



**US Army Corps  
of Engineers**

**Draft Integrated Design and Implementation Report  
and  
Environmental Assessment**

**Louisiana Coastal Area  
Beneficial Use of Dredged Material Program  
Houma Navigation Canal Project  
Terrebonne Parish, Louisiana**

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## 1 Introduction

The \$100 million Louisiana Coastal Area Beneficial Use of Dredged Material (LCA BUDMAT Program) was authorized by Title VII, Section 7006(d) of the Water Resources Development Act of 2007 (PL 110-114) on 8 November 2007, in accordance with the Report of the Chief of Engineers dated 31 January 2005. The Final Programmatic Study Report and Environmental Impact Statement dated January 2010 was approved by the Assistant Secretary of the Army for Civil Works (ASA (CW)) on 13 August 2010.

This integrated Design and Implementation Report (DIR) and Environmental Impact (EA) Statement provides a Tentatively Selected Plan for the Beneficial Use of Dredged Material (BUDMAT) at Houma Navigation Canal, Terrebonne Parish, Louisiana (Project) to be implemented as part of the LCA BUDMAT Program involving the placement and beneficial use of dredged material removed during the routine maintenance dredging of the federally maintained Houma Navigation Canal (HNC) located in the Terrebonne Bay Reach of the HNC, between Channel Mile 12 and Channel Mile 0 (Figure 1 all figures are located at the end of the document), to construct platforms suitable for salt marsh creation and development. The approximate 37 mile long HNC originates in Houma, Louisiana, descends south and enters the Gulf of Mexico between East Island and Timbalier Island, in an area commonly referred to as Cat Island Pass.

Alternative plans for individual LCA BUDMAT Projects are developed with the level of detail necessary to select a justified, acceptable, and implementable plan that is consistent with is in compliance with applicable law and policy and meets the goals and objectives of the project. 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 reasonably avoid or minimize adverse environmental impacts and mitigation requirements are considered in formulating the Tentatively Selected Plan (TSP). The Project Delivery Teams (PDT) rely on existing data for other United States Army Corps of Engineers (USACE) projects that are located within the Project Area to expedite the completion of this Report. The appropriate National Ecosystem Restoration benefits are used and appropriate environmental considerations taken into account by the PDT in selecting the TSP. The description of the TSP in this DIR demonstrates acceptability, completeness, effectiveness, and efficiency.

After this draft Integrated DIR and EA, are reviewed and comments are considered and incorporated, a Recommended Plan (RP) will be identified. Once the final integrated DIR and EA (the decision document), which provides the RP is approved, the Department of the Army will proceed with the execution of a Project Partnership Agreement 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 Louisiana Coastal Area (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 for LCA. The Report of the Chief of Engineers dated 31 January 2005 (“2005 Chief’s Report”) approved the Near-Term Plan substantially in accordance with the 2004 LCA Study and a Record of Decision signed 18 November 2005. The 2004 LCA Study and its accompanying Programmatic Environmental Impact Statement is available at the main LCA website, <http://www.lca.gov>

Title VII of the Water Resources Development Act of 2007 (“WRDA 2007”) (PL 110-114) authorized an ecosystem restoration Program for the Louisiana Coastal Area 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 2005 Chief’s Report (page 4) describes the beneficial use of dredged material 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 (BUDMAT).—

(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.

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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 19 December 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 Water Resources Development Act of 1992. Section 204 of the Water Resources Development Act of 1992 (PL 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 Louisiana Coastal Area Beneficial Use of Dredged Material, 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: Legislation, Reports, and Guidance).

The LCA BUDMAT Program, January 2010, Final Programmatic Study Report and Programmatic Environmental Impact Statement (2010 Report), a component of the 2004 LCA Study, was approved by the Director of Civil Works on 12 March 2010, and the ASA (CW) signed a Record of Decision dated 13 August 2010. By Memorandum of the same date (13 August 2010), the ASA (CW) also 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 2010 Report recommended an implementation plan for the LCA Program that beneficially uses material dredged from federally maintained waterways. The authorized LCA Plan 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 BUDMAT Program are used for disposal activities associated with separate, cost-shared, individual ecosystem restoration beneficial use projects that are above and beyond the 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 BUDMAT Program, the 2010 Report provided that approximately 15 percent (i.e., \$15 million) would be used for planning, engineering, and design activities, and real estate acquisition for beneficial use projects implemented under the BUDMAT Program, and the remaining \$85 million would be used for placement of dredged material within the beneficial use disposal sites.

The 2010 Report envisioned that the Coastal Protection and Restoration Authority of Louisiana would serve as the primary NFS for the implementation of the LCA BUDMAT Program. Subsequently, the Coastal Protection and Restoration Authority Board of Louisiana declined to serve as the primary NFS and it became apparent that there was no willing primary NFS to cost share the implementation of the LCA BUDMAT Program. Therefore, individual projects in the LCA BUDMAT Program are being designed and implemented by MVN where a NFS is identified as a willing cost-share partner for an individual BUDMAT project. This process fulfills the intent of the LCA BUDMAT Program to achieve ecosystem restoration objectives in coastal Louisiana, by using sediment resources generated by the maintenance of authorized federal navigation channels. The NFS for this Project is the Coastal Protection and Restoration Authority Board of Louisiana.

The Integral Determination Report for the Project was approved on 20 Oct 2016. The Design Agreement between the Department of the Army and the NFS, Louisiana Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) was executed on 14 Feb 2017 for the placement of material dredged during maintenance dredging of the HNC Project, and the Project Management Plan (PMP) was signed on 16 Aug 2016.

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

## **1.2 Non-Federal Sponsor**

The NFS for this Project is the Louisiana Coastal Protection and Restoration Authority Board of Louisiana (CPRAB). Upon preparation of the final integrated DIR and EA, the NFS will issue a Letter of Intent demonstrating its full support of the Project (See Appendix C).

Title VII of WRDA 2007 contained specific crediting provisions for work-in-kind performed by the NFS under the LCA Program. Section 7007 of WRDA 2007 (PL 110-114), provides authority to afford credit for work in-kind contributions provided by the NFS for the design of the Project that are determined to be integral to the 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 Water

Resources and Reform Act of 2014 amended Section 7007 of WRDA 2007, to authorize credit, in accordance with Section 221 of the Flood Control Act of 1970, as amended 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 the Project cost tables contained in this DIR. For this 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 20 Oct 2016. 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.

### **1.3 Design and Implementation Report Scope**

The 2005 Chief's Report as authorized by WRDA 2007, recommended implementation of the LCA BUDMAT Program through a one-step planning and design procedure modeled upon the process for projects implemented under Section 204 of the Water Resources Development Act of 1992 (PL 102-580) 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 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 integrated DIR and 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 LCA BUDMAT Program and HNC Project Study Area**

The LCA BUDMAT Program Area is divided into 4 sub-provinces along coastal Louisiana. The Study Area for this Project is located within sub-province 3 of the LCA BUDMAT Program Area (Figure 2).

### **1.5 Houma Navigation Canal Project Area**

The Project Area is located in Terrebonne Bay near Terrebonne Parish, LA and approximately 25 miles south of Houma, LA and approximately 1.5 miles southwest of

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the community of Cocodrie, LA in Congressional District LA1. The HNC extends from the Gulf of Mexico beginning at HNC Channel Mile 0 upstream to Houma, La ending at HNC Channel Mile 36. The Project Area includes the Terrebonne Bay Reach of the HNC, which extends from HNC Channel Mile 0 to HNC Channel Mile 12 (Figure 3).

## **1.6 Prior Beneficial Use Studies and Projects**

A number of studies, reports, and environmental documents on water resources development in the Project Area have been prepared by the 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>

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**Table 1 Prior Studies and Environmental Documents**

<b>Project Year</b>	<b>Study/Report/Environmental Document Title</b>	<b>Document Type</b>
1975	Final Composite Environmental Statement for Operation and Maintenance Dredging of Four Projects Located South of the Gulf Intracoastal Waterway in Terrebonne Parish, Louisiana (Houma Navigational Canal, Little Caillou Bayou, Bayous Grand Caillou and Le Carpe (waterway from Gulf Intracoastal Waterway to Bayou Dulac) and Bayou Terrebonne)	Environmental Impact Statement
1989	Final Environmental Impact Statement, "Houma Navigation Canal Ocean Dredged Material Disposal Site Designation	EIS
1984	"Houma Navigational Canal, Louisiana -Allowable Over depth and Advanced Maintenance,"	Environmental Assessment #44
1989	Proposed Additional Dredged Material Disposal Areas for Maintenance of Houma	EA #122
1990	Additional Disposal Areas for Maintenance of Houma Navigation Canal, Terrebonne Parish, LA	EA #123
1990	Proposed Additional Dredged Material Disposal Areas for Maintenance of Houma Navigation Canal, Terrebonne Parish, LA	EA #127
2002	Deposition of Dredged Material Near Wine Island, Terrebonne Parish, LA	EA #127A
1990	Extension of Dredging Limits and Addition of a New Disposal Area for Operation and Maintenance of the Houma Navigation Canal, Terrebonne Parish, LA	EA #128
1997	Houma Navigation Canal Channel Realignment, Cat Island Pass	EA #265
2000	Houma Navigation Canal Mile 0 to Mile 11	EA #312
	Houma Navigation Canal Shoreline Protection	EA #391
	Houma Navigation Canal, Additional Disposal Areas	EA #412
2002	Houma Navigation Canal, Additional Disposal Area	EA #451
2004	"Houma Navigation Canal Secondary Impacts Study," prepared by T. Baker Smith & Son, Inc.	
2005	Louisiana Coastal Area, Louisiana, Ecosystem Restoration Program, November 2004	Programmatic EIS
2008	Mississippi River, Baton Rouge to the Gulf of Mexico, LA. Designation of Additional Disposal Area, Pass a Loutre, South Pass, Plaquemines Parish, LA	EA #268b

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Project Year	Study/Report/Environmental Document Title	Document Type
2010	LCA, Beneficial Use of Dredged Material Program	Programmatic Study Report and Programmatic EIS
2011	LCA, Medium Diversion at White Ditch	Feasibility Study and EIS
2013	Mississippi River, Baton Rouge to the Gulf of Mexico, LA, Designation of Additional Disposal Areas for Head of Passes, Southwest Pass, and South Pass, Plaquemines Parish, LA	EA #517
2015	LCA, Beneficial Use of Dredged Material at West Bay	Design and Implementation Report and EA #535
2016	Tiger Pass Marsh/Ridge Restoration Tier 2, Louisiana Coastal Area Beneficial Use of Dredged Material Program, Plaquemines Parish, Louisiana” with a signed FONSI	EA #542
2017	Tiger Pass Marsh/Ridge Restoration Tier 2, Louisiana Coastal Area Beneficial Use of Dredged Material Program, Plaquemines Parish, Louisiana” with a signed FONSI	EA #542.A



## **2 Affected Environment**

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 (2075) is performed. Those changes in conditions are determined by the impact of all on-going actions, man-made or natural, upon the resources if no alternatives are implemented as part of this evaluation. Sections 2.1 to 2.3 describe the 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 National Environmental Policy Act of 1969, as amended (NEPA) requires an analysis of the environmental effects from taking no action. 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 on-going forces that affect the Study Area. Therefore, consistent with the requirements of NEPA (40 CFR §1502.14), 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 (TSP) alternative. 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 an action alternative.

### **2.1 Description of the Study Area**

The Study Area for this Project is located within the Barataria-Terrebonne estuary at the northern edge of the Gulf of Mexico south of Cocodrie in the vicinity of the HNC and Petite Caillou in Terrebonne Parish, Louisiana. The southern end of the Terrebonne Basin is defined by a series of narrow, low-lying barrier islands (the Isles Dernieres and Timbalier chains), separated from the mainland marshes by a series of wide, shallow lakes and bays (e.g., Lake Pelto, Terrebonne Bay, and Timbalier Bay).

The Terrebonne Basin covers an area of about 2,063,500 acres and supports approximately 155,000 acres of swamp and almost 574,000 acres of marsh, grading from fresh marsh inland to brackish and saline marsh near the bays and the Gulf of Mexico. The Verret Subbasin contains most of the cypress swamp (118,000 acres) in the Terrebonne Basin. The northern Penchant Subbasin supports extensive fresh marsh (about 166,000 acres), including a predominance of flotant marsh, with 98,000 acres of intermediate and brackish marsh in the Lost Lake-Jug Lake area and about 17,000 acres of saline marsh to the south. Fresh marsh is also dominant in the Fields Subbasin (approximately 23,000 acres). The Timbalier Subbasin grades from fresh marsh in the northern part of the subbasin to saline marsh near the bays, but is dominated by brackish (71,000 acres) and saline (153,000 acres) marsh types.

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The Study Area contains a complex of habitat types, including natural levees, lakes, swamps, marshes, and bayous formed from sediments of abandoned Mississippi River delta lobes. Elevations in the Study Area vary from less than 1 foot in the marsh and up to +5.0 feet along some canal banks. Near Houma, the largest city in the area, the elevation is about 10 feet NAVD88. The elevation along the bayou ridges is 4 feet to 5 feet NAVD88 and it is less than 1-foot NAVD88 along the southern portion near the Gulf of Mexico.

The vegetation in the Study Area is classified as saline marsh (O'Neil 1949; Chabreck and Linscombe 1997, 2007; Sasser et al. 2014). Soils in the area 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. Although many plants can tolerate a periodically flooded substrate, few can tolerate the combined stresses of flooding and high salinity. The dominant species in the saline marshes of the project area is saltmarsh cordgrass, a perennial grass that grows from extensive rhizomes. Saltmarsh cordgrass also dominates the high marsh areas subject to intermittent flooding, although the highly salt-tolerant salt grass, black needle rush, and glassworts are also frequently present. Aquents dredged soils are associated with canal spoil banks and support a scrub-shrub community. Salt tolerant shrubs including wax myrtle, marsh elder, eastern baccharis, giant reed (*Phragmites* spp.), and saltmeadow cordgrass occur on these higher ridges. Although submerged aquatic vegetation is rare, intertidal mud flats and oyster reefs are relatively common in project-area saline marshes.

Four main physiographic surfaces exist in Terrebonne Parish: natural levees, backswamps, coastal marshes, and barrier islands. Soils are typically peat, mucks, and clays mixed with organic matter. Logs, stumps, and root systems are often incorporated with peat and clays. The percentage of sand increases as one approaches the open waters of Terrebonne Bay. Vegetation characteristics of the marshes include saltmeadow cordgrass (*Spartina patens*), coastal arrowhead, common reed (*Phragmites australis*), coastal water-hyssop (*Bacopa monnieri*), seashore paspalum (*Paspalum vaginatum*), spikerush (*Eleocharis palustris*), Olney's bulrush (*Scirpus hattorianus*), seashore saltgrass (*Distichlis spicata*), and camphorweed (*Heterotheca subaxillaris*). There are some canal banks through the area and the vegetation is comprised of Chinese tallow (*Triadica sebifera*), wax myrtle (*Morella cerifera*), and false-willow (*Baccharis bigelovii*).

The marshes and shallow bays in the area function as nursery grounds for valuable stocks of shrimp, oysters, crabs and finfishes. These resources provide excellent opportunities for sport and commercial fishing. Popular recreational activities in the area include fishing, hunting, boating, and camping. Historical and archeological sites may be located throughout the Study Area. Section 106 consultation is ongoing and will be concluded prior to initiation of any project construction activity.

About 12 percent of the land area in Terrebonne Parish is developed. Agricultural crops grown in the area include sugarcane, soybeans, cotton, corn, citrus fruits, and truck crops. Important terrestrial animals in the area include nutria, muskrat, raccoon, mink, and otter, which are harvested for their furs. The American alligator is harvested throughout the area for its meat and hide, especially in the swamps and fresh/intermediate marshes. The marshes and shallow bays in the area function as nurseries for valuable stocks of shrimp, oysters, crabs, and finfish. These resources provide excellent opportunities for sport and commercial fishing.

## **2.2 Description of the Watershed**

The Terrebonne Basin watershed encompasses approximately 1,455 square miles. The waterways and major navigational channels located within the basin or those that influence the Study Area are Bayou Petit Caillou, the HNC, Falgout Canal, and the Gulf Intracoastal Waterway (GIWW). These navigation channels introduce and/or compound marine influences in many of the interior coastal wetlands and water bodies within the Terrebonne Basin (USACE, 2004a). The HNC runs north and south mainly between Bayou du Large and Bayou Grand Caillou. The GIWW follows an east-west path in the northern portion of the Study Area. These two man-made channels, along with the natural channels in the area, have a strong influence on surface water in the area. There are no scenic streams in the Study Area designated under the Louisiana Natural and Scenic River System.

### **2.2.1 Sea Level Rise**

ER 1100-2-8162 states potential relative sea level change must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence. Benefits calculated using the WVA 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 “high” sea-level change scenario, any alternative would likely underperform very soon after construction since the wetland portion of the Project 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 low 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 that the marsh creation site would not functionally be a wetland until the deposition site is at an appropriate elevation conducive for wetland function, growth, and sustainability. Because any alternative involves a one-time 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 and Rita in 2005 which caused damage in the Project Area. Hurricanes Gustav and Ike in 2008, and more recently, Isaac in 2012, caused additional 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 LCA BUDMAT 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 geology of the Study Area is heavily influenced by the Mississippi River and its Deltaic Plain, a complex of abandoned and active deltas of the Mississippi River. Three of four abandoned delta complexes shaped Terrebonne and Lafourche Parishes as sediments were deposited on the Pleistocene Prairie. The Mississippi River laid down sediments from 100 meters to 200 meters thick at each delta (Penland et al. 1988). The abandoned deltas were formed generally from the west to the east in chronological sequence starting about 9,000 years before present and ending less than 100 years ago (Sevier 1990).

After delta abandonment occurs, sediments slowly deteriorate as they subside under their own weight. In addition, sea level has been rising throughout this time by about 5 meters to 8 meters (Mossa et al. 1990). Historically, the cycle of delta growth and destruction took about 5,000 years (Gosselink and Sasser 1991). However, because of a variety of factors (most notably human), delta destruction is taking place in a few human generations rather than thousands of years.

## **Soils**

The soils in the Study Area generally consist of swamp/marsh deposits, interdistributary deposits, substratum deposits and Pleistocene deposits.

The swamp/marsh deposits are composed of extremely soft to medium stiff gray and brown organic clay, peat, and humus to depths of 1 to 7 feet below existing grade. The interdistributary undifferentiated deposits comprise very soft to medium stiff gray clay and silty clay to boring termination depths of 60 feet below the existing mudline. The interdistributary clays laterally interfinger with the coarse grain deposits comprising loose gray silty sands, clayey sands, sandy silts, and clayey silts. Beneath the interdistributary deposits substratum deposits and Pleistocene clays are expected. They are most likely characterized by medium stiff to stiff clays, but were not encountered by our borings. Based on a review of the available geologic publications, the substratum and Pleistocene deposits are expected to be below el -180 and el -300, respectively.

Natural levee deposits are found adjacent to several distributaries that dissect the Study Area. Natural levee deposits average approximately 8-feet thick and become thinner away from the channel. Natural levee deposits are generally composed of oxidized clays, silts, and silty clays with relatively low water contents and higher compressive strengths than the surrounding environments. The soils of the higher natural levees are of the Mhoon-Commerce association (5.8 percent of Terrebonne Parish). These soils are brown to grayish brown soils are a silt loam, silty clay loam, or silty clay. The lower portions of the natural levees are formed by the Sharkey-Swamp soil association (6.7 percent of Terrebonne Parish). These soils are black to dark gray on the surface and have much more clay material and organic matter than those of the Mhoon-Commerce association. These soils support bottomland vegetation.

The largest area of the parish (75.1 percent in Terrebonne) is comprised of soils of the Marsh soil association, which occurs over a broad plain about level with the Gulf of Mexico between the ridge areas and is frequently flooded. These soils generally have a peat or muck surface layer, 2 feet to 5 feet thick, over alluvial clays and silty clays. The marsh soil organic content decreases moving from fresh to saline. Fresh marsh soils contain a mean of 52 percent organic matter whereas saline soils contain only 18 percent organic matter (Chabreck 1982).

Swamp deposits are found at the surface, are interbedded within interdistributary deposits throughout the Study Area, and are up to 17-feet thick. A laterally extensive layer of swamp deposits is found at approximately -35 feet NAVD88 from Mile 19 to approximately Mile 12.5 and from Mile 11.4 to Mile 7.5. This layer of swamp ranges from approximately 5 feet to 10 feet thick. Swamp deposits consist of soft to medium fat clays with organic material and wood. Swamp deposits are also found at approximately -70 feet NAVD88 and extend to the bottom of the borings. These deeper swamp deposits are medium to stiff, fat clays with relatively high strengths, organic material, and wood. The Swamp soil association occurs off the ridge areas and forms 11.5 percent of Terrebonne Parish. They are usually wet and frequently flooded.

Interdistributary deposits are found at the surface and throughout the Study Area. Where penetrated, interdistributary deposits extend down to a maximum of -750 feet NAVD88. Interdistributary deposits consist of fat and lean clays with lenses and layers of silt and silty sand. Substratum sands are located beneath interdistributary deposits and swamp deposits and are approximately 100-feet thick.

Abandoned distributary deposits are found in the northern half of the Study Area at Miles 34.1, 23, 20.7, and 19.4. These deposits are generally found at the surface or near the surface and extend down to approximately -50 feet to -60 feet NAVD88. They are not laterally extensive. Abandoned distributary deposits consist of silty sands, silts, and clay strata.

## **2.3 Relevant Resources**

This Section contains a description of relevant resources that could be impacted by the Proposed Action also referred to as the TSP. 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.

### **2.3.1 Navigation**

Within the Terrebonne Basin there is one federally maintained navigation feature, the HNC, which serves as a navigation route connecting the Gulf of Mexico with the interior of the central coast of Louisiana, providing direct access to the maritime and offshore support interests. The HNC cuts through and provides pathways to several natural waterways including Bayous Black, La Carpe, du Large, Petit and Grand Caillou, Sale, and Little Cocodrie Bayou, most of which discharge into Terrebonne Bay north of the Isles Dernieres (USACE, 2005).

The HNC has direct influence on the Terrebonne Basin barrier shoreline as its mouth is situated in Cat Island Pass at the western end of Timbalier Island. Periodic maintenance dredging of the HNC provides an opportunity for the beneficial use of dredged material on Timbalier Island and Isles Dernieres. However, because of the close proximity of the HNC to the western end of Timbalier Island, consideration must be given to ensure that the HNC dredging does not adversely impact the westerly longshore transport of sand. Since the islands support limited recreational, commercial, and industrial usages, few privately maintained channels and passes exist.

### 2.3.2 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.

#### Existing Conditions

Existing grounds within the Terrebonne Bay area boundaries are a mixture of shallow open-water, fragmented marsh, remnant bayou ridges, and oil and gas canals with adjacent spoil banks. 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 (*Borrchia 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. Unfortunately, inshore barrier islands and coastal wetlands in this region are almost non-existent and coastal marshes open directly upon Terrebonne Bay. Destruction of these coastal marshes and barrier islands protecting Terrebonne Parish may have numerous adverse effects upon the fishing and shellfish industry, recreational and commercial navigation, public housing, and wildlife resources.

### 2.3.3 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.

#### Existing Conditions

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

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 Terrebonne Basin are primarily estuarine and marine in nature. Commercially important species include the American oyster (*Crassostrea virginica*), brown and white shrimp, 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 Study Area supports rich populations of phytoplankton, zooplankton, benthos, macro-invertebrates, and numerous small fishes. These organisms constitute vital components of the aquatic food chain. White shrimp, brown shrimp, red drum, Spanish mackerel, and sharks are likely to be present in the Terrebonne Basin.

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.

Oysters are another valuable resource in the Terrebonne estuary. Oysters have been harvested for commercial sale for at least 150 years. No oyster leases are located within the Marsh Creation Site; however, oyster leases are located south of the Study Area at Caillou Lake and Bay Junop at the southern end of Bayou du Large.

#### **2.3.4 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.

### Existing Conditions

The Study Area contains a great variety of mammals, birds, reptiles, and amphibians. Abundant furbearers, including nutria, muskrat, mink, otter, and raccoon, formerly supported a trapping industry in the Terrebonne Basin. Other species inhabiting the area include white-tailed deer, skunks, rabbits, squirrels, and a variety of smaller mammals. Large populations of migratory waterfowl such as gadwalls, blue winged teal, green winged teal, wigeons, mottled ducks, lesser scaup, shovelers, pintails, and mallards are present during winter. Mottled ducks are present year-round. Coots, gallinules, rails, mourning doves and snipe are other important game species in the area. Non-game wading birds, shore birds such as egrets, ibis, herons, sandpipers willets, stilts, gulls, terns skimmers, grebes and loons also typically utilize the area.

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), however no known nests were identified within 1,500 feet of the project during recent field investigations. Numerous terrestrial invertebrates are found throughout the Study Area. The most notable are insects such as mosquitos, deer flies, horseflies, and biting midges.

### **2.3.5 Essential Fish Habitat**

#### 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). Most of the Project Area, unless previously impounded, fits into one of these categories. The Gulf of Mexico Fishery Management Council, through the generic amendment of the Fishery Management Plans for the Gulf of Mexico, lists the following federally managed species or species groups as being potentially found in coastal Louisiana: brown shrimp, white shrimp, red drum, and Spanish mackerel. Table 2 shows the EFH for the managed species expected in the Study Area.

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**Table 2 Essential Fish Habitat for Life Stages**

Species	Life Stage	Essential Fish Habitat
Brown shrimp	Adults	Gulf of Mexico <110 m, Silt sand, muddy sand
	Juvenile	Marsh edge, SAV, tidal creeks, inner marsh
White shrimp	Adults	Gulf of Mexico <33 m, Silt, soft mud
	Juvenile	Marsh edge, SAV, marsh ponds, inner marsh, oyster reefs
Pink Shrimp	Juvenile	Estuarine <65m; sand/shell substrate
Red Drum	Adults	Gulf of Mexico & estuarine mud bottoms, oyster reef
	Juvenile	SAV, estuarine mud bottoms, marsh/water interface
Spanish Mackerel	Juvenile	Offshore, beach, estuarine
Gulf Stone Crab	Eggs	Estuarine/Marine; <18 m; sand/shell/soft bottom
	Larvae/Postlarvae	18 m; planktonic/oyster reefs, soft bottom
	Juvenile	<18 m; sand/shell/soft bottom, oyster reef

### 2.3.6 Threatened and Endangered Species

#### Existing Conditions

Factors regarding the existing conditions for threatened and endangered species in the Study Area principally stem from the alteration, degradation, and loss of barrier habitats; and human disturbance. The continued high rate of land loss throughout the Study Area

over the past 100 years continues to reduce available coastland resources to threatened and endangered species. This creates increased intra- and interspecific competition for rapidly depleting resources between not only the various threatened and endangered species but also other more numerous fauna.

The national importance of endangered or threatened species is recognized by the Endangered Species Act of 1973, 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.

Seven species are listed in Terrebonne Parish as either endangered or threatened. They are: the green (threatened), Kemp's ridley (endangered), hawksbill (endangered), leatherback (endangered), and loggerhead (threatened) sea turtles; piping plover (threatened); and the West Indian manatee (endangered).

Sea turtles typically frequent the Louisiana coast as they forage in estuarine waters. Any of the turtles could potentially inhabit the general vicinity of the coastal portions of the Study Area. Both green and hawksbill sea turtles are more tropical in their distribution and are rarely seen in the north-central gulf. The remaining species have been sighted in Louisiana coastal waters.

During their first year of life, green sea turtles are thought to feed mainly on invertebrates, with adults preferring an herbivorous diet and frequenting shallow water flats for feeding (Fritts et al. 1983). The adult turtle feeds primarily on seagrasses, and algae (Bjorndal 1985).

The Kemp's ridley sea turtle occurs mainly in the coastal areas of the Gulf of Mexico and northwestern Atlantic Ocean. Juveniles and sub-adults occupy shallow, coastal regions and are commonly associated with crab-laden, sandy or muddy water bottoms. Reproduction only occurs on the northeastern coast of Mexico (U.S. Fish and Wildlife Service (USFWS) and NMFS 1992). Small turtles are generally found in near shore areas off the Louisiana coast from May through November. Between the East Gulf Coast of Texas and the Mississippi River Delta, Kemp's Ridleys use near shore waters, ocean sides of jetties, small boat passageways through jetties, and dredged and non-dredged channels. There is no proposed or designated critical habitat for these species in Louisiana.

The hawksbill sea turtle is the second smallest sea turtle averaging 87cm carapace length. These turtles generally live most of their life in tropical waters such as warmer parts of the Atlantic, Gulf of Mexico, and Caribbean Sea. Sponges form their principal diet (Witzell 1983).

Leatherback sea turtles are the largest sea turtle, often over 1.5-m carapace length. They are a highly migratory species. There is little nesting in the United States including Louisiana. Leatherbacks feed primarily on jellyfish and other coelenterates.

Loggerhead sea turtles nest within the coastal United States from Louisiana to Virginia, with major nesting concentrations occurring on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida. In Louisiana, loggerheads are known to nest on the Chandeleur Islands. Nesting and hatching dates for the loggerhead in the northern Gulf of Mexico are from May 1 through November 30. Loggerhead turtles are generally known to occur east of the Mississippi River Delta

The brown pelican is a year-round resident that typically forages on fishes throughout the Study Area. In winter, spring, and summer, nests are built in mangrove trees or other shrubby vegetation, although occasional ground nesting may occur. Small coastal islands and sand bars are typically used as loafing areas and nocturnal roosting areas.

The piping plover as well as its designated critical habitat, occur along the Louisiana coast. Piping plovers may winter in or near the Proposed Action area, frequenting shorelines, outer beaches and intertidal mud and sand flats and may be present for 8 to 10 months, arriving from the breeding grounds as early as late July and remaining until late March or April. Piping plovers feed extensively on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse emergent vegetation; they also require un-vegetated or sparsely vegetated areas for roosting. Roosting areas may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. Piping plovers' diets typically consist of insects, worms, crustaceans, and occasionally mollusks.

West Indian manatees are large, gray aquatic mammals also known as sea cows. The average adult manatee is about 9.8 feet long and weighs between 800-1,200 pounds. Manatees can be found in shallow, slow-moving rivers, estuaries, salt water bays, canals, and coastal areas. Manatees migrate within the United States. They are concentrated in Florida in the winter, but they can be found in summer months as far west as Texas and as far north as Virginia. Manatees are completely herbivorous on aquatic plants and can consume 10-15 percent of their body weight daily. West Indian manatees have no natural enemies, and it is believed they can live over 60 years. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution.

### **2.3.7 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.

### 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.

The LDEQ assesses four categories for water use under the Louisiana Environmental Regulatory Code (LAC Title 33, Chapter 11) that would apply to the Study Area. Primary Contact Recreation includes activities such as swimming, water skiing, tubing, snorkeling, skin diving, and other activities that involve prolonged body contact with water and probable ingestion. Secondary Contact Recreation includes fishing, wading, and recreational boating, and other activities that involve only incidental or accidental body contact and minimal probability of ingesting water. Fish and Wildlife Propagation includes the use of water by aquatic biota for aquatic habitat, food, resting reproduction, and cover, including indigenous fishes and invertebrates, reptiles, amphibians, and other aquatic biota consumed by humans. Oyster Propagation includes the use of water to maintain biological systems that support economically important species of oysters, clams, mussels, and other mollusks consumed by humans so that their productivity is preserved and the health of human consumers of these species is protected. In the Study Area, Oyster Propagation was identified as being impaired in some areas. The Environmental Protection Agency (EPA) and LDEQ identified low dissolved oxygen levels and high fecal coliform levels as the suspected causes for impairment for Oyster Propagation, but were not able to identify the sources of these problems (LDEQ, 2005).

### **2.3.8 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.

### 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 Code of Federal

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. Terrebonne Parish is currently classified as attainment to ozone of all NAAQS. This classification is the result of area-wide air quality modeling studies.

### **2.3.9 Cultural Resources**

The National Historic Preservation Act of 1966 (Public Law (“P.L.”) 89-655), as amended; NEPA; and other applicable laws and regulations require federal agencies to consider the effects of their undertaking on the environment and any significant cultural resources within the Project Area of the proposed undertaking, as well as its area of potential effect (APE). Typically, these studies require archival searches and field surveys to identify any cultural resources. When significant sites are recorded, efforts are taken to minimize adverse effects and preserve the cultural resources. If any significant cultural resources cannot be avoided and would be adversely affected, an appropriate mitigation plan would be implemented to recover data that would be lost due to the proposed undertaking.

#### Existing Conditions

Prehistoric and Historic peoples are documented, by archaeological and historic remains, to favor living along the natural levees and ridges associated with natural waterways. The Study Area consists of such landforms that have been subjected to subsidence and erosion throughout the distant and recent past. Numerous recorded cultural resource sites with prehistoric and/or historic affiliation have been recorded in the Project Area as a result of several surveys. A cultural resources survey was conducted over a large portion of the Marsh Creation Site, by Coastal Environments, Inc. in 2007 and 2008 (Kelley et al. 2008, State Report 22-3077). This survey revisited previously recorded sites 16TR12, 16TR14, and 16TR18 within the Marsh Creation Site, and concluded that these sites had been destroyed by bank line erosion and/or construction of the HNC.

Cultural resources sites 16TR11 and 16TR13 were recorded in 1951 as also existing within the Marsh Creation Site but were not revisited at the time of the 2008 survey. Coastal Environments, Inc. conducted a cultural resources survey of the Marsh Creation Site in 2016 (Wells et al. 2016, State Report 22-5163). Within the Marsh Creation Site, any lands that had not been previously surveyed for cultural resources were viewed by airboat or by pedestrian transects. One previously unrecorded site (16TR338) was identified, and the two previously recorded sites (16TR11 and 16TR13) were revisited and examined. All of these sites were concluded to be destroyed by activity of dredging, subsidence, and pipeline construction. None are considered eligible for the National Register of Historic Places (NRHP).

### 2.3.10 Recreational Resources

This resource is institutionally important 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 important because of the high economic value of recreational activities and their contribution to local, state and national economies. Recreational resources are publicly important 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.

#### Existing Conditions

Boating and fishing occur within the Marsh Creation Site located in Terrebonne Bay and the Gulf of Mexico. The following information is provided by the Louisiana Department of Wildlife and Fisheries ([www.wlf.louisiana.gov](http://www.wlf.louisiana.gov)) for the number of fishing and hunting licenses sold in Jefferson Parish in 2014 and the number of boating licenses sold in 2011 by Parish (Table 3).

**Table 3 Boat Licenses**

Parish	Resident Saltwater Fishing	Non-Resident Fishing	Boat Licenses
Terrebonne	19,610	137	15,029

### 2.3.11 Aesthetics (Visual Resources)

#### Existing Conditions

The proposed Alternative sites are similar in landscape features such as vegetation and topography. The Marsh Creation Site (Site 1) located just south of Cocodrie is a mixture of canals bordered by marshlands and wetlands, with low growing vegetation. Trees are sparse and tend to grow on the upper banks of the canals in only a few locations. View sheds of the Project Area can be had from water craft only. There are no institutional or publically significant visual features in or around the Marsh Creation Site.

There are no institutional or publically significant visual features in or around the Project Area. There are no known state recognized scenic streams or bayous and there are no known state, federal or All American Road Scenic Byways in or around the Study Area.

## 2.4 Future Without Project Conditions

In the Future Without Project (FWOP), or No-Action alternative, the recommended action would not be implemented and predicted additional environmental gains would not be



achieved. Dredged material would continue to be disposed within the Federal Standard, as described in Section 5.2 of this report.

Section 2.2 of the 2010 Report and EIS entitled “Existing and Future Without Project or No Action Conditions”, provides a comprehensive discussion of the future without-project conditions of various coast wide resources that remain applicable to this DIR. The following excerpt provides a summary of the FWOP condition, which can be found in the 2010 Report, Section 2.2.1.2, page 21.

“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. Waterbodies 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 LCA Study (USACE 2004) estimated 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 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 CWPPRA, Section 204, or CIAP.”

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Without implementation of the Proposed Action (TSP), 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:

- 2004 LCA Study (2004 USACE) 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 31 January 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](http://issuu.com/coastalmasterplan/docs/coastal_master_plan-v2?e=3722998/2447530); accessed 28 September 2017) has been approved by the State of Louisiana and is partially funded. Although there is an approved Master Plan project for marsh creation along the Terrebonne bay rim, which includes the area proposed for this Project, that Master Plan project is not currently funded.

The 2017 State Master Plan indicates that the CPRABhas, 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 29 September 2017).

### 3 Plan Formulation

The intent of this Project is to maximize beneficial use of dredged material dredged from O&M of the federally-authorized HNC in the vicinity of Terrebonne Parish, LA. The materials removed from the HNC as part of the LCA BUDMAT Program will be deposited in a manner to maximize habitat output above current limitations imposed on the federal navigation project by funding 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.

Table 4 depicts 50 plus years of land loss in coastal Louisiana for all sub-provinces. Sub-province 3 (highlighted) includes the Project Area.

**Table 4 The projected total land loss**

	Land in 2000 sq. mi.	Land in 2050 sq. mi.	Net Land loss sq. mi.	% Land loss between 2050 and 2000	Land loss sq. mi./yr	% Total Loss by area
Sub-province 1	1,331	1,270	61	4.61%	1.23	12%
Sub-province 2	1,114	928	186	16.68%	3.71	36%
<b>Sub-province 3</b>	<b>1,975</b>	<b>1,746</b>	<b>229</b>	<b>11.59%</b>	<b>4.58</b>	<b>45%</b>
Sub-province 4	1,431	1,394	37	2.59%	0.74	7%
<b>Total sq. mi. (sq. km)</b>	5,851 (15,154	5,338 (13,825)	513 (1,329)	8.77%	10.26 (26.57)	100%

- The projected total land loss without predicted gains for 2000 to 2050 is 674 sq. mi (1,746 sq. km). The projected total land gain is 161 sq. mi (417 sq. km). The projected net land loss is 513 sq. mi (1,329 sq. km).
- Adapted from: Barras, J., Beville, S., Britsch, D., Hartley, S., Hawes, S., Johnston, J., Kemp, P., Kinler, Q., Martucci, A., Porthouse, J., Reed, D., Roy, K., Sapkota, S., and Suhayda, J., 2003, Historical and projected coastal Louisiana land changes: 1978-2050: USGS Open File Report 03-334, 39 p. (Revised January 2004).

### **3.1.2 Planning Needs and Opportunities**

#### *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:

##### Prevent future land loss where predicted to occur:

“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). The Terrebonne Basin is an essential ecosystem since it includes wetland habitats, essential fish habitat, and has high fish and wildlife values. The ecosystem provides habitat for migratory birds, wildlife, finfish, shellfish, and other aquatic organisms including threatened or endangered species. The estuaries of the Terrebonne Basin are productive oyster habitat and have traditionally supported important fisheries. There is widespread public support of projects intended to restore coastal habitats and avert further coastal land loss. The objective of the Project is to construct platforms suitable for salt marsh creation and development in the HNC in the vicinity of the Terrebonne Bay Channel Reach. The Project is an illustrative example of government action undertaken to attempt to restore lost coastal habitat in southeastern Louisiana.

### **3.1.3 LCA BUDMAT Program Opportunities**

#### Restoration of barrier islands<sup>1</sup>:

“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 <sup>1</sup>:

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

#### Restoration of Wetlands <sup>1</sup>:

“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 use an additional 30 million cubic yards (cy) of material coast wide beneficially 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

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<sup>1</sup> January 2010, LCA BUDMAT, Final Programmatic Study Report and Programmatic Environmental Impact Statement, page 48.

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 LCA BUDMAT 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.

### *3.1.3.1 Project Specific Opportunities*

The rationale for identifying planning opportunities are provided in the 2004 LCA Study<sup>2</sup> 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 restore/nourish/create critical marsh in the vicinity of Cocodrie, Louisiana and restores valuable wetland habitat in coastal Louisiana.

## **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 restoring coastal marsh habitat.

### **3.2.2 Planning Objectives**

- 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.

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<sup>2</sup> 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.

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Disposal of dredged material would continue under the O&M of the HNC navigation project. Utilization of the LCA BUDMAT Program allows for a more specific plan of action for the placement of dredged material in a manner that attains environmental benefits beyond those that could be realized during routine disposal of dredged material removed during O&M of federal navigation channels. This Project will be implemented in conjunction with the O&M of the HNC. Funding available for the O&M of the HNC varies from year to year and therefore, the ability to implement this Project is dependent on the availability of funding for the O&M of the HNC.

2) Project Life

It is not the intent of the LCA BUDMAT 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. While the period of analysis for this Project is 50 years, the alternatives considered were designed for a 20 year project life. The material available from the dredging of the HNC for a beneficial use and placement project is not suitable for building a marsh platform that is capable of sustaining a 50 year project life. The available dredged material from the HNC is a slurry mixture comprised of fine sediment that prevents placement of the material to an elevation needed to construct a marsh platform that with reasonable certainty, could survive 50 years. Since the design life of this Project is 20 years, the comparison of alternatives over the 50 year period of analysis considered that benefits would depreciate after year 20.

3) Minimize Impacts to Oyster Fisheries.

The Study Area contains active and productive oyster fisheries and impacts to oyster fisheries should be minimized or avoided. In 2006, the Louisiana legislature enacted the Louisiana Oyster Lease Acquisition and Compensation Program (OLACP), LSA-R.S. 56:432.1 and LAC 43:1:850-869, which enables the State of Louisiana to acquire oyster leases within the direct impact areas of a coastal protection, conservation, or restoration project. This Project qualifies as such project. However, it is the sole responsibility of the NFS of this Project to provide for the lands, easements, rights-of-way, relocations, and disposal areas, including the acquisition of any oyster leases, for the Federal Standard base plan. Since funds from the BUDMAT Program would be used for disposal activities associated with this Project that is above the disposal activities covered by the USACE O&M maintenance dredging Federal Standard. BUDMAT Program funds can only be used to acquire oyster leases for the beneficial use sites that are clearly outside of the Federal Standard base plan disposal alternative.

### **3.3 Formulation of Alternative Plans**

#### **3.3.1 Identifying Management Measures**

In formulating alternatives to maximize the benefits for the Project, the following management measures were identified to address coastal habitat degradation in the Project Area.

Measure 1: Restoration of coastal ridge habitat. This measure involves the construction of land, above water and above typical wetland elevation, along the footprint of a degraded coastal ridge. The ridge would be constructed using material sourced from the routine maintenance dredging of the HNC. Dredged material would be deposited to an elevation conducive to the establishment of representative vegetation for ridge habitat.

Measure 2: Restoration or construction of coastal wetland habitat. This measure involves the construction of marsh platforms in areas of open water for the creation of marsh habitat. Marsh platforms would be constructed using material sourced from the routine maintenance dredging of the HNC. Dredged material would be deposited to an elevation conducive for wetland development.

Measure 3: Restoration or construction of a coastal ridge and wetland complex.

This measure involves the construction of a coastal ridge and wetland simultaneously in the same location. The coastal ridge 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 ridge and marsh would be constructed using material sourced from the routine maintenance dredging of the HNC. 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.

Measure 4: Restoration or construction of colonial nesting and wading bird habitat. This measure involves the construction of an island feature in areas of open water. The island would be constructed using material sourced from the routine maintenance dredging of the HNC. Dredged material would be deposited to an elevation that is not conducive for marsh development while at the same time it does not promote the recruitment of vegetation typical of, for example, a coastal ridge.

#### **3.3.2 Screening of Management Measures**

Measures 1, 3, and 4 were screened from further consideration early in the evaluation process because samples from recent dredging of the HNC, indicated that the material within Terrebonne Bay is a slurry mixture consisting primarily of very fine silts and clays,



and is not suitable for the creation and/or restoration of ridges or construction of islands for restoration of colonial nesting and wading bird habitat. Alternatives were developed based on management Measure 2 (the creation and/or restoration of coastal wetland habitat) by examining the potential for marsh creation in open water areas.

### **3.4 Initial Array of Alternatives**

Through coordination between the USACE, the NFS and natural resource agencies, the following list of Alternatives, including the FWOP condition (the no-action alternative), were developed from the management measures. Figure 4 shows the location of potential marsh creation sites within the vicinity of the HNC. Prior to initiation of the DIR, the NFS performed investigations on all sites shown in Figure 4. The NFS determined that Sites 2, 4 through 8, and 10 through 15, were not feasible locations for placement of dredged material based on factors that include but are not limited to: active oil and gas exploration located in the site, to which access corridors would need to be maintained; size of the site was less than 25 acres and did not provide adequate open water for disposal of material and marsh creation and restoration; or the site was exposed to open water around the perimeter increasing the size and cost for retention dikes. These factors were assessed on a qualitative basis only.

Therefore, the development of the initial array of alternatives was based on sites 1, 3, and 9 as shown in Figure 5, with a possible expansion of Site 1, identified as Site 1A, and various combinations of each of these sites.

Since the Study Area contains active and productive commercial oyster fisheries, development of alternatives considered impacts to fisheries, and include means to reduce potential impacts. Each alternative considers impacts to oyster leases located within the footprint of the placement site, as well as oyster leases located within 1,500 feet (ft.) of the perimeter of the site. Those located within the site footprint, would be directly impacted by the placement of dredged material. Therefore acquisition of these leases would be required. Those located outside of the site, but within 1,500 ft. of the perimeter, are considered in direct impacts. Acquisition of the oyster leases is not required, however owners would be notified of potential impacts. A retention dike would be constructed in order to minimize the risk of impacts to oyster leases located within 1,500 ft. of the perimeter.

The following describes the initial array of Alternatives that were developed for comparison and selection of a TSP, then a more detail analysis and description of the TSP was developed.

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

In the FWOP or No-Action Alternative, the Proposed Action (TSP) 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 the HNC 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.

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 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: Site 1**

This Alternative consists of constructing a marsh platform by placing dredged material from the Project into a site designated as Site 1 which consists of approximately 49.8 acres of available open water. A retention dike would be constructed around the southern half of the site, to contain the dredged material; an earthen weir would be constructed around the northern half of the site to allow for drainage. Drainage of the site would be into adjacent, surrounding marsh, potentially providing marsh nourishment. Preliminary investigations indicated there are no utilities or oyster leases within the footprint of the site. However, there are several oyster lease sites located within a 1,500 ft. perimeter of the site.

### **Alternative 2: Combined Site 1 and 1A**

This Alternative combines Site 1 and Site 1A. This Alternative consists of constructing a marsh platform by placing dredged material from the Project into sites designated as Site 1 and Site 1A. The combination of the two sites consists of approximately 95.6 acres of open water available for placement of dredged material. A combination of retention dikes and earthen weirs would be constructed around the sites, to contain the dredged material. An earthen weir would be constructed between the two sites to divide them and would assist in the development of the dredged material placed within the sites. A low level earthen weir constructed under the north east side of the site 1, would allow drainage of the site would be into adjacent, surrounding marsh, potentially providing marsh nourishment. Preliminary investigations indicated there are no utilities or oyster leases within the footprint of the sites. There are several oyster leases sites located within a 1,500 ft. perimeter of the site.

### **Alternative 3: Site 3**

This Alternative consists of constructing a marsh platform by placing dredged material from the Project into a site designated as Site 3 which consists of approximately 114.8 acres of available open water. A retention dike would be constructed around the site in order to contain the dredged material. Two earthen weirs would be constructed within the site in order to assist in the development of the dredged material placed within the site. Drainage of the site would be into surrounding marsh, potentially providing marsh nourishment. Preliminary investigations indicated there are no utilities within the footprint of the site; however, there are oyster leases located within the site, as well as within a 1,500 ft. perimeter of the site.

### **Alternative 4: Site 9**

This Alternative consists of marsh creation by placing dredged material from the Project into a site designated as Site 9 which consists of approximately 60.2 acres of available open water. A retention dike would be constructed around the site, to contain the dredged material. The retention dike would contain weirs to allow for drainage into adjacent open channels. Preliminary investigations indicated there are no utilities within the footprint of the site; however, there are oyster leases located within the site as well as within a 1,500 ft. perimeter of the site.

### **Alternative 5: Combined Site 1 and 3**

This Alternative considers creation of marsh by placing dredged material in a combination of both Sites 1 and 3. Combined, the two sites consist of approximately 164 acres of open water available for placement of dredged material. Construction of each site would be consistent with that described for Alternatives 1 and 3. Preliminary investigations indicated there are no utilities within the footprint of either site. There are oyster leases located within Site 3, as well as within a 1,500 ft. perimeter of both sites.

#### **3.4.1 Screening Criteria**

The initial array of Alternatives were screened based on not meeting project planning goals and objectives, planning constraints, technical feasibility, and likelihood for implementation. Screening criteria included impacts to existing oyster fisheries, utilities located within the site, availability of material dredged through O&M of the HNC, and the size of open water available for placement of dredged material.

#### **3.4.2 Initial Screening of Alternatives**

Of the initial Alternatives, the following Alternatives were screened from further evaluation to determine the final array: Alternative 4 (Site 9); and Alternative 5 (Sites 1 and 3). These Alternatives are technically feasible, meet all project planning goals and objectives, but cannot be implemented because of Project schedule and funding constraints.

Alternative 4 was screened due to the size of the site. Although the entire site is approximately 60 acres, a site visit confirmed that most of this is existing marsh, with limited area of open water available for placement of dredged material. Therefore this Alternative offers little benefit for marsh creation when compared to the other Alternatives.

Alternative 5 was also screened from the final array. In terms of acres, it is the largest Alternative considered; however, the estimated 1,000,000 cubic yards (cy) of dredged material will not fill both sites, so the full benefits of the combined sites could not be obtained. In addition, the cost would be higher than any other Alternatives, due to the cost to pump to both sites as well as build retention dikes around both.

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Alternative 2 and 3 were then compared based on the estimated acres of marsh that could be created and parametric cost estimates (Table 5), to determine if there was any apparent benefit in eliminating one Alternative from further consideration.

**Table 5 Initial Comparison of Alternatives**

Alternative	Site(s)	Size of placement Area (acres)	Acres of Oyster Leases Impacted	Cost to Acquire Oyster Leases (\$600 per acre)	Acres Created	Construction Cost	Total Cost
Alternative 2	1 and 1A	95.7	0	\$0	66	\$15.8M	\$15.8M
Alternative 3	3	119.4	119.4	\$71.4K	95	\$14.6M	\$15.3M

Placement of dredged material at each Alternative site requires construction of a retention dike, and in some cases, interior earthen weirs. The material from the retention dikes and earthen weirs would come from borrow material located from within or adjacent to each site. Due to the projected size of the borrow pits, coupled with the fact that the material to be dredged from Terrebonne Bay for marsh creation is very fine silty clays, the footprint of the borrow material would not be converted to marsh. This accounts for the difference between the size of the marsh creation site, and the acres of marsh to be created. Due to the existing soil conditions and depths in Alternative 2 (Combined Sites 1 and 1A), approximately 6 inches of additional dredged material would be required to achieve the same marsh elevation as Alternative 3 (Site 3).

The NFS would be required to acquire the oyster leases that are directly impacted by the Project prior to the construction of retention dikes and weirs and the placement of any dredged material within any proposed alternative site. The NFS provided an estimated cost of \$400 to \$600 per acre for the acquisition of the various oyster leases within the direct impacted areas under the final array of Alternatives for the Project. The estimated \$400 to \$600 acquisition cost per acre is only for the oyster leases located *within* the alternative sites. Additional costs for administration and acquisition negotiation and coordination are likely to be incurred for the oyster leases located within the site as well as *around the perimeter* of each alternative site.

Within the marsh creation site of Alternative 3 (Site 3) there are three oyster leases that would be directly impacted by the Project, and another seven oyster leases located around the perimeter of the site.

For Alternative 2 (Combined Sites 1 and 1A), there are no oyster leases within either of these sites, but there are four oyster leases located adjacent to the northwest perimeter

of Site 1A. Additional costs may be incurred from impacts to oyster leases outside of these two sites. These costs were not considered for the initial screening of Alternatives, but will be developed if necessary for the TSP. In addition to the cost for acquisition of oyster leases, Project scheduling must also be considered. Coordination cannot begin with the oyster lease owners until funding is available for both the Project and the O&M contract for dredging of the HNC. Coordination with the oyster lease owners could take up to a year which risks precluding Project execution under both the HNC O&M dredging contract as well as this Project. Therefore, there is high risk of aligning BUDMAT Program appropriations with HNC Project O&M activities, and the time required for acquisition of oyster leases.

This preliminary comparison of these Alternatives demonstrated that Alternative 3 provided more acres of output for approximately the same cost as Alternative 2. However, the timing associated with the required acquisition of the impacted oyster leases under Alternative 3 poses a serious implementation concern. For these reasons, Alternatives 1, 2 and 3 and the FWOP (No Action) Alternative were carried forward for a more detailed assessment.

### **3.5 Final Array of Alternatives**

The remaining Alternatives are technically feasible and can be implemented because they meet planning goals and objectives. These Alternatives were carried forward for comparison of benefits and cost.

No Action Alternative: Future Without Project Conditions

Alternative 1: Site 1

Alternative 2: Combined Site 1 and 1A

Alternative 3: Site 3

### **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 three Alternatives. Benefits were calculated by the United States Fish and Wildlife Service (USFWS) for the MVN using saline marsh Wetland Value Assessment (WVA) methodologies.

#### *3.6.1.1 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 (TSP) would adversely impact fish and wildlife resources.

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 (TSP) 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. Though the total project AAHUs are higher with the larger acre alternatives, by choosing the Proposed Action (TSP) impacts to oyster resources and their associated benefits are minimized. The projected effects of the Alternatives are summarized in Table 6.

**Table 6 LCA HNC BUDMAT Alternatives with Associated Acres and Net AAHUs Generated**

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<b>Alternative</b>	<b>Marsh created by dredged material placement (acres)</b>	<b>Net marsh AAHUs</b>	<b>Marsh nourished by sediment captured in dewatering (acres)</b>	<b>Net nourishment AAHUs</b>	<b>Total Project AAHUs</b>
Site 1	34.15	21.5	18.3	2.69	24.19
Sites 1 and 1A	65.42	41.87	18.3	2.69	44.56
Site 3	77.48	48.73	0	0	48.73

At the time the WVA was completed the model was not certified for use. However the model is undergoing certification, and it is anticipated that the final certified model will be consistent with the model used for this Project. See the WVA model results and summary of assumptions. The U.S. Fish and Wildlife Coordination Act Report (CAR) dated 21 September 2017 (See Appendix G: US Fish and Wildlife Draft Coordination Report) also offers information about the WVA process.

### *3.6.1.2 Cost Effectiveness and Incremental Cost Analysis*

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 USACE 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 Institute for Water Resource (IWR) Planning Suite Decision Support Software developed by the USACE 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. The Alternatives considered in the IWR Planning Suite are mutually exclusive and are not combinable. The combination of various sites was considered when developing the initial array of Alternatives.

### *3.6.1.3 Cost Effective Solutions*

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 produce less output. The CE analysis, performed by the IWR planning model, ensures that no other plan provides equal or greater benefit for equal or lesser cost.

The No Action Alternative is by definition cost effective since all of the proposed Alternative plans incur some cost. Considering Alternative 1 (Site 1), the other two Alternative plans provide more AAHUs; however, they accordingly both cost more. Therefore, there is no Alternative plan that provides more benefits than Alternative 1 (Site 1) at a lesser cost, effectively making Alternative 1 (Site 1) a cost effective solution. Considering Alternative 2 (Combined Sites 1 & 1A), is there a plan that provides more benefits at a lesser cost? Alternative 3 (Site 3), in fact, does so by generating 49.48 AAHUs at a cost of \$8.9 million (compared to 42.10 AAHUS at a cost of \$10.1 million). Therefore Alternative 2 (Combined Sites 1 & 1A) cannot be called a cost effective solution. Finally, considering Alternative 3 (Site 3), is there a plan that provides more benefits at a lesser cost? No, Alternative 3 (Site 3) in fact produces the greatest benefits and is therefore a cost effective solution.

Table 7 displays the expected environmental outputs in terms of habitat units along with the total cost and average annual cost for each of the Alternatives including the No Action Alternative. As described above, Alternative 1 (Site 1) and Alternative 3 (Site 3) are cost effective, but Alternative 2 (Combined Sites 1 & 1A) is not.

### *3.6.1.4 Incrementally Justified Solutions (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 Table 7. In this case, Alternative 3 (Site 3) is the only Best Buy Plan.

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Table 8 depicts the “Best Buy and Incremental Costs” per habitat unit for each of the Best Buy plans that can be used to assist in the decision making process. Incremental cost is calculated by dividing the difference between two solutions’ costs by the difference between the two solutions’ outputs. Reviewing Table 8 with the incremental cost information now allows the decision maker to make the following comparisons of alternative habitat creation and restoration plans and to progressively ask “Is it worth it?”

**Table 7 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-Site 1	\$8,124,177	\$539,781	21.83	Yes
Alternative 2-Site 1 & 1A combined	\$10,107,696	\$671,569	42.10	No
Alternative 3-Site 3	\$8,931,426	\$593,416	49.48	Yes

Note: Costs are shown at the 2017 price level and were annualized using the current FY17 Federal discount rate of 2.875 percent over a 20-year design period of analysis.

**Table 8 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 3--Site 3	\$8,931,426	\$593,416	49.48	\$11,993	49.48	\$593,416	\$11,993

Note: Costs are shown at the 2017 price level and were annualized using the current FY17 Federal discount rate of 2.875 percent over a 20-year design period of analysis.

### 3.6.1.5 Cost Analysis

A cost effective/incremental cost analysis was run on the final array of Alternatives including the No-Action Alternative. Alternatives 1 and 3 are cost effective. Alternative 3 is the “Best Buy” plan.

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 6 shows Alternatives 1, 2, and 3 and highlights the cost effective solutions and the incrementally justified (Best Buy) solutions.

### 3.6.2 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 9 provides a summary of the acceptability, completeness, effectiveness and efficiency Alternatives 1 and 3 are both cost effective, however Alternative 3 is undesirable to the NFS due to the number and cost of acquisitions of the oyster leases. As discussed previously, the timing for acquisition of oyster leases, and execution of BUDMAT funds for construction is not feasible. Therefore, Alternative 3 was not selected as the TSP. Alternative 2 is not cost effective and therefore was not selected as the TSP. Alternative 1 meets the requirements of completeness, effectiveness, efficiency, and acceptability, and therefore was selected as the TSP.

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Table 9 Acceptability, Completeness, Effectiveness, and Efficiency

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.	Cost Effective	Acceptable to the NFS a Federal, and other agencies and resources.
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.	Not Cost Effective	Acceptable to Federal and other resource agencies.
3	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.	Best Buy	Not acceptable to the NFS due to impacts to oyster leases. Not feasible to implement due to timing of acquiring oyster leases, and executing BUDMAT funding.

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## **4 Environmental Consequences**

### **4.1 Navigation**

#### Future Conditions with No-Action

There would be no anticipated impacts to navigation without implementation of the Proposed Action (TSP). O&M activities would continue to dredge the HNC 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 HNC, 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 Marsh Creation Site 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 Marsh Creation Site 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.

### **4.2 Wetlands**

#### Future Conditions with No Action

Without implementation of the Proposed Action, wetlands in the vicinity of the Proposed Action would continue to be directly and indirectly impacted by the present natural and anthropogenic factors. Land loss in the Marsh Creation Site, 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) Salinity intrusion would continue to impact vulnerable marsh habitats further inland as the Terrebonne Bay rim marshes 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. The overall habitat value and acreage of the remaining wetlands would decline with the No Action Alternative. Vast acreages of wetlands have been lost and would continue to be lost in this portion of the Mississippi Deltaic Plain.

#### Future Conditions with the Proposed Action

Wetlands would be created on in the Marsh Creation Site and it is anticipated that individual beneficial use sites constructed during a single maintenance dredging event may encompass about 20 to 30 acres. Larger sites (greater than 50 acres) may be constructed through sequential dredged material placement events across two or more

maintenance cycles. Dredged material would be discharged by a hydraulic dredge into shallow open-water areas to a height no greater than +3.58 Mean Lower Low Water (MLLW). Dredged slurry would be allowed to overflow existing emergent marsh vegetation, but would not be allowed to exceed a height of about one foot above the existing marsh substrate. It is expected that dredged material would settle to elevations conducive to wetlands development (within the normal range of the tides) after dewatering and compaction.

### **4.3 Aquatic Resources /Fisheries**

#### Future Conditions with No Action

Without implementation of the Proposed Action, the Marsh Creation Site would remain as shallow open water and eroding marsh. The average depth of open-water area would continue to increase as a consequence of 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 expanding open water bays 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.

#### Future Conditions with the Proposed Action

With implementation of the Proposed Action (TSP), there will be minimal direct impacts to fisheries in the bay 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 National Marine Fisheries Service (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.

Oysters should not be impacted due to the distance from the Marsh Creation Site and containment controlling the sediment plume. Some benthic and macro invertebrate mortality would occur from the disposal of dredged material, however, in time the populations in the area should return to those of pre-project conditions. 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 Marsh Creation Site would temporarily increase turbidity, but most fish would vacate the area and are expected to return once the plume settles.



#### **4.4 Essential Fish Habitat**

##### Future Conditions with No Action

Without implementation of the Proposed Action (TSP), no direct impacts to EFH would occur. However, land loss in the Marsh Creation Site, 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 due to natural and anthropogenic factors in this portion of the Mississippi Deltaic Plain.

##### Future Conditions with the Proposed Action

With implementation of the Proposed Action (TSP), initially some EFH for brown shrimp, white shrimp, and red drum will be directly impacted by filling shallow open water areas and mud bottoms with dredged material. Within a growing season, some marsh vegetation should establish in marsh creation 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. Benthic organisms within the Marsh Creation Site would be lost, however, creation 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.

#### **4.5 Wildlife**

##### Future Conditions with No Action

Without implementation of the Proposed Action (TSP), land loss in the proposed deposition area would likely continue at the present rate resulting in a reduction of habitat 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 (*Anas acuta*), mallard (*Anas platyrhynchos*), teal (*Anas discors*), coot redheads (*Fulica*), lesser scaup (*Aythya affinis*), mergansers (*Lophodytes*), wigeons (*Anas*), canvasbacks (*Aythya valisineria*) and black ducks (*Anas rubripes*); and other avian species such as ibis, egrets, cormorants, terns, gulls, skimmer, pelicans, and various raptors. Recently approved CWPPRA and beneficial use projects, such as the Bayou De Cade Ridge and Marsh Creation, could result in the creation of wetland habitat within the surrounding areas which would provide valuable and diverse habitat for foraging, refugia, nesting, and loafing of terrestrial wildlife, migratory waterfowl, and other avian species.

##### Future Conditions with the Proposed Action

With implementation of the Proposed Action (TSP), direct impacts from displacement of wildlife near the sediment discharge pipe would occur. The sediment discharge pipe is usually installed in shallow open water areas. Wildlife that stays 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.

Migratory waterfowl and other avian species would be affected throughout the period that birds are present. Migratory waterfowl typically arrive during late August through January while other species live year round. Ducks prefer shallow open water habitat which is abundant in the project vicinity, and they are expected to relocate to adjacent areas during construction. Mudflats would provide feeding areas for shorebirds, waterfowl, and other wildlife. In general, creating marsh in the bay area and reducing wetland loss in the receiving area would preserve wildlife habitat.

#### **4.6 Threatened and Endangered Species**

##### Future Conditions with No Action

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 for the threatened piping plover. Other listed species could also be adversely impacted by the continued degradation including: green sea turtle, hawksbill sea turtle, Kemp's Ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and the West Indian manatee.

##### 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 Project Area 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.

#### **4.7 Water and Sediment Quality**

##### Future Conditions with No-Action

Without implementation of the Proposed Action, 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 erode as a result of wave activity.

##### 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. Proposed marsh creation and restoration features 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 proposed 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 (Appendix B: Environmental Appendix).

#### **4.8 Air Quality**

##### Future Conditions with No Action

In the future, without the implementation of the Proposed Action (TSP), it is likely that the quality of ambient air would not be adversely affected. Additionally, environmental impacts to air quality resulting from ongoing HNC 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 HNC maintenance activities commence, it is expected that there would be minimal short term impacts to air quality in Terrebonne Parish during dredging and disposal activities. Terrebonne 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.

#### **4.9 Cultural Resources**

##### Future Conditions with No Action

Without implementation of the Proposed Action (TSP), any recorded or undiscovered cultural resources would continue to be exposed to current conditions. In the Marsh Creation Site this will likely result in destruction from shoreline erosion or modern development.

##### Future Conditions with the Proposed Action

With implementation of the Proposed Action (TSP), any previous or newly discovered cultural resources within the Marsh Creation Site will be covered by disposed sediment. This will make those resources inaccessible both to future research and to modern human disturbance. Coordination with the State Historic Preservation Officer (SHPO) and federally-recognized Indian tribes was originally conducted with letters dated 29 January 2016. In a letter dated 15 February 2016, the SHPO concurred with the finding that sites 3 sites located within the Project Area are not eligible for nomination to the NRHP. The SHPO also concurred with the determination that no historic properties would be impacted by use of and that there were no further concerns for the proposed beneficial use of dredged material in the Marsh Creation Site.

The Proposed Action (TSP) as discussed in this integrated DIR and EA was coordinated with the SHPO and federally-recognized Indian tribes in letters dated 2 August 2017 and August 2017 respectively. The SHPO concurred that no historic properties would be affected by the proposed undertaking on 30 August 2017. The Caddo Nation of Oklahoma concurred with the proposed project in a letter dated 25 August 2017. No other comments were received from federally-recognized Indian tribes.

#### **4.10 Recreation Resources**

##### Future Conditions with No Action

Without implementation of the Proposed Action (TSP), 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 the area in the past. Without implementation of the Proposed Action (TSP), the existing conditions would persist, but with continued conversion of existing marsh to open water habitats. Most of the recreational activities that occur in the project area consist of hunting, fishing, wildlife observation, and general enjoyment of the aesthetic marsh environment. Recreational resources in the region that would most likely be affected in the future-without action are those related to loss of wetlands and habitat diversity. Wildlife abundances are directly related to the amount of wetlands present. As high land loss through either erosion or subsidence continues, the wildlife abundances in the Project Area would decrease. The abundance of migratory birds and other animals directly dependent on the wetlands would also decrease as they moved to more suitable habitat.

With a continued conversion of marsh to open water, much of the estuarine fishery abundances would be expected to decline over time. Lower quality fishery spawning, nursery, and foraging habitat would translate to a decline in sport fishing success in the future. As the usage by game species declines, so would the hunting opportunities. As usage by migratory birds declines, so would the opportunities for viewing.

In general, loss of intertidal, emergent wetlands to shallow, unvegetated open water would result in decrease fishery production and therefore have negative impacts on recreational fishing. Conversion of intertidal marsh and associated submerged aquatic vegetation to large, unvegetated open-water areas would diminish habitat value for all wildlife species. The result is a loss of emergent marsh and diminished capacity of the area to support fish and wildlife populations.

Marsh wetlands reduce storm surges from tropical systems. An increase in storm surge impacts from a reduction in marsh land can directly affect land loss, which, as history has showed us, can literally result in loss of boat launches, parking areas, access roads, marinas, and supply shops. The loss of access features, such as boat launches, impacts an individual's ability to recreate in particular areas. The economic loss felt by marinas and other shops may be two-fold. One is potential loss of the actual facility or access to the facility; the other is the change in opportunities.

#### Future Conditions with the Proposed Action

Recreationists would be temporarily displaced in the Project Area during disposal of dredged material. Less open water in the Marsh Creation Site would be available for boating and fishing; however, an increase in habitat value is expected as the Marsh Creation Site would accept the dredged material in its highly turbid form and in time, becomes saline marsh. The creation of marsh would provide an increase in fish and wildlife habitat including nesting habitat for water fowl and nursery habitat for fish. Consumptive recreation use would likely increase as a result of an increase in quality and quantity of fish and wildlife habitat. Bird watching opportunities are also expected to

increase as a result of improved habitat for neo-tropical migratory songbirds and other avian species.

Positive long-term recreational benefits would be realized from the deposition of dredged material into shallow open water areas and onto eroding marsh. Marsh plants consisting of emergent and/or submerged aquatic vegetation would become established, complementing the already existing fish and wildlife habitat and increasing future recreational activities in the area. Recreation fishing opportunities could increase due to the increase in fisheries habitat in the Project Area.

Other direct, short-term impacts to recreational resources would result from the Project Area being unavailable during construction for recreational activities. During and immediately after construction there would be a decrease in the quality of habitat, and wildlife and fishery species associated with recreational opportunities would be displaced; however, the area would reestablish emergent wetland vegetation. Therefore, these adverse impacts would be temporary and localized. Adverse direct impacts would be offset by the creation of saline marsh that would contribute to restoring the base of organisms used for recreational activities such as fishing, bird watching and hunting. Following construction, the Project Area would again be available for recreational activities.

Creating wetlands and reducing loss rates for the project area may protect nearby recreational infrastructure, such as boat launches. Wildlife-dependent recreation activities may be maintained and possibly increase. Recreation activities dependent upon wetland habitat would be maintained and possibly increase. There would be a temporary decrease in boat traffic accessibility through the Project Area during placement of material. Fishing and hunting activities could continue in areas near the Project Area.

Cumulative impacts would be the synergistic effect with the additive combination of impacts and benefits for overall net acres created by other federal, state, local, and private marsh creation and restoration efforts including beneficial use of dredged material under the Federal Standard. Beneficial use of dredged material above the Federal Standard will result in an even larger amount of wetlands and habitat created than would be allowed under the Federal Standard. More wetlands and habitat translates into more opportunity for recreational use of the Project Area.

#### **4.11 Aesthetics (Visual Resources)**

##### Future Conditions with No Action

Under the No Action Alternative, there would no direct, indirect, or cumulative impacts to visual resources within the Study Area. Visual resources would most likely evolve from existing conditions in a natural process, or change as dictated by future land use maintenance practices and policies.

### Future Conditions with the Proposed Action

Due to the fact that there are no institutional or publically significant visual features available to the overall public, there would be no direct impacts to visual resources.

Temporary impacts could potentially occur due to construction efforts in the area. Increased traffic due to construction vehicles, dust, debris and increased noise volumes could affect the residential areas and fishing camps located to the north of the Project Area. These temporary impacts should return to normal upon completion of the project. Other indirect impacts are negligible. There are no foreseen cumulative impacts to visual resources in the Study Area.

#### **4.12 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 (TSP) would not qualify for an HTRW investigation.

The USACE Engineer Regulation, ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste 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 EPA or a state for a response action (either a removal or a remedial action) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 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 Project Area proposed for dredging and disposal is included in the National Priority List.

Based upon a review of the NPL and CERCLA action sites, the probability of encountering HTRW in connection with this Project is low. The Proposed Action (TSP) does not qualify for an HTRW investigation and is evaluated as a water quality issue.

#### **4.13 Cumulative Impacts**

The Council on Environmental Quality's (CEQ) regulations (40 CFR 1500-1508) implementing the procedural provisions of the NEPA define cumulative effects as "the impact on the environment which results from the incremental impact of the Proposed Action (TSP) 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 Effects can result from individually minor but collectively significant actions taking place over a period of time.

The Proposed Action (TSP) would enhance wetland functional quality at the Marsh Creation Site by converting open water to marsh. Without implementation of the Proposed Action (TSP), benefits outlined in this document would not be achieved in the

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Terrebonne Bay Reach area, but could still be achieved as material dredged from the HNC would continue to be disposed of within the Federal Standard. Material would be placed in a confined manner within areas that were previously cleared and approved. Within the Terrebonne Bay area around HNC Mile 10, Bay Welsh (182 acres) and Tambour Bay (383 acres) are already designated for unconfined disposal and a typical event ranges between 500,000-1,000,000 cubic yards and would create approximately 20-30 acres of marsh.

Even though minimal in size when compared to the extent of marsh directly and/or secondarily affected by previous development activities, and natural subsidence it would contribute cumulatively to marsh and wetland creation and restoration within the Terrebonne Basin. 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 (TSP), 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 HNC and adjacent waterways. Disturbance of water quality would be temporary, confined, and short lived.



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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 Site was once marsh, so the Project is restoring what once existed. Fisheries are impacted from commercial and recreational fisherman daily, 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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## **5 Tentatively Selected Plan**

The TSP is Alternative 1 which provides for the creation and restoration of marsh within Site 1, located along the right descending bank of the HNC at approximate HNC Mile 12.0 and immediately northwest of Bayou Petit Caillou. The Marsh Creation Site 1 would be approximately 49.8 acres, and additional benefits may be obtained through the deposition of suspended sediments that would be allowed to overflow from an earthen weir that would be constructed along the north side of the Marsh Creation Site. The fine, suspended sediments that overflow the weir would enhance approximately 47.3 acres of existing marsh and shallow water areas immediately outside of and adjacent to Site 1.

In order to prevent impacts to oyster leases outside of and approximately 0.3 of a mile northwest of Site 1, earthen retention dikes would be constructed along the southern and western sides of Site 1, as well as a deflection dike to be constructed along the northeast side of alternative Site 1A. These dikes would be constructed immediately adjacent to and inside the existing marsh. Two earthen closures would also be required; one along the pipeline canal which falls south of and adjacent to the Marsh Creation Site, and the other within shallow open waters that divide Sites 1 and 1A. Retention dikes and weirs shall be constructed from borrow to be taken from inside the Marsh Creation Site. The deflection dike, to be constructed along the northeast side of alternative Site 1A, shall be constructed with borrow to be obtained from within Site 1A and adjacent to the proposed deflection dike.

The objective of this Project is to create and restore wetlands within Site 1 through the placement of dredged material that would be obtained during O&M dredging of the Terrebonne Bay reach of the HNC navigation project. The Terrebonne Bay reach extends from Mile 12 of the HNC to Mile 0.0 (beginning of the HNC bar channel and Cat Island Pass). Dredging would be performed by cutterhead dredge and in conjunction with a USACE O&M dredging contract. The dredged material would be hydraulically dredged and transported to Site 1 for wetland creation via long distance pipeline transport of the material that would be dredged between approximate Miles 8.5 and 5.5 of the HNC, Terrebonne Bay channel. Historically, maintenance dredging of Terrebonne Bay was warranted and performed every 2 to 3 years. However, due to federal funding constraints associated with the USACE O&M budget for this Project, USACE has not been able to maintain the channel to its full, authorized dimensions (including advance maintenance) on a regular basis. The HNC navigation project was last dredged in 2015, and is scheduled to be dredged in November of 2017.

### **5.1 DREDGED MATERIAL RETENTION AND ACCESS**

The dredge discharge pipeline and dike construction equipment would access the site from the right descending bank of the HNC at approximate Mile 12.0. Based on the Draft Geotechnical Report (Draft 2017 Geotechnical Report) prepared for the CPRAB by Eustis

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Engineering, dated 7 February 2017, retention dikes within Site 1 would have to be constructed to an elevation of between +6.0 ft. and +6.5 ft. NAVD88 in order to retain the dredged slurry while also preventing effluent sedimentation from impacting adjacent oyster leases West and NW of and adjacent to Site 1A (Appendix E).

Borrow for construction of these dikes would be obtained from within Sites 1 and 1A. According to the Draft 2017 Geotechnical Report, due to the poor soil conditions within Sites 1 and 1A, the design borrow pits, depths and offset locations from the required retention dikes could entail the construction of borrow pits as deep as (-)22 ft. NAVD88 (approximately 20 ft. below the existing mudline within Sites 1 and 1A), with 1V on 3H side slopes. The magnitude of work required here will require that the dikes be constructed via barge mounted dragline(s) which will access Sites 1 and 1A via a cut to be made through the bank line of the HNC. The access channel that would be cut through the bank line of the HNC would be constructed to a bottom width of 80 ft. at elevation (-)8.0 ft. NAVD88 and 1V on 2H side slopes. Stability berms of 20 ft. would be maintained between the top of cut of the access channel and the temporary adjacent disposal. The access corridor that would be dredged through the bank line of the HNC and lead into Site 1 would cut through approximately 625 ft. of existing wetlands where the potential width of the impact area within this reach of the access channel would be approximately 390 ft. Therefore, the potential temporary impacts to these wetlands as a result of this cut would be approximately 5.6 acres. Between the existing marsh and the eastern limit of Site 1, dredging for access to Site 1 would be performed over a length of approximately 590 ft. of open waters and material would be stockpiled atop the adjacent marsh and/or open waters. The potential width of the impact area within this reach of the access channel would be approximately 320 ft. This leads to a potential acreage impact for this portion of the access channel of approximately 4.3 acres (about half of which would be performed within open waters.) The total projected acres of temporary impact for the HNC bank line cut would be approximately 9.9 acres. Upon completion of dike construction and upon demobilization of the dragline(s) from Sites 1 and 1A, the material that had initially been temporarily stockpiled from dredging of the access channel would then be pulled back from atop the marsh and back into the access channel in order to restore the area as best as possible to pre-existing conditions/grade. It should be noted that geotechnical investigations of Site 1A have not been completed as of publication of this report. The final design is subject to change based on the geotechnical investigations and analysis of the soil conditions in Site 1A, as well as samples of the dredged material from the HNC.

In addition to the above, the bank line along the HNC through which this access channel would be dredged, is currently lined with shell/ crushed stone aggregate. When dredging through the bank line for access, the shell/crushed stone that falls within the access channel corridor would be removed and temporarily stockpiled for reuse. Upon completion of dike construction and demobilization from the access corridor, the gap through the bank will be closed off and the stockpiled shell/ crushed stone placed back atop the earthen closure. If necessary, additional crushed stone would be brought in from

an offsite approved quarry location to assure that the closure is restored to pre-construction conditions.

As previously stated, earthen retention dikes would be constructed along the southern and western sides of Site 1, as well as the earthen deflection dike to be constructed along the northeast side of alternative Site 1A. The retention dikes would be supplemented by two earthen closures; one along the pipeline canal which falls south of and adjacent to Site 1, and the other within shallow open waters that divide Sites 1 and 1A, as well as an earthen weir that would be constructed along the north side of Site 1. The dike, closures, and weir would all be constructed immediately adjacent to and inside the existing marsh. Due to the poor soil conditions within Site 1, a foundation geotextile fabric will be installed under the earthen retention dikes, closures and weir in order to assist in construction of these retention features.

The estimated acres of impacts for all retention features, based off of the proposed dike and weir design footprints are:

- 7.1 acres (retention dikes and closures within Site 1);
- 4.0 acres (retention/deflection dike within Site 1A); and
- 4.6 acres (earthen weir within Site 1).

At this time, the estimated impacts associated with borrow required for construction of the proposed earthen retention features are:

- 82,000 gross cys of borrow could be required to construct the retention dikes and closures within Site 1 (approximately 8.3 acres of borrow could be required);
- 42,000 gross cys of borrow could be required to construct the earthen weir (approximately 6.5 acres of borrow could be required) ; and
- 46,000 gross cys of borrow could be required to construct the earthen deflection dike along the northeast edge of Site 1A (approximately 4.6 acres of borrow could be required).

Figure 7 and Figure 8 show the Project features proposed for construction of the TSP (Alternative 1- Site 1), as well as the retention dike and dredged material design as proposed in the 2017 Draft Report.

## **5.2 Dredged Material Placement under Federal Standard**

The Federal Standard disposal plan for dredging within Terrebonne Bay evolved from unconfined placement of the dredged material a minimum of 2,000 ft. west of the channel centerline, to Single Point Discharge (SPD) locations, located approximately 2,500 ft. west of the channel centerline and at approximate Miles 7.9R, 6.5R, 4.5R and 2.5R. The revised disposal plans dictated that more dredged material be placed at each SPD location in an effort to create marsh/wetlands within Terrebonne Bay. Any other dredge and placement option in this reach of the HNC would exceed the Federal Standard.

### **5.3 Dredged Material Placement under LCA BUDMAT Program and HNC Project**

Based off of dredging the Terrebonne Bay reach to its authorized dimensions of (-) 15.92 ft. MLLW, plus 3 ft.; advance maintenance, and side slopes of 1V on 2H, as well as accounting for 1 ft. of overdepth dredging, it is anticipated that approximately 575,000 cys (NET) and approximately 665,000 cys (Gross) could be available between Miles 8.5 and 5.5 for placement with Site 1 for marsh creation. During O&M dredging, the dredged material would be placed within the Marsh Creation Site (Site 1), approximately 49.8 total acres in size. Due to the fact that the material within Terrebonne Bay reach typically consists primarily of very fine silts and clays that will not settle out quickly and remain in suspension for some time, it was estimated that approximately four (4) dredged material placement lifts would be required in order to achieve an elevation conducive to marsh creation. With the lack of geotechnical data available to properly determine an appropriate rate of settlement for the material that will be dredged from the Terrebonne Bay reach for marsh creation at Site 1, it was estimated that at least 2-3 days of dewatering would be required between each of these lifts in order to allow for the solids to settle out prior to placing the next lift of dredged material. The dredge slurry elevation would be limited to a maximum elevation of between +4.5' and +5.0 ft. NAVD88. After completion of the 4th lift, it is estimated that the elevation of the dredge fill would be between +4.25 ft. and +4.5 ft. NAVD88. Based on the settlement curves provided in the 2017 Draft Report +4.5 ft. NAVD 88 is the target elevation for a marsh platform, and the material should settle to this elevation by year 12.

Due to the character of the material that will be dredged from the HNC Terrebonne Bay Channel Reach under this Project, it is unlikely that the pits to be excavated within Site 1 for dredged material for the construction of the retention dikes, closures and weir will be backfilled to an elevation conducive to marsh creation. As a result of this, approximately 14.8 acres of the total 49.8 acres available within Site 1 will likely remain a shallow water area upon completion of the project. The dike and weir within Site 1 will encompass approximately 11.7 acres, thereby leaving approximately 23.2 acres of marsh that would be created. Also, approximately 4.6 acres within Site 1A, that will be used for dredged material for the construction of the deflection dike, will not be backfilled with dredge material.

### **5.4 Significance of the TSP**

As indicated in Table 9, the TSP meets the Planning and Guidance criteria of acceptability, completeness, effectiveness, and efficiency. Restoration of critical geomorphic features 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 creating critical wetland habitat and restoring coastal marshes. The TSP will be constructed to an elevation that provides will allow for the marsh to exist for at least 20 years after construction, the construction of retention dikes The TSP 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 create 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.

### 5.5 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.

Table 10 provides 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. Table 10 further provides the Federal and Non-Federal Responsibility for the BUDMAT Project (cost are rounded to the nearest \$10K from the estimates provided in Appendix F: Cost Certification and Total Project Cost Summary).

Table 11 provides the TSP total costs, the TSP AAHUs, and a TSP Total Project Cost/AAHU.

**Table 10 Project Cost**

	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	\$5,760,000	\$13,660,000	\$7,900,000	\$5,925,000	\$1,975,000
Engineering and Design	\$240,000	\$1,030,000	\$790,000	\$592,500	\$197,500
LERRDs	\$0	\$0	\$0	\$0	\$0
<b>Total Project Cost</b>	<b>\$6,000,000</b>	<b>\$14,690,000</b>	<b>\$8,690,000</b>	<b>\$6,517,500</b>	<b>\$2,172,500</b>

**Table 11 Project Cost and Benefits**

TSP total cost	TSP AAHUs	TSP Total Project cost/AAHU
\$8,690,000	21.83	\$398,076.04

**5.6 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 10 April 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 14 April 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 of 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.



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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

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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.

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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.

## **6 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 BUDMAT and other 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.

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 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. Under most situations, since each individual LCA BUDMAT 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 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.

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 Adaptive Management (AM) Plan (or contingency plan) should the Project monitoring show that the Project is not performing as expected. The required elements include:

- Nature, duration, and periodicity of monitoring, analysis, costs, and responsibilities;

- Scope and duration should include the minimum monitoring actions necessary to evaluate success;
- An evaluation of predicted outcomes compared to actual results to determine success;
- Monitoring plan has been reviewed during Agency Technical Review (ATR);
- Monitoring will be continued until “ecological success” is documented by the USACE in consultation with the NFS;
- Necessary monitoring for a period not to exceed 10 years will be considered a Project cost and will be cost shared as a Project construction cost and funded under Construction;
- Monitoring can end sooner than 10 years if success is determined;
- Financial and implementation responsibilities for the Monitoring Plan will be identified in the Project Partnership Agreement;
- The developed AM Plan must be appropriately scoped to Project scale;
- The rationale and cost of AM and anticipated adjustments will be reviewed as part of the decision document;
- Significant changes needed to achieve ecological success that can’t be addressed through operational changes or the AM plan may be examined under other authorities;
- Costly AM plans may lead to re-evaluation of the Project.

### **6.1.1 Adaptive Management Evaluation Summary**

Evaluations determined that this Project is not a candidate that could benefit from AM. An assessment revealed that the reasonably foreseeable adaptations to these projects would all effectively constitute new construction. Although there is no opportunity for AM of BUDMAT projects, the LCA BUDMAT Program will document lessons learned and would be used programmatically to inform and make adjustments to subsequent LCA BUDMAT 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 restoration and beneficial use projects.

### **6.2 Sustainability**

Containment structures will be built for the TSP to hold dredged material in place. Dredged material will be placed to create a platform conducive to the development of coastal marsh creation. It is not the intent of the LCA BUDMAT Program to construct an ecosystem restoration project that necessarily would 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.

### **6.3 Real Estate**

Placement of dredged material will be in open waters that may have dual ownership by the state of Louisiana and private landowners. Access corridors would be required to allow construction equipment and the dredge pipeline to reach the discharge site. Adverse impacts to areas of existing marsh would be avoided to the maximum extent practicable. Any use of access corridors that results in the impact of existing marsh would be backfilled to a maximum elevation of approximately +3 feet of adjacent marsh elevation upon completion of dredging and disposal activities to restore these degraded corridors to pre-project marsh elevations and ultimately functioning marsh habitat. The lands, easements and rights-of-way required for the Project are outlined in Appendix H: Real Estate. Real Estate Plan in accordance with the requirements of Engineering Regulation 405-1-12.

### **6.4 Relocations**

There will be no relocations of any facility or utility as part of this Project. Numerous oil and gas pipelines are located within the Project Area, however there are none located within the Marsh Creation Area of the TSP. Necessary precautions will be taken to avoid adversely impacting all pipelines. Pipeline owners will be notified prior to the initiation of construction. Ownership of the pipelines along with contact information will be included with the plans and specifications for this Project (See Appendix D: Relocations Summary provides additional information on pipelines in the Project Area).

### **6.5 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.

#### **6.5.1 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 Integrated DIR and EA. Additional geotechnical investigations, include soil borings, and detailed design of the earthen weir is 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.

#### **6.5.2 Availability of Dredged Material**

Selection of the TSP is based on the assumption that at least 575,000 CY of material will be available for dredging under O&M of the HNC at the time of Project construction. Dredging of the HNC is scheduled for November of 2017. This dredging could reduce

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the quantity of material available for dredging and placement at the start of construction of the Project which is scheduled for construction commencement later in FY18.



## **7 Coordination**

Preparation of this draft EA and draft Finding of No Significant Impact 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

Coastal Protection and Restoration Authority of Louisiana Protection and Authority of Louisiana

Louisiana Department of Environmental Quality

Louisiana State Historic Preservation Officer

Terrebonne 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

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Jena Band of Choctaw Indians

Quapaw Tribe of Oklahoma

Seminole Tribe of Florida

Seminole Nation of Oklahoma

Tunica-Biloxi Tribe of Louisiana

## **8 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 HNC would create coastal saline marsh. Some temporary impacts from dike construction would occur during project construction; however, the marsh creation benefits would far outweigh the construction detriments. The Proposed Action (TSP) is self-mitigating.

## **9 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. Compliance with laws will be accomplished upon 30-day public and agency review of this draft EA #533 and associated draft Finding of No Significant Impact.

### **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 Terrebonne 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 is currently underway and will be finalized prior to signing of the 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 will be mailed out for public review and a 30 day comment period. 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 (TSP) and is currently being coordinated with the Louisiana Department of Natural Resources (LADNR) in conjunction with the public review and comment period. (Appendix B: Environmental Appendix)

### **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 five T&E species, the Pallid sturgeon, West Indian manatee, piping plover, red knot, and American alligator that 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 initiate coordination with the USFWS on 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. (Appendix B: Environmental Appendix)

### **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 the proposed changes to the previously approved ridge restoration and marsh creation project described in EA #533 and provided a draft CAR with project specific recommendations on 21 September 2017. The Draft CAR is contained in Appendix D 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 (TSP) is projected to create 34.15 acres of saline marsh over the 50-year life period of analysis for a net total 24.19 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:

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1. 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 1 - Concur. USFWS guidelines will be followed in order to remain compliant with the Migratory Bird Treaty Act (MBTA).

2. 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 2 - Concur. The NMFS is a part of the PDT. The NMFS will receive a copy of this EA and Coordination on EFH will occur during the 30-day public review process.

3. 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 3 - Concur. If existing wetlands are impacted they would be restored to pre-project elevation and expected to re-vegetate naturally. If needed, post-construction surveys would be taken and provided to the natural resource agencies for review. Flotation channels are not expected.

4. To ensure that dredged material is placed to each particular habitat's specified elevations, we recommend that the USACE use an updated NA VD88 datum (i.e., current geoid) consistent with the NA VD88 datum that is referenced for the elevations of existing marsh and water level in the Project Area.

Response 4 - Concur. The most recent datum was utilized in determining the most efficient land creation location, shape and size.

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5. If containment dikes are constructed, they should be breached or degraded to the settled elevations of the Marsh Creation Site. Such breaches should be undertaken after consolidation of the dredged sediments and vegetative colonization of the exposed soil surface, or a maximum of 2 years after construction.

Response 5 – Concur to the extent such action is deemed necessary. Containment dikes would be breached or degraded to settled elevation if necessary. The final design elevations of the earthen retention dikes will be determined based on a detailed in situ soil analysis. The dikes are not anticipated to increase the overall footprint. Depending on soil conditions and the nature of the dredged material (expected to be a sandy material), the dikes could be designed in a manner to avoid the need for degrading in out years. This would only apply to earthen retention dikes for the marsh creation component. Material necessary for marsh platform dike, weir and closure construction would come from within the proposed project sites. The retention dikes would be expected to settle over time and would be allowed to vegetate naturally. If necessary, these retention dikes would be later breached or degraded to the settled elevations of the Marsh Creation Site by the NFS.

6. 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 6 - MVN also recognizes the value of SAV habitat. The area proposed for marsh creation currently contains no SAV. Therefore, if any SAV is impacted by construction, it would be minimal and would be offset by the indirect benefits of the Project.

7. 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 7 - Concur. MVN will continue to coordinate with the resource agencies.

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

Response 8 - Concur. MVN will continue to coordinate with the resource agencies.

9. 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 9 – Concur. Please see section 1.3 of the Adaptive Management and Monitoring Plan. 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.

10. 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 (TSP) does not adversely affect any federally listed threatened or endangered species or their habitat.

Response 10 – Concur.

### **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. EA #533 was provided to the NMFS for review and comment on 11 November 2017. Comments and EFH conservation recommendations were received from the NMFS in their email dated 17 November 2017. MVN will continue to coordinate with NMFS throughout the public comment period. (Appendix B: Environmental Appendix)

### 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, 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. Brown pelicans are known to nest on barrier islands and other coastal islands in Lafourche, and Terrebonne Parishes.
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, MVN 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 a finding of no historic properties affected, was coordinated for the original Project goals as presented in EA #533, with a letter dated 2 August 2017 to the SHPO. In a letter dated 30 August 2017, SHPO concurred that the actions of this EA are determined as having no additional potential to cause effect to any potential cultural resources (Appendix B: Environmental Appendix).

## **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 (TSP) 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 (TSP). The Caddo Nation of Oklahoma responded in a letter dated 25 August 2017 stating that "the project does not appear to endanger cultural or religious sites of interest to the Caddo Nation". In an email dated 6 September 2017, the Choctaw Nation of Oklahoma stated "Terrebonne Parish lies outside their area of interest".

Environmental compliance for the Proposed Action (TSP) would be achieved upon: coordination of this EA and draft Finding of No Significant Impact FONSI with appropriate agencies, organizations, and individuals for their review and comments; USFWS and NMFS confirmation that the Proposed Action (TSP) would not be likely to adversely affect

LCA BUDMAT Program – Houma Navigation Canal Project  
Integrated Design and Implementation Report  
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any endangered or threatened species; Louisiana Department of Natural Resources concurrence with the determination that the Proposed Action is consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program; receipt of a Water Quality Certificate from the State of Louisiana public review of the Section 404(b)(1) Public Notice; signature of the Section 404(b)(1) Evaluation; receipt of the SHPO's Determination of No Effect on cultural resources; receipt and acceptance or resolution of all USFWS Fish and Wildlife Coordination Act recommendations; and receipt and acceptance or resolution of all NMFS EFH recommendations.

The FONSI will not be signed until the Proposed Action (TSP) achieves environmental compliance with applicable laws and regulations, as described above.

## 10 Conclusion

The purpose of this Design and Implementation Report 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 (TSP) consists of removing dredged material from the Terrebonne Bay reach to construct platforms suitable for salt marsh development. Dredged material would be discharged into the Marsh Creation Site by pipeline from a hydraulic cutterhead dredge. Excavation and discharge of flotation channel access material, and of closure / dike material would be performed by a mechanical dredge. Earthen retention dikes, earthen deflection dikes, earthen weirs, and earthen closures would be constructed, as necessary, to help contain the dredged material within the Marsh Creation Site. Flotation access channels would be excavated, as needed, to allow construction equipment to access the Marsh Creation Site.

MVN has assessed the environmental impacts of the Proposed Action (TSP) has determined that the Proposed Action (TSP) would have no significant impact upon cultural resources and endangered or threatened species; and no significant adverse impacts on intermediate marsh, brackish marsh, SAV, wooded swamp, water bodies, water quality, fisheries, EFH, wildlife, recreational resources, aesthetics, noise, and air quality. Therefore, an EIS for the Proposed Action (TSP) 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), 2 April 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, 10 April 2015, Subject: Approved Model Project Partnership Agreement (PPA) for Louisiana Coastal Area Beneficial Use of Dredged Material; Memorandum, CECW-MVD, 14 April 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.

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## **11 Preparers**

This draft Integrated DIR and EA and the associated draft FONSI were prepared by Patricia Naquin, biologist, and Jennifer Vititoe, Plan Formulator with relevant sections prepared by: Joe Musso - HTRW; Eric Williams - Cultural Resources; Andrew Perez – Recreational Resources; and Richard Radford - Visual Resources, Rick Broussard – Engineering, . The address of the preparers is: U.S. Army Corps of Engineers, Mississippi River Valley Regional Planning and Environmental Division South, CEMVN-PDN-CEP, 7400 Leake Avenue, New Orleans, Louisiana 70118.

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**FIGURES**

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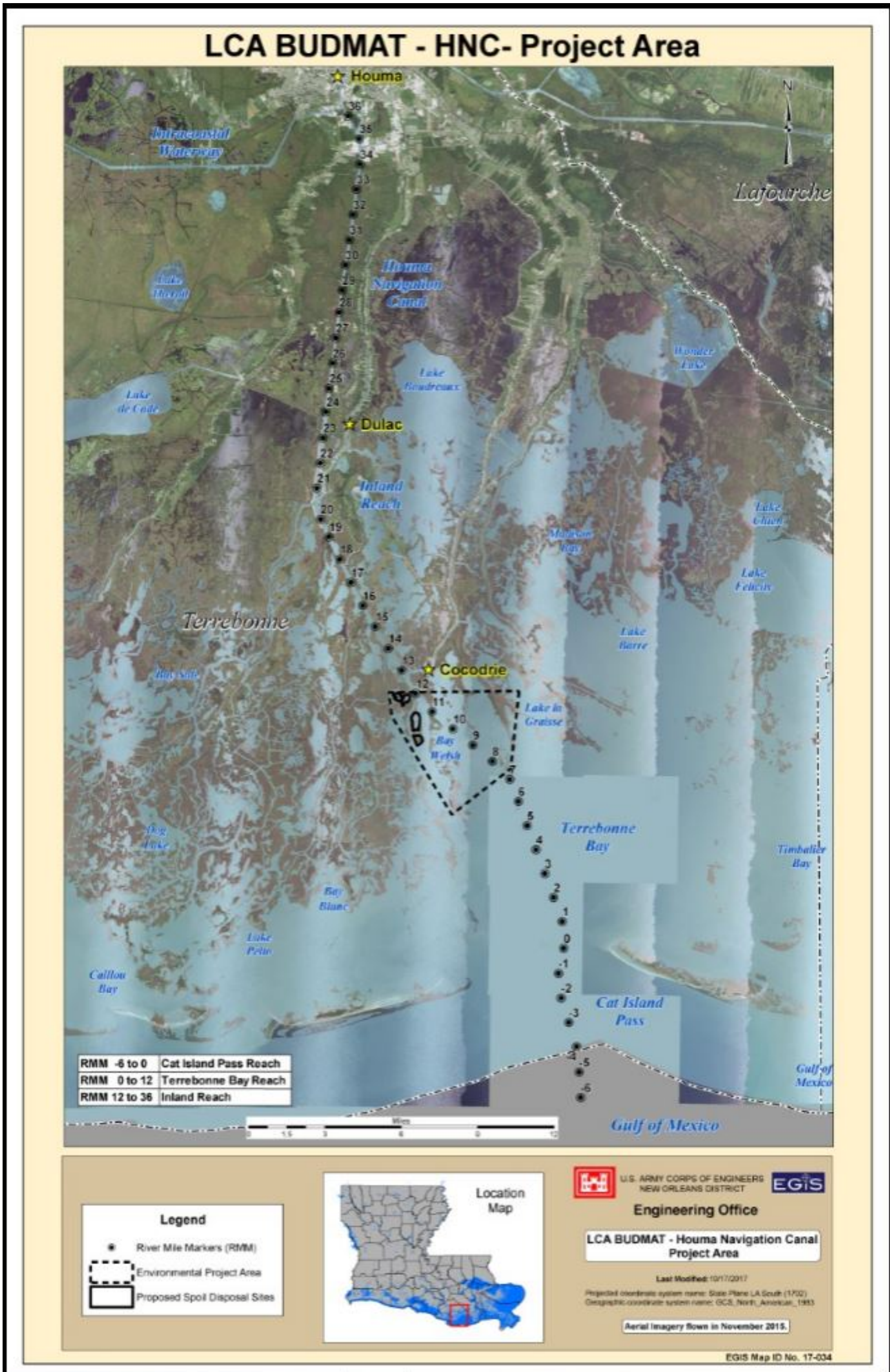


Figure 1 LCA BUDMAT - HNC Project Area

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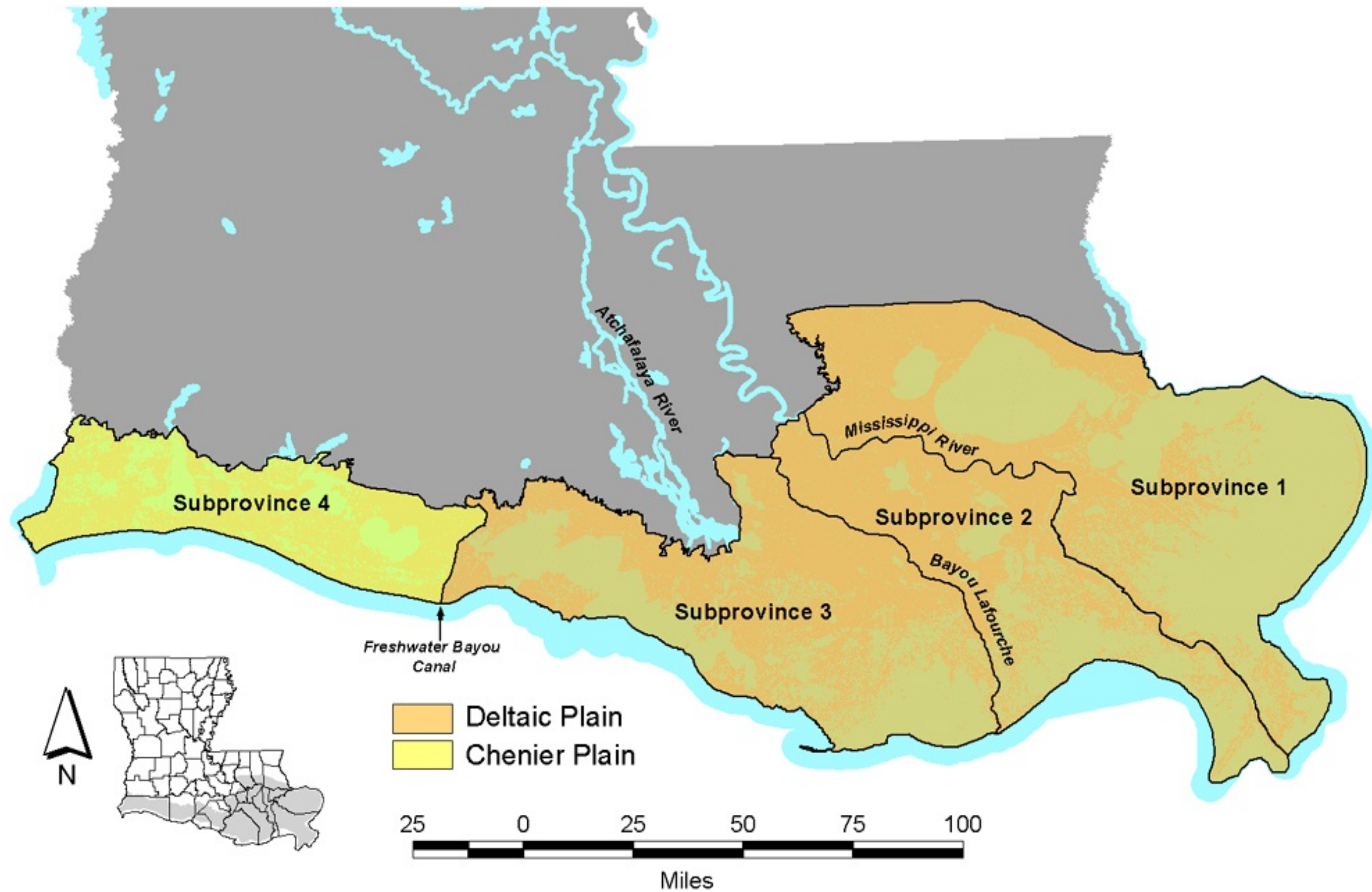


Figure 2 LCA Sub provinces, LCA BUDMAT Project Area



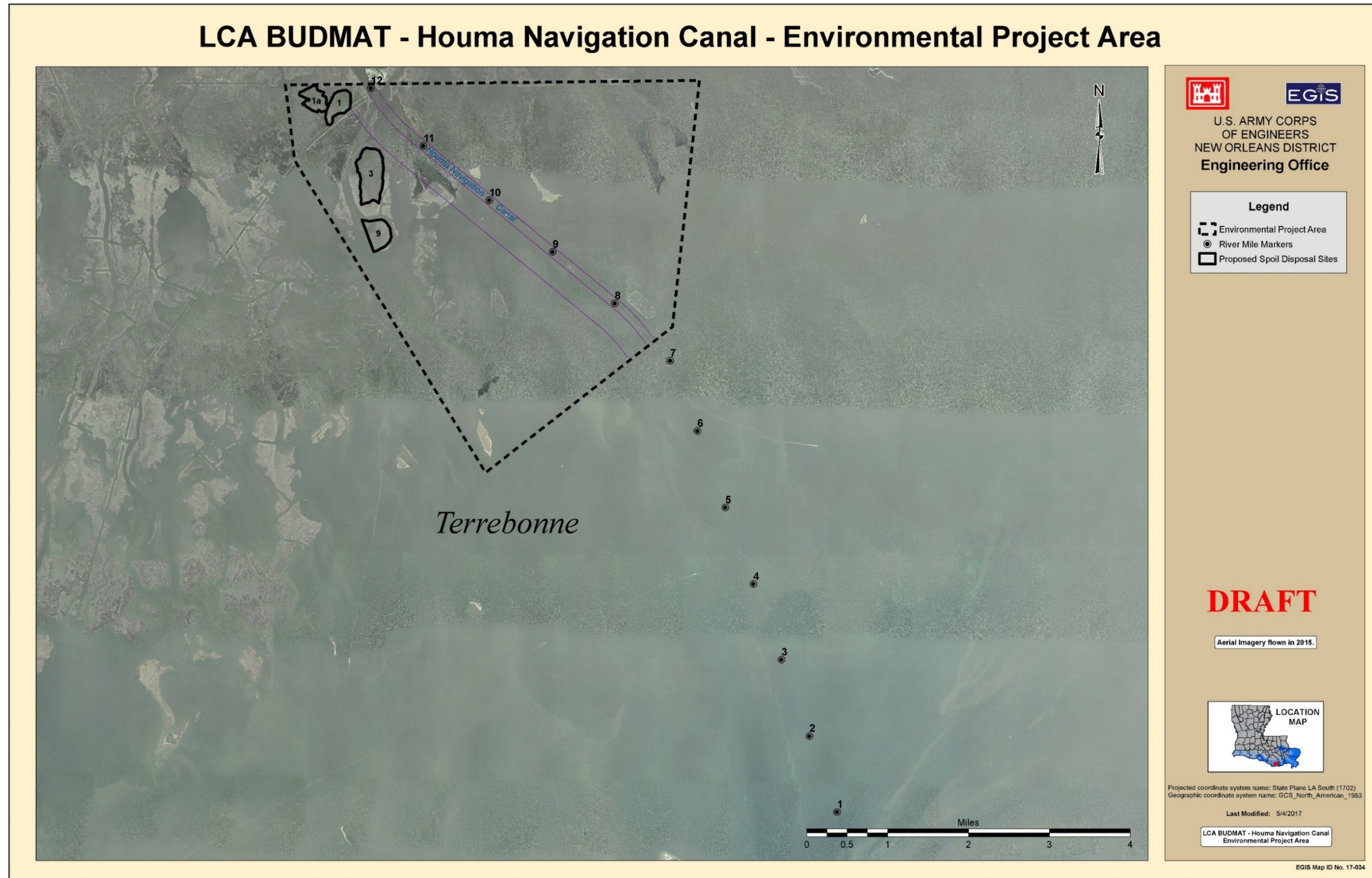



Figure 3 LCA BUDMAT - Houma Navigation Canal



### LCA BUDMAT - Houma Navigation Canal - All Potential Disposal Sites




  
U.S. ARMY CORPS  
OF ENGINEERS  
NEW ORLEANS DISTRICT  
Engineering Office

**Legend**

- Proposed Spoil Disposal Sites
- Possible Disposal Sites Not Being Considered in Study
- Access Routes
- River Mile Markers

**DRAFT**

Aerial Imagery flown in 2015.

 LOCATION MAP

Projected coordinate system name: State Plane LA South (1702)  
Geographic coordinate system name: GCS\_North\_American\_1983

Last Modified: 5/4/2017

LCA BUDMAT - Houma Navigation Canal  
All Potential Disposal Sites

EGIS Map ID No. 17-034

Figure 4 All Potential Disposal Sites



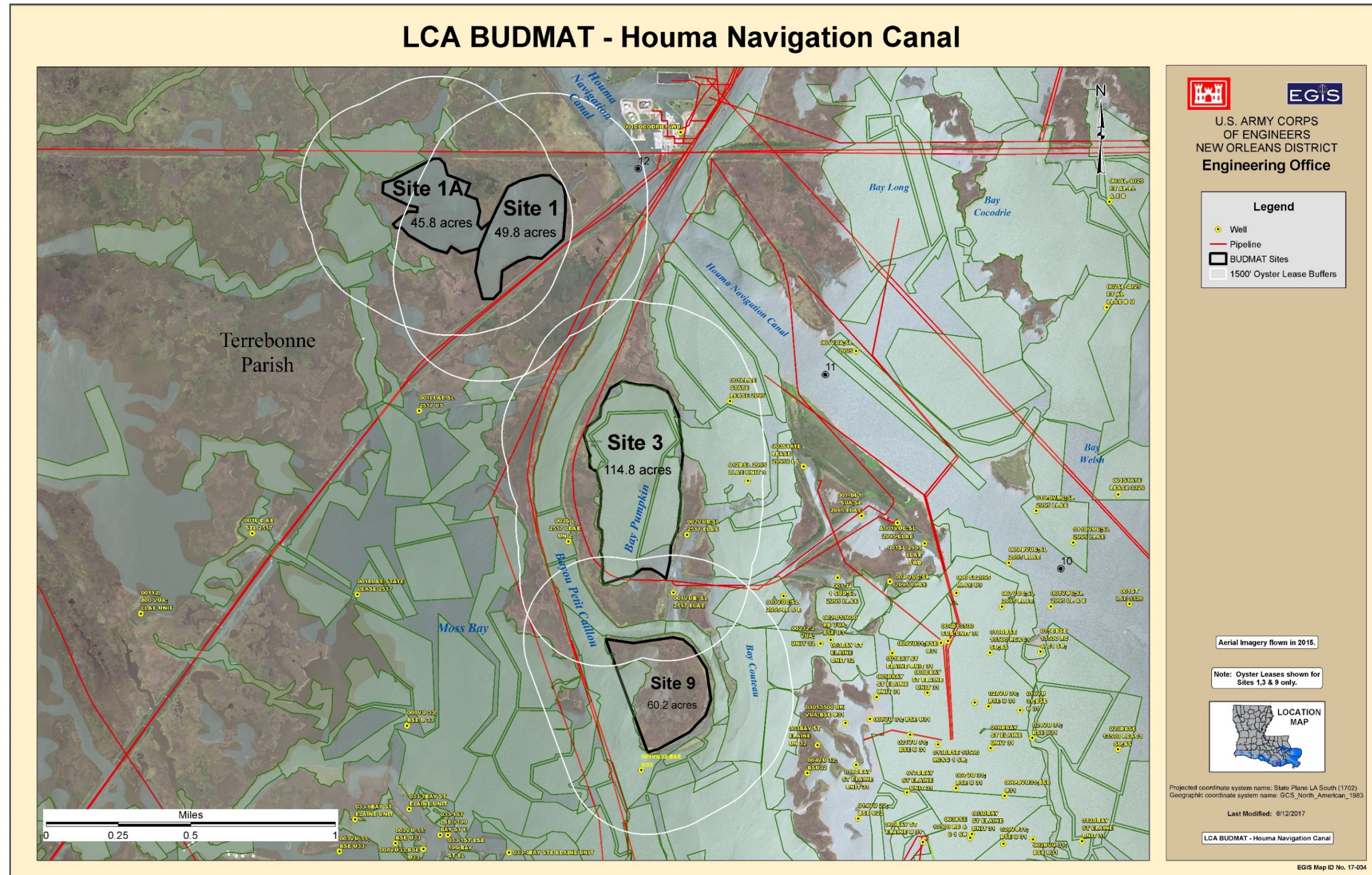


Figure 5 HNC - Initial Array Disposal Sites with Oyster Leases and Utilities



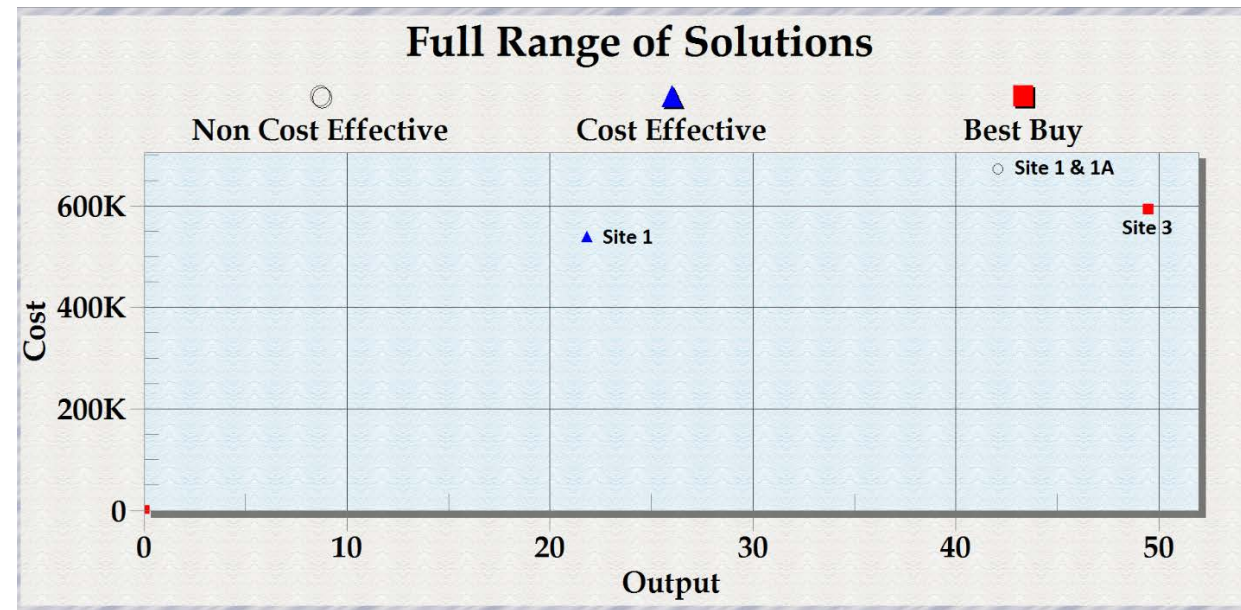


Figure 6 Cost Effectiveness and Best Buy



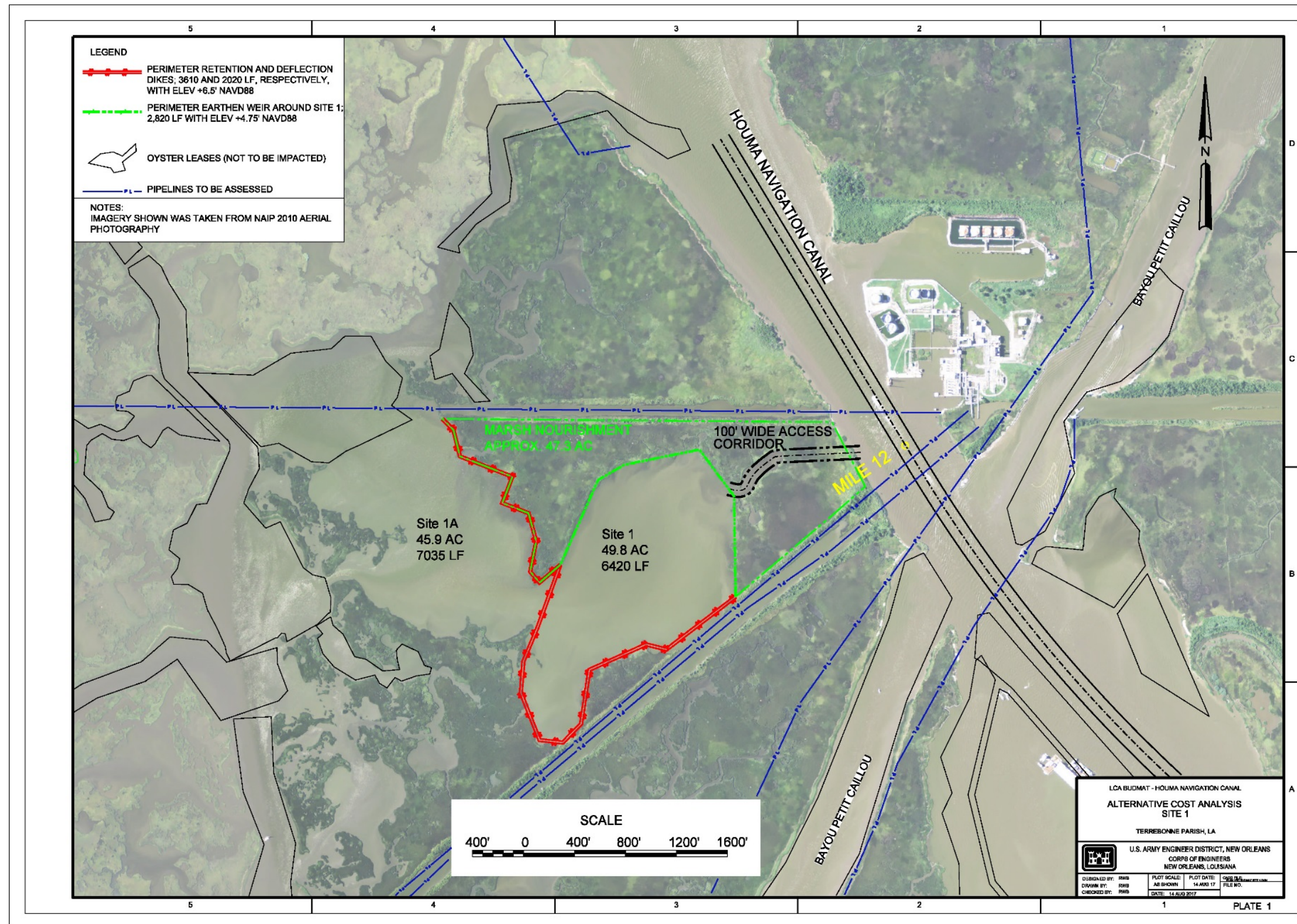


Figure 7 Site 1 – Plan



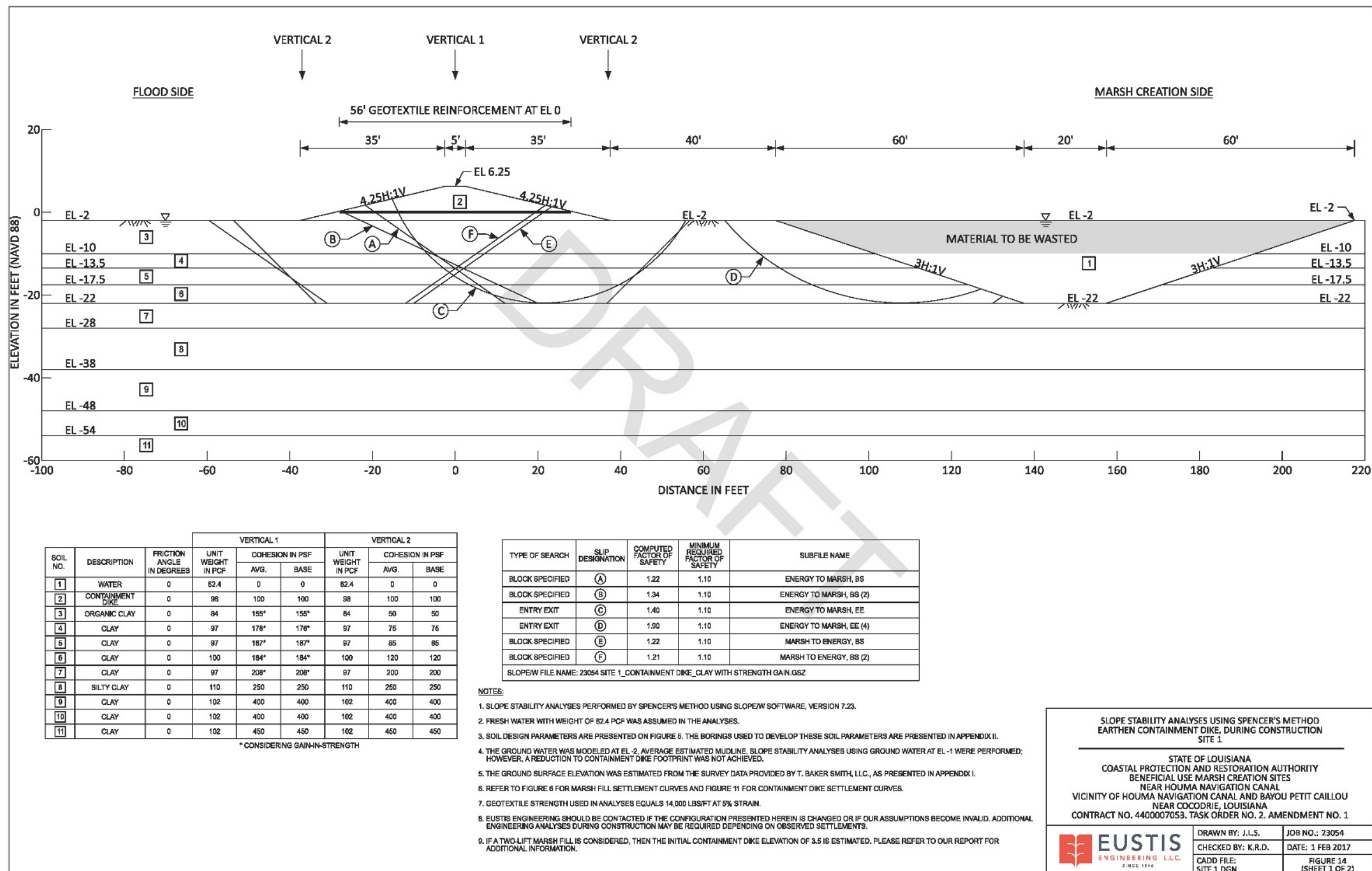


Figure 8 - Site 1 Retention Dike and Borrow Design for Dike Construction

## APPENDICIES

## **Appendix A. Legislation, Reports, and Guidance**



DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF ENGINEERS  
WASHINGTON, D.C. 20314-1000

REPLY TO  
ATTENTION OF:

CECW-MVD (1105-2-10a)

31 JAN 2005

SUBJECT: Louisiana Coastal Area, Louisiana, Ecosystem Restoration

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on ecosystem restoration for the Louisiana Coastal Area (LCA). It is accompanied by the report of the district and division engineers. These reports are in partial response to authority contained in resolutions adopted by the Committees on Public Works of the House of Representatives and United States Senate, dated April 19, 1967 and October 19, 1967, respectively. The resolutions requested a review of the reports of the Chief of Engineers to determine the advisability of improvements or modifications to existing improvements in the coastal area of Louisiana in the interest of hurricane protection, prevention of saltwater intrusion, preservation of fish and wildlife, prevention of erosion, and related water resources purposes. Investigations and preconstruction engineering and design activities for the LCA will continue under the authority provided by the resolutions cited above.
2. The reporting officers recommend approval of the LCA Ecosystem Restoration Program to reduce the severe wetland losses occurring along coastal Louisiana. In arriving at this recommendation, the reporting officers worked closely with other Federal agencies, the State of Louisiana, environmental groups, stakeholders, and interested parties to ensure that the program recommended for implementation best meets restoration objectives. The LCA Ecosystem Restoration Program addresses the most critical restoration needs and consists of various components that could commence implementation in the near term. The LCA Ecosystem Restoration Program includes components that the reporting officers recommend for authorization, related investigations that would continue under existing authorities, and elements that might be recommended for subsequent authorization by the investigations described herein. The LCA Ecosystem Restoration Program recommends 15 near-term features aimed at addressing the critical restoration needs. The components currently recommended for authorization include five critical near-term ecosystem restoration features, a demonstration program consisting of a series of demonstration projects, a beneficial use of dredged material program, and a science and technology program. The five critical near-term ecosystem restoration features, demonstration projects, and beneficial use of dredged material projects are all subject to the approval of feasibility level of detail decision documents by the Secretary of the Army. The analyses supporting the recommendations were based on the information and analytical tools available during the plan formulation and evaluation phase. The feasibility level of detail decision documents will identify specific sites, scales, and adaptive management measures, and will optimize features and outputs necessary to achieve the restoration objectives.

CECW-MVD

SUBJECT: Louisiana Coastal Area, Louisiana, Ecosystem Restoration

Site-specific analyses of the recommended features, demonstration projects, project modifications, and beneficial use of dredged material projects will be prepared to obtain approval by the Secretary of the Army. The following paragraphs describe the LCA Ecosystem Restoration Program components in greater detail.

3. Near-Term Critical Ecosystem Restoration Features. The reporting officers recommend authorization of five near-term critical ecosystem restoration features that have relatively advanced investigations and could be implemented expeditiously. Implementation of the five near-term critical ecosystem restoration features would be subject to approval of feasibility level of detail decision documents by the Secretary of the Army. The five near-term critical ecosystem restoration features include:

a. Mississippi River Gulf Outlet (MRGO) Environmental Restoration Feature. The recommended plan for the MRGO Environmental Restoration feature consists of the construction of rock breakwaters along the southern shoreline of Lake Borgne at an approximate elevation of 4.0 feet North American Vertical Datum (NAVD) for an approximate distance of 15 miles and the construction of rock breakwaters along the north bank of the MRGO at the same elevation an approximate distance of 23 miles. At October 2004 price levels, the estimated first cost is \$105,300,000. The proposed feature would protect about 6,350 acres of critical wetlands that would otherwise be lost, regardless of whether or not the authorized channel depth of the MRGO is maintained. The proposed feature would prevent the accelerated loss of marshes, ridges, bayous, ponds, aquatic grass beds, and shorelines needed for the Lake Borgne, Lake Pontchartrain, and Breton Sound estuaries. It must be emphasized that a decision on whether to maintain the MRGO navigation channel as a deep draft-shipping route has not been made. A study that is addressing maintaining deep-draft navigation is currently underway and is scheduled for completion in Fiscal Year 2005. However, this study will not ultimately resolve the question of final disposition of the MRGO. Additional studies conducted within the context of LCA will holistically evaluate alternatives considering various water resources needs of the area, and make a recommendation on MRGO based on assessment of environmental and economic benefits and impacts. The MRGO Environmental Restoration Feature will not be implemented until the indicated studies are completed and a decision on the MRGO is made, or until it is demonstrated that implementation of the MRGO Environmental Restoration Feature is justified and warranted regardless of a decision whether or not to maintain deep-draft navigation on the MRGO.

b. Small Diversion at Hope Canal Feature. The recommended plan for the Small Diversion at Hope Canal feature consists of two 10-foot by 10-foot gated box culverts, a 100-foot by 100-foot receiving pond reinforced with riprap, and an outflow channel approximately 27,500 feet long that would extend from the receiving pond to U.S. Interstate 10. At October 2004 price levels, the estimated first cost is \$68,600,000. The proposed feature would restore freshwater and sediment flows to the Maurepas Swamp necessary to regenerate cypress and tupelo trees and to restore productivity of 36,000 acres of critical cypress-tupelo swamp habitat.

c. Barataria Basin Barrier Shoreline Restoration Feature. The recommended plan for the Barataria Basin Barrier Shoreline Restoration feature consists of dredging and placing about 9 to 10 million cubic yards (mcy) of sand to create a dune approximately 6 feet high with a shoreward berm about 1,000 feet wide along 13 miles of Caminada Shoreline. Approximately 6 mcy of material would be pumped to create about 3,000 acres of marsh, and approximately 3.4 mcy of sand would be placed at Shell Island (west) to create about 139 acres of dune and about 74 acres of marsh. Approximately 6.6 mcy of sand would be placed at Shell Island (east) to create about 223 acres of dune/berm and about 191 acres of marsh. At October 2004 price levels, the estimated first cost is \$242,600,000. The proposed feature would preserve the integrity of the western and central boundaries of Barataria Basin and protect the fragile inland marshes from encroachment by the Gulf of Mexico. It would provide a net increase of 640 acres of dune/berm habitat and 1,780 acres of saline marsh habitat at Caminada Headland and 147 acres of shoreline habitat on Shell Island.

d. Small Bayou Lafourche Reintroduction Feature. The recommended plan for the Small Bayou Lafourche Reintroduction feature would increase flows in the distributary to approximately 1,000 cubic feet per second (cfs) by upgrading the capacity of an existing pump and siphon facility to 340 cfs, constructing a new pump/siphon facility to pass 660 cfs, removing a fixed weir, dredging about 6.7 mcy from 55 miles of channel, constructing 3 miles of bank stabilization, installing and operating 5 monitoring stations, installing two adjustable weirs to control water levels, and constructing a sediment trap at Donaldsonville to control siltation. At October 2004 price levels, the estimated first cost is \$133,500,000. The proposed feature would provide the freshwater, sediment and nutrients needed to reduce salinity and stimulate ecologic production for 49,000 acres of wetlands and 36,000 acres of estuarine waters. The restored production would counterbalance subsidence and prevent future wetland losses.

e. Medium Diversion at Myrtle Grove with Dedicated Dredging Feature. The recommended plan for Medium Diversion at Myrtle Grove with Dedicated Dredging feature consists of a 2,500 to 15,000 cfs gated, box culvert diversion structure with a 2,600-foot inflow channel and a 13,000-foot outflow channel. The plan also includes dedicated dredging and placing 2 mcy of material from the Mississippi River annually for 16 years to create marsh wetlands. At October 2004 price levels, the estimated first cost is \$278,300,000. The proposed feature would provide up to 13,400 acres of new emergent marsh and prevent the loss of another 6,300 acres of marsh.

4. Science & Technology (S&T) Program. The reporting officers recommend a S&T Program to decrease scientific and engineering uncertainties and to further optimize efforts to achieve ecosystem restoration. The S&T Program would consist of data acquisition and analysis, monitoring, model development and application, and research. The program would improve the effectiveness of existing and proposed features. At October 2004 price levels, the S&T Program would cost an estimated \$100,000,000. The sponsor could provide its share of the S&T Program through in-kind services.

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5. Demonstration Program. The reporting officers recommend authorization of a program to evaluate the effectiveness of advances developed by the S&T Program in field applications. The need for each demonstration project would be identified through the S&T Program, and implementation would be subject to Secretary of the Army approval of feasibility level of detail decision documents. At October 2004 price levels, the first cost of the demonstration program is estimated at \$95,000,000. Individual demonstration projects would be limited to a cost of \$25 million each.

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 October 2004 price levels, the estimated cost of the Beneficial Use of Dredged Material program is \$100,000,000.

7. Related Investigations. The U.S. Army Corps of Engineers has sufficient authority to initiate a number of investigations that are recommended by the reporting officers as part of the overall LCA Ecosystem Restoration Program. The recommended investigations include the following:

a. Investigations of the Near-Term Critical Ecosystem Restoration Features Recommended for Authorization. The reporting officers recommend further investigations of each of the five near-term critical ecosystem restoration features cited above to better define and evaluate each feature and to provide a basis for the Secretary to approve proceeding with implementation. At October 2004 price levels, these investigations are estimated to cost a total of \$31,000,000.

b. Investigations of Additional Near-Term Restoration Features. The reporting officers recommend further investigations of the following ten restoration features, in anticipation of potentially recommending the features for future authorization as part of the LCA Ecosystem Restoration Program. At October 2004 price levels, these investigations are estimated to cost \$39,000,000. The investigations would be conducted under the existing authority cited above. These investigations include:

- Multi-purpose Operation of the Houma Canal Lock
- Terrebonne Basin Barrier-Shoreline Restorations
- Land Bridge between Caillou Lake and Gulf of Mexico
- Small Diversion at Convent/Blind River
- Amite River Diversion Canal
- Medium Diversion at White's Ditch
- Stabilization of Gulf Shoreline at Pointe Au Fer Island
- Atchafalaya River Conveyance to Northern Terrebonne Marshes
- Modification of Caernarvon Diversion
- Modification of Davis Pond Diversion

c. Investigations of Project Modifications. The reporting officers recommend a program to investigate the potential modification of existing water resources projects in order to further restore the Louisiana coastal ecosystem. The investigations would focus on improving the

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environmental performance of existing projects. At October 2004 price levels, the estimated cost of this program is \$10,000,000.

d. Investigations of Demonstration Projects. To support the demonstration program above, the reporting officers recommend investigations to further define, evaluate and recommend potential demonstration projects for implementation. The resulting decision documents would be provided to the Secretary of the Army for approval. At October 2004 price levels, the estimated cost of these investigations is \$5,000,000.

e. Investigations of Other Large-Scale Concepts. The reporting officers recommend investigations of certain large-scale and long-term coastal restoration concepts that could potentially be recommended for future authorization beyond the near-term plan. While the Louisiana Coastal Areas study focused on near-term restoration features that could be implemented expeditiously, it is acknowledged that there are large-scale concepts that could provide significant long-term ecosystem restoration benefits. Investigations that are being initiated in Fiscal Year 2005, will address the need to reduce coastal wetland losses and possibly achieve a net restoration. These studies and their resultant projects, if authorized and constructed, could significantly restore environmental conditions that existed prior to large-scale alteration of the natural ecosystem. At October 2004 price levels, the estimated cost of these investigations is \$60,000,000. The investigations include:

- Acadiana Bay Estuarine Restoration Study
- Upper Atchafalaya Basin Study
- Chenier Plain Freshwater Management and Allocation Reassessment Study
- Mississippi River Delta Management Study
- Mississippi River Hydrodynamic Model
- Third Delta Study

8. At October 2004 price levels, the estimated first cost of the components recommended for authorization is \$1,123,300,000. The estimated first cost of the individual components recommended for authorization are summarized below in table 1.

Critical Restoration Features	
Mississippi River Gulf Outlet Environmental Restoration Feature	\$ 105,300,000
Small Diversion at Hope Canal Feature	68,600,000
Barataria Basin Barrier Shoreline Restoration Feature	242,600,000
Small Bayou Lafourche Reintroduction Feature	133,500,000
Medium Diversion with Dedicated Dredging at Myrtle Grove Feature	278,300,000
Subtotal	<u>\$ 828,300,000</u>
Science and Technology Program	100,000,000
Demonstration Program	95,000,000
Beneficial Use of Dredged Material Program	<u>100,000,000</u>
Total First Cost of the Authorization Request	\$1,123,300,000



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At October 2004 price levels, the estimated cost of the related investigations is \$145,000,000 as shown in table 2. These investigations, performed under existing study authorities, would further address the advisability of implementing the five critical ecosystem restoration features, modifications of existing projects, demonstration projects, ten additional ecosystem restoration features, and six future large-scale features.

Table 2 Louisiana Coastal Area, Louisiana, Ecosystem Restoration Summary of Costs for Related Investigations (October 2004 Price Level)	
Investigations of Features Recommended for Authorization	
MRGO Environmental Restoration Feature	\$ 5,400,000
Small Diversion at Hope Canal Feature	3,600,000
Barataria Basin Barrier Shoreline Restoration Feature	6,000,000
Small Bayou Lafourche Reintroduction Feature	8,000,000
Medium Diversion with Dedicated Dredging at Myrtle Grove Feature	8,000,000
Subtotal	<u>\$ 31,000,000</u>
Investigations of Features for Future Authorization	
Multipurpose Operation of Houma Navigation Lock*	\$ -
Terrebonne Basin Barrier Shoreline Restoration	8,700,000
Land Bridge between Caillou Lake and the Gulf of Mexico	6,300,000
Small Diversion at Convent/Blind River	4,400,000
Amite River Diversion Canal Modification	500,000
Medium Diversion at White's Ditch	5,400,000
Gulf Shoreline at Point Au Fer Island	4,900,000
Convey Atchafalaya River Water to Northern Terrebonne Marshes	8,200,000
Modification of Caernarvon Diversion	300,000
Modification of Davis Pond Diversion	300,000
Subtotal	<u>\$ 39,000,000</u>
Investigations of Modification of Existing Projects Program	\$ 10,000,000
Investigations of Demonstration Projects	\$ 5,000,000
(continued on next page)	

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Table 2 (continued) Louisiana Coastal Area, Louisiana, Ecosystem Restoration Summary of Costs for Related Investigations (October 2004 Price Level)	
Investigations of Other Large Scale Concepts	
Acadiana Bays Estuarine Restoration Study	\$ 7,100,000
Upper Atchafalaya Basin Study*	-
Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study	12,000,000
Mississippi River Delta Management Study	15,300,000
Mississippi River Hydrodynamic Study	10,300,000
Third Delta Study	<u>15,300,000</u>
Subtotal	\$ 60,000,000
 Total First Cost of Related Investigations (*Funded Separately)	 <u>\$ 145,000,000</u>

At October 2004 price levels, the preliminary estimated first cost of the ten additional features most likely to be recommended by the investigations is estimated to be \$728,200,000 as shown in table 3.

Table 3 Louisiana Coastal Area, Louisiana, Ecosystem Restoration Summary of Preliminary Costs for Features Anticipated for Future Authorization (October 2004 Price Level)	
Multipurpose Operation of Houma Navigation Lock	\$ 18,100,000
Terrebonne Basin Barrier Shoreline Restoration	124,600,000
Land Bridge between Caillou Lake and the Gulf of Mexico	56,300,000
Small Diversion at Convent/Blind River	88,000,000
Amite River Diversion Canal Modification	5,600,000
Medium Diversion at White's Ditch	86,100,000
Gulf Shoreline at Point Au Fer Island	43,400,000
Convey Atchafalaya River Water to Northern Terrebonne Marshes	221,200,000
Modification of Caernarvon Diversion	20,700,000
Modification of Davis Pond Diversion	<u>64,200,000</u>
Total First Cost of Project Authorized in the Future	\$ 728,200,000

At October 2004 price levels, the currently estimated overall first cost of the LCA Ecosystem Restoration Plan, which includes the components recommended for authorization, the related investigations and the ten additional future features, is \$1,996,500,000 as shown in table 4.

Table 4 Louisiana Coastal Area, Louisiana, Ecosystem Restoration Summary of All Costs for the Selected Plan (October 2004 Price Level)	
Features and Programs in the Authorization Request	\$ 1,123,300,000
Investigations Already Authorized	145,000,000
Features Anticipated for Future Authorization	<u>728,200,000</u>
Total First Cost of the LCA Program	\$ 1,996,500,000

9. Consistent with existing law and Corps policy, the reporting officers recommend that the ecosystem restoration features be cost shared in accordance with the Water Resources Development Act of 1986 (WRDA), as amended by Section 210 of WRDA of 1996. Accordingly, ecosystem restoration features would be cost shared 65 percent Federal and 35 percent non-Federal. Additionally, the reporting officers recommend that in accordance with Section 204 of WRDA 1992, cost sharing of the beneficial use of dredged material program be cost shared 75 percent Federal and 25 percent non-Federal. Also, in accordance with Section 105 of WRDA 1986, as amended, investigations (feasibility level studies) would be cost shared 50 percent Federal and 50 percent non-Federal. Table 5 shows Federal and non-Federal costs of the various features of the LCA Ecosystem Restoration Program.

While the reporting officer’s recommendations on cost sharing are, as indicated, consistent with law and policy on typical ecosystem restoration projects, the Louisiana Coastal Area is a very large and complex ecosystem influenced by both natural and a variety of man made factors. Effectively and efficiently restoring this vast national treasure will require the involvement and financing of the proposed restoration measures by the Corps, the State of Louisiana, other Federal agencies, and potentially private and corporate America. Accordingly, I recommend as part of the further investigation phase that the Corps, working with other Federal agencies, develop a cross-cutting budget for funding of the LCA Ecosystem Restoration Program. The Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) has been very successful in implementing smaller scale coastal restoration measures. The cross-cutting budget development should consider incorporating CWPPRA projects for implementation under the LCA Ecosystem Restoration Program. And finally, the cross-cutting budget should also examine the allocation of project costs among the various Federal and non-Federal parties and interests involved in LCA restoration. The result of the cross-cutting budget could serve as the basis for the Corps and the Federal agencies to recommend an LCA Ecosystem Restoration Program-specific cost sharing formula for authorization by Congress.

10. Non-Federal Sponsor. The State of Louisiana Department of Natural Resources (LDNR) is the non-Federal cost-sharing sponsor for the recommended plan. The LDNR would fulfill all non-Federal sponsor responsibilities, including the operation, maintenance, repair, replacement and rehabilitation of the plan features.

Table 5 Louisiana Coastal Area, Louisiana, Ecosystem Restoration Cost Sharing (October 2004 Price Level)			
Item	Federal Cost*	Non-Federal Cost*	Total Cost
<u>Authorization Request</u>			
Conditionally Authorized Projects			
PED	\$ 23,500,000	\$ 12,800,000	\$ 36,300,000
LERR&D	0	183,600,000	183,600,000
Ecosystem Restoration	<u>514,800,000</u>	<u>93,600,000</u>	<u>608,400,000</u>
Subtotal (65/35 percent)	\$ 538,300,000	\$ 290,000,000	\$ 828,300,000
Science and Technology Program (65/35)	65,000,000	35,000,000	100,000,000
Demonstration Project Program (65/35)	61,750,000	33,250,000	95,000,000
Beneficial Use of Dredged Material (75/25)	<u>75,000,000</u>	<u>25,000,000</u>	<u>100,000,000</u>
Subtotal of Authorization Request	\$ 740,050,000	\$ 383,250,000	\$ 1,123,300,000
<u>Investigations (50/50 percent)</u>			
Conditional Authorization Features	\$ 15,500,000	\$ 15,500,000	\$ 31,000,000
Modifications of Existing Projects	5,000,000	5,000,000	10,000,000
Demonstration Projects	2,500,000	2,500,000	5,000,000
Features for Future Authorization	19,500,000	19,500,000	39,000,000
Other Large Scale Concepts	<u>30,000,000</u>	<u>30,000,000</u>	<u>60,000,000</u>
Subtotal of Related Investigations	\$ 72,500,000	\$ 72,500,000	\$ 145,000,000
<u>Future Authorization Projects (65/35 Percent)</u>			
Multipurpose Operation of Houma Navigation Lock	\$ 11,800,000	\$6,300,000	\$18,100,000
Terrebonne Basin Barrier Shoreline Restoration	81,000,000	43,600,000	124,600,000
Land Bridge between Caillou Lake and the Gulf of Mexico	36,600,000	19,700,000	56,300,000
Small Diversion at Convent/Blind River	57,200,000	30,800,000	88,000,000
Amite River Diversion Canal Modification	3,600,000	2,000,000	5,600,000
Medium Diversion at White's Ditch	56,000,000	30,100,000	86,100,000
Gulf Shoreline at Point Au Fer Island	28,200,000	15,200,000	43,400,000
Convey Atchafalaya River Water to Northern Terrebonne Marshes	143,800,000	77,400,000	221,200,000
Modification of Caernarvon Diversion	13,400,000	7,300,000	20,700,000
Modification of Davis Pond Diversion	<u>41,700,000</u>	<u>22,500,000</u>	<u>64,200,000</u>
Subtotal for Future Projects	\$ 473,300,000	\$ 254,900,000	\$ 728,200,000
Total LCA Ecosystem Restoration	\$1,285,850,000*	\$ 710,650,000*	\$1,996,500,000

\* Indicated cost sharing is consistent with law and Corps policy. The result of the cross-cutting budget could serve as the basis for the Corps and the Federal agencies to recommend a cost sharing formula for authorization by Congress.

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11. While the recommendations contained in the LCA report, as further modified herein, are based on our current understanding of the coastal Louisiana ecosystem and our knowledge of ecosystem restoration as a whole, proposed restorations efforts, including the critical restoration projects, the demonstration projects, as well as the S&T Program, will significantly advance our understanding of the LCA ecosystem. To ensure that LCA ecosystem restoration objectives are realized, monitoring and adaptive management must be a critical element of LCA projects. As we learn more about what restoration measures work best in the LCA from the various investigations, monitoring and adaptive management, and as well from improved knowledge base from the S&T Program, it will be critically important to reassess, as appropriate, the recommendations contained herein. I, therefore, recommend that the Corps provide a status report to Congress every 5 years on our assessment of the successes and proposed refinements to the LCA plan, as appropriate, to ensure that restoration of coastal Louisiana remains effective, focused, and generally supported by affected stakeholders.

12. The LCA study has significantly benefited from the close involvement, coordination, and collaboration of a co-located interagency study team made up of scientists and recognized experts in ecosystem restoration. The implementation of an LCA Ecosystem Restoration Program to restore coastal Louisiana will require the continued involvement and close coordination of the State of Louisiana and Federal agencies having development, coordination and implementation responsibilities, as well as the involvement of all stakeholders. Also key to the success of the LCA Ecosystem Restoration Program is the infusion of the best available science and engineering for the proposed development and implementation of restoration plans. Accordingly, the reporting officers recommend establishment of a Science and Technology (S&T) Program and an S&T Office to advise the LCA program manager throughout plan implementation. To maintain an appropriate level of independence, the S&T Office should be managed separately from the LCA restoration program. The S&T program director should be a Federal scientist/manager. The S&T program director would be supported by a team of experts in ecosystem restoration drawn from State and Federal agencies and academia. The S&T director would provide recommendations to the LCA program manager, but the LCA program manager would retain ultimate responsibility for decisions on management and implementation of all LCA restoration activities. Building on the successful Federal agency involvement to date, I further recommend the establishment of a Washington-level Federal agencies coordinating team consisting of senior level decision makers to integrate respective programs and ensure that they are complementary to the overall LCA restoration goals and objectives.

13. Washington level review indicates that the LCA Ecosystem Restoration Program recommended by the reporting officers is environmentally justified, technically sound, cost effective and socially acceptable. The LCA Ecosystem Restoration Program conforms with essential elements of the U.S. Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies and complies with other administration and legislative policies and guidelines. Also, the views of interested parties, including Federal, State and local agencies have been considered.

14. I concur in the findings, conclusions, and recommendation of the reporting officers. Accordingly, I recommend implementation of the LCA Ecosystem Restoration Program in accordance with the reporting officers' recommended plan with such modifications as in the

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discretion of the Chief of Engineers may be advisable. The recommendation is subject to cost sharing, financing, and other applicable requirements of Federal and State laws and policies, or changes in cost sharing based on the cross-cutting budget should Congress authorize a program, or project-specific cost sharing for the LCA Ecosystem Restoration Program. Accordingly, the non-Federal sponsor must agree with the following requirements prior to project implementation:

a. Provide a minimum of 50 percent of costs allocated to general investigations, studies, and feasibility-level decision documents;

b. Provide a minimum of 35 percent of total project costs allocated to ecosystem restoration/environmental protection project costs, including demonstration projects, and a minimum of 25 percent of total project costs allocated to beneficial use of dredged material, unless Congress authorizes a different cost sharing:

(1) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Federal Government, in consultation with the non-Federal sponsor, to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project;

(2) Provide or pay to the Federal Government any additional funds needed to cover the cost of providing all retaining dikes, waste weirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project;

(3) Provide, during construction, any additional funds necessary to make its total contribution attributable to ecosystem restoration/environmental protection, including demonstration projects, equal to 35 percent of total project costs, and 25 percent of the total project costs allocated to beneficial use of dredged material, unless Congress authorizes a different cost sharing;

c. Provide 35 percent of the costs allocated to the Science and Technology Program, unless Congress authorizes a different cost sharing;

d. Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation that are in excess of 1 percent of the total amount authorized to be appropriated for the project;

e. Do not use Federal funds from other Federal programs, including any non-Federal contribution required as a matching share, to meet any of the non-Federal obligations for the project unless the Federal granting agency providing the Federal portion of such funds verifies in writing that the expenditure of such funds for such purpose is authorized;

f. Operate, maintain, repair, replace, and rehabilitate the project, or functional portion the project, including mitigation, at no cost to the Federal Government, in a manner compatible with

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the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

g. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspecting, operating, maintaining, repairing, replacing, rehabilitating, or completing the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall relieve the non-Federal sponsor of responsibility to meet the non-Federal sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

h. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors;

i. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the initial construction, periodic nourishment, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

j. Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, periodic nourishment, operation, or maintenance of the project;

k. Agree that, as between the Federal Government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, and repair the project in a manner that would not cause liability to arise under CERCLA;

l. Prevent obstructions of or encroachments on the project (including prescribing and enforcing regulations to prevent such obstruction or encroachments) which might reduce ecosystem restoration benefits, hinder operation and maintenance, or interfere with proper functioning of the project, such as any new developments on project lands or the addition of facilities which would degrade the benefits of the project;

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m. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as would properly reflect total costs of construction of the project, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

n. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5), and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

o. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army," and all applicable Federal labor standards and requirements, including but not limited to 40 U.S.C. 3141 - 3148 and 40 U.S.C. 3701 - 3708 (revising, codifying, and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c et seq.); and

p. Comply with all 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 CFR Part 24, in acquiring lands, easements, and rights-of-way necessary for the initial construction, periodic nourishment, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

15. The recommendation contained herein reflects the information available at this time and current departmental policies governing the formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of the national civil works construction program, nor the perspective of higher review levels within the executive branch. Consequently, the recommendation may be modified before it is transmitted to Congress for



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authorization and execution funding. However, prior to transmittal to Congress, interested Federal agencies, the State of Louisiana, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

A handwritten signature in black ink, appearing to read "Carl A. Stroock", with a long horizontal flourish extending to the right.

CARL A. STROCK  
Lieutenant General, US Army  
Chief of Engineers



DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS  
441 G STREET NW  
WASHINGTON, D.C. 20314-1000

CECW-PB

31 AUG 2009

MEMORANDUM FOR COMMANDERS, MAJOR SUBORDINATE COMMANDS

SUBJECT: Implementation Guidance for Section 2039 of the Water Resources Development Act of 2007 (WRDA 2007) – Monitoring Ecosystem Restoration

1. Section 2039 of WRDA 2007 directs the Secretary to ensure that when conducting a feasibility study for a project (or component of a project) for ecosystem restoration that the recommended project includes a plan for monitoring the success of the ecosystem restoration. The monitoring plan shall include a description of the monitoring activities, the criteria for success, and the estimated cost and duration of the monitoring as well as specify that monitoring will continue until such time as the Secretary determines that the success criteria have been met. Within a period of ten years from completion of construction of an ecosystem restoration project, monitoring shall be a cost-shared project cost. Any additional monitoring required beyond ten years will be a non-Federal responsibility. A copy of Section 2039 is enclosed.
2. Applicability. This guidance applies to specifically authorized projects or components of projects as well as to those ecosystem restoration projects initiated under the Continuing Authority Program (CAP) or other programmatic authorities.
3. Guidance.
  - a. Monitoring includes the systematic collection and analysis of data that provides information useful for assessing project performance, determining whether ecological success has been achieved, or whether adaptive management may be needed to attain project benefits. Development of a monitoring plan will be initiated during the plan formulation process for ecosystem restoration projects or component of a project and should focus on key indicators of project performance.
  - b. The monitoring plan must be described in the decision document and must include the rationale for monitoring, including key project specific parameters to be measured and how the parameters relate to achieving the desired outcomes or making a decision about the next phase of the project, the intended use(s) of the information obtained and the nature of the monitoring including duration and/or periodicity, and the disposition of the information and analysis as well as the cost of the monitoring plan, the party responsible for carrying out the monitoring plan and a project closeout plan. Monitoring plans need not be complex but the scope and duration should include the minimum monitoring actions necessary to evaluate success. The appropriateness of a monitoring plan will be reviewed as part of the decision document review including agency technical review (ATR) and independent external peer review (IEPR), as necessary. The estimated cost of the proposed monitoring program will be included in the project cost estimate and cost-shared accordingly.

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SUBJECT: Implementation Guidance for Section 2039 of the Water Resources Development Act of 2007 (WRDA 2007) – Monitoring Ecosystem Restoration

c. Upon completion of the construction of the ecosystem restoration project (or component of a project), monitoring for ecological success will be initiated. Monitoring will be continued until ecological success is determined. Once ecological success has been documented by the District Engineer in consultation with the Federal and State resources agencies, and a determination has been made by the Division Commander that ecological success has been achieved (may be less than ten years), no further monitoring will be required. Ecological success will be documented through an evaluation of the predicted outcomes as measured against the actual results. The law allows for but does not require a 10 year cost shared monitoring plan. Necessary monitoring for a period not to exceed 10 years will be considered a project cost and will be cost shared as a project construction cost and funded under Construction. Costs for monitoring beyond a 10 year period will be a non-Federal responsibility. Financial and implementation responsibilities for the monitoring plan will be identified in the Project Partnership Agreement. For CAP projects, or for those projects that may be authorized with an explicit dollar cap, any cost shared monitoring costs cannot increase the Federal cost beyond the authorized project limit of the CAP or other authority under which the project is being considered.

d. Contingency Plan (Adaptive Management). An adaptive management plan (i.e., a contingency plan) will be developed for all ecosystem restoration projects. The adaptive management plan must be appropriately scoped to the scale of the project. If the need for a specified adjustment is anticipated due to high uncertainty in achieving the desired outputs/results, the nature and cost of such actions should be explicitly described in the decision document for the project. The reasonableness and the cost of the adaptive management plan will be reviewed as part of the decision document. Costly adaptive management plans may indicate the need to reevaluate the formulation of the ecosystem restoration project. The information generated by the monitoring plan will be used by the District in consultation with the Federal and State resources agencies and the MSC to guide decisions on operational or structural changes (adaptive management) that may be needed to ensure that the ecosystem restoration project meets the success criteria. The adaptive management plan cost should be shown in the 06 feature code of the cost estimate.

If the results of the monitoring program support the need for physical modifications to the project, the cost of the changes will be cost shared with the non-Federal sponsor and must be concurred in by the non-Federal sponsor. The appropriate HQUSACE RIT should be advised at such time that it is determined a modification to a project is required. Any changes to the adaptive management plan approved in the decision document must be coordinated with HQUSACE at the earliest possible opportunity. If a needed change is not part of the approved adaptive management plan and is determined by HQUSACE to be a deficiency correction the annual budget guidance to initiate a study for such corrections should be followed. Significant changes to the project required to achieve ecological success and which cannot be appropriately

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SUBJECT: Implementation Guidance for Section 2039 of the Water Resources Development Act of 2007 (WRDA 2007) – Monitoring Ecosystem Restoration

addressed through operational changes or through the approved adaptive management plan may need to be examined under other authorities, such as Section 216, River and Harbor and Flood Control Act of 1970.

4. This guidance is effective immediately and will be incorporated into ER 1105-2-100 upon the next revision.

FOR THE COMMANDER:



THEODORE BROWN, P.E.  
Chief, Planning and Policy Division  
Directorate of Civil Works

Encl

DISTRIBUTION:

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## **SEC. 2039. MONITORING ECOSYSTEM RESTORATION.**

*(a) In General- In conducting a feasibility study for a project (or a component of a project) for ecosystem restoration, the Secretary shall ensure that the recommended project includes, as an integral part of the project, a plan for monitoring the success of the ecosystem restoration.*

*(b) Monitoring Plan- The monitoring plan shall--*

- (1) include a description of the monitoring activities to be carried out, the criteria for ecosystem restoration success, and the estimated cost and duration of the monitoring; and*
- (2) specify that the monitoring shall continue until such time as the Secretary determines that the criteria for ecosystem restoration success will be met.*

*(c) Cost Share- For a period of 10 years from completion of construction of a project (or a component of a project) for ecosystem restoration, the Secretary shall consider the cost of carrying out the monitoring as a project cost. If the monitoring plan under subsection (b) requires monitoring beyond the 10-year period, the cost of monitoring shall be a non-Federal responsibility.*



DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS  
WASHINGTON, D.C. 20314-1000

DEC 19 2008

CECW-P

MEMORANDUM FOR COMMANDER, Mississippi Valley Division (CEMVD-PD)

SUBJECT: Implementation Guidance for Section 7006(d) of the Water Resources Development Act of 2007 – Louisiana Coastal Area - Construction

1. Section 7006(d) authorizes the Secretary, substantially in accordance with the 31 January 2005 report of the Chief of Engineers, to implement a program for the beneficial use of dredged material from federally maintained waterways in accordance with the Louisiana Coastal Area program at a total cost of \$100,000,000. A copy of Section 7006(d) is enclosed for your information.
2. The report of the Chief of Engineers dated 31 January 2005 recommends that the beneficial use of dredged material program be cost shared in accordance with Section 204 of the Water Resources Development Act (WRDA) of 1992. Section 204 has been modified by Section 2037 of WRDA 2007. In accordance with Section 2037(c) all work under the beneficial use of dredged material program will be cost shared at 65% Federal and 35% non-Federal.
3. Section 7006(d) directs that in carrying out the program the Secretary shall consider the beneficial use of sediments from the Illinois River System for wetland restoration in coastal Louisiana. The use of dredged material from the Illinois River System shall be evaluated and documented in the Louisiana Coastal Area Beneficial Use of Dredged Material Report that is submitted for review and approval.

FOR THE COMMANDER:

A handwritten signature in black ink, appearing to read "St L Stockton".

STEVEN L. STOCKTON, P.E.  
Director of Civil Works

Encl

7006. LOUISIANA COASTAL AREA - 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.

(2) CONSIDERATION.—In carrying out the program under paragraph (1), the Secretary shall consider the beneficial use of sediment from the Illinois River System for wetlands restoration in wetlands-depleted watersheds of the coastal Louisiana ecosystem.



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS  
441 G STREET, NW  
WASHINGTON, DC 20314-1000

MAR 12 2010

CECW-MVD

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Louisiana Coastal Area, Beneficial Use of Dredged Material, Final Programmatic Study Report and Environmental Impact Statement

1. Purpose: To provide for your review and approval the Final Programmatic Report and Environmental Impact Statement for the Louisiana Coastal Area (LCA) Beneficial Use of Dredged Material (BUDMAT) program. Section 7006(d) of the Water Resources Development Act of 2007 (WRDA 2007) authorizes the BUDMAT program for coastal Louisiana substantially in accordance with the report of the Chief of Engineers dated 31 January 2005, also referred to as the restoration plan.
2. Recommendation: That the ASA(CW) approve the LCA BUDMAT Final Programmatic Report and Environmental Impact Statement and sign the Record of Decision. Consistent with Section 204 of the Continuing Authorities Program (CAP), it is further recommended that approval authority for implementing beneficial use projects under the BUDMAT Program be delegated to the Commander, Mississippi Valley Division.
3. Background:
  - a. The LCA Study resulted in the recommendation of the restoration plan whose goal is to reduce the current trend of degradation of the coastal ecosystem and was transmitted to your office with the report of the Chief of Engineers for the Louisiana Coastal Area, Louisiana, Ecosystem Restoration, Study dated 31 January 2005, and is included as enclosure 1.
  - b. The restoration plan emphasizes the use of restoration strategies that: reintroduce historical flows of river water, nutrients, and sediment to coastal wetlands; restore coastal hydrology to minimize saltwater intrusion; and maintain the structural integrity of the coastal ecosystem. Execution of the restoration plan is a critical step towards achieving and sustaining a coastal ecosystem that can support and protect the environment, economy, and culture of southern Louisiana and thus contribute to the economy and well-being of the Nation. Benefits to and effects on existing infrastructure, including navigation, hurricane and storm damage risk reduction, flood damage reduction, land transportation works, agricultural lands, and oil and gas production and distribution facilities were strongly considered in the formulation of coastal restoration plans.



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SUBJECT: Louisiana Coastal Area, Beneficial Use of Dredged Material, Final Programmatic Study Report and Environmental Impact Statement

c. By letters dated 18 November 2005, the LCA Study Report and accompanying report of the Chief of Engineers dated 31 January 2005, were transmitted to Congress along with a letter from the Office of Management and Budget dated 1 November 2005 (enclosure 2 and 3).

d. The restoration plan was authorized in Title VII of the WRDA 2007. In accordance with WRDA 2007, decision documents that would provide detailed project justification, design, and implementation data are being prepared. These decision documents, which include the BUDMAT Final Programmatic Study Report and Environmental Impact Statement, would support requests for project construction and would provide the basis for the implementation of the restoration plan. Construction authorization for the BUDMAT Program is provided in WRDA 2007, Title VII, Section 7006(d).

e. The President's Budget for Fiscal Year 2011 includes \$19,000,000 for new start construction for the LCA program. These funds could be applied to the construction of authorized projects that have completed favorable Executive Branch review.

#### 4. Discussion:

a. The Corps completed the enclosed LCA BUDMAT Final Programmatic Study Report and Environmental Impact Statement, dated January 2010, which is included as enclosure 4. The report meets the requirements of the legislation by recommending an implementation plan for a program for coastal Louisiana that beneficially uses material dredged from Federally maintained waterways and is substantially in accordance with the LCA restoration plan.

b. The BUDMAT Program includes \$100 million in programmatic authority to allow for the incremental cost for beneficial use of dredged material over a 10-year period. Funds from BUDMAT Program would be used for disposal activities associated with separate, cost-shared, individual ecosystem restoration beneficial use projects that are above and beyond the disposal activities that are covered under the USACE O&M maintenance 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 BUDMAT Program, approximately 15 percent i.e., \$15 million would be used for planning, engineering, and design activities, and real estate acquisition for beneficial use projects implemented under the BUDMAT Program, and the remaining \$85 million would be used for placement of dredged material within the beneficial use disposal sites.

c. The customized program alternative developed through the plan formulation process conducted for this study would utilize a proactive, streamlined approach to achieve objectives of the BUDMAT Program. Using an approach that follows the basic procedures described in the

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SUBJECT: Louisiana Coastal Area, Beneficial Use of Dredged Material, Final Programmatic Study Report and Environmental Impact Statement

2007 EPA/USACE Beneficial Use Planning Manual, the multi-agency Project Delivery Team (PDT) identified potential selection criteria and evaluated their applicability for screening and selecting beneficial use projects. The PDT determined that an initial screening process was needed to identify potential projects that could be coordinated with O&M dredging, followed by two levels of evaluation criteria: first, a set of screening criteria is used to identify suitable candidate projects for design. The beneficial use projects for which planning and design efforts have been completed are then ranked by a second criteria set to determine which project will be implemented by the BUDMAT program in conjunction with O&M dredging of Federally maintained waterways. Through implementation of this program, it is expected that this beneficial use program could contribute to the attainment of up to approximately 21,000 acres of newly created wetlands.

d. Plan formulation for the customized BUDMAT program included an assessment of existing program structures to determine their ability to carry out the required functions of the BUDMAT Program. Existing program processes that fully or partially address the functional requirements for the BUDMAT program were incorporated into the customized program alternative. The customized program alternative also relies on the project planning and design processes of the Continuing Authorities Program (CAP) Section 204, which provides the appropriate level of planning and design for beneficial use projects implemented under a programmatic authorization.

e. Plan formulation also considered the beneficial use of sediment from the Illinois River System for wetlands restoration in wetlands-depleted watersheds of the coastal Louisiana ecosystem as required in WRDA 2007. The plan formulation determined that the use of sediments from the Illinois River System is cost prohibitive due to transportation costs and treatment costs for invasive species.

f. The State of Louisiana supports the LCA Beneficial Use of Dredged Material Program at the authorized 65 percent Federal, 35 percent non-Federal cost sharing, with operations, maintenance, repair, replacement and rehabilitation being a 100 percent non-Federal responsibility, as required by WRDA 2007.

g. The BUDMAT Report includes a Programmatic Environmental Impact Statement that tiers off the LCA PEIS and a draft Record of Decision is included as enclosure 5.

h. The documentation of review findings and a draft transmittal letter to the Office of Management and Budget are provided as enclosures 6 and 7.

CECW-MVD

SUBJECT: Louisiana Coastal Area, Beneficial Use of Dredged Material, Final Programmatic Study Report and Environmental Impact Statement

5. Conclusions:

a. I have reviewed the final Programmatic Environmental Impact Statement for the Beneficial Use of Dredged Material Program (BUDMAT) in the coastal parishes of Louisiana. Based on this review, and the views of interested agencies and the concerned public, I find the recommended plan fully addresses the planning objectives and request your approval. The plan is justified, in accordance with environmental statutes, and is in the public interest.

FOR THE COMMANDER:

A handwritten signature in black ink, appearing to read 'S. L. Stockton', written in a cursive style.

STEVEN L. STOCKTON, P.E.  
Director of Civil Works

Enclosures

## **RECORD OF DECISION**

### **Louisiana Coastal Area Beneficial Use of Dredged Material Program**

The Louisiana Coastal Area Beneficial Use of Dredged Material (BUDMAT) Final Report and Programmatic Environmental Impact Statement (EIS), dated January 2010 and with Errata June 2010, describes the recommended program for the beneficial use of dredged material for the coastal parishes of Louisiana. Based on this report, the reviews of other Federal, State and local agencies, input from the public, and the review by my staff, I find that the plan recommended by the Director of Civil Works is technically feasible, in compliance with environmental statutes, and in the public interest.

The BUDMAT study was undertaken as a result of the authorization provided in Title VII of the Water Resources Development Act (WRDA) of 2007. The goal of the authorization was to reduce the degradation of the Louisiana coastal ecosystem. The near-term Louisiana Coastal Area (LCA) Plan that was authorized in Title VII required the preparation of a series of decision documents to provide detailed construction information. The BUDMAT report and EIS provide the basis for the implementation of an extended beneficial use of dredged material program in coastal Louisiana.

The recommended plan for the BUDMAT Program specifies the procedures to solicit, screen, plan, design and construct ecosystem restoration projects using dredged material beneficially under the authority of Section 7006(d) of WRDA 2007. This plan represents an opportunity to contribute to the LCA Program objectives, as outlined in the near-term LCA Plan. Implementation would proceed with a more detailed analysis of the potential beneficial use disposal sites, a process that would be repeated annually in coordination with the ongoing implementation of dredging activities in coastal Louisiana. It should be noted that this report was prepared prior to the Deepwater Horizon incident; however, because this report is programmatic in nature, annual beneficial use options would be evaluated based on the latest site specific data.

A broad array of management and site selection alternatives were evaluated to identify suitable procedures for the annual process of implementing restoration projects that beneficially use dredged material. A customized screening procedure was developed to evaluate restoration opportunities in coordination with dredging operations and restoration program objectives. The near-term LCA Plan estimated that approximately 21,000 acres of wetlands could be created through the 10-year, \$100 million BUDMAT Program. Due to the updated and more detailed information developed through this study, the current estimate of wetlands that could be created for the BUDMAT Program is approximately 3,400 acres. The recommended plan is consistent with the authorizing legislation and is the environmentally preferable alternative.

The draft Programmatic Study Report and Programmatic EIS was circulated for public review for 45 days on November 20, 2009. Ten comment letters were received and none expressed opposition to the proposed action. All comments were responded to in the Final EIS, which was filed with the Environmental Protection Agency on January 22, 2010. All practicable means to avoid or minimize adverse environmental effects have been incorporated into the recommended plan. Because the BUDMAT Program would result in an overall benefit to the environment, no compensatory mitigation is proposed. National Environmental Policy Act environmental documents will be prepared for individual projects proposed under the BUDMAT Program, once specific sites are selected. Monitoring and adaptive management would be performed to ensure performance, as needed.

Technical, environmental, economic, and risk criteria used in the formulation of alternative plans were those specified in the Water Resource Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, Executive Orders, regulations and local government plans were considered in the evaluation of alternatives. Based on review of these evaluations, I find that the public interest would be best served by implementing the recommended plan. This Record of Decision completes the National Environmental Policy Act process.

August 13, 2010  
Date

Jo-Ellen Darcy  
Jo-Ellen Darcy  
Assistant Secretary of the Army  
(Civil Works)





DEPARTMENT OF THE ARMY  
OFFICE OF THE ASSISTANT SECRETARY  
CIVIL WORKS  
108 ARMY PENTAGON  
WASHINGTON DC 20310-0108

AUG 13 2010

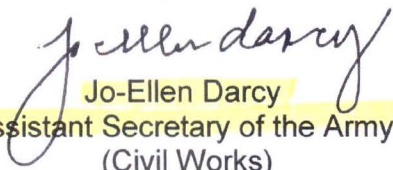
MEMORANDUM FOR DEPUTY COMMANDING GENERAL FOR CIVIL AND  
EMERGENCY OPERATIONS

SUBJECT: Louisiana Coastal Area, Beneficial Use of Dredged Material – Delegation of  
Authority and Project Partnership Agreement Development

Your memorandum of March 12, 2010 transmitted the Beneficial Use of Dredged  
Material (BUDMAT) program report to me for review and approval. I have done so and  
provided the report to Congress with Administration support. You also requested that I  
delegate approval authority for implementing the BUDMAT program to the Commander,  
Mississippi Valley Division (MVD).

I delegate approval authority to the MVD Commander, subject to a per-project  
limitation on the Federal investment for this delegation to \$15 million. In the event that a  
BUDMAT project exceeds this amount, you must retain approval authority.

Execution of BUDMAT projects would be streamlined by the development of a  
model Project Partnership Agreement. My office is available to work with you in the  
development of such a model agreement.

  
Jo-Ellen Darcy  
Assistant Secretary of the Army  
(Civil Works)



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS  
441 G STREET, NW  
WASHINGTON, DC 20314-1000

CECW-P

DEC 03 2014

MEMORANDUM FOR Commanders, Major Subordinate Commands

SUBJECT: Implementation Guidance for Section 1030 of the Water Resources Reform and Development Act (WRRDA) of 2014, Continuing Authorities

1. Section 1030 of WRRDA 2014 increases the programmatic limits and per project limits for certain Continuing Authority Program (CAP) authorities and for the Flood Plain Management Services (FPMS) Program. In addition, Section 1030 requires that the Secretary publish in the Federal Register the criteria used for prioritizing the annual funding for CAP projects and on an annual basis the status of each CAP project. A copy of Section 1030 is enclosed.
2. The annual programmatic limits and per-project limits on federal participation are increased for the following CAP authorities, as noted below. The increased federal per-project limits will be applied only to those Section 14, Section 107, Section 111, Section 204, Section 205, Section 206, and Section 1135 projects whose initial federal construction contract was or will be awarded on or after 10 June 2014.
  - a. Section 107 of the River and Harbor Act of 1960, as amended (33 U.S.C. 577). The annual program limit increases from \$35 million to \$50 million and the federal per-project limit increases from \$7 million to \$10 million.
  - b. Section 111 of the River and Harbor Act of 1968, as amended (33 U.S.C. 426i). The federal per-project limit increases from \$5 million to \$10 million.
  - c. Section 204 of the Water Resources Development Act of 1992, as amended (33 U.S.C. 2326). The annual program limit increases from \$30 million to \$50 million and the federal per-project limit increases from \$5 million to \$10 million.
  - d. Section 205 of the Flood Control Act of 1948, as amended (33 U.S.C. 701s). The federal per-project limit increases from \$7 million to \$10 million.
  - e. Section 1135 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 2309a). The federal per-project limit increases from \$5 million to \$10 million.
  - f. Section 206 of the Water Resources Development Act of 1996, as amended (33 U.S.C. 2330). The federal per-project limit increases from \$5 million to \$10 million.

SUBJECT: Implementation Guidance for Section 1030 of the Water Resources Reform and Development Act (WRRDA) of 2014, Continuing Authorities

g. Section 14 of the Flood Control Act of 1946, as amended (33 U.S.C. 701r). The annual program limit increases from \$15 million to \$20 million and the federal per-project limit increases from \$1.5 million to \$5 million.

3. Section 1030(f)(1) of WRRDA 2014 raises the amount of the non-federal contribution that may be provided through in-kind contributions for Section 1135 projects from 80 percent to 100 percent.

4. The CAP Feasibility Cost Sharing Agreement and the Project Partnership Agreement (PPA) models that address these authorities have been updated. Whether an existing agreement needs to be amended as a result of Section 1030 should be determined by the following:

a. Existing agreements do not need to be amended solely to reflect the increased annual program limits.

b. Existing PPAs for Section 14, Section 107, Section 111, Section 204, Section 205, Section 206, and Section 1135 projects, whose initial federal construction contract was awarded on or after 10 June 2014, should be amended to reflect the applicable increased federal per-project limit. Review and approval of an amendment for this purpose is delegated to the MSC Commander and may not be further delegated. The District Commander is authorized to execute the amendment after its approval.

c. Executed PPAs for Section 1135 projects whose initial federal construction contract was awarded on or after 10 June 2014 should be amended to reflect the increased amount of in-kind contributions allowed. Review and approval of an amendment for this purpose is delegated to the MSC Commander and may not be further delegated. The District Commander is authorized to execute the amendment after its approval.

5. Section 1030(d) of WRRDA 2014 amends Section 2037 of WRDA 2007, which amended Section 204 of WRDA 1992, 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, the cost sharing for the beneficial use of dredged material is 75 percent federal and 25 percent non-Federal. Those projects include Hamilton Airfield Wetlands Ecosystem Restoration Expansion, California, authorized by Section 3018 of WRDA 2007; Poplar Island Expansion, Maryland, authorized by Section 3087 of WRDA 2007; and, Louisiana Coastal Area Beneficial Use of Dredged Material, Louisiana, authorized by Section 7006(d) of WRDA 2007.

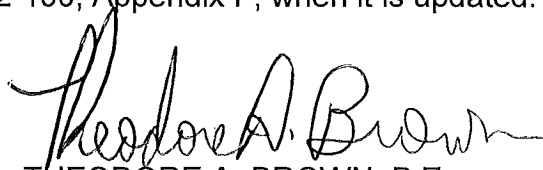


SUBJECT: Implementation Guidance for Section 1030 of the Water Resources Reform and Development Act (WRRDA) of 2014, Continuing Authorities

6. Sections 1030(a) (2) and (3) of WRRDA 2014 require that the Secretary publish in the Federal Register the criteria used for prioritizing the annual funding for CAP projects and on an annual basis the status of each CAP project. The information on status of CAP projects will include the name and a short description of each active CAP project, the cost estimate to complete each active CAP project, and the funding available in that fiscal year for each CAP authority. This information is also to be provided to the Senate Committee on Environment and Public Works and the House Committee on Transportation and Infrastructure. CECW-IP is responsible for these activities.

7. Section 1030(h) of WRRDA 2014 amends Section 206 of the Flood Control Act of 1970 to increase the program limit for the FPMS Program from \$15 million to \$50 million. The existing guidance on FPMS in ER 1105-2-100, Appendix G, should continue to be followed.

8. This will be incorporated into ER 1105-2-100, Appendix F, when it is updated.



THEODORE A. BROWN, P.E.  
Chief, Planning and Policy  
Directorate of Civil Works

Encl

**DISTRIBUTION:**

Division Commanders:

Great Lakes and Ohio River Division (CELRD)

Mississippi Valley Division (CEMVD) (Former Lower Mississippi Valley Division)

North Atlantic Division (CENAD)

Northwestern Division (CENWD)

Pacific Ocean Division (CEPOD)

South Atlantic Division (CESAD)

South Pacific Division (CESPD)

Southwestern Division (CESWD)

SUBJECT: Implementation Guidance for Section 1030 of the Water Resources Reform and Development Act (WRRDA) of 2014, Continuing Authorities

**SEC. 1030. CONTINUING AUTHORITY.**

(a) CONTINUING AUTHORITY PROGRAMS.—

(1) DEFINITION OF CONTINUING AUTHORITY PROGRAM PROJECT.—In this subsection, the term “continuing authority program” means 1 of the following authorities:

(A) Section 205 of the Flood Control Act of 1948 (33 U.S.C. 701s).

(B) Section 111 of the River and Harbor Act of 1968 (33 U.S.C. 426i).

(C) Section 206 of the Water Resources Development Act of 1996 (33 U.S.C. 2330).

(D) Section 1135 of the Water Resources Development Act of 1986 (33 U.S.C. 2309a).

(E) Section 107 of the River and Harbor Act of 1960 (33 U.S.C. 577).

(F) Section 3 of the Act of August 13, 1946 (33 U.S.C. 426g).

(G) Section 14 of the Flood Control Act of 1946 (33 U.S.C. 701r).

(H) Section 103 of the River and Harbor Act of 1962 (Public Law 87–874; 76 Stat. 1178).

(I) Section 204(e) of the Water Resources Development Act of 1992 (33 U.S.C. 2326(e)).

(J) Section 208 of the Flood Control Act of 1958 (33 U.S.C. 701b–8a).

(K) Section 104(a) of the River and Harbor Act of 1958 (33 U.S.C. 610(a)).

(2) PRIORITIZATION.—Not later than 1 year after the date of enactment of this Act, the Secretary shall publish in the Federal Register and on a publicly available website, the criteria the Secretary uses for prioritizing annual funding for continuing authority program projects.

(3) ANNUAL REPORT.—Not later than 1 year after the date of enactment of this Act and each year thereafter, the Secretary shall publish in the Federal Register and on a publicly available website, a report on the status of each continuing authority program, which, at a minimum, shall include—

(A) the name and a short description of each active continuing authority program project;

(B) the cost estimate to complete each active project;

and

SUBJECT: Implementation Guidance for Section 1030 of the Water Resources Reform and Development Act (WRRDA) of 2014, Continuing Authorities

(C) the funding available in that fiscal year for each continuing authority program.

(4) CONGRESSIONAL NOTIFICATION.—On publication in the Federal Register under paragraphs (2) and (3), the Secretary shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a copy of all information published under those paragraphs.

(b) SMALL RIVER AND HARBOR IMPROVEMENT PROJECTS.—Section 107 of the River and Harbor Act of 1960 (33 U.S.C. 577) is amended—

(1) in subsection (a), by striking “\$35,000,000” and inserting “\$50,000,000”; and

(2) in subsection (b), by striking “\$7,000,000” and inserting “\$10,000,000”.

H. R. 3080—40

(c) SHORE DAMAGE PREVENTION OR MITIGATION.—Section 111(c) of the River and Harbor Act of 1968 (33 U.S.C. 426i(c)) is amended by striking “\$5,000,000” and inserting “\$10,000,000”.

(d) REGIONAL SEDIMENT MANAGEMENT.—

(1) IN GENERAL.—Section 204 of the Water Resources Development Act of 1992 (33 U.S.C. 2326) is amended—

(A) in subsection (c)(1)(C), by striking “\$5,000,000” and inserting “\$10,000,000”; and

(B) in subsection (g), by striking “\$30,000,000” and inserting “\$50,000,000”.

(2) APPLICABILITY.—Section 2037 of the Water Resources Development Act of 2007 (121 Stat. 1094) is amended by adding at the end the following:

“(c) APPLICABILITY.—The amendment made by subsection (a) shall not apply to any project authorized under this Act if a report of the Chief of Engineers for the project was completed prior to the date of enactment of this Act.”.

(e) SMALL FLOOD CONTROL PROJECTS.—Section 205 of the Flood Control Act of 1948 (33 U.S.C. 701s) is amended in the third sentence by striking “\$7,000,000” and inserting “\$10,000,000”.

(f) PROJECT MODIFICATIONS FOR IMPROVEMENT OF ENVIRONMENT.—Section 1135(d) of the Water Resources Development Act of 1986 (33 U.S.C. 2309a(d)) is amended—

(1) in the second sentence, by striking “Not more than 80 percent of the non-Federal share may be” and inserting “The non-Federal share may be provided”; and

SUBJECT: Implementation Guidance for Section 1030 of the Water Resources Reform and Development Act (WRRDA) of 2014, Continuing Authorities

(2) in the third sentence, by striking “\$5,000,000” and inserting “\$10,000,000”.

(g) AQUATIC ECOSYSTEM RESTORATION.—Section 206(d) of the Water Resources Development Act of 1996 (33 U.S.C. 2330(d)) is amended by striking “\$5,000,000” and inserting “\$10,000,000”.

(h) FLOODPLAIN MANAGEMENT SERVICES.—Section 206(d) of the Flood Control Act of 1960 (33 U.S.C. 709a(d)) is amended by striking “\$15,000,000” and inserting “\$50,000,000”.

(i) EMERGENCY STREAMBANK AND SHORELINE PROTECTION.—Section 14 of the Flood Control Act of 1946 (33 U.S.C. 701r) is amended—

(1) by striking “\$15,000,000” and inserting “\$20,000,000”;

and

(2) by striking “\$1,500,000” and inserting “\$5,000,000”.

**Appendix B. Environmental**

**ANNEX A**  
**Draft Findings of No Significant Impacts (FONSI)**



**DEPARTMENT OF THE ARMY**

7400 LEAKE AVENUE  
NEW ORLEANS, LOUISIANA 70118

Regional Planning and  
Environment Division South  
Environmental Planning Branch

**DRAFT FINDING OF NO SIGNIFICANT IMPACT  
(FONSI)**

**DRAFT INTEGRATED DESIGN AND IMPLEMENTATION REPORT  
AND  
ENVIRONMENTAL ASSESSMENT #533  
LOUISIANA COASTAL AREA  
BENEFICIAL USE OF DREDGED MATERIAL PROGRAM  
HOUMA NAVIGATION CANAL PROJECT  
TERREBONNE PARISH, LOUISIANA**

Description of the Proposed Action. The U.S. Army Corps of Engineers (USACE), Mississippi River Valley Regional Planning and Environmental Division South (RPEDS), has prepared this Draft Integrated Design and Implementation Report (DIR) and Environmental Assessment #533 (EA #533) for the Corps of Engineers, New Orleans District (CEMVN) to evaluate the potential impacts associated with the placement and beneficial use of dredged material removed during the routine maintenance dredging of the federally maintained Houma Navigation Canal (HNC) between HNC Channel Mile 12 and HNC Channel Mile 0. The material would be used to construct platforms suitable for salt marsh creation and development. The approximate 37 mile long HNC originates in Houma, Louisiana, descends south and enters the Gulf of Mexico between East Island and Timbalier Island, in an area commonly referred to as Cat Island Pass.

The Proposed Action is an individual Beneficial Use of Dredged Material Program (BUDMAT) project to be implemented pursuant to Title VII of the Water Resources Development Act of 2007 (WRDA 2007) which authorized an ecosystem restoration Program for the Louisiana Coastal Area (LCA) substantially in accordance the January 31, 2005 Report of the Chief of Engineers. Section 7006(d) of WRDA 2007 specifically authorizes the LCA BUDMAT Program for the beneficial use of material dredged from federally maintained waterways in the coastal Louisiana ecosystem. The LCA BUDMAT Program, January 2010, Final Programmatic Study Report and Programmatic Environmental Impact Statement (2010 LCA BUDMAT Report and PEIS), a component of the broader-scale 2004 LCA Ecosystem Restoration Study Report and Programmatic Environmental Impact Statement (2004 LCA Study and PEIS), was approved by the Director of Civil Works on 12 March 2010, and the Assistant Secretary of the Army, Civil

Works, signed a Record of Decision dated 13 August 2010. Draft EA #533 tiers off of the 2004 LCA Study and PEIS and the 2010 LCA BUDMAT Report and PEIS.

Factors Considered in Determination. CEMVN has assessed the impacts of the No Action and the Proposed Action alternatives on important resources, including but not limited to, navigation, wetlands, wildlife, aquatic resources/fisheries, essential fish habitat, threatened and endangered species, water and sediment quality, air quality, cultural resources, recreational resources, and visual resources (aesthetics). No significant adverse impacts were identified for any of these important resources. No impacts have been identified that would require compensatory mitigation and all practical means of avoiding adverse environmental effects have been adopted. The Proposed Action should result in an overall net benefit to wetland resources in the Project Area, through the restoration and creation of emergent wetland habitat which is of a higher value to fish and wildlife resources than the existing open water.

In correspondence dated ###/###/#### (coordination ongoing), the Louisiana Department of Natural Resources (LDNR) \_\_\_\_\_ that the Proposed Action is/is not consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program. The Louisiana Department of Environmental Quality (LDEQ) \_\_\_\_\_ a State Water Quality Certification on ###/###/#### (coordination ongoing) and the Section 404(b)(1) will be signed at the end of the public review and comment period. In a letter dated 30 August 2017, the Louisiana State Historic Preservation Officer (SHPO) stated that no known historic properties would be affected by undertaking the Proposed Action. Through correspondence dated ###/###/#### (coordination ongoing), the USFWS \_\_\_\_\_ that the Proposed Action is \_\_\_\_\_ to adversely affect any threatened or endangered species in the Project Area. CEMVN has concurred with, or resolved, all draft Fish and Wildlife Coordination Act recommendations contained in a letter from the U.S. Fish and Wildlife Service (USFWS) dated 21 September 2017. CEMVN will continue to coordinate with the National Marine Fisheries Service (NMFS) regarding essential fish habitat in the project area.

Environmental Design Commitments. The following commitments, as recommended by the USFWS, are an integral part of the Proposed Action:

- 1) Any design changes that may cause potential impacts to the human environment would be evaluated to determine whether additional NEPA analysis would be required.
- 2) If any unrecorded cultural resources are determined to exist within the Project Area boundaries, a CEMVN-PDR-RN archeologist would be notified and final coordination with the SHPO and THPO would occur. [CEMVN-PDR-RN/SHPO Standard Operating Procedure]
- 3) If the Proposed Action is changed significantly or is not implemented within one year, CEMVN will reinstate coordination with the USFWS to ensure that the



Proposed Action would not adversely affect any Federally-listed threatened or endangered species, or their habitat.

- 4) All on-site personnel are responsible for observing water-related activities for the presence of manatee(s). All work, equipment, and vessel operation should cease if a manatee is spotted within a 50-foot radius (buffer zone) of an active work area. Once the manatee has left the buffer zone of its own accord (manatees must not be herded or harassed into leaving), or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in-water work can resume under careful observation for manatee(s).
- 5) Avoid adverse impacts to water bird colonies through careful design of Project features and timing of construction. The USFWS recommends that a qualified biologist inspect proposed work sites for 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.
- 6) The impacts to Essential Fishery Habitat should be discussed with the National Marine Fisheries Service to determine if 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.
- 7) Access corridors across existing wetlands should be avoided if possible and 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 and provided to the natural resource agencies for review.
- 8) To ensure that dredged material is placed to each particular habitat's specified elevations, USACE should 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.
- 9) Containment dikes should be breached or degraded to the settled elevations of the disposal areas after consolidation of the dredged sediments and vegetative colonization of the exposed soil surface, or a maximum of 2 years after construction.
- 10) The USFWS 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 un-vegetated open water areas for marsh creation.

- 11) Further detailed planning of Project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, Water Control Plans, or other similar documents) and any proposed change in Project features or plans should be coordinated in advance with the USFWS, NMFS, LDWF, EPA, and LDNR and the agencies should be provided with an opportunity to review and submit recommendations on the work addressed in those reports.
- 12) USACE regulations generally require monitoring and adaptive management plans for ecosystem restoration projects. USACE should coordinate with the USFWS during the development of any such plans.
- 13) Endangered Species Act (ESA) consultation should be reinitiated if the proposed Project features change significantly or are not implemented within one year of the last ESA consultation with the USFWS, to ensure that the Proposed Action does not adversely affect any federally listed threatened or endangered species or their habitat.

Public Involvement. The Proposed Action has been coordinated with appropriate federal, state, and local agencies and businesses, organizations, and individuals through the distribution of Draft EA #533 on ###/###/#### for public review and comment. Comments received during this time will be included in the final EA and made a part of this FONSI.

Conclusion. CEMVN has assessed the potential environmental impacts of the Proposed Action and has determined that the action, if implemented, would have beneficial environmental effects through the creation of wetland habitats as detailed in draft EA #533. Based on draft EA #533, a review of agency and other comments received following the publication and distribution of draft EA #533, and the implementation of the environmental design commitments listed above, the District Engineer has determined that the Proposed Action would have no significant impact on the human environment. Therefore, an Environmental Impact Statement will not be prepared.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Michael N. Clancy  
Colonel, U.S. Army  
District Commander

## **ANNEX B**

### **Louisiana Coastal Area Beneficial Use of Dredge Material Programmatic EIS, 2010**

The Louisiana Coastal Area Beneficial Use of Dredge Material Programmatic EIS can be found on the Nola Environmental website at <http://www.nolaenvironmental.gov/>

## ANNEX D

### Louisiana Coastal Area, Louisiana – Ecosystem Restoration PEIS, 2004

#### RECORD OF DECISION

##### LOUISIANA COASTAL AREA LOUISIANA - ECOSYSTEM RESTORATION

I have reviewed the correspondence and pertinent documents for the final programmatic Environmental Impact Statement (EIS) for the Louisiana Coastal Area (LCA) Ecosystem Restoration Program, November 2004. Based on this review, and after consideration of the views of interested agencies, I find the recommended Program fully addresses the planning objectives. The Program is in accordance with environmental statutes and is in the public interest. Implementing this program would begin to reduce the wetland losses in coastal Louisiana. In accordance with the Council on Environmental Quality regulations, further National Environmental Policy Act documents would be tiered to this programmatic EIS prior to construction of any LCA Ecosystem Restoration Program feature.

A series of alternative plans were formulated as part of the LCA Program planning effort. Three plans were considered in detail: Alternative Plan B focused on river reintroductions of sediment and nutrients from the Mississippi River into the coastal wetlands, while Alternative Plan D emphasized restoring geomorphic structures to promote coastal wetland protection and restoration. The third alternative, the LCA Ecosystem Restoration Program, included both river diversions and restoration of geomorphic structures. The report of the Chief of Engineers recommends the LCA Ecosystem Restoration Plan as the near term plan. In the context of this programmatic EIS, this is the environmentally preferable alternative. My recommendation to Congress reflects this recommendation with a more open opportunity for implementation of the recommended features, without changing the basic findings of the programmatic EIS or conclusions of the Chief of Engineers. My recommendation for Congressional authorization of the LCA Program includes the following:

- Programmatic authorization for restoration features for which construction would begin within 5 to 10 years, with implementation subject to approval of feasibility-level of detail decision documents by the Secretary of the Army.
- Programmatic authorization of a Science and Technology (S&T) Program for data acquisition and analysis, monitoring, model development and application, and research.
- Programmatic authorization to establish a Demonstration Program to determine the effectiveness of engineering advances developed by the S&T Program.
- Programmatic authorization for the beneficial use of dredged material.

- Investigations of modifications of existing structures.
- Investigations and preparation of necessary feasibility-level of detail decision documents for additional near-term critical restoration features.
- Investigations for assessing potentially promising large-scale and long-term restoration concepts.

The LCA Program would facilitate the implementation of critical restoration features and essential science and technology demonstration projects, increase the beneficial use of dredged material, and determine the need for modification of selected existing projects to support coastal restoration objectives. The S&T Program would provide for acquisition of data and development of analytic tools to further resolve scientific uncertainties and support program implementation. The remaining recommended plan components would provide the basis for continued restoration within an established framework.

The benefits provided by the LCA Program include: the sustainable reintroduction of riverine sediment and nutrient resources; rebuilding wetlands in areas at high risk for future loss; the preservation and maintenance of critical coastal geomorphic structure; the preservation of critical areas within the coastal ecosystem; and the opportunity to begin to identify and evaluate potential long-term solutions. The proposed beneficial use program would allow the Corps of Engineers to take greater advantage of existing maintenance dredging material to achieve restoration objectives. There is a reasonable potential to beneficially use an additional 30 million cubic yards of dredged material annually. The LCA Program presents significant capacity for the prevention of future wetland losses with a smaller component of wetland building capacity; however, overall levels of environmental outputs will remain significantly reduced compared to historical conditions. Implementation of the near term plan could offset an estimated 175,000 of the 328,000 acres projected to be lost within coastal Louisiana under the no action alternative.

Comment from individuals, organizations, and government agencies were received during the 30-day comment period (November 5, 2004 to December 6, 2004) following publication in the Federal Register of the notice of availability of the final EIS. The majority of the comments received were generally directed at registering support for the LCA Program while pointing out that this near-term action is only a first step and should be followed by a comprehensive, coastwide, large-scale and long-term restoration of coastal Louisiana. All appropriate means to avoid, minimize, reduce and/or rectify adverse environmental effects will be incorporated into subsequent feasibility level of detail decision documents. Compensatory mitigation for unavoidable environmental impacts is not anticipated, as the LCA Program will create, restore, and

protect significantly more coastal wetland ecosystems than the relatively small unavoidable adverse impacts associated with the construction of restoration features.

18 November 2005  
Date

John Paul Woodley, Jr.  
John Paul Woodley, Jr.  
Assistant Secretary of the Army  
(Civil Works)

# ANNEX C

## WVA Model Results and Summary of Assumptions

### Wetland Value Assessment Project Information Sheet

August 14, 2017

**Prepared for:**  
U.S. Army Corps of Engineers

**Prepared by**  
U.S. Fish and Wildlife Service  
Aline Morrow  
aline\_morrow@fws.gov

**Project Name:** LCA BUDMAT Houma Navigation Canal (HNC)

**Addendum:** Addition of approximately 47.3 acres of marsh nourishment.

**Project Type(s):** Marsh Creation & Nourishment

**Project Area:** The HNC Marsh Creation **SITES 1 & 1A** and Marsh Nourishment are located south of Cocodrie in Terrebonne Parish, Louisiana (Figure 1).

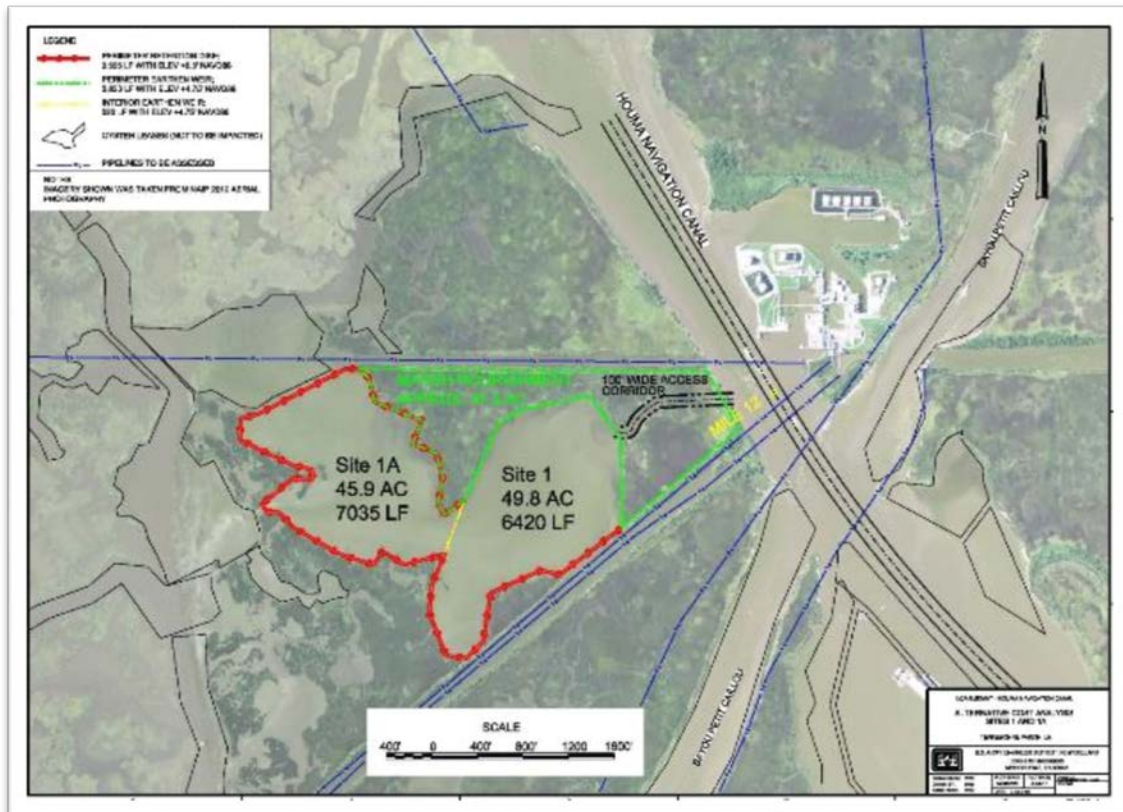


Figure 1. Project Area.

**Problem:**

Sites in the southern reach of the HNC suffer marsh breakup from natural subsidence and shoreline erosion from tidal dynamics. An analysis of erosion rates in an extended 9,062 acre area was performed for the period of 1956 to 2008. Approximately 1579 acres of land, totaling 17 % of emergent land, have been lost from the area over the 52 year period. Estimates predict the loss of an additional 2016 acres of land area by 2050 if current rates of erosion continue. The LCA BUDMAT HNC Marsh Creation project will utilize dredged material beneficially to create/restore lost wetlands, enhance existing wetlands, and provide habitat for a variety of fish and wildlife species.

**Project Goal:**

The project features the creation of emergent tidal marsh in several alternate locations using dredge material from HNC maintenance. Cooperating agencies will determine the elevation for dredge fill needed to ensure a target elevation conducive to marsh creation. Dredge materials will be contained by dikes. The current proposal calls for 9595 linear feet of perimeter retention dike at an elevation of +6.5' NAVD88 to be constructed along the southern section of site 1 and completely around 1A. 2820 linear feet of earthen weir at an elevation of +4.75 NAVD88 is proposed around the northern section of site 1 and the nourishment site to allow for dewatering into and nourishment of the marsh to the north. An interior earthen weir (520 linear feet at elevation +4.75 NAVD88) is proposed between sites 1 and 1A to facilitate dewatering of site 1A. Gaps will be constructed in the containment dikes after dewatering and settlement to allow fish and other aquatic organisms access to the created marsh.

**Existing Wetlands:**

The project area and surrounding marsh has consistently been classified as saline marsh (Chabreck and Linscombe 1997, Sasser et al. 2008, Sasser et al. 2014). Marsh creation sites 1 and 1A are completely open water. Water depths were provided by Ducks Unlimited using bathymetry. Site visits confirmed water depths of the proposed marsh creation cells. Marsh nourishment site is emergent marsh with few small pools and trenasses. Aquatic vegetation is not known to exist in the waters of these proposed sites which was also confirmed during the site visit as no submerged aquatic vegetation (SAV) was observed in any of the marsh creation cells. These data were utilized in conducting a Wetland Value Assessment (WVA) using the saline marsh model.

**Habitat Assessment Method:**

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

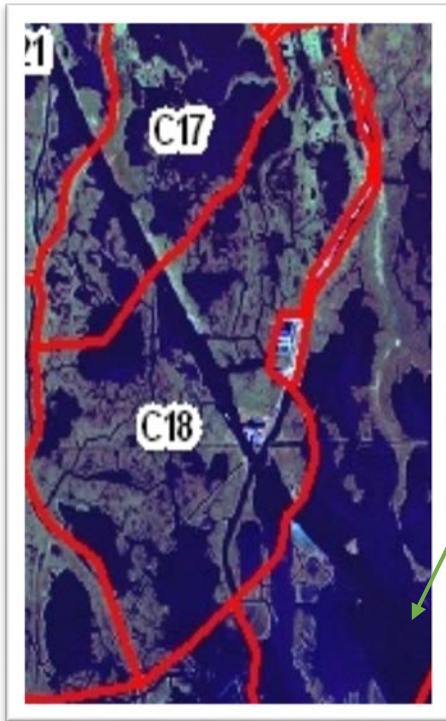
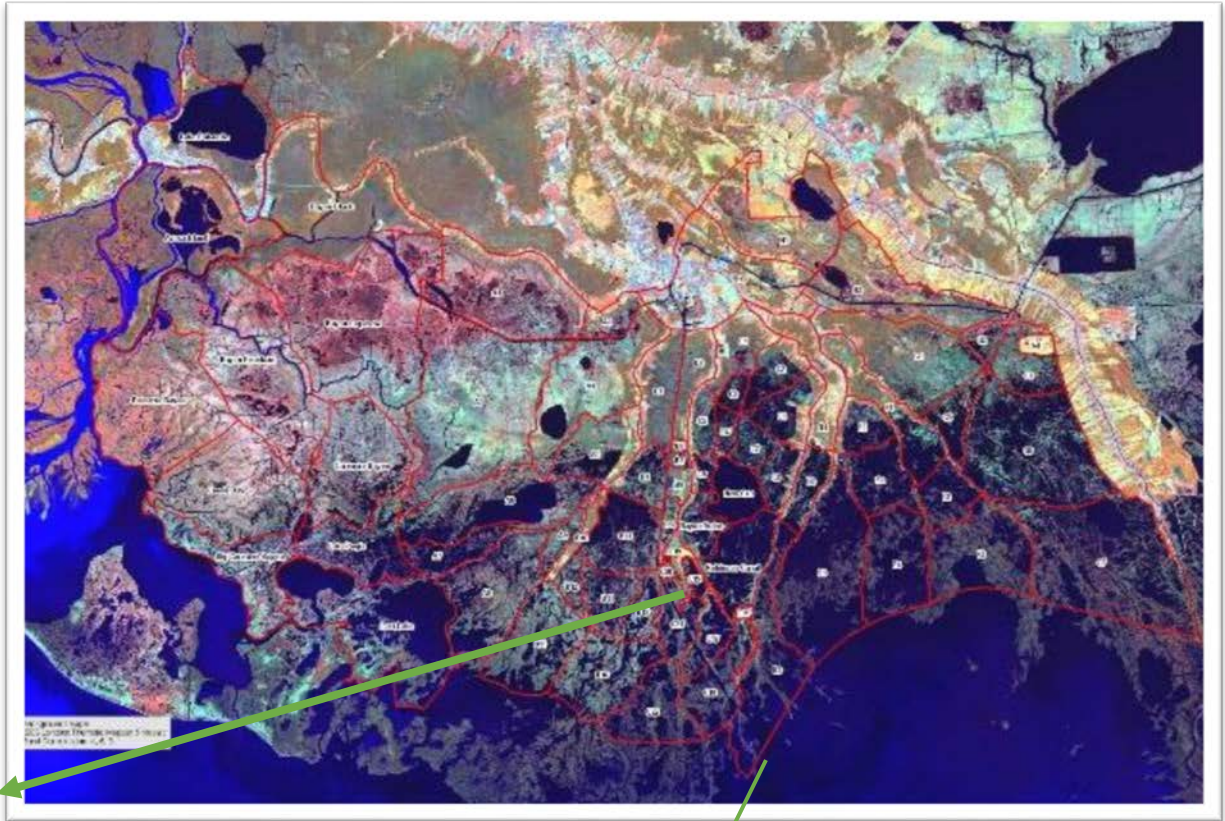
The WVA model for marsh habitat attempts to assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. While the model does not specifically assess other wetland functions and values such as storm-surge protection, floodwater storage, water quality improvement, nutrient



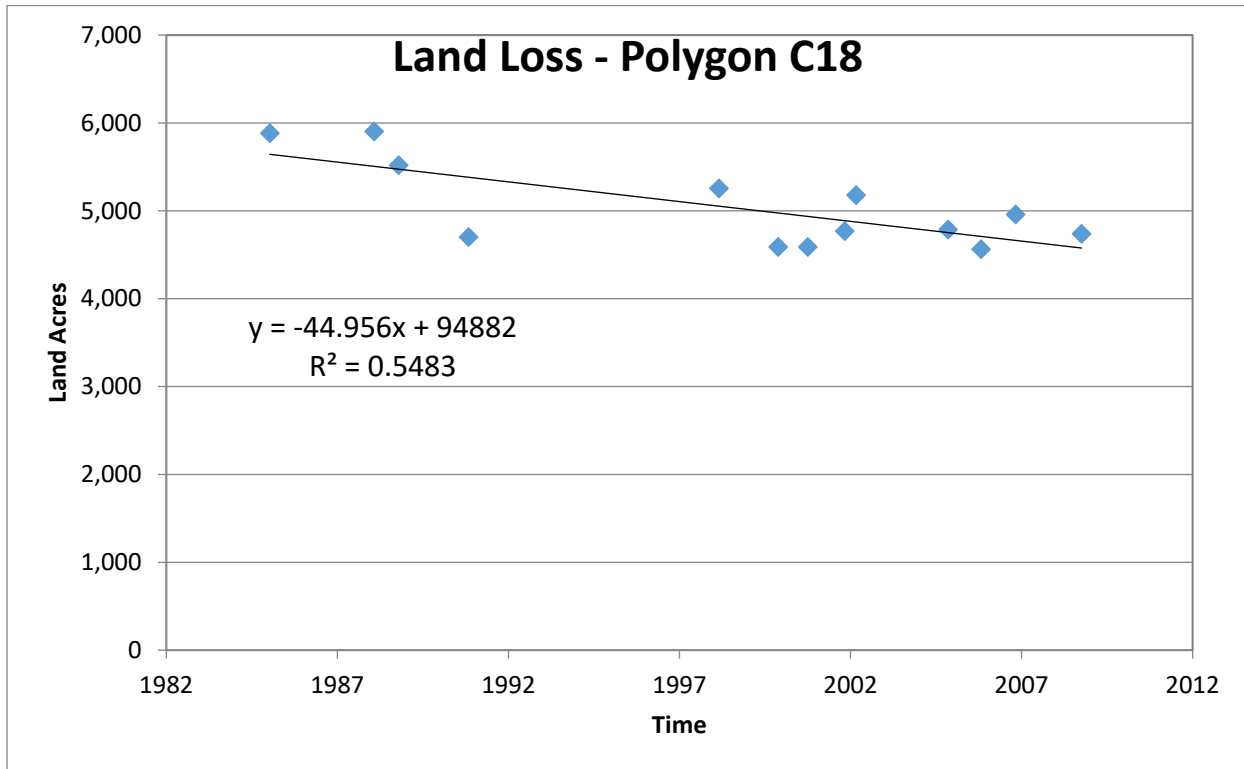
import/export, and aesthetics, it can be generally assumed that these functions and values are positively correlated with fish and wildlife habitat quality.

The procedure for evaluating project benefits on fish and wildlife habitats, the WVA model, uses a series of variables that are intended to capture the most important conditions and functional values of a particular habitat. Values for these variables are derived for existing conditions and are estimated for conditions projected into the future if no restoration efforts are applied (i.e., future-without-project), and for conditions projected into the future if the proposed restoration project is implemented (i.e., future-with-project), providing an index of quality or habitat suitability of the habitat for the given time period. The habitat suitability index (HSI) is combined with the acres of habitat to get a number that is referred to as "habitat units". Expected project benefits are estimated as the difference in habitat units between the future-with-project (FWP) and future-without project (FWOP). To allow comparison of WVA benefits to costs for overall project evaluation, total benefits are averaged over a 50-year period, with the result reported as Average Annual Habitat Units (AAHUs).

# Land Loss Data



**Figure 2. USGS Extended Boundary used to estimate land loss for project area (C18).**



**Figure 3. Land loss rate determined by FWS**

The Fish and Wildlife Service calculated land loss rate using USGS Land/Water data (Figure 2), but with a different regression (land acres: time). That rate was used to calculate land/water values over the life of the project. (Figure 3)

**Extended Boundary Percent Loss Rate = -0.79%**

FWOP project site loss rate: -1.42 ac/yr

FWP project site loss rate: -0.71 ac/yr (resumes to background loss rate at TY43).

Land loss rates were adjusted by the projected effects of three Relative Sea Level Rise (RSLR) scenarios. The **medium RSLR** scenario was chosen for these analyses.

**Variable V1: Percent of wetland area covered by emergent vegetation**

**FWOP**– Marsh creation sites 1 & 1A are currently all open water. Under current subsidence rates, sites 1 & 1A will continue to be open water through all years for FWOP.

Site 1			
		acres	%
TY0-TY50	Marsh	0	0
	Water	49.8	100

Site 1A			
		acres	%
TY0-TY50	Marsh	0	0
	Water	46	100

Marsh nourishment site 1 is currently 90% emergent marsh. Under current subsidence rates, at TY50 the site will be reduced to 31% emergent marsh.

<b>Marsh Nourishment</b>			
		acres	%
<b>TY0</b>	Marsh	42.4	89.6
	Water	4.93	10.4
<b>TY1</b>	Marsh	41.9	88.6
	Water	5.40	11.4
<b>TY3</b>	Marsh	40.9	86.6
	Water	6.36	13.4
<b>TY5</b>	Marsh	40.0	84.5
	Water	7.32	15.5
<b>TY10</b>	Marsh	37.5	79.3
	Water	9.8	20.7
<b>TY20</b>	Marsh	32.3	68.3
	Water	15.01	31.7
<b>TY50</b>	Marsh	14.6	30.9
	Water	32.7	69.0

**FWP**– It is assumed that all acres within sites 1 & 1A would be marsh creation. Created marsh platform has limited marsh function until settlement and breaching of retention dikes. The standard civil works assumption was applied that settlement will occur by TY5. Land loss is applied at the time of marsh creation. The rate is 50% of the background loss rate until TY43 when at least 10 inches of organic accretion is projected to cover the marsh and background loss rate is resumed. Based on standard civil works project assumptions; 10 % marsh credit was applied at TY1, 25% credit at TY 3, and 100% credit at TY5. Created marsh platform is assumed to be converted to marsh by TY5.

<b>Site 1</b>		
	Marsh acres	%
<b>TY0</b>	0.00	0.00
<b>TY1</b>	4.96	10.00
<b>TY3</b>	12.3	24.7
<b>TY5</b>	48.79	98
<b>TY10</b>	48.5	97.6
<b>TY20</b>	43.67	87.7
<b>TY50</b>	34.15	68.6

<b>Site 1A</b>		
	Marsh acres	%
<b>TY0</b>	0.00	0.00
<b>TY1</b>	4.54	10.7
<b>TY3</b>	11.26	25.3
<b>TY5</b>	44.67	97.9
<b>TY10</b>	44.49	97.5
<b>TY20</b>	39.99	87.5
<b>TY50</b>	31.27	68.3

The marsh nourishment area, due to the existing marsh vegetation, is assumed to vegetate adequately without plantings and be able to fully function as marsh by TY3. As a conservative estimate, settlement was also assumed to occur at TY3. A 50% marsh credit was applied at TY1 and 100% marsh credit at TY3. As with the marsh creation sites, the marsh nourishment site is also credited with a 50% reduction in the FWOP loss rate (until TY41).

Marsh Nourishment		
	Marsh acres	%
<b>TY0</b>	42.4	89.6
<b>TY1</b>	42.4	89.7
<b>TY3</b>	42.3	89.4
<b>TY5</b>	45.22	95.6
<b>TY10</b>	42.6	90.1
<b>TY20</b>	37.1	78.5
<b>TY50</b>	18.3	38.7

**Variable V2: Percent of open water covered by aquatic vegetation**

**Existing Conditions** – Sites 1 and 1A are largely deep open water (water depth > 1.5 ft) with no SAV known to exist. Water depths and SAV occurrence in project area were confirmed by USFWS personnel on site visit. Existing SAV conditions are expected to continue. Tidal fluctuations, currents, wave action, salinity, and overall system energy may hinder SAV occurrence. Therefore, SAV coverage is estimated and proposed at 0% for all FWOP and FWP target years for both marsh creation sites.

**FWOP and FWP**–(Sites 1 and 1A) TY0-TY50: 0%

**Variable V3: Marsh edge and interspersions**

**Existing Conditions** – The proposed marsh creation cells (Sites 1 and 1A) are entirely open water. Under the current erosion and subsidence regime, the marsh creation sites will continue to be 100% open water. Therefore, 100% Class 5 is proposed for all years for FWOP for both sites.

The proposed marsh nourishment site is primarily emergent marsh with few tidal ponds and trenasses. Under the current erosion and subsidence regime, the marsh nourishment sites will continue to convert to open water leading to changes in interspersions class at TY10 and TY50.

**FWOP**–(Sites 1 & 1A) TY0 – TY50: 100% Class 5

Marsh Nourishment			
	Class	%	Notes
<b>TY0</b>	1	100	Approx. 90% marsh
<b>TY1</b>	1	100	Approx. 90% marsh
<b>TY3</b>	1	100	Approx. 90% marsh
<b>TY5</b>	1	100	Approx. 85% marsh
<b>TY10</b>	2	100	Approx. 80% marsh
<b>TY20</b>	2	100	Approx. 70% marsh
<b>TY50</b>	3	100	Approx. 30% marsh

**FWP**–

Site 1			
	Class	%	Notes
<b>TY0</b>	5	100	baseline
<b>TY1</b>	5	100	standard assumptions
<b>TY3</b>	3	100	standard assumptions
<b>TY5</b>	1	50	standard assumptions
	3	50	standard assumptions
<b>TY10</b>	1	100	standard assumptions
<b>TY20</b>	1	100	approx. 88 % marsh
<b>TY50</b>	2	100	approx. 69 % marsh

Site 1A			
	Class	%	Notes
<b>TY0</b>	5	100	baseline
<b>TY1</b>	5	100	standard assumptions
<b>TY3</b>	3	100	standard assumptions
<b>TY5</b>	1	50	standard assumptions
	3	50	standard assumptions
<b>TY10</b>	1	100	standard assumptions
<b>TY20</b>	1	100	approx. 88 % marsh
<b>TY50</b>	2	100	approx. 68 % marsh

Marsh Nourishment			
	Class	%	Notes
<b>TY0</b>	1	100	baseline
<b>TY1</b>	5	100	Standard assumptions
<b>TY3</b>	1	100	Standard assumptions
<b>TY5</b>	1	100	Approx. 100% marsh
<b>TY10</b>	1	100	Approx. 90% marsh
<b>TY20</b>	2	100	Approx. 80% marsh
<b>TY50</b>	3	100	Approx. 40% marsh

**Variable V4: Percent of open water area ≤ 1.5 feet deep in relation to marsh surface**

**Existing Conditions**– Water depths in marsh creation cells 1 & 1A were measured by Ducks Unlimited using bathymetry in May 2015. Depths were confirmed on a 06 July 2017 site visit using a survey rod and corrected for the effect of wind and tide using the USACE gage at Cocodrie. All open water in the marsh nourishment cell were assumed to be shallow. USACE RSLR estimates predict a sea-level rise of approximately 1.3 feet over the next 50 years under the Intermediate RSLR scenario (LCWC 1999). It was assumed that RSLR will reduce the existing shallow open water for FWOP by 1/3 at TY50.

**FWOP**– Assuming a 1/3 reduction in shallow open water at TY50.

Site 1		
	Water ≤ 1.5ft (%)	Notes
<b>TY0</b>	12	
<b>TY1</b>	12	
<b>TY3</b>	12	

Site 1A		
	Water ≤ 1.5ft (%)	Notes
<b>TY0</b>	3	
<b>TY1</b>	3	
<b>TY3</b>	3	

<b>TY5</b>	12	
<b>TY10</b>	12	
<b>TY20</b>	12	
<b>TY50</b>	8	Reduced by 1/3

<b>TY5</b>	3	
<b>TY10</b>	3	
<b>TY20</b>	3	
<b>TY50</b>	2	Reduced by 1/3

<b>Marsh Nourishment</b>		
Water ≤ 1.5ft (%)		Notes
<b>TY0</b>	100	
<b>TY1</b>	100	
<b>TY3</b>	100	
<b>TY5</b>	100	
<b>TY10</b>	100	
<b>TY20</b>	100	
<b>TY50</b>	66	Reduced by 1/3

**FWP**– It is assumed that all open water is less than 1.5 ft deep at TY1 through TY20. By TY50, it is assumed that continued subsidence and sea level rise will result in the formation of some open water greater than 1.5 feet deep. Marsh that is lost is assumed to become open water ≤ 1.5 feet deep until TY50. At that point, it is assumed that 1/6 of the shallow open water would become deeper than 1.5 feet. In Site 1, 2.6 ac out of the 15.65 ac of open water would become greater than 1.5 ft deep. In Site 1A, 2.49 ac out of the 14.59 water acres in would become greater than 1.5 ft deep. In the marsh nourishment site, 4.83 ac out of the 29 acres of open water would become greater than 1.5 ft deep.

<b>Site 1</b>		
Water ≤ 1.5ft (%)		Notes
<b>TY0</b>	0	
<b>TY1</b>	100	
<b>TY3</b>	100	
<b>TY5</b>	100	
<b>TY10</b>	100	
<b>TY20</b>	100	
<b>TY50</b>	95	2.6 ac ≥ 1.5 ft deep

<b>Site 1A</b>		
Water ≤ 1.5ft (%)		Notes
<b>TY0</b>	1	
<b>TY1</b>	100	
<b>TY3</b>	100	
<b>TY5</b>	100	
<b>TY10</b>	100	
<b>TY20</b>	100	
<b>TY50</b>	95	2.5 ac ≥ 1.5 ft deep

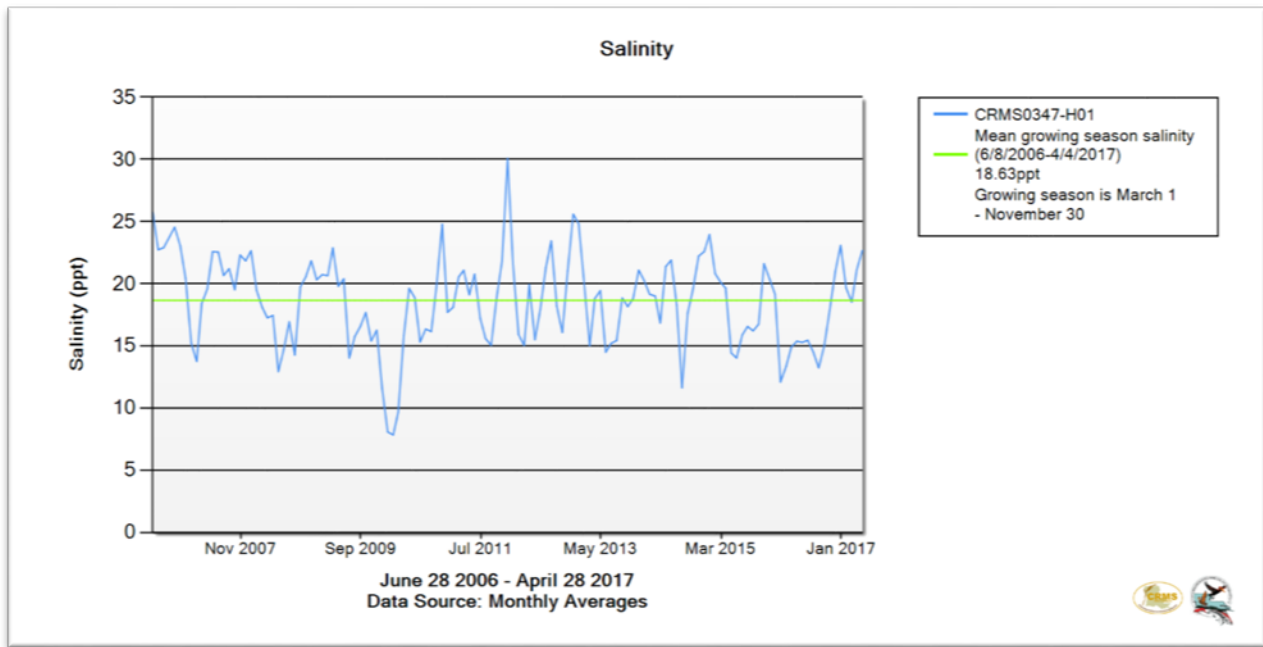
<b>Marsh Nourishment</b>		
Water ≤ 1.5ft (%)		Notes

<b>TY0</b>	100	
<b>TY1</b>	100	
<b>TY3</b>	100	
<b>TY5</b>	100	
<b>TY10</b>	100	
<b>TY20</b>	100	
<b>TY50</b>	90	4.83 ac $\geq$ 1.5 ft deep

**Variable V5: Salinity**

**Existing conditions** - Mean growing season salinity for CRMS station 0347 for the period June 2006 to April 2017 was 18.63 ppt (Figure 4). Salinity is not assumed to change FWOP or FWP.

**FWOP & FWP**– TY0 – TY50: 18.63 ppt



**Figure 4. Mean growing season salinity data from CRMS 0347.**



**Variable V6: Aquatic organism access**

**Existing conditions** – All sites are not impounded nor have any hydrological controls. Access to all parts of project site is assumed to be equal. Existing conditions are expected to continue for all years for FWOP.

**FWOP**–(Sites 1 & 1A, Marsh nourishment) TY0-TY50: 1.0

**FWP**–Post construction, retention dikes will block all aquatic organism access. We propose full access value beginning at TY5 when project area is 100% marsh and water. It is assumed that all aquatic organisms will have total and equal access to sites from TY5-TY50.

<b>Sites 1, 1A, Marsh Nourishment</b>		
	Access Value	Notes
<b>TY0</b>	1.00	standard assumptions
<b>TY1</b>	0.00	
<b>TY3</b>	0.00	
<b>TY5</b>	1.00	100% marsh & water/full aquatics access
<b>TY10</b>	1.00	standard assumptions
<b>TY20</b>	1.00	standard assumptions
<b>TY50</b>	1.00	standard assumptions

**Project Benefits**

**SITE 1-BENEFITS IN AAHUs DUE TO PROJECT**

<b>Project Life (Years)</b>	<b>10</b>	<b>20</b>	<b>50</b>
A. Emergent Marsh Habitat Net AAHUs	28.72	36.70	35.37
B. Open Water Habitat Net AAHUs	-30.51	-30.22	-27.08
<b>Net Benefits=(3.5xEMAAHUs+OWAAHUs)/4.5</b>	<b>15.56</b>	<b>21.83</b>	<b>21.50</b>

**SITE 1A-BENEFITS IN AAHUs DUE TO PROJECT**

<b>Project Life (Years)</b>	<b>10</b>	<b>20</b>	<b>50</b>
A. Emergent Marsh Habitat Net AAHUs	26.48	33.92	33.21
B. Open Water Habitat Net AAHUs	-27.79	-27.50	-24.61
<b>Net Benefits=(3.5xEMAAHUs+OWAAHUs)/4.5</b>	<b>14.42</b>	<b>20.27</b>	<b>20.37</b>

**MARSH NOURISHMENT SITE-BENEFITS IN AAHUs DUE TO PROJECT**

<b>Project Life (Years)</b>	<b>10</b>	<b>20</b>	<b>50</b>
A. Emergent Marsh Habitat Net AAHUs	-2.29	2.93	4.33
B. Open Water Habitat Net AAHUs	-3.76	-3.53	-3.08
<b>Net Benefits=(3.5xEMAAHUs+OWAAHUs)/4.5</b>	<b>-2.62</b>	<b>1.49</b>	<b>2.69</b>

Chabreck, R. and G. Linscombe. 1997. Vegetative type map of the Louisiana coastal marshes. Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA.

Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority [LCWC]. 1999. Coast 2050: Toward a Sustainable Coastal Louisiana, The Appendices. Appendix C – Region 1 Supplemental Information. Louisiana Department of Natural Resources. Baton Rouge, La.

Sasser, C.E., Visser, J.M., Mouton, Edmond, Linscombe, Jeb, and Hartley, S.B., 2008, Vegetation types in coastal Louisiana in 2007: U.S. Geological Survey Open-File Report 2008–1224, 1 sheet, scale 1:550,000.

Sasser, C.E., Visser, J.M., Mouton, Edmond, Linscombe, Jeb, and Hartley, S.B., 2014, Vegetation types in coastal Louisiana in 2013: U.S. Geological Survey Scientific Investigations Map 3290, 1 sheet, scale 1:550,000.

# Wetland Value Assessment Project Information Sheet

August 14, 2017

**Prepared for:**  
U.S. Army Corps of Engineers

**Prepared by**  
U.S. Fish and Wildlife Service  
Aline Morrow  
aline\_morrow@fws.gov

**Project Name:** LCA BUDMAT Houma Navigation Canal (HNC)

**Project Type(s):** Marsh Creation

**Project Area:** The HNC Marsh Creation **SITE 3** is located south of Cocodrie in Terrebonne



Parish, Louisiana (Figure 1).

## **Figure 1. Project Area.**

### **Problem:**

Sites in the southern reach of the HNC suffer marsh breakup from natural subsidence and shoreline erosion from tidal dynamics. An analysis of erosion rates in an extended 9,062 acre area was performed for the period of 1956 to 2008. Approximately 1579 acres of land, totaling 17 % of emergent land, have been lost from the area over the 52 year period. Estimates predict the loss of an additional 2016 acres of land area by 2050 if current rates of erosion continue. The LCA BUDMAT HNC Marsh Creation project will utilize dredged material beneficially to create/restore lost wetlands, enhance existing wetlands, and provide habitat for a variety of fish and wildlife species.

### **Project Goal:**

The project features the creation of emergent tidal marsh in several alternate locations using dredge material from HNC maintenance. Cooperating agencies will determine the elevation for dredge fill needed to ensure a target elevation conducive to marsh creation. Dredge materials will be contained by dikes. Gaps will be constructed in the containment dikes after dewatering to allow fish and other aquatic organisms access to the created marsh.

### **Existing Wetlands:**

The project area and surrounding marsh has consistently been classified as saline marsh (Chabreck and Linscombe 1997, Sasser et al. 2008, Sasser et al. 2014). Marsh creation site 3 is completely open water. Water depths were provided by Ducks Unlimited using bathymetry. Site visits confirmed water depths of the proposed marsh creation cells. Aquatic vegetation is not known to exist in the waters of these proposed sites which was also confirmed during the site visit as no submerged aquatic vegetation (SAV) was observed in any of the marsh creation cells. These data were utilized in conducting a Wetland Value Assessment (WVA) using the saline marsh model.

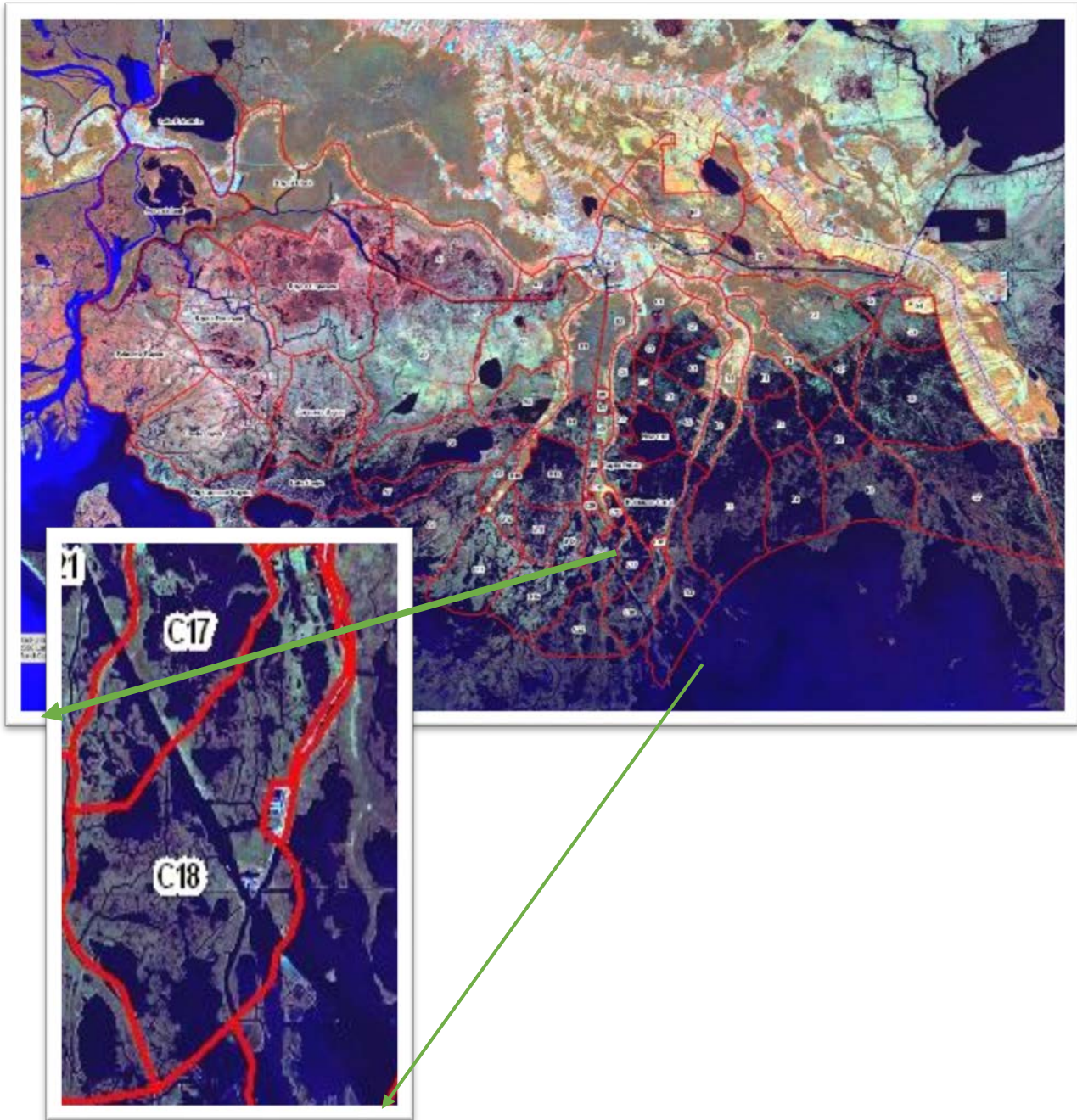
### **Habitat Assessment Method:**

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

The WVA model for marsh habitat attempts to assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. While the model does not specifically assess other wetland functions and values such as storm-surge protection, floodwater storage, water quality improvement, nutrient import/export, and aesthetics, it can be generally assumed that these functions and values are positively correlated with fish and wildlife habitat quality.

The procedure for evaluating project benefits on fish and wildlife habitats, the WVA model, uses a series of variables that are intended to capture the most important conditions and functional values of a particular habitat. Values for these variables are derived for existing conditions and are estimated for conditions projected into the future if no restoration efforts are applied (i.e., future-without-project), and for conditions projected into the future if the proposed restoration

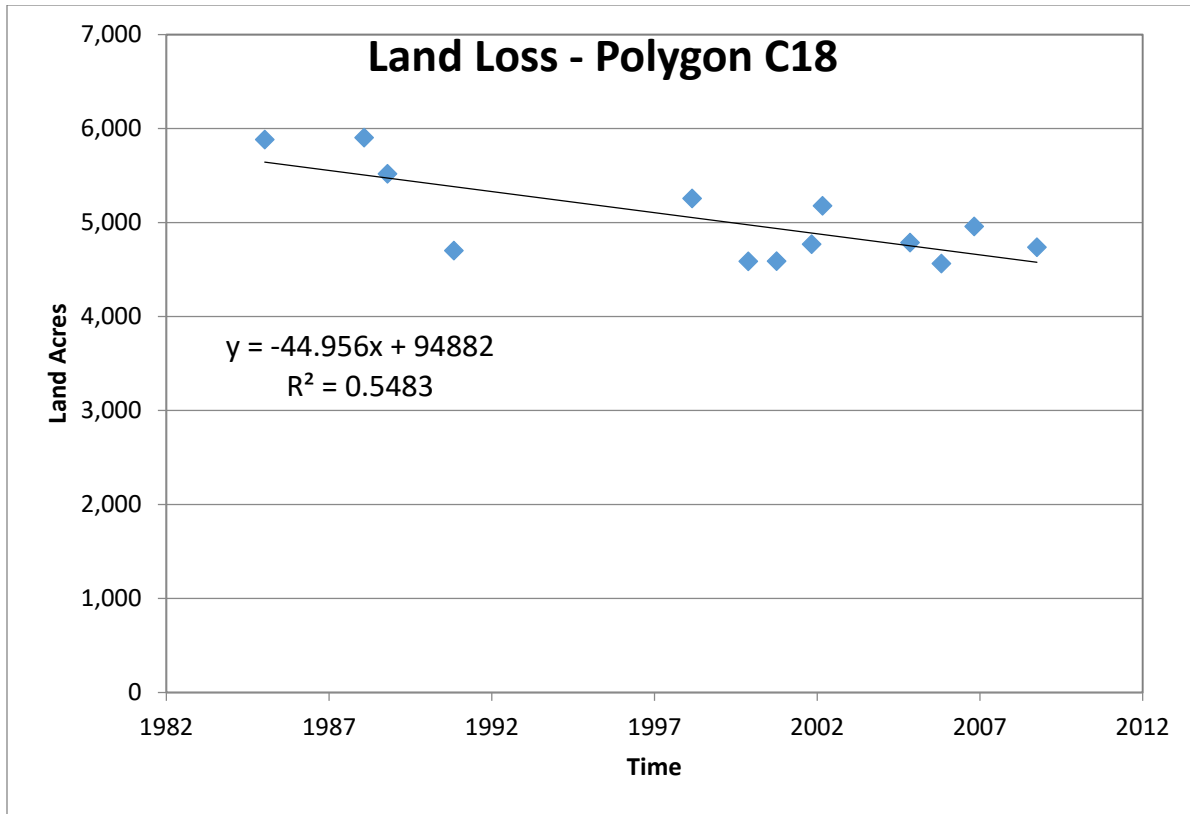
project is implemented (i.e., future-with-project), providing an index of quality or habitat suitability of the habitat for the given time period. The habitat suitability index (HSI) is combined with the acres of habitat to get a number that is referred to as “habitat units”. Expected project benefits are estimated as the difference in habitat units between the future-with-project (FWP) and future-without project (FWOP). To allow comparison of WVA benefits to costs for overall project evaluation, total benefits are averaged over a 50-year period, with the result reported as Average Annual Habitat Units (AAHUs).



**Land Loss Data**

**Figure 2. USGS Extended Boundary used to estimate land loss for project area (C18).**





**Figure 3. Land loss rate determined by FWS**

The Fish and Wildlife Service calculated land loss rate using USGS Land/Water data (Figure 2), but with a different regression (land acres: time). That rate was used to calculate land/water values over the life of the project. (Figure 3)

**Extended Boundary Percent Loss Rate = -0.79%**

FWOP project area loss rate: -1.17 ac/yr

FWP project area loss rate: -0.58 ac/yr (resumes to background loss rate at TY43).

Land loss rates were adjusted by the projected effects of three Relative Sea Level Rise (RSLR) scenarios. The **medium RSLR** scenario was chosen for these analyses.

**Variable V1: Percent of wetland area covered by emergent vegetation**

**FWOP**– Marsh creation area 3 is currently all open water. Under current subsidence rates, this area will continue to be open water through all years for FWOP.

<b>Area 3</b>			
		acres	%
<b>TY0-TY50</b>	Marsh	0	0
	Water	113	100

**FWP**– It is assumed that all acres within the project area would be marsh creation (i.e., no marsh nourishment assumed). Created marsh platform has limited marsh function until settlement and breaching of retention dikes. Land loss is applied at the time of marsh creation. The rate is 50% of the background loss rate until TY43 when at least 10 inches of organic accretion is projected to cover the marsh and background loss rate is resumed. Based on standard civil works project assumptions; 10 % marsh credit was applied at TY1, 25% credit at TY 3, and 100% credit at TY5. Created marsh platform is assumed to be converted to marsh by TY5.

<b>Area 3</b>			
		acres	%
<b>TY0</b>	Marsh	0.00	0.00
	Water	113.0	100.00
<b>TY1</b>	Marsh	11.25	10.00
	Water	0.49	0.43
<b>TY3</b>	Marsh	27.9	24.7
	Water	1.40	1.24
<b>TY5</b>	Marsh	110.70	98.0
	Water	2.30	2.04
<b>TY10</b>	Marsh	108.16	95.7
	Water	4.84	4.28
<b>TY20</b>	Marsh	102.28	90.5
	Water	10.72	9.48
<b>TY50</b>	Marsh	77.48	68.6
	Water	35.52	31.43

**Variable V2: Percent of open water covered by aquatic vegetation**

**Existing Conditions** –The project area is largely deep open water (water depth > 1.5 ft) with no SAV known to exist. Water depths and SAV occurrence in project area were confirmed by USFWS personnel on site visit. Existing SAV conditions are expected to continue. Tidal fluctuations, currents, wave action, salinity, and overall system energy may hinder SAV occurrence. Therefore, SAV coverage is estimated and proposed at 0% for all FWOP and FWP target years for both marsh creation areas.

**FWOP and FWP**–TY0-TY50: 0%

**Variable V3: Marsh edge and interspersions**

**Existing Conditions** – The proposed marsh creation cell is entirely open water. Under the current erosion and subsidence regime, the marsh creation area will continue to be 100% open water. Therefore, 100% Class 5 is proposed for all years for FWOP for both areas.

**FWOP**–TY0 – TY50: 100% Class 5

**FWP**–

Area 3			
	Class	%	Notes
<b>TY0</b>	5	100	standard assumptions
<b>TY1</b>	5	100	standard assumptions
<b>TY3</b>	3	100	standard assumptions
<b>TY5</b>	1	50	standard assumptions
	3	50	standard assumptions
<b>TY10</b>	1	100	standard assumptions
<b>TY20</b>	1	100	approx. 90 % marsh
<b>TY50</b>	3	100	approx. 69 % marsh

**Variable V4: Percent of open water area ≤ 1.5 feet deep in relation to marsh surface**

**Existing Conditions**– Water depths were measured by Ducks Unlimited using bathymetry in May 2016. Depths were confirmed on a 06 July 2017 site visit using a survey rod and corrected for the effect of wind and tide using the USACE gage at Cocodrie. USACE RSLR estimates predict a sea-level rise of approximately 1.3 feet over the next 50 years under the Intermediate RSLR scenario (LCWC 1999). It was assumed that RSLR will reduce the existing shallow open water for FWOP by 1/3 at TY50.

**FWOP**– Assuming a 1/3 reduction in shallow open water at TY50.

Area 3		
	Water ≤ 1.5ft (%)	Notes
<b>TY0</b>	14	
<b>TY1</b>	14	
<b>TY3</b>	14	
<b>TY5</b>	14	
<b>TY10</b>	14	
<b>TY20</b>	14	
<b>TY50</b>	9	Reduced by 1/3

**FWP**– It is assumed that all open water is less than 1.5 ft deep at TY1 through TY25. By TY50, it is assumed that continued subsidence and sea level rise will result in the formation of some open water greater than 1.5 feet deep. Marsh that is lost is assumed to become open water ≤ 1.5 feet deep until TY50. At that point, it is assumed that 1/6 of the shallow open water would become deeper than 1.5 feet. In Area 3, 5.58 ac out of the 35.52 ac of open water would become greater than 1.5 ft deep.

<b>Area 3</b>
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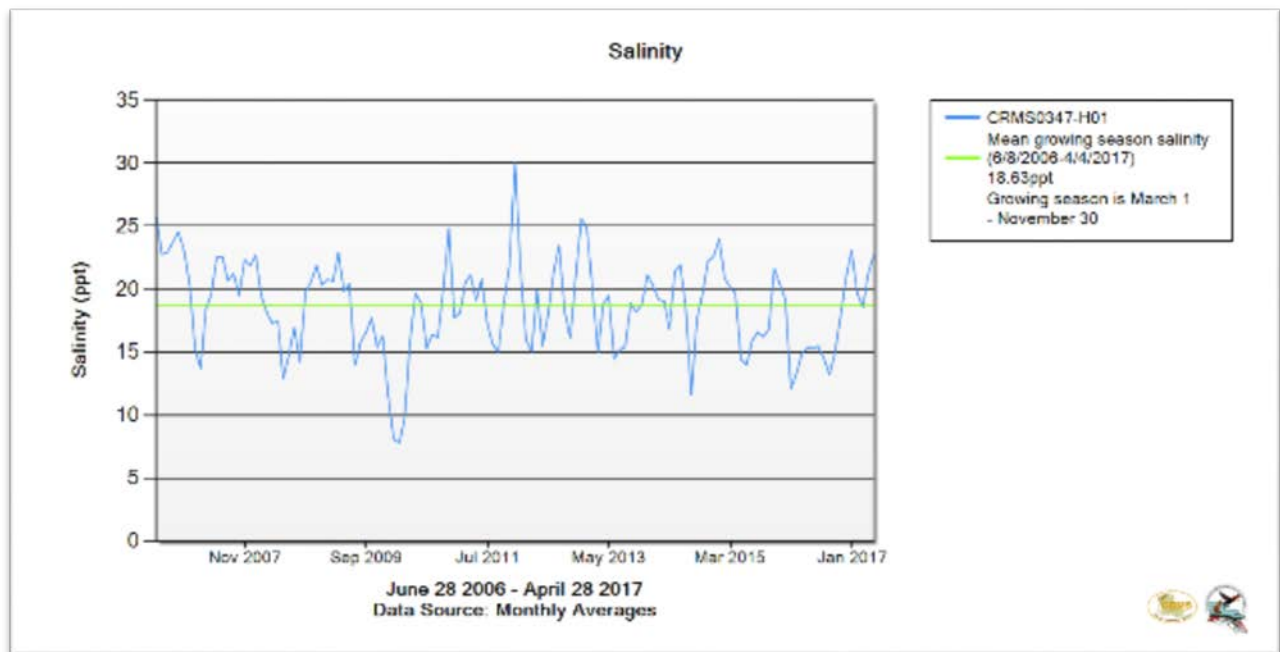


	Water ≤ 1.5ft (%)	Notes
<b>TY0</b>	0	
<b>TY1</b>	100	
<b>TY3</b>	100	
<b>TY5</b>	100	
<b>TY10</b>	100	
<b>TY20</b>	100	
<b>TY50</b>	95	5.92 ac ≥ 1.5 ft deep

**Variable V5: Salinity**

**Existing conditions** - Mean growing season salinity for CRMS station 0347 for the period June 2006 to April 2017 was 18.63 ppt (Figure 4). Salinity is not assumed to change FWOP or FWP.

**FWOP & FWP**– TY0 – TY50: 18.63 ppt



**Figure 4. Mean growing season salinity data from CRMS 0347.**

**Variable V6: Aquatic organism access**

**Existing conditions** – Area 3 is not impounded nor has any hydrological controls. Access to all parts of project area is assumed to be equal. Existing conditions are expected to continue for all years for FWOP.

**FWOP**–TY0-TY50: 1.0

**FWP**–Post construction, retention dikes will block all aquatic organism access. We propose full access value beginning at TY5 when project area is 100% marsh and water. It is assumed that all aquatic organisms will have total and equal access to sites from TY5-TY50.

<b>Area 3</b>		
	<b>Access Value</b>	<b>Notes</b>
<b>TY0</b>	1.00	standard assumptions
<b>TY1</b>	0.00	
<b>TY3</b>	0.00	
<b>TY5</b>	1.00	100% marsh & water/full aquatics access
<b>TY10</b>	1.00	standard assumptions
<b>TY20</b>	1.00	standard assumptions
<b>TY50</b>	1.00	standard assumptions

### Project Benefits

#### AREA 3-BENEFITS IN AAHUs DUE TO PROJECT

Project Life (Years)	10	20	50
A. Emergent Marsh Habitat Net AAHUs	65.16	83.27	80.26
B. Open Water Habitat Net AAHUs	-69.44	-68.78	-61.63
<b>Net Benefits=(3.5xEMAAHUs+OWAAHUs)/4.5</b>	<b>35.25</b>	<b>49.48</b>	<b>48.73</b>

#### Literature Cited

Chabreck, R. and G. Linscombe. 1997. Vegetative type map of the Louisiana coastal marshes. Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA.

Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority [LCWC]. 1999. Coast 2050: Toward a Sustainable Coastal Louisiana, The Appendices. Appendix C – Region 1 Supplemental Information. Louisiana Department of Natural Resources. Baton Rouge, La.

Sasser, C.E., Visser, J.M., Mouton, Edmond, Linscombe, Jeb, and Hartley, S.B., 2008, Vegetation types in coastal Louisiana in 2007: U.S. Geological Survey Open-File Report 2008–1224, 1 sheet, scale 1:550,000.

Sasser, C.E., Visser, J.M., Mouton, Edmond, Linscombe, Jeb, and Hartley, S.B., 2014, Vegetation types in coastal Louisiana in 2013: U.S. Geological Survey Scientific Investigations Map 3290, 1 sheet, scale 1:550,000.

# **ANNEX E**

## **Agency Coordination**

Refer to Appendix G for the Draft Coordination Act Report from USFW



# Caddo Nation of Oklahoma

Post Office Box 487 • Binger, Oklahoma 73009 • 405-656-2344 • Fax 405-656-2892

August 25, 2017

<b>Company:</b>	DEPT. OF THE ARMY – Corps of Engineers, New Orleans District
<b>Description:</b>	Louisiana Coastal Authority Beneficial use of Dredged Material from the Terrebonne and Cat Island Pass Reaches of the Houma Navigation Canal.
<b>County:</b>	Terrebonne Parish
<b>State:</b>	LOUISIANA
<b>Point of Contact:</b>	Eric M. Williams – Ph# 504-862-2862 Email: eric.m.williams@usace.army.mil

Dear Mr. Williams,

The Caddo Nation of Oklahoma Cultural Preservation Department received correspondence regarding the above project. Our office is committed to protecting sites important to the Caddo Nation tribal heritage, culture, and religion. Furthermore, we are particularly concerned with archaeological sites that may contain human burials or remains, as associated funerary objects.

As described in our correspondence we received from your office and upon research of our database(s) and files we find that the Caddo people occupied this area either prehistorically or historically. However the location of the project does not appear to endanger cultural or religious sites of interest to the Caddo Nation. Please continue with the project as planned. However, should this project inadvertently uncover an archaeological site or object(s), we request that you halt all construction and ground disturbance activities and immediately contact the appropriate federal or state agencies, as well as our office.

We appreciate you're cooperation in contacting the Caddo Nation of Oklahoma in order to conduct proper consultation. Should you have any questions, feel free to contact our office at 405-656-2344 ext. 2068.

Sincerely,

Phil Cross, THPO  
Cultural Preservation Department  
Caddo Nation of Oklahoma  
P.O. Box 487  
Binger, OK 73009



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT  
7400 LEAKE AVENUE  
NEW ORLEANS, LOUISIANA 70118

AUG 02 2017

Regional Planning and  
Environment Division, South  
Environmental Planning Branch

Ms. Kristin P. Saunders  
State Historic Preservation Officer  
Department of Culture, Recreation and Tourism  
Office of Cultural Development  
P.O. Box 44247  
Baton Rouge, Louisiana 70804

**Subject: Louisiana Coastal Authority Beneficial Use of Dredged Material from the Terrebonne and Cat Island Pass Reaches of the Houma Navigation Canal, Terrebonne Parish, Louisiana.**

Dear Ms. Saunders:

The U.S. Army Corps of Engineers, New Orleans District (CEMVN) proposes to remove dredge material from routine maintenance dredging of the Houma Navigation Canal (HNC) for placement and construction of platforms for salt marsh development. The dredged materials would be placed in the previously evaluated and designated Bay (Channel) Area disposal site located in Terrebonne Parish, Louisiana. Other beneficial use features may include ridges designed to function like natural levees near the upper bay area, as well as sacrificial feeder berms designed to erode and nourish down-drift barrier islands near the bar channel. The Area of Potential Effect (APE) for this undertaking includes the Bay Area disposal area, the routinely maintained HNC, and the pipeline access corridor from the HNC to the Bay Area disposal area. See Enclosure 1 for APE project features.

Coastal Environments, Inc. (CEI) conducted a Phase I cultural resources investigation and remote sensing survey of the Bay Area disposal site as documented in the report entitled "*Phase I Cultural Resources Investigations and Remote Sensing Survey of the Bay Area and Bar Channel Disposal Areas, Houma Navigation Canal, Terrebonne Parish, Louisiana*", Report #22-5163 dated June 2016. Within the proposed Bay Area disposal site, any lands that had not been previously surveyed for cultural resources were viewed by airboat or by pedestrian transects. One previously unrecorded site (16TR338) was identified, and two previously recorded sites (16TR11 and 16TR13) were revisited and examined. All of these sites were concluded to be destroyed by activity of dredging, subsidence, and pipeline construction. None are considered eligible for the National Register of Historic Places (NRHP).

RECEIVED

AUG 07 2017

ARCHAEOLOGY



The subject undertaking and the results of the CEI investigations were originally coordinated with the Louisiana State Historic Preservation Officer in our letter dated January 29, 2016 (Enclosure 2) and included the Bar Channel as an additional disposal area. The remote sensing survey of the Bar Channel identified twelve locations that could be associated with historic shipwrecks. To avoid further investigation and destruction of the twelve identified locations, a 50-meter buffer was proposed around each of the locations during disposal activities. In your letter dated February 15, 2016 (Enclosure 3), you agreed that with the 50-meter buffer there would be no impact to historic properties and that there were no further concerns for the undertaking.

The Bar Channel disposal area is no longer being considered as part of this undertaking and is no longer in the Area of Potential Effect. The Bay Area disposal area has been previously investigated and now sites were identified that were eligible for listing to the NRHP. Based on the removal of the Bar Channel disposal area from the proposed undertaking, the results of the CEI investigation, and the information provided in this letter the CEMVN proposes a finding of ***no historic properties affected*** for the proposed undertaking. We ask that you offer any comment to this determination within 30 days. Please contact Eric Williams at 504-862-2862, or by email at [eric.m.williams@usace.army.mil](mailto:eric.m.williams@usace.army.mil), with any questions or concerns you may have regarding this project.

Sincerely,



Marshall K. Harper  
Chief, Environmental Planning Branch

Enclosure(s)

No known historic properties will be affected by this undertaking. Therefore, our office has no objection to the implementation of this project. This effect determination could change should new information come to our attention.



Kristin P. Sanders  
Deputy State Historic Preservation Officer

Date

**APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT**  
(33 CFR 325)

OMB APPROVAL NO. 0710-003  
Expires October 1996

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please **DO NOT RETURN** your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application or a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
--------------------	----------------------	------------------	-------------------------------

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME US Army Corps of Engineers, New Orleans District	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) Same as Applicant
6. APPLICANT'S ADDRESS Regional Planning and Environmental Division, South CEMVN-PDN-CEP 7400 Leake Avenue New Orleans, LA 70118 ATTN: Patricia Naquin	9. AGENT'S ADDRESS
7. APPLICANT'S PHONE NOS. W AREA CODE  a. Residence  b. Business (504) 862-1544	10. AGENT'S PHONE NOS. W AREA CODE  a. Residence  b. Business

11. STATEMENT OF AUTHORIZATION

*Marshall K. Hayler*  
APPLICANT'S SIGNATURE

10/26/17  
DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

Louisiana Coastal Area, Beneficial Use of Dredged Material Program, Houma Navigation Canal Project, Terrebonne, Louisiana

13. NAME OF WATERBODY, IF KNOWN (if applicable) Terrebonne Bay	14. PROJECT STREET ADDRESS (if applicable)
15. LOCATION OF PROJECT Terrebonne Louisiana COUNTY STATE	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, (see instructions)



## 17. DIRECTIONS TO THE SITE

### 18. Nature of Activity (Description of project, include all features.)

The Proposed Action consists of removing dredged material through the routine operation and maintenance dredging of the federal HNC Project to construct platforms suitable for salt marsh creation and development.

The proposed Marsh Creation Site is approximately 49.8 acres in size and would be located along the right descending bank of the HNC (Terrebonne Bay Reach) and immediately northwest of Bayou Petit Caillou. The Terrebonne Bay Reach of the project begins at approximate HNC Channel Mile 12.0 and extends to Channel Mile 0, near the beginning of the HNC Bar Channel and Cat Island Pass. A cutterhead dredge would be used to dredge the material from between approximate HNC Channel Miles 8.5 and 5.5 (Terrebonne Bay Channel). The dredged material would be discharged into the Marsh Creation Site via a long distance pipeline from the cutterhead dredge. Flotation access channels would be excavated, as needed, using a mechanical dredge to allow construction equipment to access the Marsh Creation Site.

In order to prevent erosion from the Marsh Creation Site and to avoid impacts to oyster leases outside of the Marsh Creation Site, earthen retention dikes, deflection dikes, and an earthen weir would need to be constructed to help contain the dredge slurry and prevent effluent sedimentation from impacting oyster leases west and northwest of Site 1A. The earthen retention dikes would be constructed along the southern and western side of the Marsh Creation Site and an earthen weir would be constructed along the northeast side of the Sediment Overflow Area an approximately 47.3 acre site adjacent to the proposed Marsh Creation Site. Borrow material for the construction of the dikes and weir would be sourced from within the Marsh Creation Site. Two additional earthen closures would also be constructed. The first closure would be along the pipeline canal south and adjacent to the Marsh Creation Site and the second closure would be constructed within the shallow open waters that divide the Marsh Creation Site and the Sediment Overflow Area using borrow material sourced from the Marsh Creation Site. Due to the poor soil conditions within the Marsh Creation Site, a foundation geotextile fabric would be installed under the earthen retention dikes, closures and weir in order to assist in construction of these retention features.

There is a potential for the overflow of some fine, suspended sediment from the weir on the Marsh Creation Site into the Sediment Overflow Area potentially providing marsh nourishment. Preliminary investigations indicated that there are no utilities or oyster leases within the footprint of the Marsh Creation Site, although there are several oyster leases located within a 1,500 foot buffer from the perimeter of the Site. All oyster leases (or portion thereof) that are directly impacted, or within 150 feet of the Marsh Creation Site, would have to be acquired. Access to the Marsh Creation Site from the HNC would not impact any oyster leases, but if access was required through other waterways, additional oyster leases would have to be acquired.

According to the Draft 2017 Geotechnical Report<sup>1</sup>, due to the poor soil conditions known to occur within the Marsh Creation Site, and likely to also occur in Site 1A, the design borrow pits, depths and offset locations from the required retention dikes could entail the construction of borrow pits as deep as (-22 feet NAVD88 (approximately 20 feet below the existing mudline within the Marsh Creation Site and Site 1A, with 1V on 3H side slopes. The magnitude of work requires that the dikes be constructed via barge mounted dragline(s) which would access the Marsh Creation Site and Site 1A via a cut to be made through the bank line of the HNC. The access channel that would be cut through the bank line of the HNC and stability berms of 20 feet would be maintained between the top of cut of the access channel and the temporary adjacent disposal. The access corridor that would be dredged through the bank line of the HNC and lead into Site 1 would cut through approximately 625 feet of existing wetlands where the potential width of the impact area within this reach of the access channel would be approximately 390 feet per linear foot. The potential temporary impacts to these wetlands as a result of this cut would be approximately 5.6 acres.

Between the existing marsh and the eastern limit of Site 1, dredging for access to Site 1 would be performed over a length of approximately 590 feet of open waters and material would be stockpiled atop the adjacent marsh and/or open waters. The potential width of the impact area within this reach of the access channel would be approximately 320 feet per linear foot. This leads to a potential acreage impact of approximately 4.3 acres, approximately half of which would be performed within open waters. The total projected acres of temporary impact resulting from the HNC bank line cut would be approximately 9.9 acres.

Upon completion of dike construction and upon demobilization of the dragline(s) from the Marsh Creation Site and Site 1A, the material that had initially been temporarily stockpiled from dredging of the access channel would then be pulled back from atop the marsh and back into the access channel in order to restore the area as best as possible to pre-existing conditions/grade.

The estimated acres of impacts for all earthen retention features, based off of the proposed earthen retention and deflection dikes, earthen closures, and earthen weir design footprints are:

- 3.7 acres (two retention dikes to be constructed on southern and western sides of the Marsh Creation Site);
- 4.0 acres (one deflection dike to be constructed on Site 1A);
- 4.6 acres (one earthen weir to be constructed on Marsh Creation Site); and
- 3.5 acres (two earthen closures to be constructed along the pipeline canal and in the shallow open water between the Marsh Creation Site and Site 1A).

At this time, the estimated impacts associated with borrow required for construction of the proposed earthen retention features are:

- 82,000 gross cys of borrow could be required to construct the retention dikes and closures within the Marsh Creation Site (approximately 8.2 acres of borrow could be required);
- 42,000 gross cys of borrow could be required to construct the earthen weir (approximately 6.5 acres of borrow could be required); and
- 46,000 gross cys of borrow could be required to construct the earthen deflection dike along the northeast edge of Site 1A (approximately 4.0 acres of borrow could be required).

### 19. Project Purpose (Describe the reason or purpose of the project. (See instruction.)

<sup>1</sup> 2017 Draft Geotechnical Report prepared for the NFS by Eustis Engineering, dated 7 February 2017 (Project No. 23054). The report is based on preliminary investigations of Sites 1, 3, and 9 only. Further geotechnical investigations are underway that will aid in optimizing project design and implementation. These investigations include additional assessment of the geotechnical properties of Site 1A as well as borrow characterization of the material currently available in the HNC reach to be dredged. The Final Geotechnical Report will include additional sediment analyses and engineering and design recommendations for the retention dikes based on this information. The project retention and access designs described herein may be refined or revised based on this additional information and other factors.

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). The Terrebonne Basin is an essential ecosystem since it includes wetland habitats, essential fish habitat, and has high fish and wildlife values. The ecosystem provides habitat for migratory birds, wildlife, finfish, shellfish, and other aquatic organisms including threatened or endangered species. The estuaries of the Terrebonne Basin are productive oyster habitat and have traditionally supported important fisheries.

There is widespread public support of projects intended to restore coastal habitats and avert further coastal land loss. The objective of the Proposed Action is to construct platforms suitable for salt marsh creation and development in the vicinity of the Terrebonne Bay (Bay Channel) Reach. The Proposed Action is an illustrative example of government action undertaken to attempt to restore lost coastal habitat in southeastern Louisiana.

*USE BLOCKS 20-22 IF DREDGED AND OR FILL MATERIAL IS TO BE DISCHARGED*

20. Reason(s) for Discharge

Projects proposed and constructed under the LCA BUDMAT Program call for the beneficial use placement of these dredged materials in locations identified as supporting ecosystem restoration efforts in coastal Louisiana. LCA BUDMAT disposal locations are located beyond the disposal areas that would otherwise be identified under the Federal Standard as the base operations and maintenance disposal plan for operation and maintenance of the navigation project. The Federal Standard disposal plan for dredging within Terrebonne Bay evolved from unconfined placement of the dredged material a minimum of 2,000 feet west of the HNC channel centerline, to Single Point Discharge (SPD) locations, located approximately 2,500 feet west of the HNC channel centerline and at approximate HNC Channel Miles 7.9R, 6.5R, 4.5R and 2.5R. The revised disposal plan dictated that more dredged material be placed at each SPD location in an effort to create wetlands within Terrebonne Bay. The effort and cost to confine and place the dredged material that shoals within the Terrebonne Bay Reach, into the Marsh Creation Site through O&M dredging would exceed the Federal Standard.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards.

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Approximately 49.8 acres of open water and potentially another 47.3 acres of marsh nourishment.

23. Is Any Portion of the Work Already Complete? Yes  No  IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list.

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL	IDENTIFICATION NO.	DATE APPLIED	DATE APPROVED	DATE DENIED
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To the best of my knowledge the proposed activity described in my permit application complies with and will be conducted in a manner that is consistent with the LA Coastal management Program.

\*Would include but is not restricted to zoning, building and flood plain permits.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

*Marshall K. Hayer* 10/26/17  
 SIGNATURE OF APPLICANT DATE

\_\_\_\_\_  
 SIGNATURE OF AGENT DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.

## **Appendix C. NFS (CPRAB) Letter of Intent and Statement of Financial Capability**

This will be included in the final report

## Appendix D. Relocations Summary



## General

Relocations data was collected, tabulated and detailed in this appendix by the USACE New Orleans District Relocations Team. The Relocations Team reviewed the project area and used existing facility maps and databases to obtain information on existing facilities (Figure C-1).

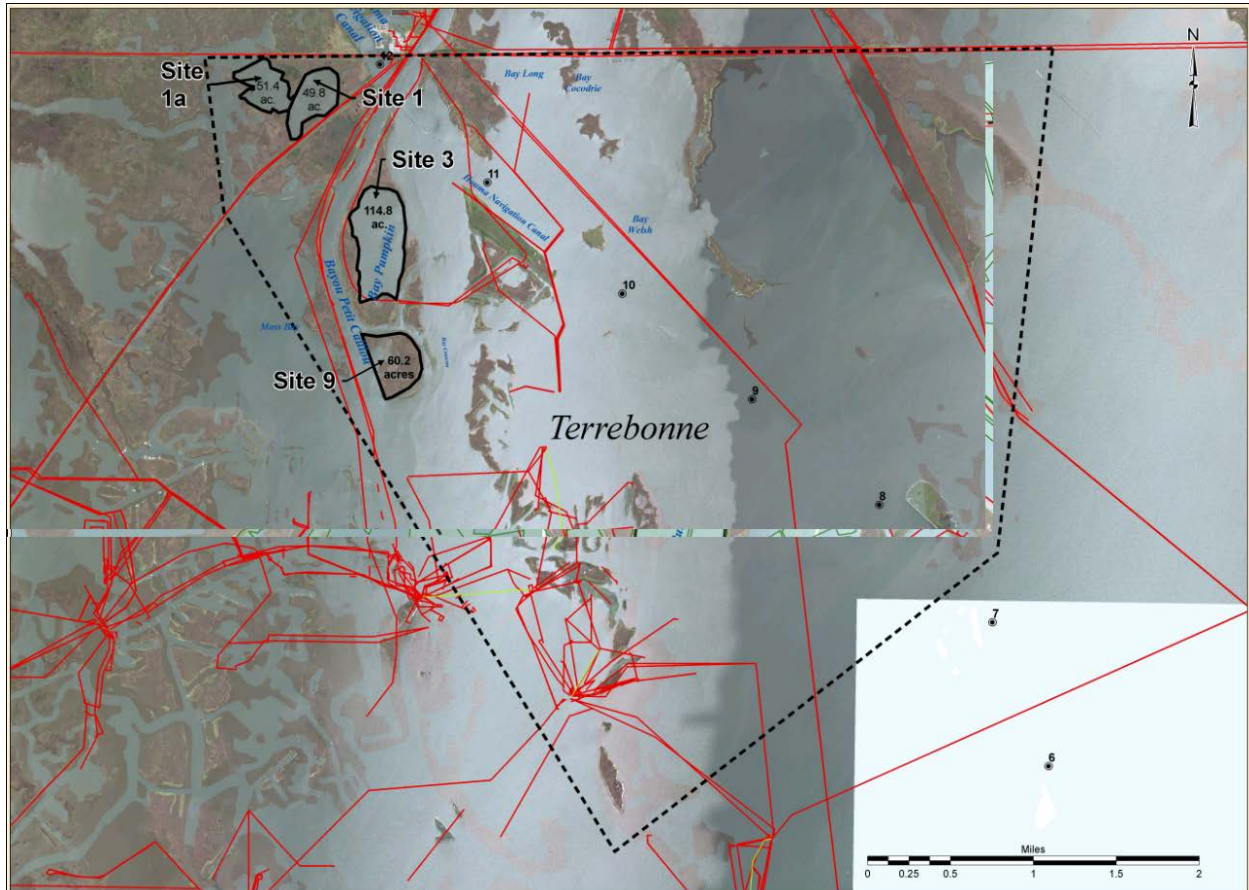


Figure C-1: Location of Pipelines Investigated.

The Relocations Team was tasked with investigating, identifying and verifying pipelines located within the TSP placement area. Database searches included the National Pipeline Database, State Online Natural Resources Information System (SONRIS), Louisiana Department of Natural Resources (LADNR), HTST-IHS, Penwell and National Pipeline Mapping System (NPMS) data.

## Methodology

Pipeline owners were contacted by telephone and email and provided a project description with maps. Owners were asked to identify the status of each pipeline: Active, Inactive, Abandoned, Removed, or Proposed. Abandoned pipelines were further classified by whether they were flushed, cut, and capped.

## Results

All of the pipeline owners, within the project area, were Table C-3 lists a description of the pipelines that still exist within the project area.

Table C-1

Previous Owner	Present Owner	Quantity	Size	Description*
Burlington (owned by Conoco Phillips)	Hilcorp	Field		Field
Chevron	Hilcorp	1	16 inch	NG, A
El Paso (owned by Kinder Morgan)*	Kinder Morgan-TGP	1	6 inch	SNG, A /Within the buffer zones for areas 3 & 9.
Kinetica*	Kinetica	1	36 inch	NG, I / 523Q-100 – Within the buffer zones for areas 1A and 1
Kinetica*	TGN	1	26 inch	TO-T-2-5000-1
Kinder Morgan	TGP	1	26 inch	NG, I
Kinder Morgan (also see El Paso)				
Hilcorp (see Burlington (Conoco Phillips), Chevron and Plains)				
Plains*	Hilcorp	1	8 inch	CRD,P
Tennessee Gas Pipeline (TGP)*	TGP	2		NG/500-1 & 500-2
Tennessee Gas Pipeline (TGP)*	TGP	1	24 inch	523M-100
Shell	Texaco	1	8 inch	CRD,
Stone Energy	Stone Energy	1	8 inch	OIL, A
TOCE	TOCE	1	2-2 inch	Flow
* Have file from pipeline owners. List are on file with USACE New Orleans.				
Facility descriptions based on available records.				

Pipeline designation: A = active, ABD=abandoned, CRD=crude, I=inactive, NG= natural gas, P=production, SNG=synthetic natural gas

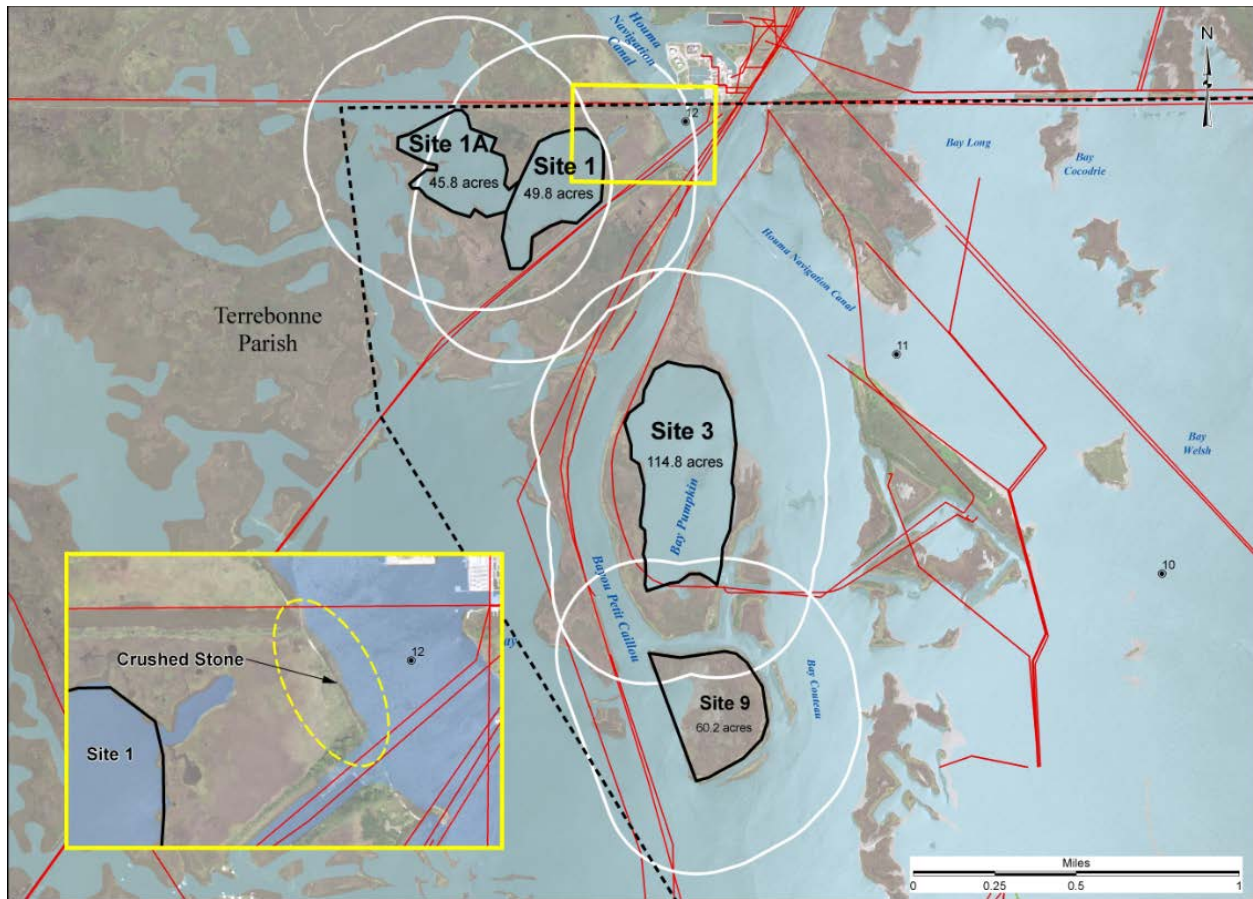


Figure C-2: Location of Crushed Stone Pipelines Investigated for Land and Pipeline Owners in the Vicinity of Site 1.

All of the pipeline owners and land owners associated with the crushed stone area located near Area 1, were contacted and the results are as follows:

**Land owner:**

- Louisiana Land and Exploration LL&E.

**Pipeline owner:**

The rocks on the pipeline that runs West - East are Kinder Morgan's Tennessee Gas Pipeline Company. This is the active TGP 500-1 line. The other rocks on the canal with the two pipelines that come from Southwest to Northeast, were installed by TGP but one line was sold to Kinetica and one line was abandoned in place. Kinder Morgan currently does not have any rights on this canal.

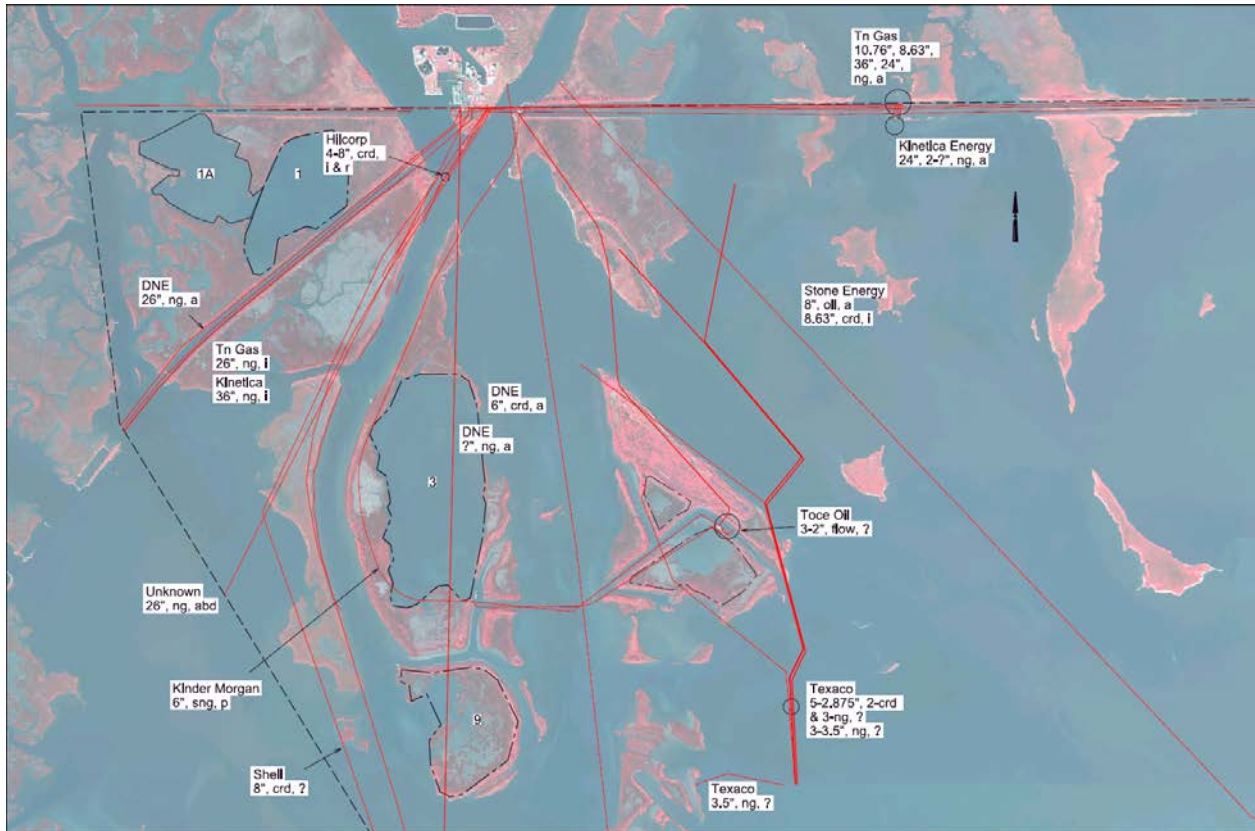


Figure C-3: Northwest Portion of Project Area showing Pipeline Ownership. (DNE=does not exist)



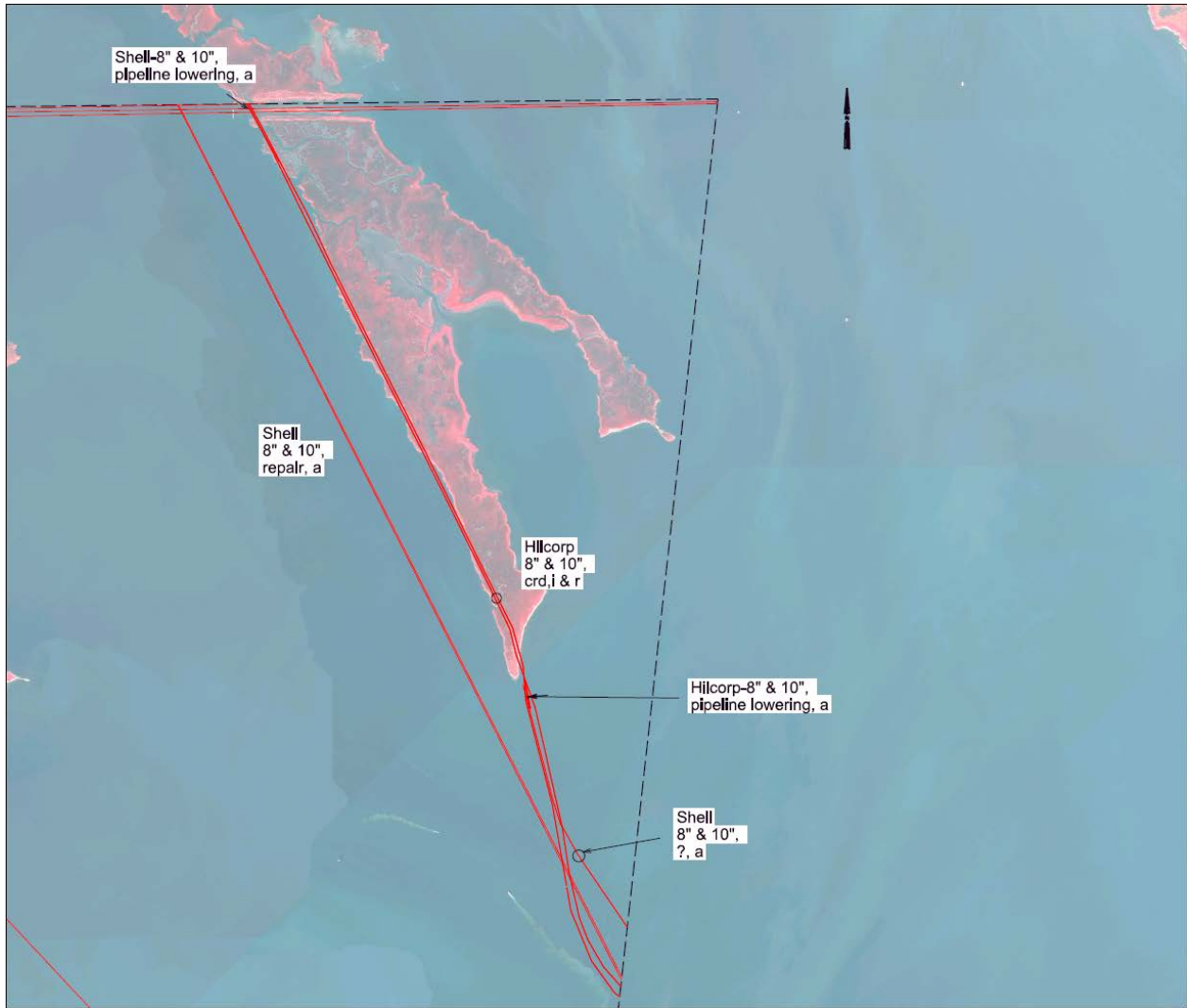


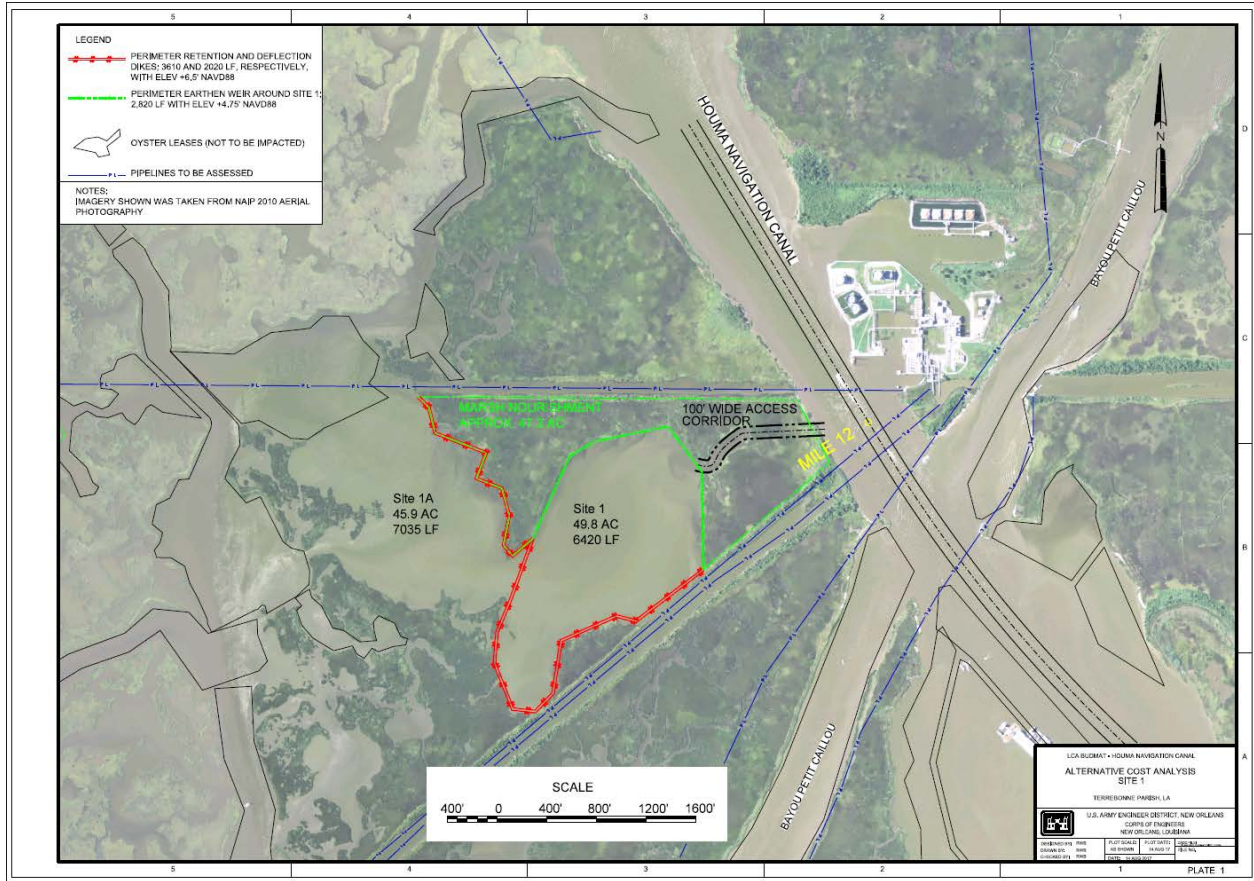
Figure C-4: Northeast Portion of Project Area showing Pipeline Ownership.



Figure C-5: Southern Portion of Project Area showing Pipeline Ownership. (DNE=does not exist)

## Conclusion

Based on findings of the Relocations Team, the Design Team determined that the existing utility pipelines within the project area will not be impacted. Flotation access channels would be excavated and replaced. Flotation access channels would be excavated, as needed, to allow construction equipment to access the placement areas.



**Figure C-6: HNC BUDMAT Access Routes.**

**Appendix E. LCA BUDMAT at Houma Navigation Canal, Draft 2017 Geotechnical Report (Eustis Engineering)**

Provided Separately upon Request

## **Appendix F. Cost Certification and Total Project Cost Summary**

Cost Certification will be included in the final report.

Total Project Cost Summary and Abbreviated Risk Analysis are included herein

\*\*\*\* TOTAL PROJECT COST SUMMARY \*\*\*\*

PROJECT: Houma Navigation Canal BUDMAT  
PROJECT NO: 457205  
LOCATION: Terrebonne Parish, LA

DISTRICT: New Orleans District  
POC: CHIEF, COST ENGINEERING, Thomas D. Murphy  
PREPARED: 10/18/2017

This Estimate reflects the scope and schedule in report; DIR Louisiana Coastal Area BUDMAT @ Houma Navigation Canal

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)					
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J	Program Year (Budget EC): Effective Price Level Date: 2018 1 OCT 17		TOTAL FIRST COST (\$K) K	NFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
										Spent Thru: 1-Oct-17 (\$K)						
17	BEACH REPLENISHMENT	\$6,162	\$1,738	28.2%	\$7,900	0.0%	\$6,162	\$1,738	\$7,900		\$0	\$7,900	2.0%	\$6,288	\$1,774	\$8,062
<b>CONSTRUCTION ESTIMATE TOTALS:</b>		\$6,162	\$1,738		\$7,900	0.0%	\$6,162	\$1,738	\$7,900		\$0	\$7,900	2.0%	\$6,288	\$1,774	\$8,062
01	LANDS AND DAMAGES	\$0	\$0	-	\$0	-	\$0	\$0	\$0		\$0	\$0	-	\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN	\$545	\$60	11.0%	\$605	0.0%	\$545	\$60	\$605		\$0	\$605	2.4%	\$558	\$61	\$619
31	CONSTRUCTION MANAGEMENT	\$154	\$29	19.0%	\$183	0.0%	\$154	\$29	\$183		\$0	\$183	3.9%	\$160	\$30	\$190
<b>PROJECT COST TOTALS:</b>		\$6,861	\$1,827	26.6%	\$8,688		\$6,861	\$1,827	\$8,688		\$0	\$8,688	2.1%	\$7,006	\$1,865	\$8,871

\_\_\_\_\_  
CHIEF, COST ENGINEERING, Thomas D. Murphy

ESTIMATED TOTAL PROJECT COST: **\$8,871**

\_\_\_\_\_  
PROJECT MANAGER, Brad Inman

\_\_\_\_\_  
CHIEF, REAL ESTATE, Linda Labure

\_\_\_\_\_  
CHIEF, PLANNING, xxx

\_\_\_\_\_  
CHIEF, ENGINEERING, xxx

\_\_\_\_\_  
CHIEF, OPERATIONS, xxx

\_\_\_\_\_  
CHIEF, CONSTRUCTION, xxx

\_\_\_\_\_  
CHIEF, CONTRACTING,xxx

\_\_\_\_\_  
CHIEF, PM-PB, xxx

\_\_\_\_\_  
CHIEF, DPM, xxx

\*\*\*\* TOTAL PROJECT COST SUMMARY \*\*\*\*

\*\*\*\* CONTRACT COST SUMMARY \*\*\*\*

PROJECT: Houma Navigation Canal BUDMAT  
LOCATION: Terrebonne Parish, LA  
This Estimate reflects the scope and schedule in report;

DIR Louisiana Coastal Area BUDMAT @ Houma Navigation Canal

DISTRICT: New Orleans District  
POC: CHIEF, COST ENGINEERING, Thomas D. Murphy

PREPARED: 10/18/2017

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: Effective Price Level:		17-Oct-17 1-Oct-17		Program Year (Budget EC): Effective Price Level Date:		2018 1 OCT 17						
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
17	MARSH CREATION BEACH REPLENISHMENT	\$10,718	\$2,943	27.46%	\$13,661	0.0%	\$10,718	\$2,943	\$13,661	2019Q1	2.0%	\$10,937	\$3,003	\$13,941
<b>CONSTRUCTION ESTIMATE TOTALS:</b>		\$10,718	\$2,943	27.46%	\$13,661		\$10,718	\$2,943	\$13,661			\$10,937	\$3,003	\$13,941
01	LANDS AND DAMAGES	\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	\$107	\$12	10.97%	\$119	0.0%	\$107	\$12	\$119	2018Q3	1.8%	\$109	\$12	\$121
0.5%	Planning & Environmental Compliance	\$54	\$6	10.97%	\$60	0.0%	\$54	\$6	\$60	2018Q3	1.8%	\$55	\$6	\$61
1.0%	Engineering & Design	\$107	\$12	10.97%	\$119	0.0%	\$107	\$12	\$119	2018Q3	1.8%	\$109	\$12	\$121
1.0%	Reviews, ATRs, IEPs, VE	\$107	\$12	10.97%	\$119	0.0%	\$107	\$12	\$119	2018Q3	1.8%	\$109	\$12	\$121
0.5%	Life Cycle Updates (cost, schedule, risks)	\$54	\$6	10.97%	\$60	0.0%	\$54	\$6	\$60	2018Q3	1.8%	\$55	\$6	\$61
0.5%	Contracting & Reprographics	\$54	\$6	10.97%	\$60	0.0%	\$54	\$6	\$60	2018Q3	1.8%	\$55	\$6	\$61
0.5%	Engineering During Construction	\$54	\$6	10.97%	\$60	0.0%	\$54	\$6	\$60	2019Q1	3.9%	\$56	\$6	\$62
0.5%	Planning During Construction	\$54	\$6	10.97%	\$60	0.0%	\$54	\$6	\$60	2019Q1	3.9%	\$56	\$6	\$62
0.5%	Project Operations	\$54	\$6	10.97%	\$60	0.0%	\$54	\$6	\$60	2018Q3	1.8%	\$55	\$6	\$61
31	CONSTRUCTION MANAGEMENT													
1.0%	Construction Management	\$107	\$19	17.40%	\$126	0.0%	\$107	\$19	\$126	2019Q1	3.9%	\$111	\$19	\$130
1.0%	Project Operation:	\$107	\$19	17.40%	\$126	0.0%	\$107	\$19	\$126	2019Q1	3.9%	\$111	\$19	\$130
0.5%	Project Management	\$54	\$9	17.40%	\$63	0.0%	\$54	\$9	\$63	2019Q1	3.9%	\$56	\$10	\$66
<b>CONTRACT COST TOTALS:</b>		\$11,631	\$3,061		\$14,692		\$11,631	\$3,061	\$14,692			\$11,874	\$3,124	\$14,998

\*\*\*\* TOTAL PROJECT COST SUMMARY \*\*\*\*

\*\*\*\* CONTRACT COST SUMMARY \*\*\*\*

PROJECT: Houma Navigation Canal BUDMAT  
LOCATION: Terrebonne Parish, LA  
This Estimate reflects the scope and schedule in report;

DIR Louisiana Coastal Area BUDMAT @ Houma Navigation Canal

DISTRICT: New Orleans District  
POC: CHIEF, COST ENGINEERING, Thomas D. Murphy

PREPARED: 10/18/2017

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared:		17-Oct-17		Program Year (Budget EC):		2018						
		Effective Price Level:		1-Oct-17		Effective Price Level Date:		1 OCT 17						
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
09	FEDERAL STANDARD CHANNELS & CANALS	-\$4,556	-\$1,205	26.5%	-\$5,761	0.0%	-\$4,556	-\$1,205	-\$5,761	2019Q1	2.0%	-\$4,649	-\$1,230	-\$5,879
<b>CONSTRUCTION ESTIMATE TOTALS:</b>		-\$4,556	-\$1,205	0.00%	-\$5,761		-\$4,556	-\$1,205	-\$5,761			-\$4,649	-\$1,230	-\$5,879
01	LANDS AND DAMAGES	\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN													
	Project Management									0				
	Planning & Environmental Compliance									0				
2.2%	Engineering & Design	-\$100	-\$11	10.97%	-\$111	0.0%	-\$100	-\$11	-\$111	2018Q2	0.8%	-\$101	-\$11	-\$112
	Reviews, ATRs, IEPRs, VE									0				
	Life Cycle Updates (cost, schedule, risks)									0				
	Contracting & Reprographics									0				
	Engineering During Construction									0				
	Planning During Construction									0				
	Project Operations									0				
31	CONSTRUCTION MANAGEMENT													
2.5%	Construction Management	-\$114	-\$17	15.29%	-\$131	0.0%	-\$114	-\$17	-\$131	2019Q1	3.9%	-\$118	-\$18	-\$136
	Project Operation:													
	Project Management													
<b>CONTRACT COST TOTALS:</b>		-\$4,770	-\$1,233		-\$6,003		-\$4,770	-\$1,233	-\$6,003			-\$4,868	-\$1,259	-\$6,127



**Abbreviated Risk Analysis**

Project (less than \$40M): **HNC BUDMAT SITE 1**  
 Project Development Stage/Alternative: **Feasibility (Recommended Plan)**  
 Risk Category: **Moderate Risk: Typical Project Construction Type**

Alternative: **Site 1**

Meeting Date: **9/27/2017**

Total Estimated Construction Contract Cost = \$ **10,718,058**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Estimated Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$ -	0%	\$ -	\$ -
1	17 BEACH REPLENISHMENT	Mob/Demob	\$ 3,010,000	13%	\$ 402,857	\$ 3,412,857
2	17 BEACH REPLENISHMENT	Dredging Mile 8.5 to Mile 5.5 Marsh Creation	\$ 1,523,750	36%	\$ 549,713	\$ 2,073,463
3	17 BEACH REPLENISHMENT	Flotation and Access Dredging	\$ 210,000	23%	\$ 48,760	\$ 258,760
4	17 BEACH REPLENISHMENT	Earthen Dike and Weir Construction	\$ 2,855,974	45%	\$ 1,294,426	\$ 4,150,400
5	17 BEACH REPLENISHMENT	Additional Mob & Demob -Moves	\$ 557,600	13%	\$ 74,629	\$ 632,229
6	17 BEACH REPLENISHMENT	Dredging Mile 11.1 to Mile 1.5 (NC)	\$ 2,560,734	22%	\$ 573,217	\$ 3,133,951
7			\$ -	0%	\$ -	\$ -
8			\$ -	0%	\$ -	\$ -
9			\$ -	0%	\$ -	\$ -
10			\$ -	0%	\$ -	\$ -
11			\$ -	0%	\$ -	\$ -
12	All Other	Remaining Construction Items	\$ -	0.0%	\$ -	\$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 643,084	11%	\$ 70,542	\$ 713,626
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 267,952	17%	\$ 46,617	\$ 314,569
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)				\$ -	\$ -

<b>Totals</b>						
	Real Estate	\$ -	0%	\$ -	\$ -	\$ -
	Total Construction Estimate	\$ 10,718,058	27%	\$ 2,943,603	\$ 13,661,661	
	Total Planning, Engineering & Design	\$ 643,084	11%	\$ 70,542	\$ 713,626	
	Total Construction Management	\$ 267,952	17%	\$ 46,617	\$ 314,569	
	<b>Total Excluding Real Estate</b>	<b>\$ 11,629,094</b>	<b>26%</b>	<b>\$ 3,060,761</b>	<b>\$ 14,689,855</b>	

Confidence Level Range Estimate (\$000's)	Base	50%	80%
		\$11,629k	\$13,466k

\* 50% based on base is at 5% CL.

**Fixed Dollar Risk Add:** (Allows for additional risk to be added to the risk analysis. Must include justification. Does not allocate to Real Estate.

**Abbreviated Risk Analysis**

Project (less than \$40M): **HNC BUDMAT FEDERAL STANDARD**  
 Project Development Stage/Alternative: **Feasibility (Recommended Plan)**  
 Risk Category: **Moderate Risk: Typical Project Construction Type**

Alternative: **FEDERAL STANDARD**

Meeting Date: **9/27/2017**

Total Estimated Construction Contract Cost = \$ **4,554,500**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Estimated Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$ -	0%	\$ -	\$ -
1	17 BEACH REPLENISHMENT	Mob/Demob	\$ 1,404,100	13%	\$ 187,924	\$ 1,592,024
2	17 BEACH REPLENISHMENT	Dredging Mile 11.1 to Mile 1.5	\$ 3,150,400	32%	\$ 1,016,894	\$ 4,167,294
3				0%	\$ -	\$ -
4				0%	\$ -	\$ -
5				0%	\$ -	\$ -
6				0%	\$ -	\$ -
7			\$ -	0%	\$ -	\$ -
8			\$ -	0%	\$ -	\$ -
9			\$ -	0%	\$ -	\$ -
10			\$ -	0%	\$ -	\$ -
11			\$ -	0%	\$ -	\$ -
12	All Other	Remaining Construction Items	\$ -	0.0%	\$ -	\$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 100,000	11%	\$ 10,969	\$ 110,969
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 113,863	15%	\$ 17,407	\$ 131,270
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)				\$ -	\$ -

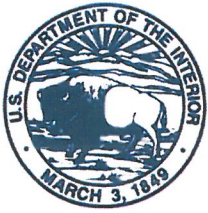
<b>Totals</b>						
	Real Estate	\$ -	0%	\$ -	\$ -	\$ -
	Total Construction Estimate	\$ 4,554,500	26%	\$ 1,204,819	\$ 5,759,319	
	Total Planning, Engineering & Design	\$ 100,000	11%	\$ 10,969	\$ 110,969	
	Total Construction Management	\$ 113,863	15%	\$ 17,407	\$ 131,270	
	<b>Total Excluding Real Estate</b>	<b>\$ 4,768,363</b>	<b>26%</b>	<b>\$ 1,233,195</b>	<b>\$ 6,001,558</b>	

Confidence Level Range Estimate (\$000's)	Base	50%	80%
		\$4,768k	\$5,508k

\* 50% based on base is at 5% CL.

**Fixed Dollar Risk Add:** (Allows for additional risk to be added to the risk analysis. Must include justification. Does not allocate to Real Estate.)

## **Appendix G. US Fish and Wildlife Draft Coordination Report**



United States Department of the Interior

FISH AND WILDLIFE SERVICE

646 Cajundome Blvd.

Suite 400

Lafayette, Louisiana 70506



September 21, 2017

Colonel Michael N. Clancy  
District Commander  
U.S. Army Corps of Engineers  
7400 Leake Avenue  
New Orleans, Louisiana 70118

Dear Colonel Clancy:

The U.S. Army Corps of Engineers (USACE), New Orleans District has proposed, under the authority of the Title VII of the Water Resources Development Act of 2007, to beneficially use dredged material from the Houma Navigational Canal (HNC) for marsh restoration. An Environmental Assessment (EA) for the project will evaluate the potential impacts of the designated disposal site for the placement and beneficial use of dredged material removed during maintenance dredging of the HNC. This draft report contains an analysis of the impacts on fish and wildlife resources that would result from the implementation of the proposed project and provides recommendations to minimize adverse project impacts while maximizing beneficial project impacts on those resources. This draft report has been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and a copy of the report was provided to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF) for review and their comments will be included in the final report.

Wetland deterioration in Terrebonne Parish has been caused by anthropogenic factors, such as leveeing, canal dredging, gas and oil exploration, as well as natural processes such as eustatic sea level rise, subsidence, saltwater intrusion, and erosion. The LCA BUDMAT program was authorized to help fund the beneficial use of dredged material from federally-maintained waterways in coastal Louisiana. The program is only utilized for ecosystem restoration projects that are beyond the scope of disposal activities covered under the USACE Operations and Maintenance (O&M) dredging program Federal Standard. The program is authorized at \$100 million, and funds have been appropriated for the HNC project in partnership with Louisiana Coastal Planning and Restoration Authority (CPRA).

The objectives for the LCA HNC BUDMAT Project are to create emergent marsh habitat adjacent to the Houma Navigational Canal in coordination with the USACE O&M dredging program. Dredged material removed during routine maintenance of the lower HNC, between miles 8.5 and 5.5, would be pumped through pipelines to the project area and placed at identified locations outside of the Federal Standard. The area identified for the HNC BUDMAT project is located south of Cocodrie, Louisiana, and adjacent to the HNC.



## STUDY AREA

The LCA HNC BUDMAT Project area is located in Terrebonne Parish, Louisiana and approximately 25 miles south of Houma and approximately 1.5 miles southwest of the community of Cocodrie (Figure 1). The project area is the open water and surrounding marsh of north Terrebonne Bay. The vegetation in the study area is classified as saline marsh (O’Neil 1949; Chabreck and Linscombe 1997, 2007; Sasser et al. 2014). Soils in the area 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. Although many plants can tolerate a periodically flooded substrate, few can tolerate the combined stresses of flooding and high salinity. The dominant species in the saline marshes of the project area is saltmarsh cordgrass, a perennial grass that grows from extensive rhizomes. Saltmarsh cordgrass also dominates the high marsh areas subject to intermittent flooding, although the highly salt-tolerant salt grass, black needle rush, and glassworts are also frequently present. Aquents dredged soils are associated with canal spoil banks and support a scrub-shrub community. Salt tolerant shrubs including wax myrtle, marsh elder, eastern baccharis, giant reed (*Phragmites* spp.), and saltmeadow cordgrass occur on these higher ridges. Although submerged aquatic vegetation is rare, intertidal mud flats and oyster reefs are relatively common in project-area saline marshes.

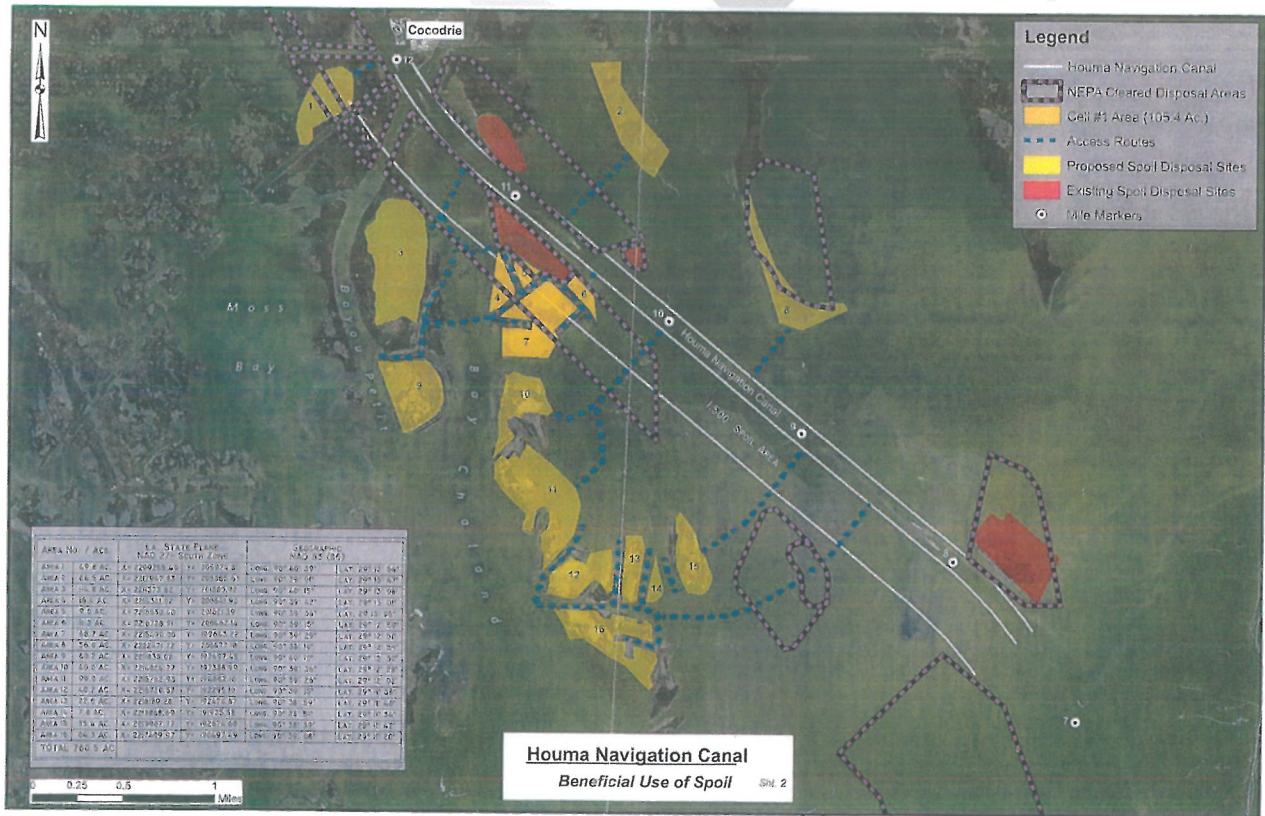


Figure 1. All sites considered for LCA HNC BUDMAT project.



## FISH AND WILDLIFE RESOURCES

The saline marshes and ridges in the project area provide habitat for federal trust species including wading birds, waterfowl, and neotropical migrants. The saline waters of the study area support many commercially and recreationally important finfishes and shellfishes. Marsh in the project area provides important habitat for the growth and production of estuarine-dependent species such as blue crab, white shrimp, brown shrimp, Gulf menhaden, Atlantic croaker, spot, red drum, black drum, sand seatrout, spotted seatrout, southern flounder, striped mullet, and other finfishes. Commercial shrimp harvests have been positively correlated with the area of tidal emergent wetlands (Turner 1977 and 1982). Future commercial harvests of shrimp and other fishes and shellfishes would likely be adversely impacted by losses in marsh habitat (Turner 1982). Extensive oyster reefs in the project area provide refuge and food for many aquatic species. Their ecosystem services and harvest are important to the local economy. Other wildlife in the project area include: swamp rabbit, nutria, muskrat, mink, river otter, raccoon, and marsh rice rat.

## FUTURE FISH AND WILDLIFE RESOURCES

The Terrebonne Bay is generally experiencing high rates of land loss due to subsidence, erosion, etc., with localized areas of stability and marsh progradation. Couvillion et al. (2017) described the Terrebonne basin as having the greatest land area lost of all Louisiana basins studied between 1932 and 2016. An estimated 502 square miles (321,280 acres) were lost, a decrease of 29% from the 1932 land area. The loss of marsh acreage would result in less foraging, protection, nesting, etc., resources for fish and wildlife. This further leads to declines in the fish and wildlife populations.

### Threatened and Endangered Species and Migratory Birds

Federally-listed threatened and endangered species that could be encountered in the project area are the endangered West Indian manatee (*Trichechus manatus*), the threatened piping plover (*Charadrius melodus*), and the threatened red knot (*Calidris canutus rufa*), and sea turtles (the USACE should consult with the NMFS; that agency is responsible for aquatic marine threatened or endangered species that occur in the marine environment. Please contact Eric Hawk (727/824-5312) at the NMFS Regional Office in St. Petersburg, Florida, for information concerning those species in the marine environment.). The USACE should consult with the Service regarding any potential impacts to those species and include any Service-recommended protective measures in their work plan.

The endangered West Indian manatee (*Trichechus manatus*) is known to regularly occur in Lakes Pontchartrain and Maurepas and their associated coastal waters and streams. It also can be found less regularly in other Louisiana coastal areas, most likely while the average water temperature is warm. Based on data maintained by the Louisiana Natural Heritage Program (LNHP), over 80 percent of reported manatee sightings (1999-2011) in Louisiana have occurred from the months of June through December. Manatee occurrences in Louisiana appear to be increasing and they have been regularly reported in canals within the adjacent coastal marshes of southeastern Louisiana. Manatees may also infrequently be observed in the Mississippi River and coastal areas of southwestern Louisiana. Cold weather and outbreaks of red tide may adversely affect these animals. However, human activity is the primary cause for declines in species number due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution.

During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable. The following additional protective measures should be included in any contract for work in areas where the manatee is found:

- All on-site personnel are responsible for observing water-related activities for the presence of manatee(s). We recommend the following to minimize potential impacts to manatees in areas of their potential presence:
- All work, equipment, and vessel operation should cease if a manatee is spotted within a 50-foot radius (buffer zone) of the active work area. Once the manatee has left the buffer zone on its own accord (manatees must not be herded or harassed into leaving), or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in-water work can resume under careful observation for manatee(s).
- If a manatee(s) is sighted in or near the project area, all vessels associated with the project should operate at “no wake/idle” speeds within the construction area and at all times while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom. Vessels should follow routes of deep water whenever possible.
- If used, siltation or turbidity barriers should be properly secured, made of material in which manatees cannot become entangled, and be monitored to avoid manatee entrapment or impeding their movement.
- Temporary signs concerning manatees should be posted prior to and during all in-water project activities and removed upon completion. Each vessel involved in construction activities should display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8½ " X 11" reading language similar to the following: “CAUTION BOATERS: MANATEE AREA/ IDLE SPEED IS REQUIRED IN CONSRUCTION AREA AND WHERE THERE IS LESS THAN FOUR FOOT BOTTOM CLEARANCE WHEN MANATEE IS PRESENT”. A second temporary sign measuring 8½ " X 11" should be posted at a location prominently visible to all personnel engaged in water-related activities and should read language similar to the following: “CAUTION: MANATEE AREA/ EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION”.

Collisions with, injury to, or sightings of manatees should be immediately reported to the Service’s Louisiana Ecological Services Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821). Please provide the nature of the call (i.e., report of an incident, manatee sighting, etc.); time of incident/sighting; and the approximate location, including the latitude and longitude coordinates, if possible.



The piping plover (*Charadrius melodus*), federally listed as a threatened species, is a small (7 inches long), pale, sand-colored shorebird that winters in coastal Louisiana and may be present for 8 to 10 months annually. Piping plovers arrive from their northern breeding grounds as early as late July and remain until late March or April. They feed on polychaete marine worms, various crustaceans, insects and their larvae, and bivalve mollusks that they peck from the top of or just beneath the sand. Piping plovers forage on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse emergent vegetation. They roost in unvegetated or sparsely vegetated areas, which may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. They also forage and roost in wrack (i.e., seaweed or other marine vegetation) deposited on beaches. In most areas, wintering piping plovers are dependent on a mosaic of sites distributed throughout the landscape, because the suitability of a particular site for foraging or roosting is dependent on local weather and tidal conditions. Plovers move among sites as environmental conditions change, and studies have indicated that they generally remain within a 2-mile area. Major threats to this species include the loss and degradation of habitat due to development, disturbance by humans and pets, and predation.

On July 10, 2001, the Service designated critical habitat for wintering piping plovers (Federal Register Volume 66, No. 132); a map of the seven critical habitat units in Louisiana can be found at <http://criticalhabitat.fws.gov/crithab>. Their designated critical habitat identifies specific areas that are essential to the conservation of the species. The primary constituent elements for piping plover wintering habitat are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support those habitat components. Constituent elements are found in geologically dynamic coastal areas that contain intertidal beaches and flats (between annual low tide and annual high tide), and associated dune systems and flats above annual high tide. Important components (or primary constituent elements) of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting plovers

The red knot (*Calidris canutus rufa*), federally listed as a threatened species, is a medium-sized shorebird about 9 to 11 inches (23 to 28 centimeters) in length with a proportionately small head, small eyes, short neck, and short legs. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage. Non-breeding plumage is dusky gray above and whitish below. The red knot breeds in the central Canadian arctic but is found in Louisiana during spring and fall migrations and the winter months (generally September through May).

During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots forage on beaches, oyster reefs, and exposed bay bottoms, and they roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams (*Donax variabilis*), a frequent and often important food resource for red knots, are common along many gulf beaches. Major threats to this species along the Gulf of Mexico include the loss and degradation of habitat due to erosion, shoreline stabilization, and development; disturbance by humans and pets; and predation



building, or improvement of any kind including without limitation, boat ramps, docks, piers, utilities, pipelines, cables, trails, footbridges, roads, signs, billboards, communication facilities, towers and conduits, aircraft landing strips, and other similar facilities; (b) any industrial, commercial, residential, and/or agricultural uses, including but not limited to, all methods of production and management of livestock (no housing, feeding, training, or maintaining), crops, orchards, trees and other vegetation (no horticultural or floricultural activities), except as otherwise provided for herein; (c) the use or operation of vehicles and watercraft, including but not limited to, marsh/swamp buggies, air boats, off-road vehicles, 4-wheel drive vehicles, all-terrain vehicles, and other similar vehicles; (d) the use of the surface of the Property for the exploration, drilling, mining, production, development, extraction, excavation or removal of oil, gas, hydrocarbons, petroleum products, coal, or other minerals, soil, sand, gravel, rock, loam, peat, or sod; (e) filling, excavating, dredging, removing, channeling, leveling, diking, draining, impounding, diverting water, or any other alteration to the surface of the Property; (f) landfilling, dumping, and placing substances or materials such as trash, waste, sewerage, debris, soil or other fill material, or unsightly or offensive materials on the Property; (g) planting, mowing, removing, defoliating, destroying, burning, trimming, or cutting of trees, shrubs, underbrush or other vegetation or any other means of altering grasslands, marshlands, wetlands, or other natural habitat; (h) the use and application of fertilizers, chemicals, pesticides or biological controls; (i) disturbing or interfering with nesting or brood-rearing activities of migratory birds, threatened or endangered species, and other critical habitat; and (j) any and all activities that are detrimental to erosion control, soil conservation, wetlands, marsh, cheniers, ridges, fish and wildlife habitat preservation, ecosystem restoration, or the Project purposes.

The Grantor reserves unto itself, and its heirs, successors, assigns, transferees or lessees all such rights and privileges in the Property that may be used without interfering with or abridging the rights and Easement rights hereby acquired or the purposes or features of the Project; subject to existing easements for public roads, highways, public utilities, railroads and pipelines. Such reservation shall include, but not be limited to the rights to engage in aquaculture uses and to engage in and conduct the following recreational activities and uses: (a) hunting and trapping, including fur-bearing animals, (b) alligator egg harvesting, (c) fishing, crabbing, shrimping, and oystering, provided, however that such activities, uses, occupation, and enjoyment of the Property shall not unreasonably interfere with the lawful rights and activities of the Grantee pursuant to this Agreement. The Grantor expressly reserves the right to directional drill, from adjacent waters and/or lands not subject to this Easement, for the purpose of extracting oil, gas, hydrocarbons, petroleum products, coal, or minerals from beneath the surface of the Property subject to this Easement, provided that such directional drilling does not impact or interfere with the Project features or purposes.

In accordance with the Migratory Bird Treaty Act of 1918 (as amended), please be 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. Brown pelicans are known to nest on barrier islands and other coastal islands in Lafourche, and Terrebonne Parishes.
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, we recommend 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).

#### Essential Fish Habitat

The project may be located within an area identified as Essential Fish Habitat (EFH) by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, Magnuson-Stevens Act; P.L. 104-297). The USACE should consult with NMFS regarding EFH to ensure conservation of such habitat.

#### Species of Management Concern

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, Louisiana-eyed silk moth, glossy ibis, seaside sparrow, black rail, mottled duck, and the peregrine falcon.

## DESCRIPTION OF TENTATIVELY SELECTED PLAN AND EVALUATED ALTERNATIVES

Through coordination between the USACE Project Delivery Team (PDT) and the non-federal sponsor (CPRA) the following initial list of alternatives was developed. Additional review of these alternatives was conducted by the Service and other natural resource agencies.

The choice of the Tentatively Selected Plan was informed by a draft geotech report prepared for CPRA by Eustis Engineering, dated 7 February 2017 (EUSTIS ENGINEERING PROJECT NO. 23054). Dredge material to be used for marsh creation is described as primarily very fine silts and clays that will not settle out quickly and remain in suspension for some time. Concerns about the amount of material being able to fill the alternative sites, the time needed for suspended material to settle, and the fine particles affecting oyster resources in the area led to the decision of the TSP.

Additional concerns arose from CPRA about increased future erosion potential at Site 3. Due to its more direct exposure to Terrebonne Bay and the HNC, they were concerned fetch, wave action, and boat traffic would degrade the site at a higher rate than other alternatives. The TSP and Site 1A are flanked by pipeline canals and associated spoil banks which could offer more protection from erosion.

### **Tentatively Selected Plan (TSP): LCA HNC BUDMAT; Site 1 marsh creation with nourishment of existing marsh**

For this alternative, material dredged from the Houma Navigational Canal will be placed confined into the 49.8 acre Site 1 at an elevation of +4.5' to +5.0' North American Vertical Datum (NAVD)88 for marsh creation. Dredging will be performed by a cutterhead dredge and the material transported via long distance pipeline transport. It is estimated that approximately four (4) dredge material placement lifts, with at least 2-3 days of dewatering between lifts in order to allow for solids to settle out, would be required in order to achieve an elevation conducive to marsh creation.

Using a barge mounted dragline, earthen weirs and retention and deflection dikes will be constructed around Site 1 and the existing marsh to the north of the site. A 3,610 linear foot retention dike will be built around the south of Site 1 using material from within the site. A 2,020 linear foot deflection dike will be built to the northeast of Site 1A (along the existing marsh and Site 1) using material from within Site 1A. Both dikes will be at an elevation of +6.5 NAVD88. A 2,820 linear foot earthen weir around the existing marsh to the north of Site 1 will be built to an elevation of +4.75' NAVD88 to allow for the dewatering of Site 1 and capture of fine suspended sediment. See Figure 2 for dike layout plan. All dikes will be built with a 5' crown width and slopes of 1 Vertical (V) on 4.25 Horizontal (H) for the marsh creation and flood side. Due to the poor soil conditions within Site 1, a foundation geotextile fabric will be installed under the earthen retention dikes, closures and weir in order to assist in construction of these retention features.



The estimated acres of impacts for all retention features, based off of the proposed dike and weir design footprints are:

- 7.1 acres (retention dikes and closures within Site 1);
- 4.0 acres (retention/deflection dike within Site 1A); and
- 4.6 acres (earthen weir within Site 1).

It is unlikely that the borrow pits excavated within Site 1 for construction of the retention dikes, closures, and weir will be backfilled to an elevation conducive to wetland creation. As a result of this, approximately 14.8 acres of the total 49.8 acres available within Site 1 will likely remain a shallow water area upon completion of the project. Considering that the dike and weir within Site 1 will encompass approximately 11.7 acres, approximately 23.2 acres of wetlands would be created. Also, approximately 4.6 acres within Site 1A, that will be used as borrow for construction of the deflection dike, will receive no dredged material fill.

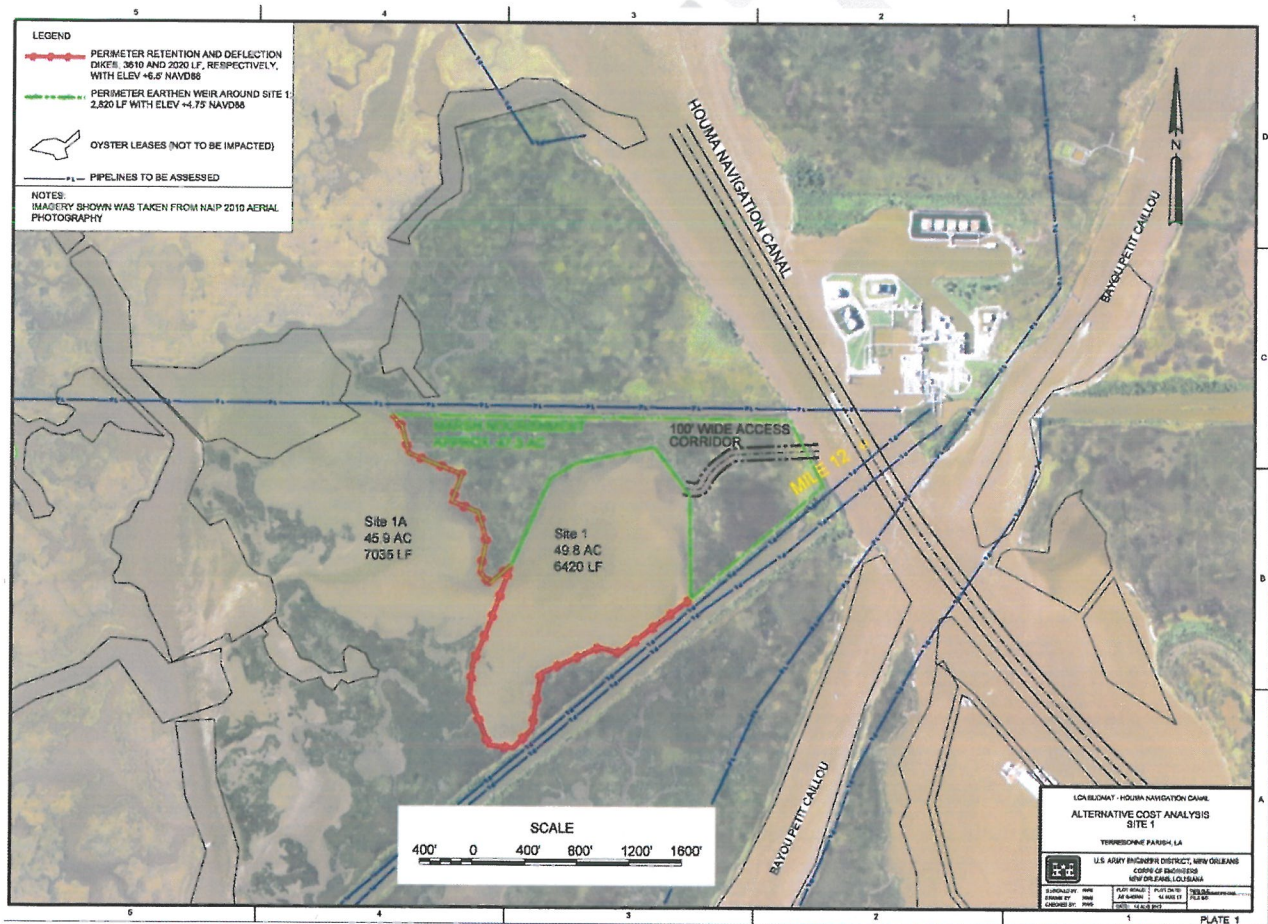


Figure 2. Tentatively Selected Plan (Site 1 Marsh Creation) dike and access corridor plan.

Access to Site 1 for dike construction requires the dredging of a 100' wide access channel from the HNC. The shell/crushed stone aggregate along the bankline of the HNC will be removed and temporarily stockpiled for reuse. The access channel will be constructed to a bottom width of 80' at elevation -8.0' NAVD88 and 1V on 2H side slopes. Stability berms of 20' would be maintained between the top of cut of the access channel and the temporary adjacent disposal. The access corridor that would be dredged through the bank line of the HNC and lead into Site 1 would cut through approximately 625' of existing wetlands where the potential width of the impact area



within this reach of the access channel would be approximately 390' per linear foot (approximately 5.6 acres). Upon completion of dike construction and upon demobilization of the dragline(s) from Sites 1 and 1A, the material that had initially been temporarily stockpiled from dredging of the access channel would then be pulled back from atop the marsh and back into the access channel in order to restore the area as best as possible to pre-existing conditions/grade.

**LCA HNC BUDMAT; Site 1 & 1A marsh creation with nourishment of existing marsh**

For this alternative, material dredged from the Houma Navigational Canal will be placed confined into the 49.8 acre Site 1 and 45.9 acre Site 1A (Figure 3). This alternative has the same dredging, dike construction, access channel, and marsh creation specifications as the TSP with two changes: the dike between Site 1 and 1A becomes an earthen weir and an earthen retention dike surrounds Site 1A for sediment retention. Dewatering of both sites would occur to the existing marsh to the north of Site 1 and northeast of Site 1A.

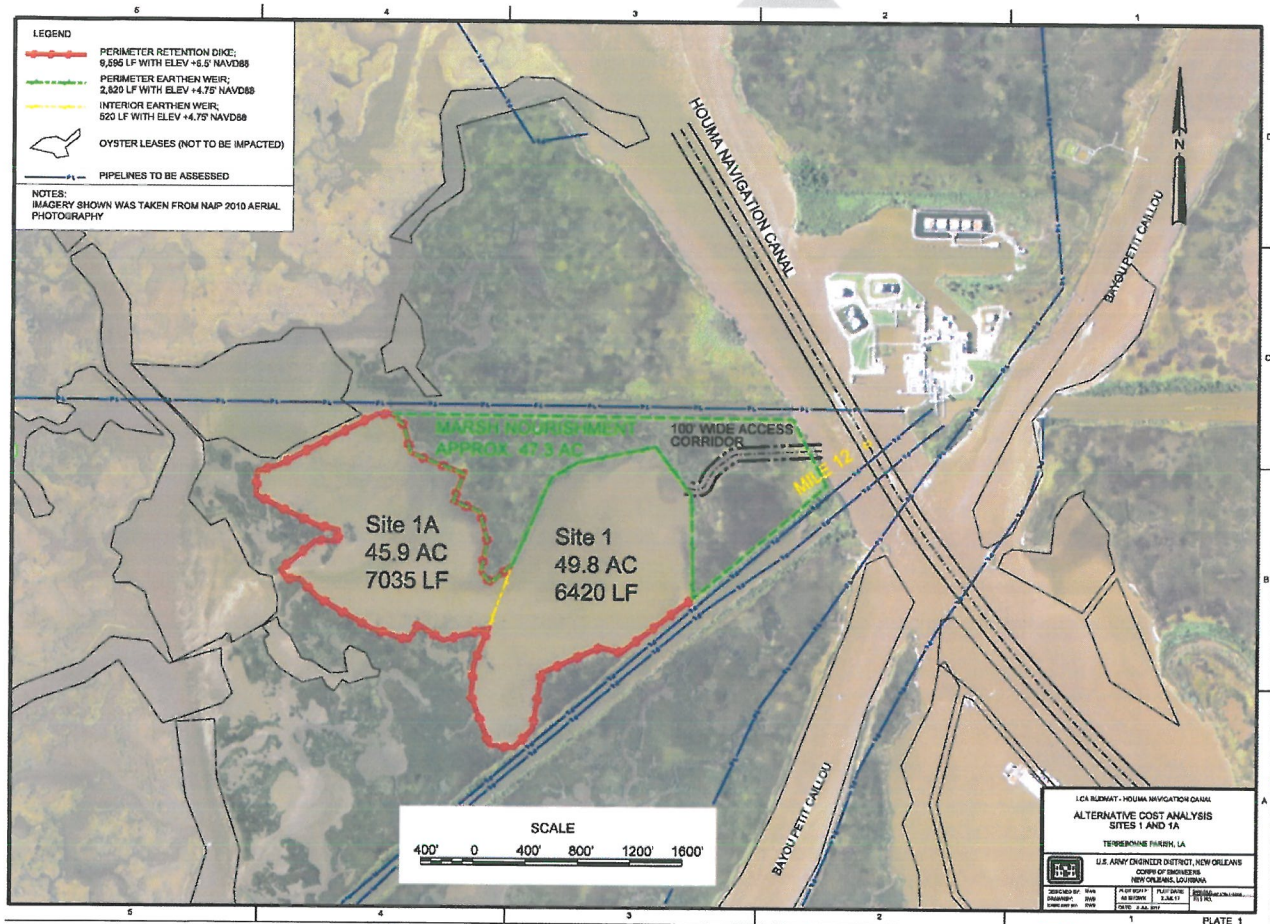


Figure 3. Alternative Site 1 & 1A marsh creation with nourishment of existing marsh map.

**LCA HNC BUDMAT; Site 3 marsh creation**

For this alternative, material dredged from the Houma Navigational Canal will be placed confined into the 113 acre Site 3 (See Figure 1). This alternative has the same dredging and marsh creation specifications as the TSP. An earthen retention dike would be constructed around the site at the same specifications as the TSP. Oyster leases within and around the project footprint would be bought by CPRA due to impacts from the pipeline for sediment transfer and creation of the marsh.



## EVALUATION METHODS FOR SELECTED PLAN AND ALTERNATIVES

### Wetland Value Assessment (WVA)

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 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 project would adversely impact fish and wildlife resources.

## **IMPACTS OF SELECTED PLAN AND ALTERNATIVES**

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 TSP 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. Though the total project AAHUs are higher with the larger acre alternatives, by choosing the TSP impacts to oyster resources and their associated benefits are minimized. The projected effects of the alternatives are summarized in Table 1 respectively.

**Table 1.** LCA HNC BUDMAT alternatives with associated acres and net AAHUs that would be generated.

Alternative	Marsh created by dredged material placement (acres)	Net marsh AAHUs	Marsh nourished by sediment captured in dewatering (acres)	Net nourishment AAHUs	Total project AAHUs
Site 1	34.15	21.5	18.3	2.69	24.19
Sites 1 & 1A	65.42	41.87	18.3	2.69	44.56
Site 3	77.48	48.73			48.73

### SERVICE POSITION AND RECOMMENDATIONS

The Service’s analysis of project alternatives considered for the study area has shown the potential for beneficial effects on fish and wildlife resources. Construction of the TSP (Site 1 Marsh Creation) is projected to create 34.15 acres of saline marsh over the 50 year life of the project for a net total 24.19 AAHUs. The net benefits of the other alternatives that were evaluated are listed in Table 1. The Service 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:

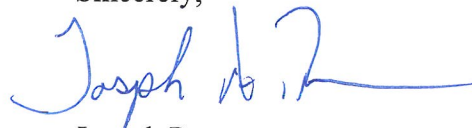
1. Avoid adverse impacts to water bird colonies through careful design project features and timing of construction. We recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season. For areas containing nesting wading birds (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.
2. 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.
3. 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.
4. 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.



5. If containment dikes are constructed, they should be breached or degraded to the settled elevations of the disposal area. Such breaches should be undertaken after consolidation of the dredged sediments and vegetative colonization of the exposed soil surface, or a maximum of 2 years after construction.
6. 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.
7. 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.
8. Any proposed change in project features or plans should be coordinated in advance with the Service, NMFS, LDWF, and LDNR
9. 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.
10. 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 project does not adversely affect any federally listed threatened or endangered species or their habitat.

We appreciate the opportunity to assist in the development of and provide comments on the LCA HNC BUDMAT project. We look forward to your response to our recommendations and to future coordination to further protect and restore fish and wildlife resources as more specific plans are developed. If you need further assistance or have questions regarding this letter, please contact Aline Morrow (337/291-3129) of this office.

Sincerely,



Joseph Ranson  
Field Supervisor  
Louisiana Ecological Services Field Office

cc: USACE, NOD, New Orleans, LA (Attn: Ms. Patricia Leroux)  
EPA, Dallas, TX  
NMFS, Baton Rouge, LA  
LDWF, Baton Rouge, LA  
LDNR, CMD, Baton Rouge, LA  
CPRA, Baton Rouge, LA

DRAFT

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**Appendix H. Real Estate Plan**

**DRAFT REAL ESTATE PLAN**

**Louisiana Coastal Area  
Beneficial Use of Dredge Material Program  
at  
HOUMA NAVIGATION CANAL  
Terrebonne Parish, Louisiana**

**October, 2017**

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## Exhibit A: Non-Standard Estate

## **1. PURPOSE OF THE REAL ESTATE PLAN**

This Draft Real Estate Plan (REP) presents the real estate requirements and costs for the Design and Implementation Report (DIR) for Louisiana Coastal Area Beneficial Use of Dredged Material Program (LCA BUDMAT) at Houma Navigation Canal (HNC). The information contained herein is tentative in nature for planning purposes only. The LCA BUDMAT Program, as authorized, consists of the beneficial use of materials dredged from authorized Federal navigation projects for purposes of ecosystem restoration in the Louisiana Coastal Area.

This Draft REP presents a preliminary plan for the acquisition of lands, easements and rights-of-way (LER) for the LCA BUDMAT Program HNC Project features and is in compliance with ER 405-1-12.

## **2. PROJECT AUTHORIZATION**

Restoration strategies presented in the 1998 report entitled "Coast 2050:Toward a Sustainable Coastal Louisiana," which evolved into the Louisiana Coastal Area 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 for LCA. The Report of the Chief of Engineers dated 31 January 2005 ("2005 Chief's Report") approved the Near-Term Plan substantially in accordance with the 2004 LCA Study and a Record of Decision signed 18 November 2005.

Title VII of the Water Resources Development Act of 2007 ("WRDA 2007") (PL 110-114) authorized an ecosystem restoration Program for the Louisiana Coastal Area 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 at a total cost of \$100,000,000.

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

### **SEC. 7006. CONSTRUCTION.**

#### **(d) BENEFICIAL USE OF DREDGED MATERIAL (BUDMAT).—**

**(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 19 December 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 Water Resources Development Act of 1992. Section 204 of the Water Resources Development Act of 1992 (PL 102-580), was later modified by Section 2037 of WRDA 2007, requiring all 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 Louisiana Coastal Area Beneficial Use of Dredged Material, 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.

The LCA BUDMAT Program, January 2010, Final Programmatic Study Report and Programmatic Environmental Impact Statement (2010 Report), a component of the 2004 LCA Study, was approved by the Director of Civil Works on 12 March 2010, the ASA (CW) signed a Record of Decision dated 13 August 2010. The 2010 Report recommended an implementation plan for the LCA Program that beneficially uses material dredged from federally maintained waterways. Funds from the BUDMAT Program are used for disposal activities associated with separate, cost-shared, individual ecosystem restoration beneficial use projects that are above and beyond the disposal activities that are covered under the USACE Operation 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.

The Design Agreement between the Department of the Army and the non-Federal Sponsor, Louisiana Coastal Protection and Restoration Authority Board (CPRAB) was executed on 14 Feb 2017 for the placement of material dredged during maintenance dredging of the Houma Navigation Canal Project.

Further details on authorization are in the main report.



#### **4. DESCRIPTION OF THE TENTATIVELY SELECTED PLAN**

The LCA BUDMAT – Houma Navigation Canal (HNC) Project calls for the creation and restoration of marsh within Site 1, located along the right descending bank of the HNC at approximate HNC Mile 12.0 and immediately northwest of Bayou Petit Caillou. The Marsh Creation Site 1 would be approximately 49.8 acres, and additional benefits may be obtained through the deposition of suspended sediments that would be allowed to overflow from an earthen weir that would be constructed along the north side of the Marsh Creation Site. The fine, suspended sediments that overflow the weir would enhance approximately 47.3 acres of existing marsh and shallow water areas immediately outside of and adjacent to Site 1 (see Figure 2 on the following pages).

In order to prevent impacts to oyster leases outside of and approximately 0.3 of a mile northwest of Site 1, earthen retention dikes would be constructed along the southern and western sides of Site 1, as well as a deflection dike to be constructed along the northeast side of alternative Site 1A. These dikes would be constructed immediately adjacent to and inside the existing marsh. Two earthen closures would also be required; one along the pipeline canal which falls south of and adjacent to the Marsh Creation Site, and the other within shallow open waters that divide Sites 1 and 1A. Retention dikes and weirs shall be constructed from borrow to be taken from inside the Marsh Creation Site. The deflection dike, to be constructed along the northeast side of alternative Site 1A, shall be constructed with borrow to be obtained from within Site 1A and adjacent to the proposed deflection dike.

The objective of this Project is to create and restore wetlands within Site 1 through the placement of dredged material that would be obtained during O&M dredging of the Terrebonne Bay reach of the HNC navigation project. The Terrebonne Bay reach extends from Mile 12 of the HNC to Mile 0.0 (beginning of the HNC bar channel and Cat Island Pass). Dredging would be performed by cutterhead dredge and in conjunction with a USACE O&M dredging contract. The dredged material would be hydraulically dredged and transported to Site 1 for wetland creation via long distance pipeline transport of the material that would be dredged between approximate Miles 8.5 and 5.5 of the HNC, Terrebonne Bay channel. Historically, maintenance dredging of Terrebonne Bay was warranted and performed every 2 to 3 years. However, due to federal funding constraints associated with the USACE O&M budget for this Project, USACE has not been able to maintain the channel to its full, authorized dimensions (including advance maintenance) on a regular basis. The HNC navigation project was last dredged in 2015, and is scheduled to be dredged in November of 2017.

#### **DREDGED MATERIAL RETENTION AND ACCESS**

The dredge discharge pipeline and dike construction equipment would access the site from the right descending bank of the HNC at approximate Mile 12.0. Based on the Draft Geotechnical Report (Draft 2017 Geotechnical Report) prepared for the CPRAB by Eustis

Engineering, dated 7 February 2017, retention dikes within Site 1 would have to be constructed to an elevation of between +6.0 ft. and +6.5 ft. NAVD88 in order to retain the dredged slurry while also preventing effluent sedimentation from impacting adjacent oyster leases West and NW of and adjacent to Site 1A.

Borrow for construction of these dikes would be obtained from within Sites 1 and 1A. According to the Draft 2017 Geotechnical Report, due to the poor soil conditions within Sites 1 and 1A, the design borrow pits, depths and offset locations from the required retention dikes could entail the construction of borrow pits as deep as (-)22 ft. NAVD88 (approximately 20 ft. below the existing mudline within Sites 1 and 1A), with 1V on 3H side slopes. The magnitude of work required here will require that the dikes be constructed via barge mounted dragline(s) which will access Sites 1 and 1A via a cut to be made through the bank line of the HNC. The access channel that would be cut through the bank line of the HNC would be constructed to a bottom width of 80 ft. at elevation (-)8.0 ft. NAVD88 and 1V on 2H side slopes. Stability berms of 20 ft. would be maintained between the top of cut of the access channel and the temporary adjacent disposal. The access corridor that would be dredged through the bank line of the HNC and lead into Site 1 would cut through approximately 625 ft. of existing wetlands where the potential width of the impact area within this reach of the access channel would be approximately 390 ft. Therefore, the potential temporary impacts to these wetlands as a result of this cut would be approximately 5.6 acres. Between the existing marsh and the eastern limit of Site 1, dredging for access to Site 1 would be performed over a length of approximately 590 ft. of open waters and material would be stockpiled atop the adjacent marsh and/or open waters. The potential width of the impact area within this reach of the access channel would be approximately 320 ft. This leads to a potential acreage impact for this portion of the access channel of approximately 4.3 acres (about half of which would be performed within open waters.) The total projected acres of temporary impact for the HNC bank line cut would be approximately 9.9 acres. Upon completion of dike construction and upon demobilization of the dragline(s) from Sites 1 and 1A, the material that had initially been temporarily stockpiled from dredging of the access channel would then be pulled back from atop the marsh and back into the access channel in order to restore the area as best as possible to pre-existing conditions/grade. It should be noted that geotechnical investigations of Site 1A have not been completed as of publication of this report. The final design is subject to change based on the geotechnical investigations and analysis of the soil conditions in Site 1A, as well as samples of the dredged material from the HNC.

In addition to the above, the bank line along the HNC through which this access channel would be dredged, is currently lined with shell/ crushed stone aggregate. When dredging through the bank line for access, the shell/crushed stone that falls within the access channel corridor would be removed and temporarily stockpiled for reuse. Upon completion of dike construction and demobilization from the access corridor, the gap through the bank will be closed off and the stockpiled shell/ crushed stone placed back atop the earthen closure. If necessary, additional crushed stone would be brought in from an offsite approved quarry location to assure that the closure is restored to pre-construction conditions.

As previously stated, earthen retention dikes would be constructed along the southern and western sides of Site 1, as well as the earthen deflection dike to be constructed along the northeast side of alternative Site 1A. The retention dikes would be supplemented by two earthen closures; one along the pipeline canal which falls south of and adjacent to Site 1, and the other within shallow open waters that divide Sites 1 and 1A, as well as an earthen weir that would be constructed along the north side of Site 1. The dike, closures, and weir would all be constructed immediately adjacent to and inside the existing marsh. Due to the poor soil conditions within Site 1, a foundation geotextile fabric will be installed under the earthen retention dikes, closures and weir in order to assist in construction of these retention features.

#### DREDGED MATERIAL PLACEMENT

Based on dredging Terrebonne Bay to its authorized dimensions, it is anticipated that approximately 575,000 cys (NET) and approximately 665,000 cys (GROSS) could be available between Miles 8.5 and 5.5 for placement within Site 1 for wetland creation. During O&M dredging, the dredge material would be placed within the proposed wetland creation area (Site 1), approximately 49.8 total acres in size. It is estimated that approximately 4 dredge material placement lifts would be required in order to achieve an elevation conducive to marsh creation.

Due to the character of the material that will be dredged from the HNC Terrebonne Bay Channel Reach under this Project, it is unlikely that the pits to be excavated within Site 1 for dredged material for the construction of the retention dikes, closures and weir will be backfilled to an elevation conducive to marsh creation. As a result of this, approximately 14.8 acres of the total 49.8 acres available within Site 1 will likely remain a shallow water area upon completion of the project. The dike and weir within Site 1 will encompass approximately 11.7 acres, thereby leaving approximately 23.2 acres of marsh that would be created. Also, approximately 4.6 acres within Site 1A, that will be used for dredged material for the construction of the deflection dike, will not be backfilled with dredge material.

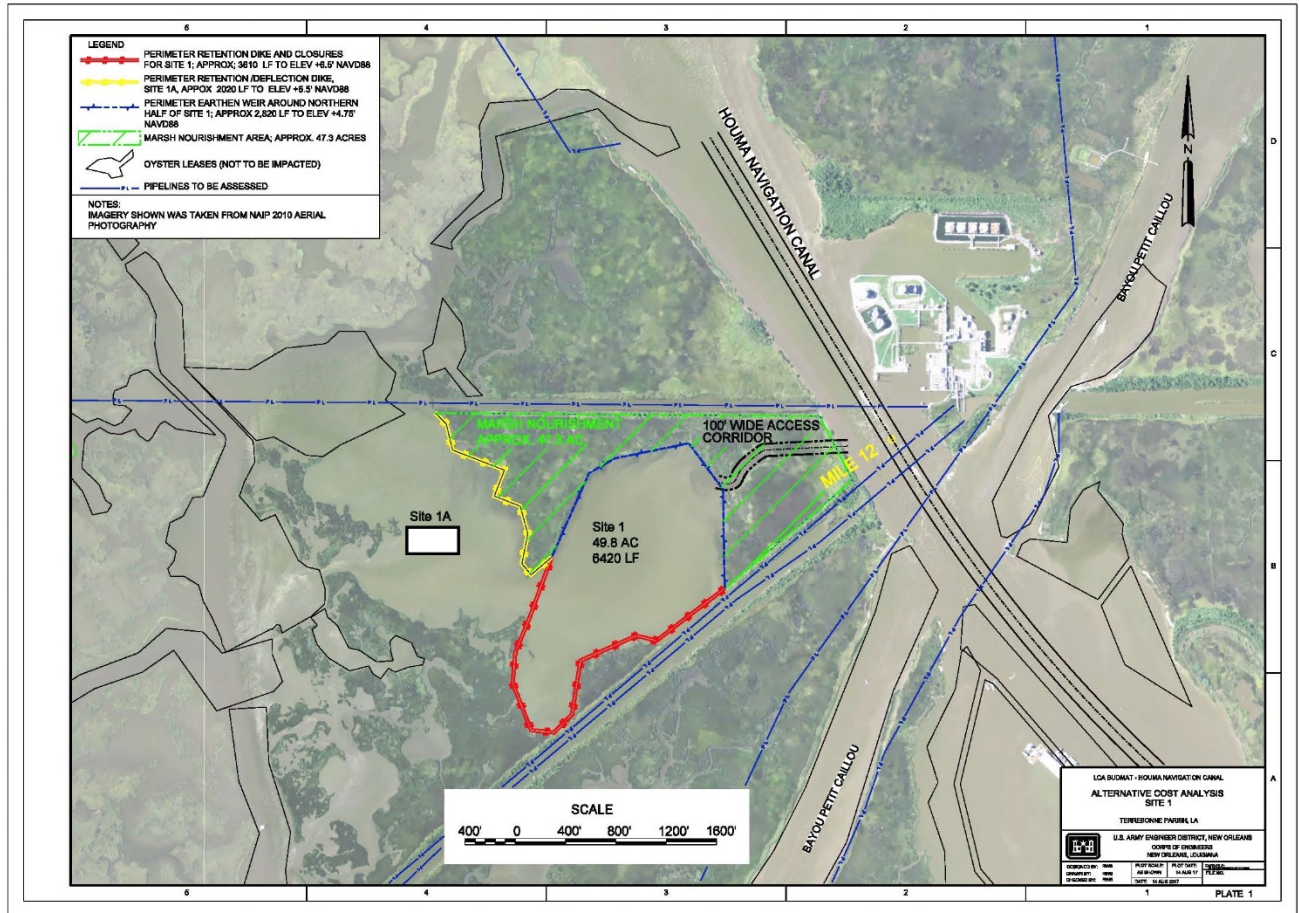


Figure 2 Recommended Plan – Flotation access channels will be excavated, as needed to allow construction equipment to access the placement areas, and will be replaced.

## 5. PROJECT MAPS



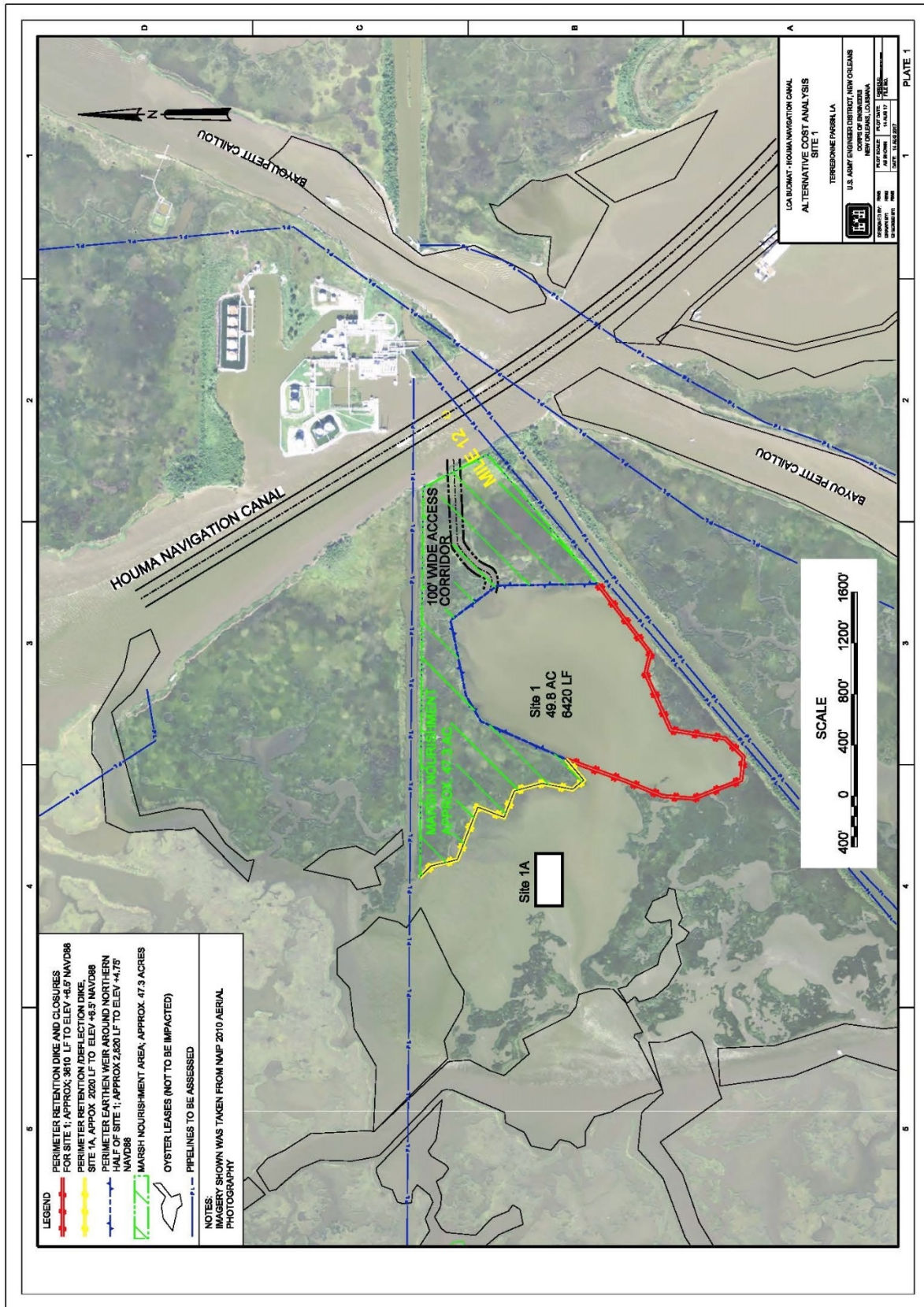


Figure 2 Recommended Plan (larger)





Figure 3: Approximate location of the Houma Navigation Canal (Terrebonne Bay Reach) and the LCA Budmat area (red polygon) with typical limits of dredging (white line) and Federal Standard open-water disposal areas (yellow-orange) used during routine channel maintenance.

## **6. NON-FEDERAL SPONSOR**

The Non-Federal Sponsor (NFS) for this Project is The Louisiana Coastal Protection and Restoration Authority Board (CPRAB). CPRA, the implementation and enforcement arm of CPRAB, is an agency for the State of Louisiana that was created by legal mandate (P.L. 109-148 and LA Act 8 (2005)) for the purpose of coordinating state, local and Federal agency efforts to achieve long-term coastal restoration and hurricane protection.

Title VII of WRDA 2007 contained specific crediting provisions for work-in-kind performed by the NFS under the LCA Program. Section 7007 of WRDA 2007 (PL 110-114), provides authority to afford credit for work in-kind contributions provided by the NFS for the design of the Project that are determined to be integral to the 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 Water Resources and Reform Act of 2014 amended Section 7007 of WRDA 2007, to authorize credit, in accordance with Section 221 of the Flood Control Act of 1970, as amended 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. For this 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 20 Oct 2016. 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.

The Non-Federal Sponsor (NFS) will be responsible for providing the lands, easements and rights-of-way (LER) for project construction and will be responsible for Operation, Maintenance, Repair, Replacement, and Rehabilitation.

A NFS Capability Assessment will be executed and included in the Final Real Estate Plan. In previous assessments, CPRAB has been found to be highly capable of performing acquisition of LER. CPRAB will be notified in writing of the risks of acquiring LER before execution of the PPA.

## **7. LANDS, EASEMENTS AND RIGHTS-OF-WAY**

Dredged material for marsh creation will be removed during routine maintenance dredging from the Houma Navigation Canal in waters of the United States; therefore no LER will be required for dredging.

Lands required: Non-standard estate for Site 1 for marsh creation, dike & closures, earthen weirs and borrow; Temporary Work Area Easement for Site 1A for dike and borrow; and Temporary Work Area Easement for the Potential Sediment Overflow Area for potential sediment overflow, work area, pipeline, staging and access. See Table 1, "LER TO ACQUIRE" below.

**LER TO ACQUIRE**

SITE	ACREAGE	ESTATE	DESCRIPTION
1	49.8 total	Non-Standard Estate	Marsh creation
	7.1		Perimeter retention dike & closures - approx. 3610 LF
	4.6		Perimeter earthen weir – approx. 2820 LF
	8.3		Borrow (for retention dikes & closures)
	6.5		Borrow (for earthen weir)
1A	4	Temporary Work Area Easement	Perimeter retention/deflection dike – approx. 2020 LF
	4.6	Temporary Work Area Easement	Borrow (for deflection dikes)
Potential Sediment Overflow Area - North of site 1 (green)	47.3 total	Temporary Work Area Easement	Potential sediment overflow, work area, pipeline, staging and 100’ wide access corridor (HNC bank line cut)

**Table 1**

**8. ESTATES**

Standard Estate

**TEMPORARY WORK AREA EASEMENT**

A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_), for a period not to exceed Three (3) years, beginning with date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a borrow area, work area, including the right to borrow and/or deposit fill, spoil and waste material thereon, move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the LCA Budmat Houma Navigation Canal Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Non-Standard Estate

The non-standard estate attached in Exhibit “A” has been proposed, evaluated and approved by the NFS’s attorney and USACE Division, and is currently being reviewed by Headquarters.

The NFS, CPRAB, does not support acquisition of fee interest. CPRAB does not have the power of eminent domain; however, the CPRA, the implementation and enforcement arm of CPRAB, does have eminent domain authority. However, in June 2017, the Louisiana legislature signed Act 199 which is a revision of Louisiana Statute R.S. 49:214.5.5 which limits CPRA’s ability to exercise the power of eminent domain to only situations where

CPRAB determines that a full ownership interest is the minimum interest necessary to carry out the purposes of the project. Act 199 states “no full ownership interest in property shall be acquired for integrated coastal protection through any method by the state of Louisiana, the Coastal Protection and Restoration Authority, a levee district, a levee authority, a sponsoring authority, a political subdivision, or any other state, local or federal entity, or their agents or employees, including but not limited to compensatory mitigation and ecosystem restoration purposes, unless such interest is voluntarily offered and agreed to in writing by owners with at least seventy-five percent ownership in the property or such entity seeking to acquire the property proves by clear and convincing evidence in a court of competent jurisdiction that a full ownership interest in the minimum interest necessary to carry out the purposes of integrated coastal protection for the specific project for which it is acquired.” CPRAB has indicated they will not condemn for a fee estate and will not participate as a sponsor if the acquisition is determined to be fee.

**9. EXISTING FEDERAL PROJECTS WITHIN THE LER REQUIRED FOR THE PROJECT**

There are no existing federal projects within the LER required for the Project.

**10. FEDERALLY OWNED LANDS WITHIN THE LER REQUIRED FOR THE PROJECT**

There are no federally owned lands within the LER required for the project.

**11. NON-FEDERAL SPONSOR OWNED LER**

The Coastal Protection and Restoration Authority Board (CPRAB) does not own any LER needed for this project.

**12. INDUCED FLOODING**

There will be no induced flooding as a result of the Project.

**13. BASELINE COST ESTIMATES/CHART OF ACCOUNTS (COAS)**

The estimated total cost for Real Estate Acquisition for the Recommended Plan is \$82,000. This includes an estimated number of one landowner impacted. Costs include a 31% contingency (rounded) to account for uncertainty of title issues and any minor project changes during Preconstruction, Engineering & Design.

Estimated real estate costs are shown in Figure 4 below:

		AMOUNT	CONTINGENCY	PROJECT COST
	<b>ROUNDED</b>	<b>70,000</b>	<b>12,000</b>	<b>82,000</b>
	<b>TOTAL PROJECT COSTS</b>			
01	<b>LANDS AND DAMAGES</b>	69,600	12,400	82,000
01B	<b>ACQUISITIONS</b>			
01B10	BY GOVERNMENT		0	0
01B20	BY NON-FEDERAL SPONSOR (NFS)	14,450	0	14,450
01B30	BY GOVERNMENT ON BEHALF OF NON-FEDERAL SPONSOR (NFS)	0	0	0
01B40	REVIEW OF NFS	2,550	0	2,550
01C	<b>CONDEMNATIONS</b>			
01C10	BY GOVERNMENT	0	0	0
01C20	BY NON-FEDERAL SPONSOR (NFS)	0	0	0
01C30	BY GOVT ON BEHALF OF NON-FEDERAL SPONSOR (NFS)	0	0	0
01C40	REVIEW OF NFS	0	0	0
01E	<b>APPRAISAL</b>			
01E10	BY GOVT (IN HOUSE)		0	0
01E20	BY GOVT (CONTRACT)		0	0
01E30	BY NON-FEDERAL SPONSOR (NFS)	3,000	0	3,000
01E40	BY GOVT ON BEHALF OF NON-FEDERAL SPONSOR (NFS)	0	0	0
01E50	REVIEW OF NFS	1,000	0	1,000
01F	<b>PL 91-646 ASSISTANCE</b>			
01F10	BY GOVERNMENT	0	0	0
01F20	BY NON-FEDERAL SPONSOR (NFS)	0	0	0
01F30	BY GOVT ON BEHALF OF NON-FEDERAL SPONSOR (NFS)	0	0	0
01F40	REVIEW OF NFS	0	0	0
01G	<b>TEMPORARY PERMITS/LICENSES/RIGHTS-OF-ENTRY</b>			
01G10	BY GOVERNMENT	5,000	0	5,000
01G20	BY NON-FEDERAL SPONSOR (NFS)	0	0	0
01G30	BY GOVT ON BEHALF OF NON-FEDERAL SPONSOR (NFS)	0	0	0
01G40	REVIEW OF NFS	0	0	0
01G50	OTHER	0	0	0
01G60	DAMAGE CLAIMS	0	0	0
01N00	<b>FACILITY/UTILITY RELOCATIONS (Subordination Agreement)</b>	0	0	0
01R	<b>REAL ESTATE PAYMENTS</b>			
01R1	<b>LAND PAYMENTS</b>			
01R1A	BY GOVERNMENT	0	0	0
01R1B	BY NON-FEDERAL SPONSOR (NFS)	39,600	12,400	52,000
01R1C	BY GOVT ON BEHALF OF NON-FEDERAL SPONSOR (NFS)	0	0	0
01R1D	REVIEW OF NFS	0	0	0
01R2	<b>PL 91-646 ASSISTANCE PAYMENTS</b>			
01R2A	BY GOVERNMENT	0	0	0
01R2B	BY NON-FEDERAL SPONSOR (NFS)	0	0	0
01R2C	BY GOVT ON BEHALF OF NON-FEDERAL SPONSOR (NFS)	0	0	0
01R2D	REVIEW OF NFS	0	0	0
01R3	<b>DAMAGE PAYMENTS</b>			
01R3A	BY GOVERNMENT	0	0	0
01R3B	BY NON-FEDERAL SPONSOR (NFS)	0	0	0
01R3C	BY GOVT ON BEHALF OF NON-FEDERAL SPONSOR (NFS)	0	0	0
01R3D	REVIEW OF NFS	0	0	0
01R9	<b>OTHER</b>	0	0	0
01T	<b>LERRD CREDITING</b>			
01T20	ADMINISTRATIVE COSTS (By Gov't and NFS)	4,000	0	4,000

Figure 4: Cost Estimate – Chart of Accounts

**14. UNIFORM RELOCATION ASSISTANCE (PL 91-646, TITLE II AS AMENDED)**

There are no residential, commercial, industrial or habitable structures located within the Project Area; therefore, the provisions under Title II of Public Law 91-646, as amended, are not applicable.

**15. TIMBER/MINERAL/ROW CROP ACTIVITY**

The Louisiana Department of Natural Resources provides a Strategic Online Natural Resources Information System (SONRIS), which contains up-to-date information on oil & gas activity in the state of Louisiana. Review of this information has indicated that although there are oil and gas wells within the study area, there are none located within the project footprint.

There are no crops or merchantable timber affected by the Project.

**16. OYSTER LEASES**

Review of the information provided by Strategic Online Natural Resources Information system (SONRIS) and provided by CPRAB (NFS) indicate there are no oyster leases within the immediate Site 1 Area or the adjacent area north of Site 1. There are several oyster lease sites located within the 1,500 ft. perimeter of the site. Because there is a possibility this project may impact a lease, CPRAB has assessed the oyster resources within the perimeter of the project site (located on the northwest side of Site 1A).

**17. ZONING ORDINANCES**

There will be no application or enactment of zoning ordinances in lieu of, or to facilitate, acquisition of real estate interests in connection with the Project.

**18. ACQUISITION SCHEDULE**

The following acquisition schedule is based on the premise that the Project impacts one private landowner who is working with the NFS. The schedule below provides the total amount of time to complete the acquisition of real estate rights for the construction of the Project features based on the preliminary information available at this time. This schedule is only for purposes of this DIR.

1)	TOD, Mapping	1 month
2)	Obtain Title & Appraisals	2 months
3)	Negotiations	2 months
4)	Closing	2 months
5)	Approval of NSE	2 months

**19. FACILITY/UTILITY RELOCATIONS**

Preliminary investigations indicated that there are no utilities within the footprint of Site 1. There are pipelines in the area surrounding Site 1, but the existing utility pipelines within the project area will not be impacted, therefore there will be no relocations of any facility or utility as part of this Project.

Present Owner	Quantity	Size	Description
Hilcorp	Field		Field
Hilcorp	1	16"	NG, A
Kinder Morgan - TGP	1	6 "	SNG, A/ Within the buffer zones for areas 3 & 9
Kinetica	1	36"	NG, I/ 523Q-100 Within buffer zones - Areas 1A&1
TGN	1	26"	TO-T-2-5000-1
Tennessee Gas Pipeline (TGP)	1	26"	NG, I
Hilcorp	1	8"	CRD, P
TGP	2		NG/500-1 & 500-2
TGP	1	24"	523M-100
Texaco	1	8"	CRD
Stone Energy	1	8"	OIL, A
TOCE	1	2-2"	Flow

Ownership of the pipelines listed in the table above are within the project area and are shown on map below. They are not within the project footprint.

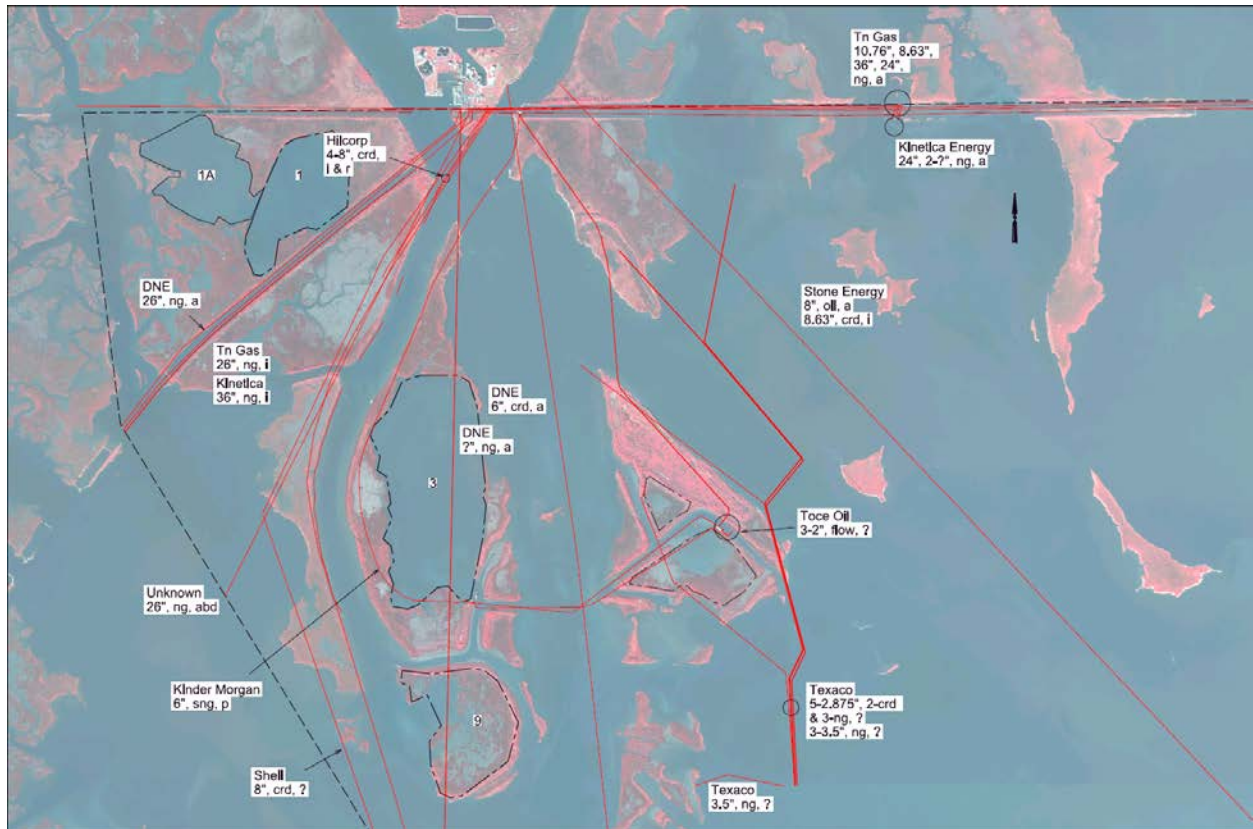


Figure 5: (above) Location of Pipeline Owners in the Vicinity of Site 1.



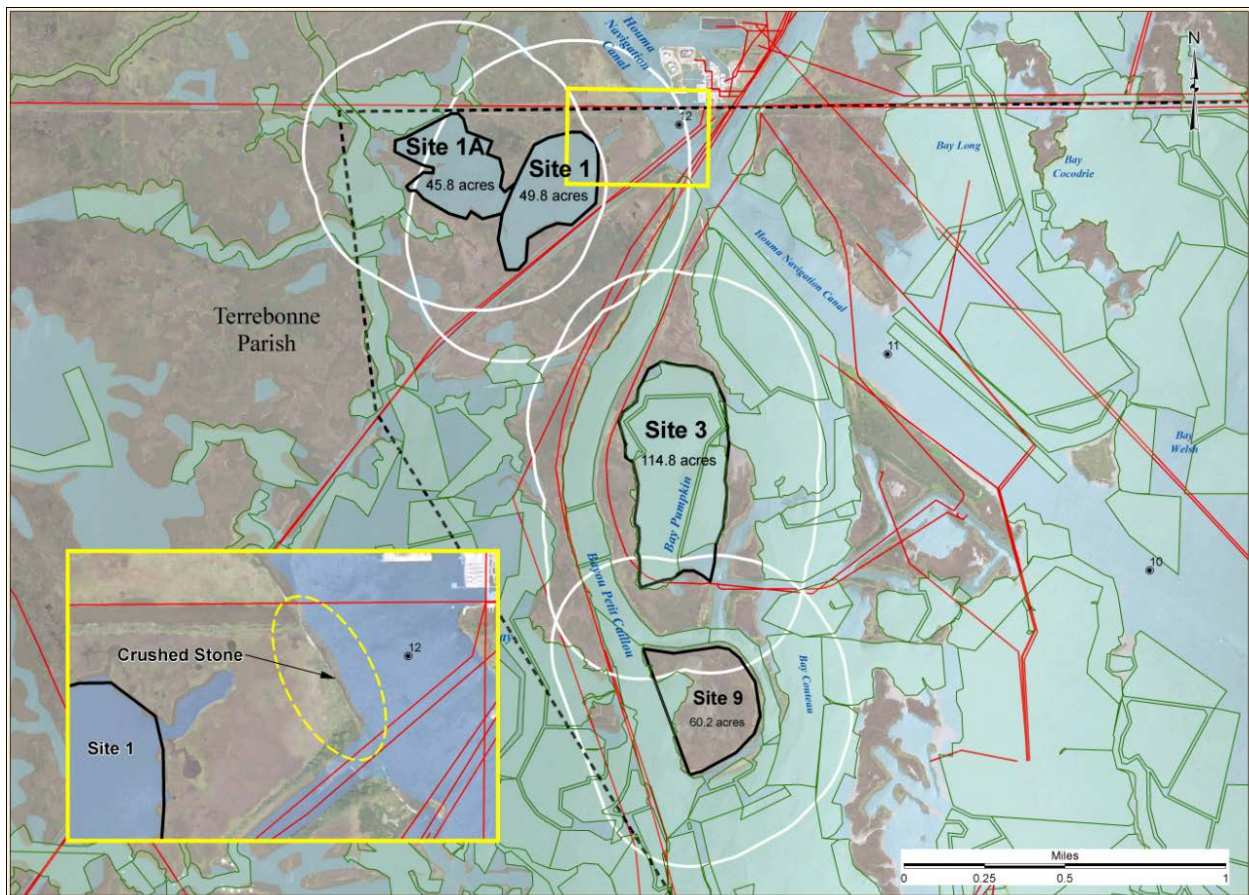


Figure 6: Map showing area associated with the crushed stone located near Site 1

ANY CONCLUSION OR CATEGORIZATION CONTAINED IN THIS REPORT THAT AN ITEM IS A UTILITY OR FACILITY RELOCATION TO BE PERFORMED BY THE NON-FEDERAL SPONSOR AS PART OF ITS LER RESPONSIBILITIES IS PRELIMINARY ONLY. THE GOVERNMENT WILL MAKE A FINAL DETERMINATION OF THE RELOCATIONS NECESSARY FOR THE CONSTRUCTION, OPERATION AND MAINTENANCE OF THE PROJECT AFTER FURTHER ANALYSIS AND COMPLETION AND APPROVAL OF AN FINAL ATTORNEY’S OPINION OF COMPENSABILITY FOR EACH OF THE IMPACTED UTILITIES AND FACILITIES.

**20. HAZARDOUS, TOXIC AND RADIOACTIVE WASTE**

The District is preparing an Environmental Assessment in October, 2017 to evaluate potential impacts of the designation of the disposal area for the placement and beneficial use of dredged material removed during maintenance dredging the Terrebonne Bay (bay channel). The findings of this Environmental Assessment indicates there are no significant adverse impacts and that the risk of encountering hazardous, toxic or radioactive material is low.

**21. NAVIGATION SERVITUDE**

The Federal navigation servitude is the dominant right of the Corps of Engineers under the Commerce Clause of the U.S. Constitution to use, control and regulate the navigable

waters of the United States and submerged lands thereunder for various commerce-related purposes.

The Houma Navigation Canal and Terrebonne Bay Channel are located within the navigable waters of the United States, and the material situated within this area represents materials dredged as a part of the O&M dredging of the Houma Navigation Canal project.

At present, the Corps of Engineers does not assert the Federal navigation servitude for purposes of ecosystem restoration, unless the ecosystem restoration activities are performed concurrently with the actions associated with the construction, operation or maintenance of an authorized Federal navigation project. In that event, the rights obtained for the maintenance of the authorized navigation project under the Federal Navigation Servitude will be extended to the implementation of the ecosystem restoration actions, but only in those areas where the rights of way needed for the ecosystem restoration project are the same as those needed for the maintenance operations on the Federal navigation project.

Although the proposed marsh creation sites are submerged marsh, the State of Louisiana does not claim these areas as State-owned lands/waterbodies. The sites are inundated and/or navigable, but they are not utilized in aid of commerce.

#### **U. LANDOWNER CONCERNS**

One private landowner of the marsh creation site will be affected and they are highly supportive of the Project. The attitude of landowners in the general area, in regards to dredging the navigable channels, is typically supportive for maintaining safe and efficient navigable channels for commercial and recreational activity. Generally, community support for coastal restoration projects is high.

Date: October 2, 2017

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**EXHIBIT A**  
**NON-STANDARD ESTATE**

**Ecosystem Restoration Easement**  
**Louisiana Coastal Area Beneficial Use of Dredged Material Program**  
**Houma Navigation Canal Project**  
**Terrebonne Parish, Louisiana**

A perpetual and assignable right, servitude, and ecosystem restoration easement ("Easement") on, over, and across [the land described in **Schedule A**] [Tract Nos. \_\_\_\_\_, \_\_\_\_\_, and \_\_,] ("Property" or "Easement Area") to the extent hereinafter set forth, for the construction, operation, maintenance, repair, replacement, rehabilitation, monitoring, and adaptive management of marsh and wetland habitat and related ecosystem restoration features, constructed in connection with the Louisiana Coastal Area, Beneficial Use of Dredged Material Program, Houma Navigation Canal Project ("Project" including "Project features and purposes"), generally authorized by Section 7006 (d) Title VII of the Water Resources Development Act of 2007, (Public Law 110-114), to be implemented on the Property to prevent any use of the Property that will impair, contravene, and/or interfere with the integrity, features, and/or purposes of the Project. In the event the Project is deauthorized by the federal government this Easement and all rights granted hereunder shall terminate. The Grantee shall have the right to construct, operate, maintain, repair, replace, rehabilitate, monitor, and adaptively manage the Project on the Property, which rights shall include the right to: (a) deposit dredged material, sediment, and/or other beneficial materials on the Property; (b) accomplish any alterations or contours on the Property to accommodate the materials deposited on the Property in connection with the Project and to perform necessary work for the prevention or remediation of damages to marsh, wetlands, habitat restoration, or other natural values; (c) install, construct, store, alter, maintain, repair, replace, relocate, and remove dikes, berms, fencing, monitoring devices, equipment, supplies, materials, warning or informational signs, notices, markers and other similar items related to the Project; (d) conduct surveys, borings, inspections, investigations, monitoring, adaptive management practices, and similar activities to evaluate the effectiveness of the Project, and/or to enhance, extend, periodically replenish and maintain the material deposited or placed on the Property, and/or to determine if the Grantor, or its successors, heirs, and assigns are complying with the covenants and prohibitions contained in this Easement; (e) plant, cause the growth of, nourish, replenish, manage, and maintain vegetation and control or remove invasive species; (f) prohibit human habitation; (g) prohibit the public use and occupancy of the Property that is detrimental to, or inconsistent with the Easement rights hereby acquired or the purposes and/or features of the Project; (h) proceed at law or in equity to enforce the provisions of this Easement to prevent the occurrence or re-occurrence of any of the prohibited activities set forth herein, and/or require the restoration of areas or features of the Property or the Project that may be damaged by any activity inconsistent with this Easement; and (i) prohibit any activity on, or use of, the Property that is detrimental to, or inconsistent with, the Easement rights hereby acquired or the purposes and/or features of the Project.

Without limiting the generality of the foregoing, the following activities and uses are expressly prohibited: (a) constructing, locating, placing, or installing any structure,

building, or improvement of any kind including without limitation, boat ramps, docks, piers, utilities, pipelines, cables, trails, footbridges, roads, signs, billboards, communication facilities, towers and conduits, aircraft landing strips, and other similar facilities; (b) any industrial, commercial, residential, and/or agricultural uses, including but not limited to, all methods of production and management of livestock (no housing, feeding, training, or maintaining), crops, orchards, trees and other vegetation (no horticultural or floricultural activities), except as otherwise provided for herein; (c) the use or operation of vehicles and watercraft, including but not limited to, marsh/swamp buggies, air boats, off-road vehicles, 4-wheel drive vehicles, all-terrain vehicles, and other similar vehicles; (d) the use of the surface of the Property for the exploration, drilling, mining, production, development, extraction, excavation or removal of oil, gas, hydrocarbons, petroleum products, coal, or other minerals, soil, sand, gravel, rock, loam, peat, or sod; (e) filling, excavating, dredging, removing, channeling, leveling, diking, draining, impounding, diverting water, or any other alteration to the surface of the Property; (f) landfilling, dumping, and placing substances or materials such as trash, waste, sewerage, debris, soil or other fill material, or unsightly or offensive materials on the Property; (g) planting, mowing, removing, defoliating, destroying, burning, trimming, or cutting of trees, shrubs, underbrush or other vegetation or any other means of altering grasslands, marshlands, wetlands, or other natural habitat; (h) the use and application of fertilizers, chemicals, pesticides or biological controls; (i) disturbing or interfering with nesting or brood-rearing activities of migratory birds, threatened or endangered species, and other critical habitat; and (j) any and all activities that are detrimental to erosion control, soil conservation, wetlands, marsh, cheniers, ridges, fish and wildlife habitat preservation, ecosystem restoration, or the Project purposes.

The Grantor reserves unto itself, and its heirs, successors, assigns, transferees or lessees all such rights and privileges in the Property that may be used without interfering with or abridging the rights and Easement rights hereby acquired or the purposes or features of the Project; subject to existing easements for public roads, highways, public utilities, railroads and pipelines. Such reservation shall include, but not be limited to the rights to engage in aquaculture uses and to engage in and conduct the following recreational activities and uses: (a) hunting and trapping, including fur-bearing animals, (b) alligator egg harvesting, (c) fishing, crabbing, shrimping, and oystering, provided, however that such activities, uses, occupation, and enjoyment of the Property shall not unreasonably interfere with the lawful rights and activities of the Grantee pursuant to this Agreement. The Grantor expressly reserves the right to directional drill, from adjacent waters and/or lands not subject to this Easement, for the purpose of extracting oil, gas, hydrocarbons, petroleum products, coal, or minerals from beneath the surface of the Property subject to this Easement, provided that such directional drilling does not impact or interfere with the Project features or purposes.