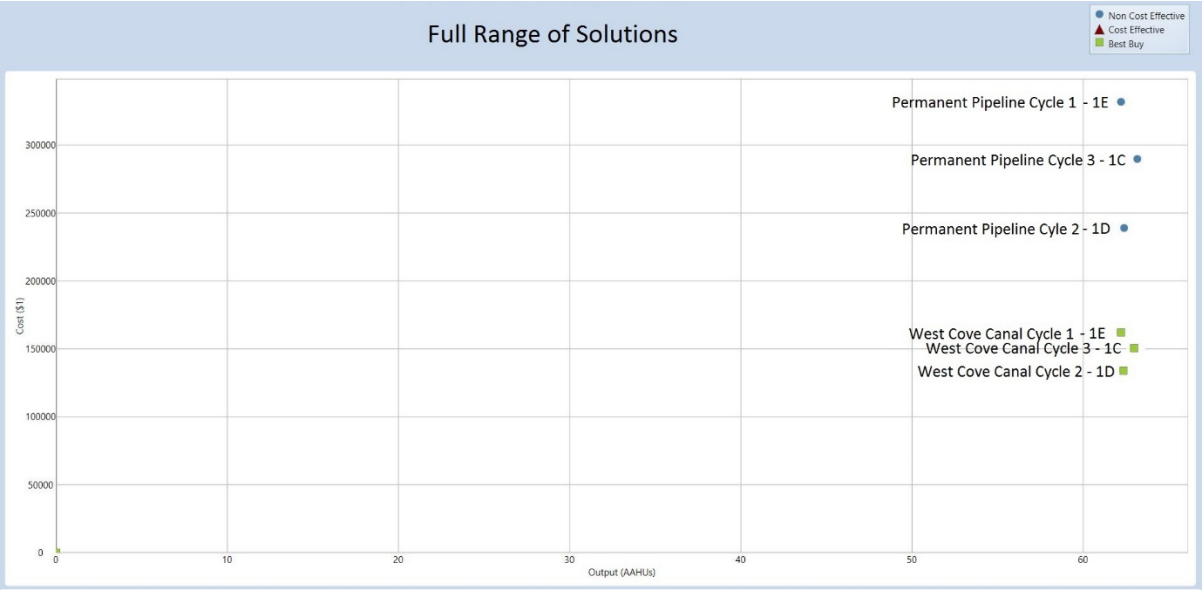

Figure 9. CE/ICA Full Range of Solutions

3.7 Selection of the Tentatively Selected Plan

3.7.1 Summary of Accounts and Comparison of Alternatives

To facilitate the evaluation and display of effects of the alternative plans, there are four accounts which are set forth in the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" 10 March 1983, and referenced in ER-1105-2-100, which encompass all significant effects of a plan on the human environment that must be considered in the alternatives screening process:

(1) The National Economic Development (NED) Account displays changes in the economic value of the national output of goods and services.

(2) The Environmental Quality (EQ) Account displays non-monetary effects on ecological, cultural, and aesthetic resources including the positive and adverse effects of ecosystem restoration plans.

(3) The Regional Economic Development (RED) Account displays changes in the distribution of regional economic activity (e.g., income and employment).

(4) The Other Social Effects (OSE) Account displays plan effects on social aspects such as community impacts, health and safety, displacement, energy conservation and others.

Although the display of the NED and the EQ Accounts is required, the NED Account does not apply as a screening factor for this Project, as the Project is not designed to produce economic benefits, therefore the NED account is not considered in the evaluation of alternatives for the Project. Display of the RED and OSE Accounts is discretionary. The RED Account is not displayed or factored in this Report because the proposed Project for ecosystem restoration will not have an impact on employment or income within the Project Area. The categories of effects in the OSE Account include: urban and community impacts; life, health, and safety factors; displacement; long-term productivity; and energy requirements and energy conservation which are not adversely impacted by the proposed project.

3.7.2 Tentatively Selected Plan Defined

As described in ER-1105-2-100, for ecosystem restoration projects, a TSP that reasonably maximizes ecosystem restoration benefits compared to costs and which is consistent with the Federal objective, shall be selected. The TSP must be shown to be cost effective and justified to achieve the desired level of output. The TSP shall be identified as the National Ecosystem Restoration (NER) Plan.

3.7.3 Acceptability, Completeness, Effectiveness, and Efficiency

Alternatives considered in any planning study, not just ecosystem creation and restoration studies, should meet minimum subjective standards of these criteria in order to qualify for further consideration and comparison with other plans. Table 14 provides a summary of the acceptability, completeness, effectiveness and efficiency. Alternative 1 is the 'best buy' plan. Alternative 2 is 'non cost-effective.' Alternative 1 meets all of the standards of completeness, effectiveness, efficiency, and acceptability; therefore, it was selected as the Tentatively Selected Plan (TSP). Alternative 2 meets the requirements of completeness, effectiveness, and acceptability, but due to costs it does not meet the efficiency standard so it cannot be selected as the TSP.

Alternative	Completeness	Effectiveness	Efficiency	Acceptability
No Action	This Alternative provides no benefits.	This Alternative will not alleviate any problems or achieve any opportunities.	Although this alternative has no cost, habitat conditions will decline. It is not efficient.	This plan can be implemented by taking no action, but it provides no solution to the identified problems.

1	This Alternative can be implemented and contributes to addressing all of the identified restoration problems or opportunities but provides benefits which are less than larger alternatives.	Addresses Problems and Opportunities. Meets goals and objectives by restoring a coastal marsh feature.	Best Buy	Acceptable to the NFS, and other Federal and state resource agencies.
2	This Alternative can be implemented and contributes to addressing all of the identified restoration problems or opportunities and provides similar benefits to other alternatives.	Addresses Problems and Opportunities. Meets goals and objectives by restoring a coastal marsh feature.	Non Cost Effective	Acceptable to the NFS, and other Federal and state resource agencies.

Table 14. Acceptability, Completeness, Effectiveness, and Efficiency

3.8 Description of the TSP (Alternative 1)

The TSP within the SNWR would entail the placement of dredged material within the refuge on three (3) different sites during the course of three (3) dredging cycles of the CSC, Mile 5.0 to Mile 17.0. These three (3) sites has been identified as Site 1C, Site 1D, and Site 1E as shown in Figure 10 and Figure 11. There would be two (2) years between each dredging cycle. Approximately 1,000,000 cubic yards (CYS) of material would be dredged during each cycle, from between approximately mile 8.5 and approximately mile 11.5 of the CSC, and deposited on one of these three (3) sites via temporary pipeline through West Cove Canal at approximately Mile 9.4. During each dredging cycle dredged material would be place as evenly as practical to the elevation specified for the area. No material would be discharged directly upon existing wetlands or emergent vegetative marsh, but material placed within each site would be allowed to overflow the low level earthen weirs to be constructed and it would be allowed to settle and/or erode, as well as vegetate naturally over time. To improve the functional values of the created marshes for fish and wildlife usage, tidal creeks may be constructed within the unvegetated marsh platform. Typical tidal creeks range from 3 to 8 feet wide, and no more than 1 to 2 feet deep at low tide. The location and design of the tidal creeks will be finalized in coordination with USFWS after settlement and dewatering of the marsh platform.

During the first dredging cycle dredged material would be deposited into the designated marsh creation area identified as “Site 1E”. Approximately 228 acres of marsh would be created on this site. To facilitate construction of the marsh 7275 feet of low level earthen weirs would be constructed. Approximately 757,000 CYS of material will be required from the channel. Material would be transported via approximately 4.7 miles of temporary pipeline through West Cove Canal.

During the second dredging cycle dredged material would be deposited into the designated marsh creation area identified as “Site 1D”. Approximately 229 acres of marsh would be created on this site and 5280 feet of low level earthen weirs would be

constructed. Approximately 869,000 CYS of material will be required from the channel. Material would be transported via approximately 4.7 miles of temporary pipeline through West Cove Canal.

During the third dredging cycle dredged material would be deposited into the designated marsh creation area identified as "Site 1C". Approximately 233 acres of marsh would be created on this site and 6548 feet of low level earthen weirs would be constructed. Approximately 774,000 CYS[4] of material will be required from the Channel. Material would be transported via approximately 5.9 miles[5] of temporary pipeline through West Cove Canal.

Figure 10. Tentatively Selected Plan (Alternative 1)

[4] Pipeline distance provided does not include pipeline required along Calcasieu Ship Channel to accommodate the reach to be dredged.
[5] The quantity provided here represents the estimated gross quantity required from the channel to achieve the estimated acreage for the site. This number should not be taken as Gross Quantity to be dredged from the channel which includes the estimated overflow area adjacent to each site, interior marsh nourishment, estimated 1.0 feet of overdepth, and adjustment for shoaling.

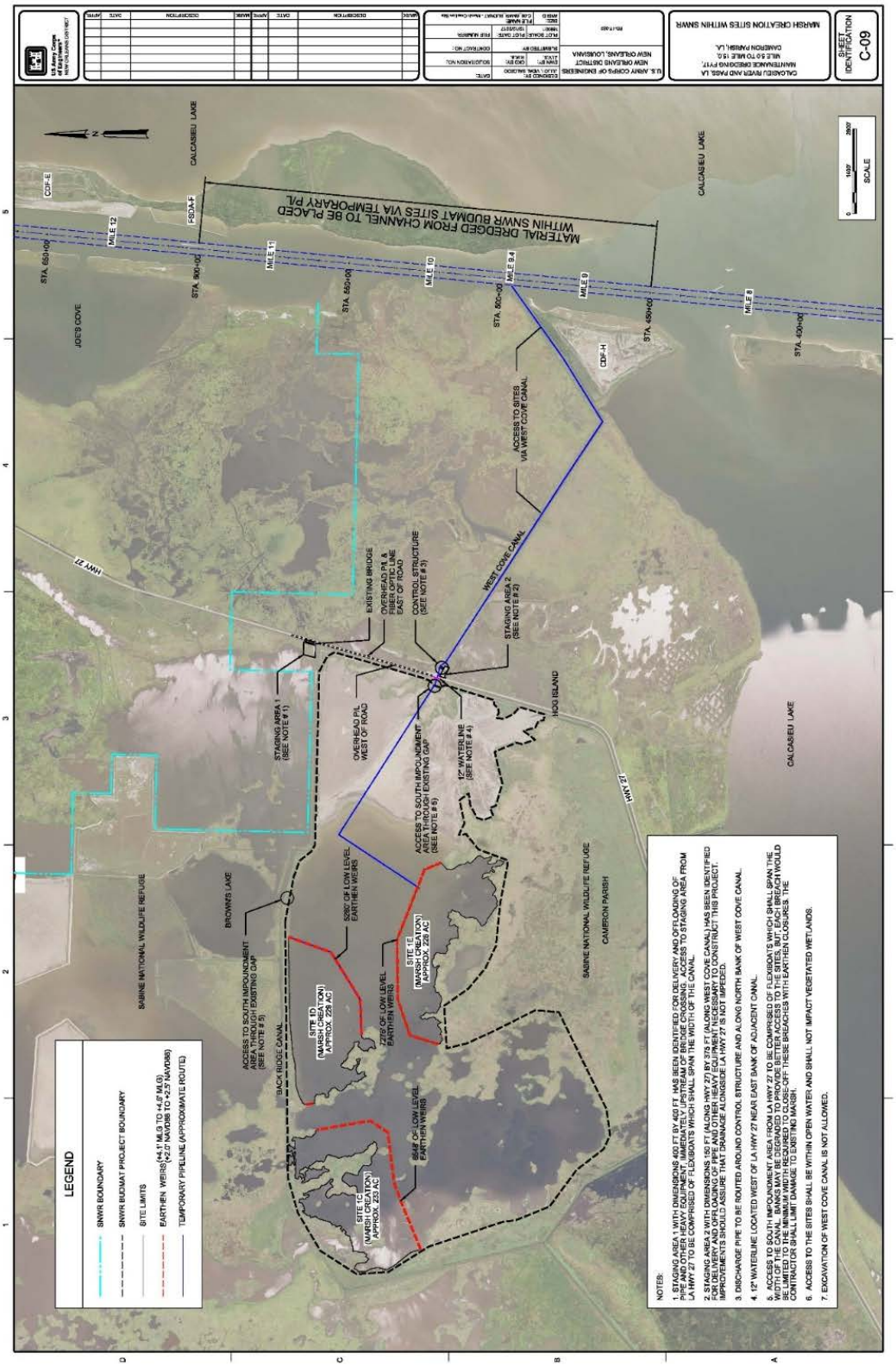

Figure 11. Detailed Illustration of the TSP.

Earthen Weirs

As shown in Figure 12, earthen weirs would be constructed to the following dimensions: minimum crown width of five (5) feet, with a target elevation of +4.1 feet MLG (2.0 feet NAVD88) to +4.6 feet MLG (2.5 feet NAVD), and side slopes no steeper than 1V on 3H. Borrow for all weir construction would come from within each site. Weirs may be breached if required to allow for proper flow of excess wastewater and to maximize the retention and buildup of the solids within the sites.

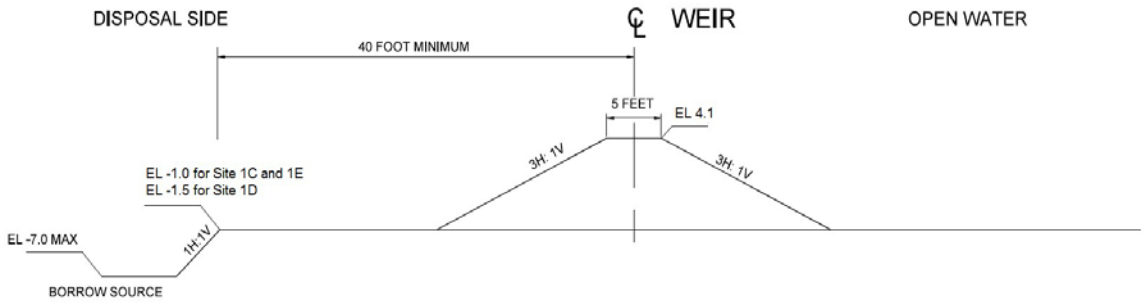

Figure 12. Typical Section Earthen Weir for Site 1C, 1D, and 1E

Access and Staging Areas

Access for temporary pipeline and equipment from the CSC navigation channel shall be via West Cove Canal, around the control structure in West Cove Canal (along the north bank of the canal), under the LA Hwy 27 bridge, and through the fresh water impoundment area to the sites. Dikes along the Back Ridge Canal at the drainage canal at Hwy 27 may be degraded, if necessary, to provide access for pipeline and equipment to the sites. Each breach would be limited to the minimum width required to close-off these breaches between each dredging cycle with earthen closures. These closures would be constructed of material that was initially removed and stockpiled. Excavation of West Cove Canal would not be allowed.

There are two (2) staging areas available adjacent to and north of West Cove Canal for bringing in and offloading of pipeline and equipment. There are two (2) existing parking lots located near West Cove Canal that are available for use and improvement/expansion. These parking lots are located within the limits of the SNWR and may be improved/expanded in order to serve as staging areas for construction equipment and for unloading and building of pipeline and other necessary equipment for construction. The northern parking lot/staging area is located to the north of Back Ridge Canal at Hwy 27. Staging Area 1 may be used for off-loading of dredge pipeline and equipment. The staging area has an area of 400 feet by 400 feet. The second parking lot/staging area 2 available is on the south side of West Cove Canal at LA Hwy 27. This parking lot has an area of 150 feet (along LA Hwy 27) by 375 feet (along West Cove Canal). If needed, expansion of these areas shall be performed with materials such as geotextile fabric, crushed stone, shell, gravel, sand, dirt or some combination of these materials which shall

remain in place after construction. Flexi-float platforms within the canal west of LA Hwy 27 shall be used at both staging areas as required.

3.8.1 Dredged Material Placement under Federal Standard

The Federal Standard disposal plan for dredging the Federally-authorized CSC consists of placing the dredged material in upland confined disposal facilities.

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4.0 Implementation of the TSP (Alternative 1)

The following sections outline the expected outcomes of the TSP.

4.1 Significance of the TSP

The TSP meets the Planning and Guidance criteria of acceptability, completeness, effectiveness, and efficiency. Creation and restoration of coastal marsh habitat enjoys a high profile and broad base of support from the public at large. The TSP meets the goals and objectives of the Project by restoring a critical habitat in an area that has and continues to experience a significant rate of marsh loss. The TSP will be constructed to an elevation that provides will allow for the marsh to exist for at least 50 years after construction. The construction of weirs for dredged material (partial) containment is also effective and efficient as it maximizes the cost per benefit output and utilizes a resource that is readily available in manner that has the potential to restore the most useable habitat. The institutional, public, and technical significance of the TSP and its impact on various coastal resources is consistent with those outlined in Section 2.2 of the 2010 Report starting on page 19.

4.2 Cost of the TSP

The following describes the Project cost for the TSP and the cost per total AAHUs. A Micro-Computer Aided Cost Engineering System Second Generation (or MII) Total Project Cost Summary (Appendix F. Cost Certification and Total Project Cost Summary**)**. The incremental costs for this Project are the costs that exceed the "base plan costs" (also referred to as the Federal Standard) of the authorized Federal navigation project. The term "base plan costs" describes the Federal Standard, and refers to the costs, as determined by the USACE, to carry out the dredging and disposal of material for the for O&M of the Federal navigation project in the most cost effective way, consistent with economic, engineering, and environmental criteria.

Tables 15, 17, and 19 provide the estimated cost of the Federal Standard for O&M, the Project Cost for implementation of the TSP, and the incremental difference of the two which is the Total Project Cost for the BUDMAT Project. The tables further provide the Federal and Non-Federal Responsibility for the BUDMAT Project. Tables 16, 18, and 20 provide the TSP total costs, the TSP AAHUs, and a TSP Total Project Cost/AAHU.

Table 15. Project Cost for West Cove Canal, Cycle 1, Restoration Site 1E

	O&M at the Federal Standard (100% Federal)	TSP	BUDMAT Project Cost	Federal Responsibility under BUDMAT (75%)	NFS Responsibility under BUDMAT (25%
First Construction Cost	$19,730,662	$24,228,537	$4,497,875	$3,373,406	$1,124,469

LERRDs	0	0	0	0	0
Total Project Cost	$19,730,662	$24,228,537	$4,497,875	$3,373,406	$1,124,469

Table 16. West Cove Canal, Cycle 1, Restoration Site 1E - Project Cost and Benefits

TSP BUDMAT total cost	TSP AAHUs	TSP Total Project cost/AAHU
$4,497,875	65	$69,198

Table 17. Project Cost for West Cove Canal, Cycle 2, Restoration Site 1D

	O&M at the Federal Standard (100% Federal)	TSP	BUDMAT Project Cost	Federal Responsibility under BUDMAT (75%)	NFS Responsibility under BUDMAT (25%
First Construction Cost	$21,099,412	$24,997,512	$3,898,100	$2,923,575	$974,525
LERRDs	0	0	0	0	0
Total Project Cost	$21,099,412	$24,997,512	$3,898,100	$2,923,575	$974,525

Table 18. West Cove Canal, Cycle 2, Restoration Site 1D - Project Cost and Benefits

TSP BUDMAT total cost	TSP AAHUs	TSP Total Project cost/AAHU
$3,898,100	62	$62,872

Table 19. Project Cost for West Cove Canal, Cycle 3, Restoration Site 1C

	O&M at the Federal Standard (100% Federal)	TSP	BUDMAT Project Cost	Federal Responsibility under BUDMAT (75%)	NFS Responsibility under BUDMAT (25%
First Construction Cost	$21,099,412	$25,740,132	$4,640,720	$3,480,540	$1,160,180
LERRDs	0	0	0	0	0
Total Project Cost	$21,099,412	$25,740,132	$4,640,720	$3,480,540	$1,160,180

Table 20. West Cove Canal, Cycle 3, Restoration Site 1C - Project Cost and Benefits

TSP total cost	TSP AAHUs	TSP Total Project cost/AAHU
$4,640,720	63	$73,662

4.3 Benefits of the TSP

The initial comparison of alternatives, and selection of the TSP was based on preliminary design assumptions. For comparison of alternatives it was assumed that the available acres of open water would successfully convert to marsh.

Once the TSP is confirmed as the Recommended Plan (RP) in a final document, a more detailed design of the marsh creation and restoration sites and the pipeline route would be developed. The design on the RP could provide additional refined details related to the pipeline route and the potential acres being restored through implementation of the RP. Table 21. TSP - Project Cost and Benefits, provides the total costs of the TSP, the TSP's AAHUs, and a TSP Total Project Cost/AAHU.

Table 21. TSP - Project Cost and Benefits

Alternative	Site(s)	Size of placement Area (acres)	Net Marsh AAHUs	Total AAHUs	Total BUDMAT Cost/Cycle
Alternative 1					
Cycle 1	1E	228	109	65	$4,497,875
Cycle 2	1D	229	104	62	$3,898,100
Cycle 3	1C	233	104	63	$4,640,720

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5.0 Environmental Consequences

5.1 Navigation

Future Conditions with No Action Alternative

There would be no anticipated impacts to navigation without implementation of the TSP. O&M activities would continue to dredge the CSC and dispose of materials in one of the already approved dredged material disposal sites.

Future Conditions with the Proposed Action

Hydraulic cutterhead dredges and disposal pipelines may cause minor and temporary interference of navigation by blocking sections of the CSC, but are not expected to interfere significantly with shipping traffic. Dredging operations would be closely coordinated with representatives of the navigation industry and a Notice to Mariners would be posted by the USCG. Beneficial use-placement of dredged material in the project area could cause minor disruptions to small vessels using portions of the project area; however, the effects on navigation would be mainly temporary. Portions of the project area may become inaccessible to some watercraft as wetland vegetation eventually colonizes the area; however, the shallow nature of the area currently limits most vessel access.

5.2 Wetlands

Future Conditions with No Action Alternative

Without implementation of the proposed action, there would be no direct effects, however wetlands in the vicinity of the proposed action would continue to be indirectly impacted by the present natural and anthropogenic factors. Land loss in the project area, due to subsidence, SLR, and erosion would likely continue at the current rate, estimated at approximately 0.76 square miles per year (Couvillion et al. 2017). Salinity intrusion would continue to impact vulnerable marsh habitats further inland as the marshes within the Calcasieu-Sabine Basin continues to degrade, causing them to either convert type or convert to open water. Subsidence and erosional land loss would continue at the present rate and the overall habitat value and acreage of the remaining wetlands would decline with the No Action Alternative.

Future Conditions with the Proposed Action

There would be limited, short-term impacts to wetlands incidental to the transportation and placement of dredge material during the Project, due to the physical size and activities of the floating dredge facility and/or associated dredge pipeline. Access corridors would temporarily impact areas of shallow open water habitat within the disposal area. However, dredged material would be placed as evenly as practicable to the

elevation specified for the area. No material would be discharged directly upon existing wetlands or emergent vegetative marsh, but material placed within each site would be allowed to overflow the low level earthen weirs to be constructed and it would be allowed to settle and/or erode, as well as vegetate naturally over time.

Ultimately, the Proposed Action would create nearly 900 acres of coastal brackish marsh habitat within the SNWR, which would outweigh any short-term direct or indirect impacts to wetlands that may occur during construction.

Restored/nourished marsh would contribute to reducing the overall habitat fragmentation in the area as well as provide many different species of fish and wildlife with shelter, nesting, feeding, roosting, cover, nursery, and other life requirements habitat. These marsh habitats will also provide neotropical migrants with essential staging and stopover habitat (after Stoffer and Zoller 2004, Zoller 2004).

5.3 Aquatic Resources /Fisheries

Future Conditions with No Action Alternative

Without implementation of the proposed action, the project area would remain as shallow open water and eroding marsh. The average depth of open-water area would continue to increase as a consequence of increases in SLR, continued subsidence, erosion, and land loss, and the resulting loss of marsh and associated vegetation to open water would have an adverse impact on fish and shellfish populations inhabiting the area. The pattern of ongoing conversion of estuarine wetlands to shallow open water and loss of existing estuarine fish habitats would diminish opportunities for species that typically utilize emergent wetland habitats. The average depth of open-water areas would continue to increase and the amount of open water less than or equal to 1.5 feet deep is expected to decrease. Wetland vegetation loss would degrade the quality of the area for fisheries as food sources and nursery habitat decline. As habitat loss continues, there would be a corresponding reduction in overall species diversity and abundance as well as loss of estuarine nursery, foraging, refugia and other estuarine aquatic habitats. Aquatic resources and fisheries would benefit from restoration activities implemented by other programs such as CIAP, CWPPRA and the disposal of dredged material within the Federal Standard from CSC maintenance events; however, these activities are not enough to keep up with the current trends in habitat loss and the rate of SLR.

Future Conditions with the Proposed Action

With implementation of the proposed action, there will be direct impacts to fisheries in the area as a temporary increase in turbidity of the surrounding area is expected to occur during the placement of material. Mobile fishery species would be able to avoid the sediment the discharge pipe and areas of increased turbidity associated with disposal, thereby minimizing the impact to those species. Fisheries access would be coordinated with NMFS and USFWS prior to construction of dikes and closures. Brown shrimp, white

shrimp, and blue crab may directly benefit from the abundance of detritus pumped providing a food source.

Because the action alternatives include placement of dredged material in shallow water bottoms, they would impact benthic and slower moving aquatic demersal organisms; however, in time the populations in the area should return to those of pre-project conditions. Additionally, shallow water bottom habitat area would increase relative to emergent marsh area and coastal islands in most of coastal Louisiana. The construction of the proposed action would impact remnant degraded marsh but would create new emergent marsh with greater refugia and forage benefits than open water bottoms and would increase the overall net habitat value of the area.

The increase in land to water interface would result in positive impacts to fisheries by providing additional and improved habitat. The estuary would be temporarily impacted from construction activities, but post-project benefits should outweigh the detriments. Indirect effects from the placement of dredged material within the project area would temporarily increase turbidity, but most fish would vacate the area and are expected to return once the plume settles. Improved marsh habitats and increased Submerged Aquatic Vegetation (SAV) could have positive indirect impacts on juvenile fishes, shrimp, crabs, and other species by increasing food and cover if they are able to access the area. The conversion of open water to marsh is generally considered a benefit to aquatic species, and there is ample open water habitat available in the basins.

5.4 Essential Fish Habitat

Future Conditions with No Action Alternative

Without implementation of the proposed action, no direct impacts to EFH would occur. However, land loss in the project area, due to subsidence, SLR and saltwater intrusion would likely continue at the current rate. Therefore, indirect impacts to EFH would likely occur as existing estuarine emergent marsh areas continue to be converted to open water resulting in the loss of existing estuarine EFH.

Future Conditions with the Proposed Action

With implementation of the proposed action, construction activities using earthen materials to create marsh could bury EFH substrates or temporarily change environmental conditions, including turbidity and salinity, in the water column

Initially some EFH for brown shrimp, white shrimp, and red drum would be directly impacted by filling shallow open water areas and mud bottoms within the marsh creation and restoration areas with dredged material, however there are ample open water habitats in the proximity these species would be able to relocate to. Within a growing season, some marsh vegetation should establish in areas and provide marsh edge/water interface, smaller marsh ponds, and mud bottoms. The areas created could potentially

provide more EFH for the ecosystem once the material settles to marsh elevation than pre-project conditions.

Some benthic organisms within the marsh creation and restoration areas would be lost, however, creation and restoration of marsh would benefit the fishery by adding nutrients and detritus to the existing food web and indirectly contribute to the overall productivity of the estuary.

5.5 Wildlife

Future Conditions with No Action Alternative

Without implementation of the proposed action, land loss in the proposed deposition areas would likely continue at the present rate resulting in a reduction of habitat quality, diversity and availability for resident terrestrial wildlife such as nutria (*Myocastor coypus Molina*), muskrat *(Ondatra zibethicus)*, mink *(Neovison vison)* and river otter *(Lontra canadensis)*; migratory waterfowl such as snow geese *(Chen caerulescens)*, gadwalls (*Anas strepera*), pintails (*Anus acuta*), mallard (*Anas platyrhynchos*), teal (*Anus discors),* coot redheads (*Fulica*), lesser scaup (*Aythya affinis*), mergansers (*Lophodytes*), wigeons (*Anus*), canvasbacks (*Aythya valisineria*) and black ducks (*Anas rubripes*); and other avian species such as ibis, egrets, cormorants, terns, gulls, skimmer, pelicans, and various raptors.

As habitat loss continues, migratory neotropic avian species would have less habitat for resting forcing them to fly further to suitable habitat. Flying longer distances to find suitable stopover habitat could result in an increase in mortality resulting in a corresponding reduction in overall species diversity and abundance. Most mammalian, amphibian and reptilian species would relocate to more suitable habitats. Wildlife would benefit from restoration activities implemented by other programs such as CIAP, CWPPRA, and the disposal of dredged material within the Federal Standard from CSC maintenance events; however these activities are not enough to keep up with the current trends in habitat loss.

Future Conditions with the Proposed Action

With implementation of the proposed action, direct impacts from displacement of wildlife near the sediment discharge pipe would occur. The proposed restoration/nourishment in the project area would result in improved habitat conditions for several species of wildlife including migratory and resident waterfowl, shorebirds, wading birds, and furbearers. Migratory waterfowl utilizing the area would benefit from a greater food supply resulting from the increased abundance and diversity of emergent and submerged species. Habitat for the resident mottled duck would also improve considerably as the marsh platform would provide more desirable nesting habitat. Intertidal marsh and marsh edge would also provide increased foraging opportunities for shorebirds and wading birds. Small fishes and crustaceans are often found in greater densities along vegetated marsh edge (Castellanos and Rozas 2001, Rozas and Minello 2001), and many of those species are important prey items for wading birds such as the great blue heron, little blue heron, great

egret, blackcrowned night-heron, and snowy egret. Mudflats and shallow water habitat restored by the deposition of dredged material would provide increased foraging opportunities for avian species that feed on tiny invertebrates and crustaceans found on mudflats.

Furbearers (such as nutria and muskrat) which feed on vegetation would benefit from the increased marsh acreage in the project area. Representative furbearers such as the mink, river otter, and raccoon have a diverse diet and feed on many different species of fishes and crustaceans. Those species often feed along vegetated shorelines which provide cover for many of their prey species. The loss of open water habitat with construction of these features would not be expected to adversely affect species that currently utilize these habitats as there is ample open water habitat in the basins. Wildlife species currently utilizing the shallow open water and vegetated shorelines in the project area are highly mobile and/or suited to semi-aquatic life and should not be affected during construction.

The sediment discharge pipe is usually installed in shallow open water areas. Wildlife that remains in the area of discharge should relocate to adjacent habitat during construction. In the long term, after a growing season, the areas will vegetate and provide more habitat for terrestrial wildlife and avian fauna. Discharge of dredged material and a turbidity plume could indirectly affect phytoplankton productivity in adjacent areas but the overall effect on primary productivity in the estuary would be negligible.

5.6 Threatened and Endangered Species

Future Conditions with No Action Alternative

Without implementation of the proposed action, no direct impacts to endangered species or their critical habitat would occur. Existing conditions would persist and listed species would likely continue to be subject to institutional recognition and further regulations and federal management. Indirect impacts would result in the continued degradation and loss of designated critical habitat and its primary constituents. The threatened piping plover would lose access to some forage and roosting habitat as it shifts to shallow open water.

Conversely, the recently delisted brown pelicans would gain access to more shallow water foraging areas, resulting from the shoreline retreat. Indirect effects would be the continued reduction of piping plover critical wintering habitat due to coastal erosion. The primary consequence of not implementing the proposed action would be the continued degradation and loss of emergent wetland habitats used by many different fish and wildlife species for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements. The loss and deterioration of transitional wetland habitats over time could continue to indirectly affect, to an undetermined degree, all listed species that may potentially utilize the area including: Gulf sturgeon, piping plovers, green sea turtles, Kemp's Ridley sea turtles, loggerhead sea turtles, hawksbill sea turtle, leatherback sea turtle, and the West Indian manatee. The recovery of some sensitive/delisted species such as brown pelican,

bald eagle, and colonial nesting birds could be indirectly impacted if habitat loss goes unabated.

Future Conditions with the Proposed Action

Although threatened or endangered species may occur within the general project vicinity, their presence within the project area is highly unlikely. The project area does not contain critical habitat for federally-listed species, and the open water areas surrounding the marsh creation and restoration areas would allow them to easily avoid the project activities. Therefore, the proposed action is unlikely to cause adverse direct or indirect impacts to (i.e., not likely to adversely affect) federally-listed threatened or endangered species, or their critical habitat, under the jurisdiction of USFWS. Additionally, MVN has concluded that no critical habitat for any threatened, endangered, or candidate species under the purview of NMFS has been designated within the project area, and that there would be no adverse impacts (i.e., no effect) to any of the NMFS federally-listed species that could potentially occur within the project area.

5.7 Water and Sediment Quality

Future Conditions with No Action Alternative

Without implementation of the proposed action, existing water quality trends would be expected to continue and no direct impacts to water quality or sediment quality would occur. Indirect impacts as a result of not implementing the proposed action would be the continued degradation of water quality as the area continues to be affected by existing and proposed marsh creation and restoration efforts, chenier geomorphologic processes, development (in particular, oil and gas development in the Calcasieu River Basin), and climate patterns (Mousavi et. al 2011).

Future Conditions with the Proposed Action

Implementation of the proposed action would primarily result in impacts associated with the discharge of dredged material and associated effluent waters during construction. The marsh creation and restoration features of the TSP would not result in either long-term or short-term water quality impacts to the adjacent aquatic ecosystem. Potential impacts of dredged material effluent discharges would include increased turbidity and decreased oxygen concentrations, are expected to be short-lived and would likely result in temporary and minor impacts to water quality, if any.

A reduction in light penetration may indirectly affect phytoplankton (i.e., primary) productivity in the area as the amount of photosynthesis carried out by phytoplankton is reduced. Localized temporary pH changes, as well as a reduction in dissolved oxygen levels, may also occur during construction efforts. Water quality is expected to return to pre-construction conditions soon after the completion of disposal activities associated with the project.

The proposed action, which is not expected to have any adverse effect on water quality of the receiving site, would be evaluated as part of the Section 404(b)(1) Evaluation. To comply with Section 401 of the Clean Water Act, Louisiana an application for Water Quality Certification was filed with the Louisiana Department of Environmental Quality and is currently pending.

5.8 Air Quality

Future Conditions with No Action Alternative

In the future, without the implementation of the proposed action, it is likely that the quality of ambient air would not be adversely affected. Additionally, environmental impacts to air quality resulting from ongoing CSC maintenance dredging events have been thoroughly addressed in prior NEPA documents, which are incorporated herein by reference.

Future Conditions with the Proposed Action

When future CSC maintenance activities commence, it is expected that there would be minimal short term impacts to air quality in Calcasieu-Sabine Basin during dredging and disposal activities. Cameron Parish is currently in attainment of all NAAQS, and is operating under attainment status. Calculations previously performed on fairly large construction projects indicate that VOC emissions from typical USACE construction projects would be well below the 100 ton per year *de minimis* limit; therefore, it is expected that there would be no adverse impacts to air quality with the Project, as proposed. The construction equipment and boats should also have catalytic converters and mufflers to reduce exhaust emissions.

5.9 Cultural Resources

Future Conditions with No Action Alternative

If no actions are taken, then no restoration of land surface will occur. Any cultural resources that may have subsided with land that was once present, would continue in that state of rapid or slow degradation from any water currents or other disturbance. It is not anticipated that any cultural resources exist within the project area, and therefore that no further destruction of any cultural resource would occur.

Future Conditions with the Proposed Action

If the proposed actions occurs, then during a period of years there will be freshly dredged sediment that is placed on top of submerged land surfaces. If any unidentified cultural resources exist within these areas, they would be covered by sediment and may potentially be destroyed by the weight of sediment. It is not anticipated that any cultural resources exist within the project area, and therefore that no further destruction of any cultural resource would occur. If cultural resources are located during the course of construction, resources that are determined to be eligible for listing, or those that are listed

on the National Register of Historic Properties, would be avoided. If avoidance is not possible, strategies would be developed in consultation with the State Historic Preservation Office and Federally-recognized Indian tribes to mitigate for adverse effects to significant cultural resources.

5.10 Recreational Resources

Future Conditions with No Action Alternative

Without implementation of the proposed action, the conditions within the recreational environment would continue as they have in the past and would be dictated by the natural land use patterns and processes that have dominated in the area. The FWOP condition is likely to continue a path of general habitat and resource degradation.

The no-action (FWOP) alternative would have no direct impacts to recreational resources in the project area. Existing conditions would persist. Much of the recreational activities occurring in SNWR and, generally, in southern Louisiana would continue to consist of hunting, fishing, and wildlife viewing. Each of these activities area directly related to the conditions of natural resources of the area. Indirect impacts include the loss of recreational opportunities which are affected by land loss and changes in habitat diversity and wildlife and fisheries populations. Loss of recreational opportunities are expected to occur without implementation of the proposed action except in those areas where dredged material from the CSC maintenance events is placed in a manner conducive to coastal habitat creation and restoration. Dredged material would continue to be disposed within the Federal Standard.

The general trend in wildlife abundance has been a decrease in wildlife numbers in areas experiencing high land loss and an increase in areas of freshwater input or land building due to restoration projects. Populations of migratory birds and other animals that are directly dependent on the marsh and swamp will decrease.

Without implementation of the proposed action, nearby wetland areas would continue to erode and/or convert to open water due to natural and anthropogenic factors. Wetland vegetation loss would degrade the quality of the area for fisheries as food sources and nursery habitat decline—continued erosion could lead to increasing water depth, and the value of the area as a nursery and food source would decline even further. Recreational fishing and hunting could be impacted from these processes.

Future Conditions with the Proposed Action

The recreational environment in and around the proposed placement sites within the project area would experience limited short-term disruption imposed by the physical size and activities of the floating dredge facility and/or associated dredge pipeline. Access corridors would impact areas of existing marsh vegetation and shallow open water habitat within the disposal area. With implementation of the proposed action, there will be minimal direct impacts to recreational resources in the area. Indirect impacts are expected to be

temporary and result from increases in turbidity of the surrounding area occurring during the placement of material. With implementation of the proposed action, no significant adverse direct or indirect impacts to recreation navigation will occur.

Newly created wetlands—especially the brackish/saline marsh anticipated in this area—will provide valuable foraging, breeding, and nursery habitat for finfish and shellfish, while helping to offset the substantial wetlands loss currently taking place in this portion of the Calcasieu Sabine Basin. With implementation of the proposed action, some positive indirect impacts to recreational fishing in the project area are expected. Over the long-term, reducing or stopping marsh loss and conversion to open water should have positive indirect impacts on fishing and hunting resources by reducing interior marsh loss and stabilizing habitats of estuarine dependent fish and wildlife. Following the establishment of wetland vegetation, an increase in habitat value and an increase in nesting habitat for water fowl and nursery habitat for fish is expected. It is expected that marsh creation within the project area and within southeast Louisiana would increase recreational opportunities for hunting, fishing, bird watching, and wildlife viewing.

5.11 Hazardous, Toxic, and Radioactive Waste

The discharge of dredged material into waters of the United States is regulated under the Clean Water Act (CWA). In the absence of a known Hazardous, Toxic, and Radioactive Waste (HTRW) concern, the proposed action would not qualify for an HTRW investigation.

The USACE Engineer Regulation, ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) for Civil Works Projects, states that dredged material and sediments beneath navigable waters proposed for dredging qualify as HTRW only if they are within the boundaries of a site designated by the USEPA or a state for a removal or a remedial action, or if they are a part of a National Priority List (NPL) site, under CERCLA. (NPL is also known as "Superfund.") No portion of the proposed Calcasieu Sabine BUDMAT project area proposed for dredging is included in the National Priority List.

Dredged material and sediments beneath the CSC where the dredging will occur shall be tested and evaluated for their suitability for disposal in accordance with the appropriate guidelines and criteria adopted pursuant to Section 404 of the Clean Water Act and/or Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA) and supplemented by the US Army Corps of Engineers Management Strategy for Disposal of Dredged Material: Containment Testing and Controls (or its appropriate updated version), as cited in Title 33, Code of Federal Regulations, Section 336.1.

The method for dredged material testing is specified in the Evaluation of Dredged Material Proposed for Discharge in Waters of the US – Testing Manual (Inland Testing Manual) (USEPA/USACE, 1998) or the Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual (Ocean Testing Manual) (USEPA/USACE, 1991). The potential for the presence of contaminants in the dredged material is determined using the protocols in the Inland Testing Manual or the Ocean Testing Manual.

Based upon a review of the NPL and CERCLA action sites, historical aerial photographs, historical topographic maps, and pipeline and oil/gas well databases, the probability of encountering HTRW in connection with this project is low. The implementation of the TSP (i.e., flotation access channel excavation and disposal of excavated materials) does not qualify for an HTRW investigation and is evaluated as a water quality issue (see the discussions in Sections 2.3 and 5.7 on Water Quality).

Should an HTRW concern arise at any time during the construction of the project that is not addressed through compliance with the Clean Water Act and the Resource Recovery and Conservation Act exclusion for dredged material (RCRA), 40 CFR 26L4(g), the CEMVN would take immediate actions to investigate the concern. The USACE is obligated under ER 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all HTRW contamination within the vicinity of the proposed action. ER 1165-2-132 identifies the USACE policy to avoid the use of project funds for HTRW removal and remediation activities. Costs for necessary special handling or remediation of wastes (e.g., RCRA regulated pollutants and other contaminants), which are not regulated under the CERCLA, will be treated as project costs if the requirement is the result of a validly-promulgated Federal, state or local regulation.

Should an HTRW issue be determined and the development of a response action required, CEMVN would coordinate with the appropriate Federal and state authorities to develop an approved response action.

5.12 Cumulative Impacts

The Council on Environmental Quality's (CEQ) regulations (40 CFR 1500-1508) implementing the procedural provisions of the NEPA define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (Id.)

The proposed action would enhance wetland functional quality at the marsh creation and restoration area sites by converting open water to marsh. Without implementation of the proposed action, benefits outlined in this document would not be achieved in the Calcasieu-Sabine Basin, but could still be achieved as material dredged from the CSC would continue to be disposed of within the Federal Standard. The dredged material would be placed in a confined manner within areas that were previously environmentally cleared and approved.

Based on an evaluation of human activities and land use trends in this region, it is reasonable to anticipate that future activities would further contribute to cumulative degradation of wetland resources from the public and private sectors obtaining Section 10/404 permits; local, state and federal projects; and natural events such as subsidence

and wave erosion. In the past, many actions were taken with little consideration given to project related impacts on wetland ecosystems. However, a greater realization of the importance of wetlands to the public has resulted in critical evaluation of the need to impact wetland for residential, commercial or industrial, and governmental projects.

With gained knowledge comes technological advancement in developing more environmentally sensitive project designs and construction methods, as well as requirement to functionally compensate unavoidable project-related impacts to wetlands so as to meet the nation's goal of no net loss of wetland resources. Wetlands will continue to be impacted by public, private, and governmental projects. However, in having a greater awareness of the importance of wetlands, impacts associated with this and future projects will be evaluated to assure a balance is maintained between construction and impacts on the environment. It is anticipated that through the efforts taken to avoid and minimize wetland impacts and the beneficial placement of dredged material that functionally compensates unavoidable remaining impacts, the Project will not result in substantial direct, secondary or cumulative adverse impact on the aquatic environment.

The water quality in the area is affected by industrial, commercial, and residential sources. Surface water runoff from farmlands, local businesses, and effluent from residential areas and camp developments end up in the watershed. With implementation of the proposed action, there will be some disturbances to water quality in the immediate vicinity of the discharge pipe, however, the proposed retention dikes/closures should contain water for enough time for the sediments to settle out and retain sediments from re-entering the CSC and adjacent waterways. Disturbance of water quality would be temporary, confined, and short lived.

Water bodies in the area are expanding daily from wave erosion, subsidence, hurricanes, and other natural events. Unknown cultural resources may be unearthed by these natural events. Historical aerial photos indicate that the marsh creation and restoration areas were once marsh, so the project is restoring what once existed. Fisheries are impacted by the daily activities of commercial and recreational fishermen, but catch restrictions enforced by the resource agencies help manage the populations. Fisheries are dependent upon estuaries that serve as nursery areas for species from the Gulf of Mexico. The increase in marsh to water interface would result in positive effects to fisheries by providing more habitat.

Wildlife such as deer, rabbits, waterfowl, snipe, and others are hunted seasonally in the winter months. Nutria are also trapped to control the expanding populations. The increase in marsh would result in positive affects to wildlife by providing more habitat. Noise and air quality should remain constant in the area due mainly from local commercial and recreational vessel traffic.

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6.0 Other Considerations

6.1 Monitoring and Adaptive Management

The primary reason for implementing Monitoring and Adaptive Management (AM) is to increase the likelihood of achieving desired outcomes. The multi-year BUDMAT Program is being implemented using the principles of AM and a “lessons learned” approach in the selection and implementation of beneficial use projects (2010 Report). Where past performance of individual LCA BUDMAT Program projects and other ecosystem restoration projects indicate certain restoration approaches or types of restoration opportunities provide more benefit from use of dredged material for ecosystem creation and restoration, these findings will be used to reduce risk and uncertainty in the Program (Section 3.1.3, “Risk and Uncertainty”, of the 2010 Report), to make adjustments based on the increased restoration knowledge, and make better decisions for future projects.
Section 2039 of the Water Resources Development Act (WRDA) of 2007 and Implementation guidance for Section 2039, in the form of a CECW-PB Memorandum dated 31 August 2009, require ecosystem restoration projects develop a plan for monitoring the success of the ecosystem creation and restoration and develop an AM Plan (or contingency plan) should the Project monitoring show that the Project is not performing as expected.

6.1.1 Monitoring

As currently authorized, the intent of the LCA BUDMAT Program is to advance the beneficial use of maintenance dredged material executed by USACE maintenance navigation projects. The individual LCA BUDMAT Program projects are developed as one-time events to supplement the navigation projects’ beneficial use of dredged material by providing funds that would pay for the increment to transport dredged material distances above and beyond the Federal Standard.

In 1994, CEMVN implemented the large-scale Beneficial Use of Dredged Material Monitoring Program (BUMP) to quantify the amount of new habitat created and to improve dredge disposal placement techniques to maximize beneficial use. Each year, aerial photography is acquired and digital mosaics are produced for each of the BUDMat Project sites. GIS habitat analysis and field surveys are conducted to generate habitat change maps. From the analysis, coastal change data quantifies the restoration and creation of new coastal lands and other habitats. The field program includes ground truthing operations to verify and update the habitat maps and field monitoring to collect information about vegetation, disposal elevations, and placement practices (configurations and containment) to assess best practices for maximizing habitat benefits from the beneficial use of dredged material. Habitat types are broken into simple classes and sub-classes based on the types of vegetation present: water, wetlands (marsh and forested wetlands), and land (beach, bare, dune, upland, shrub/scrub, and forest).

Currently, under its existing O&M Program, CEMVN conducts aerial flights to obtain aerial photography for each of its beneficial use placement sites on an annual basis. Since

2000 and due to funding constraints, CEMVN no longer funds the analyses of the aerial photography to produce habitat change maps. Additionally, CEMVN no longer conducts a field program including ground truthing and field surveys. It is anticipated that CEMVN would, at a minimum, continue to acquire the aerial photography on an annual basis under the Federal Standard.

Monitoring of the Project through the form of collecting aerial photography would be performed under BUMP. Under most situations, since each individual LCA BUDMAT Program project is planned as a one-time event and is of limited complexity and low risk, it is anticipated that successful monitoring data provided on the individual projects would not be used to modify or perform additional construction at completed projects (2010 Report). Although no corrective/contingency actions would be taken under the individual projects, monitoring results will be used to support the overall LCA BUDMAT Program and future Program activities will build upon the information gained and lessons learned from the earlier projects. The LCA BUDMAT Program will document lessons learned and all new information would be used programmatically to inform, make adjustments and optimize the selection and implementation of subsequent LCA BUDMat Program projects, as well as other restoration efforts in the Louisiana Coastal Area. Specifically, monitoring results from the Project will help refine modeling, design, and predictions of physical and ecological processes that will in turn inform design of future creation and restoration and beneficial use projects.

6.1.2 Adaptive Management Evaluation Summary

All projects implemented under the LCA BUDMAT Program were considered and evaluated for application of adaptive management pursuant to the requirements of WRDA 2007, Section 2039 and Implementation guidance for Section 2039, in form of CECW-PB Memorandum dated 31 August 2009. These evaluations were conducted consistent ERDC TN-EMRRP-EBA-10 dated April 2012 entitled "The Application of Adaptive Management to Ecosystem Restoration Projects' by Fischenich et al. (2012) which states in pertinent part as follows:

"Paragraph (3)(d) in Section 2039 of WRDA 2007 states that ‘an adaptive management plan will be developed for all ecosystem restoration projects...appropriately scoped to the scale of the project.’ However, it is anticipated that only projects characterized by high uncertainty in achieving results will need to include specific costs and actions for adaptive management."

The following uncertainty and risks associated with success of the project were considered to be “low” indicating that LCA BUDMAT Program projects in general, and this Project specifically are not suitable candidates for adaptive management.

1. LCA BUDMAT Program projects are authorized only for a one time placement of maintenance dredged material for beneficial use.

2. LCA BUDMAT Program projects are not authorized for OMRR&R.

3. Any adaptive management measures implemented would be considered new construction which is not within the scope of the LCA BUDMAT Program project.

4. CEMVN has conducted numerous beneficial use of dredged material actions across the entire state of Louisiana and the Study Area. There is little uncertainty or risks associated with this common practice which, in and of itself is sufficient to determine that adaptive management is not warranted in this particular project.

5. The retention dikes will be designed to an elevation conducive to containment of the material, to allow it to settle to the appropriate marsh elevation. After settlement of the dredged slurry material, breaching of the retention dikes will allow for re-establishment of the intertidal exchange between the marsh and adjacent shallow open waters.

The methodology has been used successfully throughout coastal Louisiana as well as within the Study Area.

Consequently, the uncertainty and risks associated with the success of the Project is determined to be low. Evaluations determined that this Project is not a candidate that could benefit from AM. An assessment revealed that the reasonably foreseeable adaptations to this Projects would all effectively constitute new construction. Although there is no opportunity for AM of BUDMAT Program projects, the LCA BUDMAT Program would document lessons learned and would be used programmatically to inform and make adjustments to subsequent LCA BUDMAT Program projects, as well as other restoration efforts in the Louisiana Coastal Area. Specifically, monitoring results from the Project would help refine modeling, design, and predictions of physical and ecological processes that would in turn inform design of future restoration and beneficial use projects.

Containment structures would be built for the Recommended Plan to hold the dredged material in place. Dredged material would be placed to create a platform conducive to the development of coastal marsh restoration. It is not the intent of the LCA BUDMAT Program to construct ecosystem restoration projects that necessarily will exist in perpetuity. Coastal habitat, whether wetland, ridge, or other type of coastal feature, is ephemeral in nature. The period of analysis for this Project is 50 years. The benefits calculated consider subsidence, sea-level rise, and other impacts to determine the condition of the ecosystem restoration project over the period of analysis.

6.2 Real Estate

This project is being carried on lands owned and managed by the SNWR. There will be no acquisition of real estate to carry out the proposed plan. Any necessary real estate instruments required to access the SNWR would be carried out prior to construction of the project. Coordination with the state of Louisiana for temporary access through any state owned or managed rights-of-way temporarily encumbered during construction of the

project would coordinated prior to construction. Actions related to Real Estate for this proposed project are outlined in Appendix G. (Real Estate Plan) in accordance with the requirements of Engineering Regulation 405-1-12.

6.3 Relocations

There will be no relocations of any facility or utility as part of this Project. Utility and pipeline corridors are located within the project area, however there are none located within the marsh restoration sites. Necessary precautions will be taken to avoid adversely impacting any utility or pipeline present where construction activities might take place. Utility and pipeline owners will be notified prior to the initiation of construction. Ownership of utilities and pipelines along with contact information will be included with the plans and specifications for this Project (See Appendix D. Relocations Summary for additional information on utilities pipelines in the project area).

6.4 Risk and Uncertainty

Risk and uncertainty are intrinsic in water resources planning and design. Section 3.1.3, “Risk and Uncertainty”, of the 2010 Report, provides a comprehensive discussion of the items of risk and uncertainty considered. That discussion remains valid for the purposes of this DIR. The following describes risk and uncertainty related to the TSP for the Project.

6.4.1 Geotechnical Analysis

Design and implementation of the TSP is based on the 2017 Draft Geotechnical Report which is a preliminary geotechnical analysis completed and available at the time of publication of this draft Integrated DIR/EA. Additional geotechnical investigations, including soil borings and a detailed design of the earthen weir are on-going. The results of this analysis will not affect the selection of the TSP. The results will be incorporated into the Project’s pre-construction engineering and design and the development of plans and recommendations for the Alternative (Site 1) identified as the TSP.

6.4.2 Availability of Dredged Material

Selection of the TSP is based on the assumption that at least 1,000,000 CY of material is available in the CSC Federal navigation channel at the time of project construction for each marsh restoration cycle.

6.5 Value Engineering

The Value Engineering (VE)(Appendix I) Study resulted in several recommendations in lieu of the TSP. Some of the recommendations focused on sites closer to the reach being dredged in the CSC or closer to the permanent pipeline. Some recommendations pointed to degrading the CDFs and pushing the material into Calcasieu Lake to create marsh. One recommendation pointed to maximizing cost by using all of the material dredged from the reach in one beneficial use event. While all recommendations are conceivably viable,

there are limitations that would preclude the implementation of any of those recommendations. First and foremost, the plan laid out in this draft Integrated DIR/EA was done in coordination with personnel from the USFWS Field Office in Lafayette, Louisiana and SNWR personnel. It represents the plan that best fits management of the SNWR. Additionally, the CPRAB, while a supporter of the Program, is not a sponsor for this Proposed Action. This type of project relies on linking up to an O&M project. If the project were stalled to approach the CPRAB, additional time and costs could be incurred. There would also be a missed opportunity because the CSC must be dredged; material dredged during a potential negotiation would risk not being used beneficially. The Lake Charles Harbor and Terminal District is the local sponsor and is limited by its own funding limitations, but has the ability to participate in the study as tentatively planned. While the creation of marsh in Calcasieu Lake is a laudable approach, it is practically a non-starter due to many reasons, the most important being the area is an important seed ground for oysters.

While the recommendations in the Value Engineering Study represent a meaningful effort to develop alternate plans otherwise not considered, they are not necessarily reasonable for application in the beneficial use Program. The TSP as presented in this draft Integrated DIR/EA meets the management goals of the SNWR, and meets the goals of the state in restoration of coastal Louisiana.

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7.0 Coordination

Preparation of this draft Integrated DIR/EA is being coordinated with appropriate Congressional, federal, state, and local interests, as well as environmental groups and other interested parties.

U.S. Department of the Interior, Fish and Wildlife Service
U.S. Environmental Protection Agency, Region VI
U.S. Department of Commerce, National Marine Fisheries Service
U.S. Natural Resources Conservation Service, State Conservationist
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
State of Louisiana, Coastal Protection and Restoration Authority Board
Louisiana Department of Environmental Quality
Louisiana State Historic Preservation Officer
Cameron Parish Government
Alabama-Coushatta Tribe of Texas
Caddo Nation of Oklahoma
Chickasaw Nation
Chitimacha Tribe of Louisiana
Choctaw Nation of Oklahoma
Mississippi Band of Choctaw Indians
Coushatta Tribe of Louisiana
Jena Band of Choctaw Indians
Quapaw Tribe of Oklahoma
Seminole Tribe of Florida
Seminole Nation of Oklahoma
Tunica-Biloxi Tribe of Louisiana

8.0 Mitigation

This analysis of the Proposed Action (TSP) indicates that it would cause no significant impacts to any of the resources reviewed above. Instead, the beneficial use of dredged material from the CSC would create and restore coastal marsh habitat. Some temporary impacts from weir construction would occur during project construction; however, the marsh restoration benefits would far outweigh the construction detriments. The Proposed Action is self-mitigating.

9.0 Compliance with Environmental Laws and Regulations

There are many Federal and state laws pertaining to the enhancement, management and protection of the environment. Federal projects must comply with environmental laws, regulations, policies, rules and guidance. Full environmental compliance will be accomplished upon 30-day public review of this draft Integrated DIR/EA #559; coordination of this draft integrated DIR/EA with appropriate agencies, organizations, and individuals for their review and comments; USFWS and NMFS confirmation that the Proposed Action would not be likely to adversely affect any endangered or threatened species; LADNR concurrence with the determination that the Proposed Action is consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program; receipt of a WQC from the State of Louisiana; public review of the Section 404(b)(1) Public Notice; signature of the Section 404(b)(1) Evaluation; receipt and acceptance or resolution of all USFWS CAR recommendations; and receipt and acceptance or resolution of all NMFS EFH recommendations.

A FONSI will not be signed until the proposed action achieves environmental compliance with applicable laws and regulations.

Clean Air Act of 1972

The Clean Air Act (CAA) sets goals and standards for the quality and purity of air. It requires the Environmental Protection Agency to set NAAQS for pollutants considered harmful to public health and the environment. The project area is in Cameron Parish, which is currently in attainment of NAAQS. The Louisiana Department of Environmental Quality is not required by the CAA and Louisiana Administrative Code, Title 33 to grant a general conformity determination.

Clean Water Act of 1972 – Section 401 and Section 404

The CWA sets and maintains goals and standards for water quality and purity. Section 401 requires a Water Quality Certification from the LDEQ that a proposed project does not violate established effluent limitations and water quality standards. State Water Quality Certification (WQC-180329-02) is currently under review and would be finalized prior to signing of a Finding of No Significant Impact (FONSI).

As required by Section 404(b)(1) of the CWA an evaluation to assess the short- and long-term impacts associated with the discharge of dredged and fill materials into waters of the United States resulting from this Project has been completed. Section 404(b)(1) public notice and public review will be completed concurrently with the 30 day comment period for this draft Integrated DIR/EA. Comments received during this time period will be added to the final draft prior to signing of Section 404(b)(1).

Coastal Zone Management Act of 1972

The Coastal Zone Management Act (CZMA) requires that "each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs." In accordance with Section 307, a Consistency Determination was prepared for the Proposed Action and is currently being reviewed by LADNR in conjunction with the public review and comment period.

Endangered Species Act of 1973

The Endangered Species Act (ESA) is designed to protect and recover threatened and endangered (T&E) species of fish, wildlife and plants. The USFWS identified two T&E species, the West Indian manatee and sea turtles, which are known to occur or believed to occur within the vicinity of the project area. No plants were identified as being threatened or endangered in the project area. MVN will continue coordination with the USFWS during review of the draft report. Federally-listed threatened or endangered species, or their critical habitat, under the jurisdiction of USFWS. This fulfills the requirements under Section 7(a)(2) of the Endangered Species Act.

Fish and Wildlife Coordination Act of 1934

The Fish and Wildlife Coordination Act (FWCA) provides authority for the USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. The FWCA requires that fish and wildlife resources receive equal consideration to other project features. The FWCA also requires federal agencies that construct, license or permit water resource development projects to first consult with the USFWS, NMFS and state resource agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. Section 2(b) requires the USFWS to produce a CAR that details existing fish and wildlife resources in a project area, potential impacts due to a proposed project and recommendations for a project. The USFWS reviewed a draft Integrated DIR/EA #559 and provided a draft CAR with project specific recommendations on March 12, 2018. The Draft CAR is contained in Appendix F and MVN’s responses to the USFWS recommendations are as follows:

The USFWS’s analysis of project alternatives considered for the project area has shown the potential for beneficial effects on fish and wildlife resources. Construction of the Proposed Action is projected to create approximately 689 acres of brackish marsh with a

net total of 189.13 AAHUs. The USFWS supports this habitat restoration Project, provided the following fish and wildlife conservation measures are implemented concurrently with project implementation to help ensure that fish and wildlife conservation is maximized:

1. West Indian manatee conservation measures from the Future Fish and Wildlife Resources section of this report should be included in all contracts, plans, and specifications for in water work in areas where the manatee may occur.

   Response 1 – Concur. West Indian manatee conservations measures will be included in all plans and specifications prior to onset of construction

2. Avoid adverse impacts to water bird colonies through careful design project features and timing of construction. We recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season. For areas containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a nesting colony should be restricted to the non-nesting period. For nesting brown pelicans, activity should be avoided within 2,000 feet of the colony. Activity is restricted within 650 feet of black skimmers, gulls, and terns.

   Response 2 - Concur. USFWS guidelines will be followed in order to remain compliant with the Migratory Bird Treaty Act (MBTA).

3. For impacts to Essential Fishery Habitat, USACE should consult with the National Marine Fisheries Service to ensure the project complies with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Magnuson-Stevens Act; P.L. 104-297, as amended) and its implementing regulations.

   Response 3 - Concur. The NMFS will receive a copy of this EA and Coordination on EFH will occur during the 30-day public review process.

4. Access corridors across existing wetlands should be avoided if possible. Impacted wetlands should be restored to a substrate elevation similar to the surrounding marsh. Flotation access channels in open water should be backfilled upon project completion. Post-construction surveys (e.g., centerline surveys) should be taken to ensure access channels have been adequately backfilled. That information should be provided to the natural resource agencies for review.

   Response 4 - Concur. If existing wetlands are impacted they would be restored to pre-project elevation and expected to re-vegetate naturally. Post-construction surveys would be taken and provided to the natural resource agencies for review. Flotation channels are not expected; however, if needed, they will be backfilled.

5. To ensure that dredged material is placed to each particular habitat's specified elevations, we recommend that the USACE use an updated NAVD88 datum (i.e., current geoid) consistent with the NAVD88 datum that is referenced for the elevations of existing marsh and water level in the Project Area.

   Response 5 - Concur. The most recent datum will be utilized in determining the most efficient land creation location, shape and size.

6. At a minimum, the containment weirs should be breached with approximately 50-foot gaps every 500 feet. The locations of breaches should be coordinated with the USFWS. Such breaches should be undertaken after consolidation of the dredged sediments and vegetative colonization of the exposed soil surface, or a maximum of 3 years after construction.

   Response 6 –Concur. CEMVN would coordinate with USFWS on the need for, timing, and location of breaches.

7. Tidal creeks (described in the Future Fish and Wildlife Resources section of this report) should be constructed at the same time as the weir breaches, in coordination with the USFWS.

   Response 7 – Tidal creeks are expected to develop naturally over time; however, if they do not develop naturally, CEMVN will coordinate with USFWS on the need for, design, and location of tidal creeks.

8. The Service recognizes the value of submerged aquatic vegetation (SAV) habitat to fish and wildlife, including Federal trust resource species. If SAV is encountered, the USACE should avoid these areas if possible and utilize unvegetated open water areas for marsh creation.

   Response 8 - CEMVN also recognizes the value of SAV habitat. The area proposed for marsh creation and restoration currently contains no SAV. Therefore, if any SAV is impacted by construction, CEMVN expects that it would be minimal and would be offset by the direct benefits of the Project.

9. Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, Water Control Plans, or other similar documents) should be coordinated with the Service, NMFS, LDWF, EPA and LDNR. The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.

   Response 9 - Concur. MVN will continue to coordinate with the resource agencies.

10. Any proposed change in project features or plans should be coordinated in advance with the Service, NMFS, LDWF, and LDNR.

    Response 10 - Concur. MVN will continue to coordinate with the resource agencies.

11. The LCA BUDMAT Program specifies that monitoring and adaptive management plans are required for beneficial use habitat creation projects. The USACE should coordinate with the Service during development of those plans.

    Response 11 – Concur. Please see the Adaptive Management and Monitoring Plan contained within the draft Integrated DIR/EA #559. USACE has coordinated with USFWS on various aspects of the Project throughout development. Due to the unique nature of this Project, an adaptive management plan was determined to be unnecessary. However, a monitoring plan was developed to determine ecological success of this project and has been communicated to USFWS via the draft report.

12. ESA consultation should be reinitiated should the proposed project features change significantly or are not implemented within one year of the last ESA consultation with this office to ensure that the proposed action does not adversely affect any federally listed threatened or endangered species or their habitat.

    Response 12 – Concur. USACE will continue to involve other agencies and initiate re-coordination should the project change significantly, or if construction has not begun within the next year.

13. All construction activities on SNWR will require the USACE to obtain a Special Use Permit from the Refuge Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. We recommend that the USACE request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact Refuge Manager Terry Delaine (337) 762-3816 or Wildlife Biologist Billy Leonard (337) 598-2216 for assistance in obtaining a Special Use Permit. Close coordination by both the USA CE and its contractor must be maintained with the Refuge Manager to ensure that construction activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

    Response 13 - Concur. USACE will obtain all necessary documentation to proceed with the Proposed Action.

Magnuson-Stevens Fisheries Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act, as amended, P.L. 104-208, addresses the authorized responsibilities for the protection of EFH by NMFS in association with regional fishery management councils. The NMFS has a findings with

the MVN on the fulfillment of coordination requirements under provisions of the Magnuson-Stevens Fishery Conservation and Management Act. In those findings, the MVN and NMFS have agreed to complete EFH coordination requirements for federal civil works projects through the review and comment on National Environmental Policy Act documents prepared for those projects. The draft Integrated DIR/EA #559 will be provided to NMFS for review and comment concurrent with public review. CEMVN will continue to coordinate with NMFS throughout the public comment period and any comments and EFH conservation recommendations received from the NMFS will be included in the final version of the draft Integrated DIR/EA #559.

Species of Management Concern

The USFWS draft CAR notes that species of fish, wildlife, and plants labeled as S1 and S2 by the Louisiana Department of Wildlife and Fisheries are extremely and very rare species, respectively, that are vulnerable to extirpation in Louisiana. These species, along with those identified as priority species by the Gulf Coast Joint Venture are species of management concern. Continued population declines could result in these species becoming candidates for listing under the Endangered Species Act. Some of these species may also be referred to as at-risk species; the Service has defined at-risk species as those species that have either been proposed for listing, are candidates for listing, or have been petitioned for listing.

Species of concern which use the study area include Wilson's plover, gull-billed tern, reddish egret, black skimmer, and peregrine falcon. Species of concern and at-risk species that would use study area's fresh, intermediate, brackish and saline marsh habitat and adjacent open waters, include the saltmarsh topminnow, Louisiana-eyed silk moth, glossy ibis, seaside sparrow, black rail, mottled duck, and the peregrine falcon.

Migratory Bird Treaty Act

The bald eagle was removed from the List of Endangered and Threatened Species in August 2007 but continues to be protected under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act of 1918, as amended (MBTA). During nesting season, construction must take place outside of USFWS/LDWF buffer zones. A USACE Biologist and USFWS Biologist will survey for nesting birds prior to the start of construction.

Per the USFWS draft CAR and in accordance with the Migratory Bird Treaty Act of 1918 (as amended), the USFWS advised that the project is located in habitats which are commonly inhabited by colonial nesting waterbirds and/or seabirds. Colonies may be present that are not currently listed in the database maintained by the Louisiana Department of Wildlife and Fisheries. That database is updated primarily by (1) monitoring previously known colony sites and (2) augmenting point-to-point surveys with flyovers of adjacent suitable habitat. Although several comprehensive coast-wide surveys have been recently conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season because some waterbird

colonies may change locations year-to-year. To minimize disturbance to colonial nesting birds, the following restrictions on activity should be observed:

1. For colonies containing nesting brown pelicans, all activity occurring within 2,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 15 through March 31). Nesting periods vary considerably among Louisiana's brown pelican colonies, however, so it is possible that this activity window could be altered based upon the dynamics of the individual colony.

2. For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present).

3. For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present).

In addition, CEMVN recommends that on-site contract personnel be trained to identify colonial nesting birds and their nests, and avoid affecting them during the breeding season (i.e., the time period outside the activity window).

National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act of 1966, as amended, requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The procedures in 36 CFR Part 800 define how Federal agencies meet these statutory responsibilities. The Section 106 process seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties, including the SHPO or Tribal Historic Preservation Officer (THPO) and any Tribe that attaches religious or cultural significance to historic properties that may be affected by an undertaking. The goal of consultation is to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. Consultation pursuant to Section 106 has been completed and conclusions of no historic properties affected were agreed in letters dated 8 Aug 2007 and 11 July 2008, and responses dated 5 Oct 2007, 6 Mar 2008, and 19 Aug 2008.

Tribal Consultation

NEPA, Section 106 of the National Historic Preservation Act, EO 13175 (Consultation and Coordination with Indian Tribal Governments), the American Indian Religious

Freedom Act, and related statutes and policies have a consultation component. In accordance with MVN's responsibilities under NEPA, Section 106, and EO 13175, MVN will offer the following federally-recognized Indian Tribes the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands: Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and Tunica-Biloxi Tribe of Louisiana. During public review of the draft report, letters will be mailed to the tribal leaders requesting input regarding the proposed action.

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10.0 Description of the Non-Federal Sponsor's Project Implementation Requirements, Roles and Responsibilities.

Prior to commencement of construction, the NFS must enter into a Project Partnership Agreement (PPA), with the Government to provide its required cooperation. The NFS must agree to meet the requirements for Non-Federal responsibilities, as summarized below and in future legal documents.

The NFS for this Project is in basic agreement with the requirements of the Model PPA to be used for beneficial use of dredged material projects implemented under the Louisiana Coastal Area Beneficial Use of Dredged Material Program. (See CECW-MVD Memorandum dated April 10, 2015). The review, approval, and signature of an LCA BUDMAT PPA that does not deviate from the approved Model PPA has been delegated to the MSC Commander, and has been further delegated to the District Commander. (See Memorandum, CEMVD-PD-L dated April 14, 2015 and Memorandum, ASA (CW), dated 13 August 2010).

Federal implementation of this Project is subject to the Non-Federal Sponsor agreeing to comply with applicable Federal laws and policies in the Model PPA, including but not limited to:

1. The Non-Federal Sponsor shall provide 25 percent of the total Project costs in accordance with Section 1030(d) of the Water Resources Reform and Development Act of 2014, which amended Section 2037 or the Water Resources Development Act of 2007.

2. The Non-Federal Sponsor shall provide the real property interests, relocations, and investigations for hazardous substances required for construction, operation, and maintenance of the Project.

3. The Non-Federal Sponsor shall prevent obstructions or encroachments on the Project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) that might reduce the outputs produced by the Project, hinder operation and maintenance of the Project, or interfere with the Project's proper function.

4. The Non-Federal Sponsor shall not use the Project, or real property interests required by the PPA, as a wetlands bank or mitigation credit for any other project.

5. The Non-Federal Sponsor shall not use Federal Program funds to meet any of its obligations under the PPA unless the Federal agency providing the funds verifies in writing that the funds are authorized to be used for the Project. Federal program funds are those funds provided by a Federal agency, plus any non-Federal contribution required as a matching share therefor.

6. Except as provided in the PPA, the Non-Federal Sponsor shall not be entitled to any credit or reimbursement for costs it incurs in performing its responsibilities under the PPA.

7. In carrying out its obligations under the PPA, the Non-Federal Sponsor shall comply with all the requirements of applicable Federal laws and implementing regulations, including, but not limited to: Title VI of the Civil Rights Act of 1964 (P.L. 88-352), as amended (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto; the Age Discrimination Act of 1975 (42 U.S.C. 6102); and the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Army Regulation 600-7 issued pursuant thereto.

8. The Non-Federal Sponsor shall acquire the real property interests that the Government has determined are necessary for the construction, operation, and maintenance of the Project. The Non-Federal Sponsor shall provide the Government with authorization for entry thereto in accordance with the Government's schedule for construction of the Project. The Non-Federal Sponsor shall ensure that real property interests provided for the Project are retained in public ownership for uses compatible with the authorized purposes of the Project.

9. The Non-Federal Sponsor shall perform or ensure the performance of the relocations that the Government has determined are necessary for the construction, operation, and maintenance of the Project in accordance with the Government's construction schedule for the Project.

10. The Non-Federal Sponsor shall comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 C.F.R. Part 24, in acquiring real property interests for construction, operation, and maintenance of the Project and shall inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

11. The Non-Federal Sponsor shall be responsible for undertaking any investigations to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (hereinafter "CERCLA") (42 U.S.C. 9601-9675), that may exist in, on, or under real property interests required for the construction, operation, and maintenance of the Project.

12. In the event it is discovered that hazardous substances regulated under CERCLA exist in, on, or under any of the required real property interests, the Non-Federal Sponsor and the Government, in addition to providing any other notice required by applicable law, shall provide prompt written notice to each other, and the Non-Federal Sponsor shall not proceed with the acquisition of such real property interests until the parties agree that the Non-Federal Sponsor should proceed.

13. If hazardous substances regulated under CERCLA are found to exist in, on, or under any required real property interests, the parties shall consider any liability that might arise under CERCLA and determine whether to initiate construction, or if already initiated, whether to continue construction, suspend construction, or terminate construction. Should the parties initiate or continue construction, the Non-Federal Sponsor shall be responsible, as between the Government and the Non-Federal Sponsor, for the costs of cleanup and response, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination. Such costs shall be paid solely by the Non-Federal Sponsor without reimbursement or credit by the Government.

14. As between the Government and the Non-Federal Sponsor, the Non-Federal Sponsor shall be considered the operator of the Project for purposes of CERCLA liability. To the maximum extent practicable, the Non-Federal Sponsor shall operate, maintain, repair, rehabilitate, and replace the Project in a manner that will not cause liability to arise under CERCLA.

15. To the maximum extent practicable, no later than 6 months after it provides the Government with authorization for entry onto a real property interest or pays compensation to the owner, whichever occurs later, the Non-Federal Sponsor shall provide the Government with documents sufficient to determine the amount of credit to be provided for the real property interest in accordance with the provisions of the PPA.

16. The Non-Federal Sponsor shall obtain, for each real property interest, an appraisal of the fair market value of such interest that is prepared by a qualified appraiser who is acceptable to the parties. Subject to valid jurisdictional exceptions, the appraisal shall conform to the Uniform Standards of Professional Appraisal Practice. The appraisal must be prepared in accordance with the applicable rules of just compensation, as specified by the Government.

17. For real property interests acquired by eminent domain proceedings instituted after the effective date of the PPA, the Non-Federal Sponsor shall notify the Government in writing of its intent to institute such proceedings and submit the appraisals of the specific real property interests to be acquired for review and approval by the Government.

18. Any credit afforded under the terms of the PPA for relocations for construction, operation, and maintenance of the Project is subject to satisfactory compliance with applicable Federal labor laws covering non-Federal construction, including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (labor standards originally enacted as the Davis-Bacon Act, the Contract Work Hours and Safety Standards Act, and the Copeland Anti-Kickback Act). Notwithstanding any other provision of the PPA, credit may be withheld, in whole or in part, as a result of the Non-Federal Sponsor's failure to comply with its obligations under these laws.

19. The Non-Federal Sponsor shall not be entitled to credit for value of or costs it incurs for real property interests that were previously provided as an item of local cooperation for another Federal project.

20. No later than 60 calendar days prior to the beginning of a fiscal year in which the Government will be incurring costs for construction, the Government shall notify the Non-Federal Sponsor in writing of the amount of funds required from the Non-Federal Sponsor during that fiscal year. No later than 30 calendar days prior to the beginning of that fiscal year, the Non-Federal Sponsor shall make the full amount of such required funds available to the Government.

21. Any suspension or termination shall not relieve the parties of liability for any obligation previously incurred. Any delinquent payment owed by the Non-Federal Sponsor pursuant to the PPA shall be charged interest at a rate, to be determined by the Secretary of the Treasury, equal to 150 per centum of the average bond equivalent rate of the 13 week Treasury bills auctioned immediately prior to the date on which such payment became delinquent, or auctioned immediately prior to the beginning of each additional 3 month period if the period of delinquency exceeds 3 months.

22. The Non-Federal Sponsor's costs for participation on the Project Coordination Team shall not be included in the construction costs and shall be paid solely by the Non-Federal Sponsor without reimbursement or credit by the Government.

23. If at any time the Non-Federal Sponsor fails to fulfill its obligations under the PPA, the Government may suspend or terminate construction of the Project unless the Assistant Secretary of the Army (Civil Works) determines that continuation of such work is in the interest of the United States or is necessary in order to satisfy agreements with other non-Federal interests.

24. The Non-Federal Sponsor, at no cost to the Government, shall operate, maintain, repair, rehabilitate, and replace the Project. The Non-Federal Sponsor shall conduct its operation, maintenance, repair, rehabilitation, and replacement responsibilities in a manner compatible with the authorized purpose of the Project and in accordance with applicable Federal and State laws and specific directions prescribed by the Government in the OMRR&R Manual and any subsequent amendments thereto.

25. The Government may enter, at reasonable times and in a reasonable manner, upon real property interests that the Non-Federal Sponsor now or hereafter owns or controls to inspect the Project, and, if necessary, to undertake any work necessary to the functioning of the Project for its authorized purpose.

26. The Non-Federal Sponsor shall hold and save the Government free from all damages arising from design, construction, operation, maintenance, repair,

rehabilitation, and replacement of the Project, except for damages due to the fault or negligence of the Government or its contractors.

27. The parties shall develop procedures for maintaining books, records, documents, or other evidence pertaining to Project costs and expenses in accordance with 33 C.F.R. 33.20 for a minimum of three years after the final accounting.

28. The Non-Federal Sponsor is responsible for complying with the Single Audit Act Amendments of 1996 (31 U.S.C. 7501-7507). To the extent permitted under applicable Federal laws and regulations, the Government shall provide to the Non-Federal Sponsor and independent auditors any information necessary to enable an audit of the Non-Federal Sponsor's activities under the PPA. The costs of non-Federal audits shall be paid solely by the Non-Federal Sponsor without reimbursement or credit by the Government.

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11.0 Conclusion

The purpose of this draft Integrated DIR/EA #559 is to recommend a plan that will optimize the beneficial use of dredged material for ecosystem restoration purposes in a manner that exceeds the dredged material deposition that can be implemented under the Federal Standard associated with the USACE operations and maintenance dredging. The proposed action consists of removing dredged material from the CSC to construct platforms suitable for marsh development. Dredged material would be discharged into the marsh creation and restoration sites by pipeline from a hydraulic cutterhead dredge. Earthen weirs would be constructed to retain dredged material to an elevation conducive to marsh creation and restoration.

MVN has assessed the environmental impacts of the proposed action and has determined that the Proposed Action would have no significant impact upon cultural resources and endangered or threatened species; and no significant adverse impacts on resources identified in Section 2 of this draft Integrated DIR/EA. Therefore, an EIS for the proposed action is not warranted.

A Model PPA for the Louisiana Coastal Area Beneficial Use of Dredged Material Program has been approved by the ASA (CW), (See Memorandum, ASA(CW), April 2, 2015, Subject: Louisiana Coastal Area Beneficial Use of Dredged Material Projects - Model Project Partnership Agreement (PPA); Delegation of Approval and Execution Authority; and Memorandum, CECW-MVD, April 10, 2015, Subject: Approved Model Project Partnership Agreement (PPA) for Louisiana Coastal Area Beneficial Use of Dredged Material; Memorandum, CECW-MVD, April 14, 2015, Subject: Approved Model Project Partnership Agreement(PPA) for Louisiana Coastal Area Beneficial Use of Dredged Material (LCA BUDMAT) Program. The Non-Federal Sponsor, The Coastal Protection and Restoration Authority Board of Louisiana, for this Project is in agreement with the requirements of the Approved LCA BUDMAT Program Project PPA.

12.0 Recommendation

It is recommended that Alternative 1, use of a temporary pipeline through the West Cove Canal to access marsh creation and restoration sites within the SNWR as described in this draft Integrated DIR/EA, be carried forward as the TSP. Over three separate dredging cycles, the proposed plan could restore over 180 AAHUs of coastal wetland habitat at a total cost of just over $10,000,000.

Although the Project will be constructed in three cycles, the design and construction will be treated as one single project. The Project description, location, cycled implementation, acres created per cycle, and other details of the TSP are set forth in this draft Integrated DIR/EA. Once the final Integrated DIR/EA is approved, the Recommended Plan contained therein, will serve as the decision document for the Project Participation Agreements (PPAs). A PPA will be required for the implementation of each of the three cycles of the Project. If there is a lack of funding or a sufficient quantity or quality dredged

material, or there is any other impediment and reason on the part of the NFS or USACE to not to implement cycle 2, cycle 3, or both, a PPA will not be executed for one of more of the two remaining cycles.

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13.0 Preparers

This draft Integrated DIR and EA and the associated draft FONSI were prepared by Mr. Sean Mickal, Water Resources Planner, Mrs. Patricia Naquin, Biologist; with relevant sections prepared by: Mr. Joe Musso – HTRW, Dr. Paul Hughbanks - Cultural Resources, Mr. Andrew Perez – Recreational Resources, and Mr. Richard Radford - Visual Resources. Mr. Julio Vidal Salcedo – provided Engineering Design and Support; with Mr. Eric Salamone providing TSP cost estimates. Comments on this integrated document can be mailed to: US Army Corps of Engineers, New Orleans District, CEMVN-PD, 7400 Leake Avenue, New Orleans, LA 70118

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APPENDICIES

Appendix A. Legislation, Reports, and Guidance

Appendix B. Environmental

Appendix C. NFS Letter of Intent and Statement of Financial Capability

This will be included in the final report

Appendix D. Relocations Summary

Appendix E. Cost Certification and Total Project Cost Summary

Cost Certification will be included in the final report.

Total Project Cost Summary and Abbreviated Risk Analysis will be included in the final report.

Appendix F. US Fish and Wildlife Draft Coordination Report

Appendix G. Real Estate Plan

Appendix H. DQC & ATR Certification

Certifications will be included in the final report

Appendix I. Value Engineering Study