(1) COUNCIL MEMBER APPLICANT AND PROPOSAL INFORMATION SUMMARY SHEET

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Project Identification

Project Title: Beneficial Use of Dredged Material to Create Emergent Tidal Marsh in Upper Mobile Bay	Project
State(s): Alabama	County/City/Region: Mobile County

General Location: *Projects must be located within the Gulf Coast Region as defined in RESTORE Act. (attach map or photos, if applicable)*
Within the coastal zone boundaries of the Alabama Coastal Zone Management Program

Project Description

RESTORE Goals: *Identify all RESTORE Act goals this project supports. Place a **P** for Primary Goal, and **S** for secondary goals.*

- P Restore and Conserve Habitat
- S Restore Water Quality
- S Restore and Revitalize the Gulf Economy
- S Replenish and Protect Living Coastal and Marine Resources
- S Enhance Community Resilience

RESTORE Objectives: *Identify all RESTORE Act objectives this project supports. Place a **P** for Primary Objective, and **S** for secondary objectives.*

- P Restore, Enhance, and Protect Habitats
- S Restore, Improve, and Protect Water Resources
- S Protect and Restore Living Coastal and Marine Resources
- S Restore and Enhance Natural Processes and Shorelines
- S Promote Community Resilience
- S Promote Natural Resource Stewardship and Environmental Education
- S Improve Science-Based Decision-Making Processes

RESTORE Priorities: *Identify all RESTORE Act priorities that this project supports.*

- x Priority 1: Projects that are projected to make the greatest contribution
- x Priority 2: Large-scale projects and programs that are projected to substantially contribute to restoring
- x Priority 3: Projects contained in existing Gulf Coast State comprehensive plans for the restoration ….
- x Priority 4: Projects that restore long-term resiliency of the natural resources, ecosystems, fisheries …

RESTORE Commitments: *Identify all RESTORE Comprehensive Plan commitments that this project supports.*

- x Commitment to Science-based Decision Making
- x Commitment to Regional Ecosystem-based Approach to Restoration
- x Commitment to Engagement, Inclusion, and Transparency
- x Commitment to Leverage Resources and Partnerships
- x Commitment to Delivering Results and Measuring Impacts

RESTORE Proposal Type and Phases: *Please identify which type and phase best suits this proposal.*

___Project x Planning ___Technical Assistance x Implementation X Program

Project Cost and Duration

Project Cost Estimate: **Total** : $27.5 M **Phase 1** – Design $2.5M **Phase 2** – Containment Construction $25M	**$**_____	**Project Timing Estimate**: Date Anticipated to Start: May / 2015 Time to Completion: 3 years months / years* Anticipated Project Lifespan: 50 years * Phase 1 – 18 mos; Phase 2 - 18 mos

(2) Executive Summary

The Mobile Bay and watershed covers two thirds of the state of Alabama and portions of Mississippi, Georgia, and Tennessee and is the fourth largest watershed in the United States (U.S.) in terms of flow volume and is the sixth largest river system in the U.S. in terms of area. The Port of Mobile lies at the head of Mobile Bay and is the only deep-water port in Alabama. The USACE, Mobile District has the responsibility for maintenance of the federally authorized Mobile Harbor navigation project. The main Mobile Bay channel consists of a 45-foot by 400-foot channel from the mouth of the Bay extending 29 miles northward to the mouth of Mobile River. This stretch of channel has typically been dredged using hopper dredging equipment with disposal of the material in the approved Mobile-North Ocean Dredged Material Disposal Site (ODMDS) resulting in the permanent removal of approximately 4 million cubic yards of sediment from the Bay's sediment system. The Water Resources Development Act of 1996 authorized consideration of alternatives to disposing dredged material for the Mobile Harbor Federal navigation project that includes other environmentally acceptable alternatives including beneficial uses and environmental restoration. Establishing a beneficial use (BU) program and strategy for Mobile Bay will contribute to much-needed conservation of various ecological resources that exist in the Bay system.

In 2011 the Mobile Bay Interagency Working Group (IWG) was established to evaluate and provide guidance pertaining to alternative sediment management practices in Mobile Bay. The IWG consisting of the local, State and Federal agencies as well as various non-governmental groups such as the Mobile Bay NEP, TNC, MS-AL Sea Grant, and the Dauphin Island Sea Lab. One of the main recommendations from the IWG involves the beneficial use (BU) of dredged material to achieve environmental restoration utilizing semi-containment methods associated with maintenance of Mobile Bay navigation channel. Establishing a long-term placement area in the upper Mobile Bay will result in the creation of a functional emergent tidal marsh by beneficially utilizing all the suitable material dredged from the Upper Harbor portion of the navigation project. The IWG recognizes this as an opportunity to extend BU activities to habitat restoration that provides valuable ecosystem services to the Bay. The effort builds upon activities already completed in support of the selection of the project's location and footprint. These activities include: detailed hydrographic survey, SAV survey, hydrodynamic modeling, preparation of a sediment budget, and cultural resources survey.

The intent is to establish a large scale semi-contained dredged material placement area to create approximately 1,200 acres of brackish tidal marsh and submerged aquatic vegetation (SAV) habitats in northern Mobile Bay. All efforts towards moving forward with this project will continue to be coordinated through the IWG. Key elements of this strategy emphasize the connection between maintenance dredging requirements of the Bay channel, beneficial uses for purposes of ecological restoration, and regional sediment management methods. This will be accomplished by constructing a large (~1,200 acre) low profile, semi-contained marsh cells constructed using sandy material from confined disposal areas along the Black Warrior-Tombigbee (BWT) navigation waterway (**Figure 3**). Once constructed, the cells will be incrementally filled with fine grain sediments from dredging and maintenance of the upper Mobile Harbor navigation project and vegetated with tidal emergent vegetation from near by donor sites.

Comprehensive Plan Goals and Objectives. The primary goal of this project is to restore and conserve habitat by creating and restoring an estimated 1,200 acres of estuarine tidal marsh through the placement of readily available sediment material from the Mobile Bay navigation channel, ASPA terminals, and local private dredging activities into the upper bay BU area. This project is a significant step toward enhancing the ecosystem diversity of a region containing extensive open water estuarine habitats and limited tidal marsh. The project will enhance utilization of navigation maintenance sediment and contribute to maximizing use of dredge material for effective and sustainable coastal restoration. The primary objective is to Restore, Enhance, and Protect Habitats by restoring the estuarine marsh through the construction of a semi-submerged containment area and placement of dredge material at a cost of about $23,000 per acre. Secondary objectives include: improvement to water quality, providing habitat for living coastal and marine resources, enhancing community resilience by providing buffer to a main thoroughfare between Mobile and Baldwin Counties, and enhancing the economy of the region by providing cost effective disposal options for the many navigation related industries located along the Mobile River.

Project Implementation. Phase 1 will begin with geotechnical investigations of the defined area to characterize the sediments of the area and provide the load bearing capacities of the existing bay bottom and to identify the potential for on-site borrow sources for the containment berms. These two pieces of information drive the overall engineering and design and the final cost of the project. Once the geotechnical results are obtained and processed, the design team and IWG will determine the final shape of the site as well as what portions will need armament and which areas will remain open for tidal influence. Phase 1 will be complete once the final plans and specifications are delivered along with the environmental compliance coordinations and NEPA documentation. A Department of the Army permit will be applied for by the Alabama State Port Authority (ASPA), the local sponsor for the navigation project. To ensure complete coordination a member of the Mobile District Regulatory Division will be added to the IWG.

Phase 2 involves the construction of the entire containment feature as well as the initial 100-acre constructed marsh. Once developed, the initial 100-acre marsh will serve as a nursery/donor site for the long term development of the remaining 1,100 acres. Depending on the geotechnical results obtained in Phase 1, Phase 2 will commence with the borrowing of any suitable on-site material followed by barging the remaining course grain sand required from the existing USACE stockpiles along the Black Warrior Tombigbee River System. These sand stockpiles are located approximately 80 river miles north of the tidal marsh footprint. Material for the 100-acre wetland will come from one or more of the Upper Harbor sumps as part of the USACE regular maintenance program.

At the completion of the containment berms and the initial 100-acre marsh, the semi-confined site design will enable the entire site to have full tidal influence and allow marine life conveyance within the site until it is ultimately filled with dredged material and the wetlands are established. The proposed design will provide for tidal channels throughout the wetlands to increase the edge effect of the vegetation and provide for appropriate spawning grounds for native estuarine species. Due to the proximity of the site to the Brookley Air Field no portion of the site will be allowed to become sub-aquatic.

(3) PROPOSAL NARRATIVE

A. General Requirements

1. Introduction and Background

The Mobile Bay and watershed covers two thirds of the state of Alabama and portions of Mississippi, Georgia, and Tennessee (**Figure 1)**. It is the fourth largest watershed in the United States (U.S.) in terms of flow volume and is the sixth largest river system in the U.S. in terms of area. The lower Mobile Bay is a designated national estuary under the EPA's National Estuary Program (NEP). The Mobile Bay and the rivers draining into it support major uses with national implications which include the Tennessee-Tombigbee Waterway, the Port of Alabama, various commercial fisheries, large industry, tourism and recreation, and abundant development. Water entering the system in the upper-most reaches of the watershed makes its way to the Gulf of Mexico through Mobile Bay. Throughout this process, sediments and nutrients are transported and deposited along the way. The Mobile Bay Basin project offers the interrelations and connectivity between inland and coastal watersheds.

The Port of Mobile lies within the Mobile Bay watershed and is a deep-water navigation project in Mobile, Alabama which is the only deep-water port in Alabama. It was ranked by the U.S. Army Corps of Engineers (USACE) as the 9th largest port by tonnage in the nation during 2008, with a trade volume of 67,635,501 tons. This ranking had decreased to 12th largest during 2010, with a trade volume of 55,713,273 tons (USACE 2010). The port is located along the Mobile River where it empties into Mobile Bay and has public deepwater terminals with direct access to 1,500 miles of inland and intracoastal waterways serving the Great Lakes, the Ohio and Tennessee river valleys (via the Tennessee-Tombigbee Waterway), and the Gulf of Mexico. The Alabama State Port Authority (ASPA) owns and operates the public terminals at the Port. The public terminals handle containerized, bulk, break bulk, roll-on/roll-off, and heavy lift cargoes. The port is also home to private bulk terminal operators. The container, general cargo and bulk facilities have immediate access to two interstate systems and five Class I railroads. Additionally, the CG Railway operates from the port as a rail ferry service to Coatzacoalcos, Veracruz, in Mexico. The Port is the largest break bulk forest products port in the U.S. and the ASPA's McDuffie Terminal is one of the largest coal terminals in the U.S. and largest import coal terminal (ASPA 2008). The port was the fourth largest exporter of coal during 2012, with the majority exported for metallurgical processes. The largest shares of coal exports from Mobile went to Europe and South America (U.S. Energy 2012).

The Mobile Bay and Mobile Harbor navigation channels are terminal repositories of sediments transported downstream from several riverine systems and consists of mostly fine grain sediments, with some sand located in the upper channel reaches near the lower end of the Mobile River. The USACE, Mobile District has the responsibility for maintenance of the federally authorized Mobile Harbor navigation project (**Figure 2**). The main Mobile Bay channel consists of a 45-foot by 400-foot channel from the mouth of the Bay extending 29 miles northward to the mouth of Mobile River. This stretch of channel has typically been dredged using hopper dredging equipment with disposal of the material in the approved Mobile-North Ocean Dredged Material Disposal Site (ODMDS). The Water Resources and Development Act (WRDA) of 1986 mandated that all maintenance dredged material from the Mobile Bay navigation channel

be taken to the Gulf of Mexico and disposed in the ODMDS for environmental purposes. Since that time, approximately 4 million cubic yards of material has been removed from the channel annually and transported as much as 40 miles to the ODMDS at an annual cost of about $12 million. Disposal of the channel sediment in the ODMDS results in the removal of the material from the Bay's natural sediment system. The effect of this sediment loss can be seen in recession of wetlands and submerged aquatic vegetation (SAV) beds in the north and west portions of the Bay (Byrnes et al. 2013). Subsequently, WRDA of 1996 authorized consideration of alternatives to disposing dredged material for the Mobile Harbor Federal navigation project that includes other environmentally acceptable alternatives including beneficial uses and environmental restoration. Establishing BU and other environmentally acceptable alternatives within the Bay may contribute to much-needed conservation of various ecological resources that exist in the Bay system.

In 2011 the Mobile Bay Interagency Working Group (IWG) was established to evaluate and provide guidance pertaining to alternative sediment management practices in Mobile Bay. The IWG consists of the following local, State and Federal agencies:

- Alabama State Port Authority
- U.S. Army Corps of Engineers, Mobile District
- U.S. Army, Engineer Research and Development Center
- Alabama Department of Environmental Management
- Alabama Department of Conservation and Natural Resources, State Lands Division
- Alabama Department of Conservation and Natural Resources, Marine Resources Division
- Geological Survey of Alabama
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service, Habitat Conservation Division
- Mobile Bay Estuary Program
- Dauphin Island Sea Lab
- Mississippi-Alabama Sea Grant
- The Nature Conservancy
- Mobile County Environmental Department
- Federal Aviation Authority
- U.S. Environmental Protection Agency

As a result of various meetings and workshops, the IWG recommended several sediment management alternatives in the context BU and environmental restoration (Mobile Bay IWG 2014). Three recommendations were put forth by the IWG as viable opportunities to extend BU activities to habitat restoration that provides valuable ecosystem services to the Bay and are discussed below.

The first recommendation was the use of dredged material to fill an artificially created hole known as Brookley Hole. This alternative was implemented as part of regular maintenance of the upper Mobile Bay channel and is an ongoing effort initiated. In September of 2012, 1.2 million cubic yards (mcy) of dredged material from the upper Mobile Bay channel was placed in Brookley Hole. Pre-fill baseline surveys revealed that the basin exhibited hypoxia resulting in

degraded ecological productivity. The placement of material was intended to alleviate these conditions and restore the basin into environmentally productive bay bottoms. Baseline surveys prior to filling and post-fill monitoring were conducted leveraging with the USACE's Dredging Operations and Environmental Research (DOER) program. Post-fill monitoring indicated no evidence of post hypoxia/anoxia and indications of benthic and fish usage recovery (ERDC 2014)

A second recommendation involved re-establishing within bay thin-layer disposal along the Mobile Bay channel. During the 2012 recertification of the Mobile Harbor Federal Navigation Project, an open water thin-layer disposal option using historic open water sites was approved for emergency situations. In a previous IWG meeting, the group agreed that invoking the emergency option was reasonable and would be a valuable opportunity to monitor and model the open water sites to answer questions as to how the material behaves once it has been placed. In September of 2012, the USACE utilized a large pipeline dredge to clear the upper Bay channel. This action resulted in the placement of 9 mcy of maintenance dredged sediment within the historically established open water sites as shown in the attached drawing. The placement utilized thin-layer techniques such that the thickness would be no greater than12 inches. The Corps subsequently implemented a monitoring and modeling program to demonstrate and predict the behavior and fate of the placed sediment. The results of these studies were used to determine future open water placement strategies. The studies were conducted by ERDC leveraging the Engineering with Nature program. Results of the monitoring and modeling efforts concluded that the placed dredged material is less erodible than the native bay bottom sediment due to its fine grained cohesive properties. Additionally, material placed in thin-layer fashion is not transported along the bottom as a slug of sediment, rather it is remobilized into the water column by waves and currents and returned into the Bay's natural sediment transport system such that it will not impact other natural resources within the Bay (Gallani et al. 2014). Based on these results, the IWG recommended integrating a long term open bay thin-layer disposal option as part of the sediment management strategy for Mobile Bay. Implemented in 2014, the Mobile Harbor navigation project water quality certification was modified to include a long term open bay thin-layer disposal option. This option provides an environmentally acceptable alternative for managing maintenance dredged material within the Mobile Bay navigation channel that allows sufficient time for benthic recovery and permits the bottom elevations to return to that of the adjacent bottom as the placed sediment is remobilized into the Mobile Bay's natural sediment system.

The third alternate sediment management strategy is the planning and construction of a long term BU site in upper Mobile Bay which is the focus of this proposal. The intent is to establish a large scale semi-contained dredged material placement area to restore approximately 1,200 acres of brackish tidal marsh and submerged aquatic vegetation (SAV) habitats in northern Mobile Bay. Given the success of the previously discussed sediment management alternatives, the IWG recognizes this as an opportunity to further extend BU activities to habitat restoration that provides valuable ecosystem services to the Bay. All efforts towards moving forward with this project will continue to be coordinated through the IWG. The BU area will demonstrate beneficial use of dredged material to achieve environmental restoration utilizing semi-containment methods consistent with environmental standards established by the Section 404(b)(1) evaluation process. Key elements of this strategy emphasize the connection between

maintenance dredging requirements of the Bay channel, beneficial uses for purposes of ecological restoration, and regional sediment management methods. This will be accomplished by constructing a large lowprofile, semi-contained marsh cell constructed using sandy material from confined disposal areas along the Black Warrior-Tombigbee (BWT) navigation waterway (**Figure 3**). Once constructed, the cells will be incrementally filled with fine grain sediments from dredging and maintenance of the upper Mobile Harbor navigation project consisting of material from the Federal channel, ASPA-owned terminals, and public projects (**Figure 4**). It is anticipated that submerged aquatic vegetation (SAV) will become established along the protected shorelines of the containment berms and open areas of the marsh cells. More detailed characteristics of the containment structures and construction methods are discussed below in the Implementation and Methodology section.

Potential BU locations within the upper Bay were identified by the IWG for consideration (**Figure 5**). The site assigned the highest priority is the eastern-most site (green) due to its distance from Brookley airfield, lower occurrence of cultural resources, and its decreased potential to impact existing resources. A more updated location of the project as supported by the IWG is represented in **Figure 6**. In order to move forward in determining the final project location and footprint, the effort builds upon activities already completed that includes a detailed hydrographic survey, SAV survey, and cultural resources survey. Without this information described below, selection of the project's final location and footprint would not be possible.

> Hydrographic Survey: Bathymetric surveys were completed by the USACE in October 2012. The surveys included the entire upper portion of the Mobile Bay from the I-10 bridge extending 12 miles to the south terminating just to the south of Gaillard Island.
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> SAV Survey: An SAV survey was conducted by representatives from the ADCNR, State Lands Division; U.S. FWS; NOAA; and the USACE and revealed that no SAV's were present within the BU footprint and that the closest existing SAV's are located well to the north of the survey transect and proposed BU site. A determination was made that no SAV's are likely to occur within the proposed BU site.
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> Cultural Resources Survey: The ASPA funded a cultural resources survey that was completed on August 21, 2013. A marine Remote Sensing survey was conducted over an area of 2,531 acres. The survey followed Alabama SHPO guidelines and included the use of a magnetometer, bathymetric/fathometer, side scan sonar, and differential GPS with a swath spacing of 15 meters (50 feet). The survey identified shipwrecks which illustrated one of the best preserved Civil War Maritime sites which must avoided. Numerous other target hits were identified, some that are likely to be historically significant and some that may not. The northeastern portion of the survey area that was cleared totals approximately 1,250 acres. Additional guidance was discussed in terms of avoiding the resources identified by a buffer of 50 meters. If there is more acreage needed, additional surveys could be conducted on the targets within the blue area shown on the map. This would open up additional area for the BU site.

Based on the results of the above surveys, it was realized that a geotechnical evaluation will be necessary to move forward in identifying the final footprint and preliminary design. The

geotechnical investigation will require collecting approximately 20 core samples to determine the underlying sediment characteristics within the proposed area. Information gained from this effort will be used to determine if the site consists of material suitable to support construction of containment structures as well as whether material suitable for the containment structures could be dredged from within the site itself. The results of geotechnical investigation will be used to determine the final BU area footprint and project design.

Creation of this BU tidal marsh site will be conducted in two phases. Phase 1 will be the completion of the planning process consisting of:

- Geotechnical investigation for selection of the final project footprint
- Preliminary design
- Environmental evaluations
- NEPA compliance documentation
- Water quality and coastal zone consistency certifications, Department of Army permit
- Final plans and specifications

Phase 2 of the project will include:

- Construction of the outer perimeter containment berm
- Creation of the initial 100 acres of tidal marsh

2. Implementation Methodology

Given the IWG's work performed towards this project design to date, the implementation of Phase 1 would begin with the geotechnical investigations. The results would produce any potential on-site borrow sources for the containment berms and provide the load bearing capacities of the existing bay bottom. These two pieces of information drive the overall shape and cost of the project. To this point, the IWG has made the assumption based on local knowledge of the Bay bottoms that a good portion of the containment berm borrow material would not be available from within the current footprint due to the nature of the material. The IWG has been pursuing the use of course grain sand from the BWT River System as containment berm material in order to meet their original goal of a semi-contained site with a more natural coarse grain sand containment with the least amount of armament possible. The BWT sand chosen by the IWG was recently used with great success as construction fill to raise coastal water bottoms to a positive elevation at a nearby port expansion project. Once the geotechnical results are obtained and processed, the design team and IWG will determine the final shape and size of the site as well as what portions will need armament and which areas will remain open for tidal influence. Phase 1 will be complete once the final plans and specifications are delivered along with the environmental compliance coordinations and NEPA documentation.

Phase 2 involves the construction of the entire containment feature as well as the initial 100-acre constructed marsh. Once developed, the initial 100-acre marsh will serve as a nursery/donor site for the long term development of the remaining 1,100 acres. Depending on the geotechnical results obtained in Phase 1, Phase 2 will commence with the borrowing of any suitable on-site material followed by barging the remaining course grain sand required from the existing USACE stockpiles along the BWT River System. These sand stockpiles are located approximately 80 river miles north of the tidal marsh footprint. Access channels will be constructed in the shallow

areas for delivery of the sand and armament materials. The current plan is to construct the containment using RESTORE funding followed by the placement of approximately 1 mcy of suitable Federal channel material (Upper Mobile River) using USACE O&M dredging funds. Given the proximity of the site to the Mobile Harbor Upper River sumps, the initial 100-acre site meets the Federal Standard with regards to the least cost, environmentally acceptable and legal guidelines. USACE dredges over 1 mcy from the upper end of the Mobile River project annually and feels the percent sand/fines mix is favorable for developing the initial 100 acre shallow water bottoms into tidal marsh within a short amount of time.

At the completion of the containment berms and the initial 100-acre marsh, the semi-confined site design will enable the entire site to have full tidal influence and allow marine life conveyance within the site until it is ultimately filled with dredged material and the wetlands are established. Any material deemed suitable for open water placement being dredged from the ASPA facilities or local navigation dependent industries will be considered for placement within the site. Current estimates conclude that the site would be filled within 20 years of containment feature creation. At this rate a minimum of 100 acres of wetland will be added to the site each year. The proposed design will provide for tidal channels throughout the wetlands to increase the edge effect of the vegetation and provide for appropriate spawning grounds for native estuarine species. Due to the proximity of the site to the Brookley Air Field no portion of the site will be allowed to become sub-aerial. Based on similar restoration efforts, it is likely the final design will include several interior berms to aid in the development of appropriate tidal marsh elevations.

3. Monitoring and Adaptive Management of the Project or Program

The proposed 1,200-acre tidal marsh area would be monitored to ensure the project meets the goal of retaining dredged material according to the State of Alabama coastal zone program. Prior to construction, the IWG would develop a monitoring protocol for this restoration site. The protocol would include project goals, objectives, performance criteria, monitoring methods and schedule, and potential adaptive management measures. RESTORE funding would cover the cost of the monitoring program since this site would be constructed and filled under this project proposal. Costs have been estimated based on the assumptions that: 1) the primary monitoring data for evaluating achievement of the ecological success criteria would consist of aerial photography; and 2) regular site visits to be conducted to monitor of the progression of recruitment of salt marsh vegetation as well as undesirable plant species and monitor marsh elevation and water circulation within the area. Should relative sea level rise be higher than projected, the berm elevations could be increased by placement of additional material from the BWT disposal areas or other dredging activities in the area consisting of sandy material. The cost of adding more material would likely be minimal because of the continuing need to maintain the navigation projects.

4. Measures of Success for the Proposed Project or Program

- Meets intent of the Alabama State coastal zone program.
- Containment berm and cells constructed to project permit and/or plans and specifications.
- Success of tidal marsh creation in beneficial use site would be measured against performance criteria

5. Risks and Uncertainties of the Proposed Activities

The USACE, Mobile District has demonstrated the ability to build similar projects. In the early 1980's the USACE, Mobile District built Gaillard Island (**Figure 7**) in the west central Mobile Bay. The 1,300-acre island serves as the placement area for maintenance dredging of the Theodore Industrial Channel. Thirty-one million cubic yards of dredged material pulled from the bay and nearby land was used to create the island. The excavated material consisted primarily of fine grained silty sand infused with small amounts of shell and gravel from the bottom of the bay. The dredged material was transported by barge and hydraulically pumped to the island site to make the containment dikes. Marsh plants were used to develop an established root system to assist with long term integrity of the island. This was a state-of-the-art technique which has been widely studied, found to be effective and is now used nationwide. The project was controversial from an engineering and environmental standpoint. The engineers thought the island would not hold up in an open body of water and the environmentalists were concerned about the impact on the bay from an ecological standpoint. The island has been a success from the onset and has become an environmental showcase, home to thousands of birds, particularly brown pelicans. Similarly, USACE, Mobile District developed a long-term dredged material management plan for the Pascagoula River Harbor and a portion of the Upper Pascagoula Channel that includes placing material in a disposal area know as Singing River Island (SRI) (**Figure 8**). The east bank of SRI has undergone extensive erosion due to tropical storms and ship wakes. As a result, not only has shoreline been lost but also wetlands, thus presenting an opportunity for improving conditions by beneficially using dredged material in this area. Expanding the SRI dredged material placement area tying into the existing dikes to establish a new shoreline that parallels the existing arc-shaped southern shoreline of the island. This project measure included several BU features: creation of salt marsh wetlands and habitat as well as stabilization of the SRI shoreline. The 425-acre SRI dredged material BU site provides SRI with protection from further erosion along the eastern and southern shorelines. Maintenance dredged material will be placed to create tidal marsh habitat. Upon consolidation, emergent tidal marsh species will be planted at the newly created site. As subsidence and consolidation occur over time, it is anticipated that the placement of additional dredged material may be required in the marsh areas to maintain the health of the vegetation.

Construction

Soft sediments in some areas may create foundation concerns for containment berms. If not designed properly for these areas, the functionality of the berms could be compromised. However, that initial containment berm construction does provide a sandy foundation to lay the coarser grain material upon which greatly minimizes that risk. Storm surge associated with hurricanes and tropical storms poses a threat to containment berms and tidal marsh during and after project construction. Estimates of the quantity of dredged material available for marsh fill have been based on the Mobile Bay Federal navigation channel and other ASPA and private smaller dredging events. The containment berm at BU site may be susceptible to accelerated erosion due to ship wake and other hydrodynamic processes. However, the USACE, Mobile District and the IWG would continue to collaborate to prioritize placement of dredged material into the BU site in order to stabilize the containment area.

Environmental
Although no environmental construction windows are proposed, all construction and marsh filling activities would be completed in such a manner, to the maximum extent feasible, to minimize any environmental impacts to sea turtles, shorebirds, or other species.

Hazardous, Toxic, and Radioactive Waste (HTRW)
The project area lies primarily in areas where there are no known sources of contamination. The USACE knows of no sources of hazardous, toxic and radioactive waste (HTRW) in the project area. However, on April 20, 2010, the floating semi-submersible mobile offshore drilling unit Deepwater Horizon experienced an explosion and fire. The rig began leaking into the Gulf of Mexico, however there is no report of oiling in Mobile bay or the area of the BU site. The total amount of oil and natural gas that has escaped into the Gulf of Mexico is unknown, but is currently believed to be approximate 4.9 million barrels. The spill has been known to cause damage to marine and wildlife habitats as well as the Gulf's fishing and tourism industries. Should oil be encountered during project construction, the U.S. Coast Guard will be notified.

Relative Sea Level Rise
Current USACE guidance on assessing the impacts of sea level rise on project construction and operation has been utilized in the preparation of this proposal (USACE EC 1165-2-212, October 2011). The USACE guidance specifies the use of "low", "intermediate", and "high" rates of future sea-level change based upon the local historic rate of mean sea level (low) and curves established by the National Research Council (1987) for the intermediate and high rates. USACE guidance requires consideration of projected future sea-level changes and impacts in project planning, design, and O&M. Because future sea level rise rates are uncertain, planning and design would consider project performance for a range of sea level change rates. Historic rates are used as the lower bound sea level change rate. Predictions of future sea level due to intermediate and high rates of sea level change are to be developed in accordance with USACE guidance from the National Research Council's 1987 report *Responding to Changes in Sea Level: Engineering Implications.*

Historic rates of sea level change are determined from tide gage records. Long-term tide gage records on the order of 40 years are preferred over shorter term records because the sea level change rate estimate error decreases as the period of record increases. There are three long-term tide gages in the vicinity of Mobile Bay: Dauphin Island, Pascagoula, and Biloxi. Sea level rise rates for these locations are shown in Table 1.

Table 1
Historic Sea Level Rise Rates

Location	**Rise in mm/yr**	**Std. Error of Rise**
Dauphin Island, AL	2.89	0.87
Period of Record	1966-2006	
Biloxi, MS	2.26	0.26
Period of Record	1928-'76, '79-98	

Source: USACE.

Predicted rise scenarios for the Biloxi and Dauphin Island sites were computed in accordance with current USACE guidance with predicted rise varies between about 0.8 feet and 1-foot. Use of Dauphin Island relative sea level rise rates in the predictive equations results in about 0.25 feet (three inches) greater rise over the 100 year period 2000-2100 than predictions using rates determined from the Biloxi gage data.

Analysis of historical data suggests a relative sea level rise of approximately nine inches along the Mississippi coast during the 20th century. Relative sea level rise is what an observer standing on the shoreline over a long period would observe, which includes the combined effects of land subsidence (or uplift) and the rise of sea level in and of itself. For the last twenty-five years, the climate change community has also been arguing that sea level rise will accelerate in the 21st century, though to date, there is no clear confirmation that acceleration is actually taking place.

It is important to recognize that sea level has been rising, and it's prudent (and required by USACE regulations) to recognize the uncertainties inherent in sea-level rise projections. Given the long-term nature of this phenomenon, future sea level rise was projected over a 100-year period. However, the period of analysis specified by ER 1105-2-100 for USACE water resources projects of this type is 50-years. Based on extension of the Biloxi, MS tide gage data, predicted 21st century sea level rise is about 0.8 feet, about 0.4 feet over a period of 50 years. This assumes that sea level rise proceeds in the 21st century at a rate corresponding to the 20th century rate at this location. Assuming a high rate of rise in accordance with USACE guidance gives an estimate on the order of five feet of rise over the 21st century. This level of sea level rise can be easily adapted to in the proposed project.

6. Outreach and Education Opportunities

The USACE, Mobile District Public Affairs Office would announce the start and completion of construction with News Releases. The upper Mobile Bay in the vicinity of the project site is highly utilized by recreational fisherman and environmental tourists. Pamphlets and posters would be provided to the ADCNR and other Federal and State agencies that describes the overall project and it's funding through the RESTORE Council. The USACE, Mobile District would create a Mobile District webpage showcasing the project, its RESTORE funding source, and partnerships with ASPA, ADCNR, ADEM, USFWS, NMFS, NOAA, and other resource agencies.

The USACE, Mobile District, ADCNR, Mobile Bay NEP, and ASPA would provide personnel to assist with field trips for high school and college students interested in Engineering and Sciences to learn about project construction and observe the functionality of the completed beneficial use of dredged material (i.e. a viable natural resource) through the USACE STEM program.

7. Leveraging of Resources and Partnerships

The proposed project has the continued involvement of the IWG established to evaluate and provide guidance pertaining to alternative sediment management practices in Mobile Bay. The IWG consists of local, State and Federal agencies as well as academia and other non-governmental entities. The project offers substantial opportunities to document and build on these collaborative efforts with different missions and purposes. Opportunities that could be applied in other areas of the southeast and the nation include: collaboration and support; fine

grained sediment transport modeling; information exchange and dissemination; knowledge management; training; and integration of the regulatory, planning, engineering, and operational processes. The RSM approach for beneficially using dredged material to conducting restoration practices provides the ability to coordinate and collaborate; integrate numerous tools, technology, and data; leverage funding; and enhance partnerships. Dredged material used in the fill of the containment area and wetland creation would be funded via USACE, State, and private interests.

8. Project Benefits

The Mobile Bay and Mobile Harbor navigation channels are terminal repositories of sediments transported downstream from several riverine systems and consists of mostly fine grain sediments. Establishing BU and other environmentally acceptable alternatives within the Bay will contribute to much-needed conservation of various ecological resources that exist in the Bay system and for estuarine habitat restoration through the beneficial use of dredged sediments. Creating emergent tidal marsh in the upper Mobile Bay will produce productive habitat that provides valuable ecosystem services to the Mobile Bay. It is anticipated that SAV will become established along the protected shorelines of the containment berms and open areas of the marsh cells. Creating the tidal marsh will accomplish restoration and protection of the natural resources, ecosystems, fisheries, marine and wildlife habitats, and coastal wetlands of the Gulf Coast region. Additionally, this project will directly benefit State or federally listed threatened and/or endangered species such as the Gulf sturgeon, Alabama Red-Bellied Turtle, and West Indies Manatee. By conducting this project, sediments which have traditionally been removed from the Mobile Bay littoral transport system will be placed back into the natural sediment system and used for habitat restoration. Additionally, construction of the project will reduce the need for additional upland disposal areas, the construction of which has traditionally impacted large acreages of wetlands and uplands. From an operational perspective, using material from maintenance of the navigation channels and Port terminal facilities will allow utilization of cutterhead dredge equipment with more cost effective disposal practices and provide the flexibilities to utilize a greater percentage of the available dredging fleet.

The effort builds upon interagency activities already completed in support of the project. Activities associated with this effort will leverage existing tools from ongoing research while providing capabilities to evaluate probable consequences of natural change and specific project actions to make informed decisions associated with similar restoration practices. The project will emphasize connections between major navigation projects, beneficial uses of dredged material, and other sediment management methods that can reduce the costs of restoration projects. The strategy also recognizes the ongoing collaborative and interagency coordination and partnerships necessary for planning and implementation by increasing participation from project sponsors; improve data collection, sharing, and archival, technical tools; and improve understanding of regional processes thereby providing improved management decisions.

Secondary benefits would accrue through the improvement of water quality in the upper bay area, provision of nursery habitat for coastal and marine species, reduction in risk to the US Hwy 98 Causeway, and provision for cost effective dredged material placement site.

9. Focus and Emphasis Areas

a. Focus Area. The main focus of this project is to accomplish habitat restoration. Through the beneficial placement of readily available dredged material from the Mobile Bay navigation channel into the Upper Mobile Bay BU area, the project will create and restore approximately 1,200 acres of emergent estuarine tidal marsh that has transitioned into shallow open water habitat. A secondary focus is improving water quality by creating and restoring high density marsh vegetation that acts as a natural sink for nutrients and promotes sedimentation. This natural process improves the Bay's overall water quality resulting in enhanced quality of water entering the Gulf of Mexico.

b. Emphasis Area. By restoring estuarine marshes, the proposed project addresses a significant ecosystem issue in that the effect of removal of sediment from the natural system results in a gradual recession of estuarine wetlands and submerged aquatic vegetation (SAV) beds in the north and west portions of the Bay (Byrnes et al. 2013). Such resources provide a degree of storm protection and as well providing valuable ecosystem services to the Bay. These resources improve water quality and provide habitat for variety of marine wildlife associated with estuarine areas. Creating and restoring the marsh benefit humans supporting local fisheries, oyster production, and enhancing ecotourism. All of these services provide a significant boon to the local economy. Overall, the project restores brackish estuarine marshes that are among the most highly productive ecosystems and have historically been important to fisheries, migratory birds, and various protected species.

Once the containment area is constructed, the area will be used for placement of dredged material from the nearby Federal navigation channel. Furthermore, the site will also be used by the ASPA to place materials from their terminals and other facilities as well as use by other private entities. Having this option provides greater cost efficiency rather than disposing of the material in the ODMDS and upland disposal areas providing a high probability that the project will succeed and be sustainable over the life of the project.

Creating and restoring the tidal marsh takes advantage of opportunities for mitigating the loss of Bay resources and shorelines by reintroducing sediment into the basin through the placement of dredge material which will allow the sediment to an integral part of the Bay's natural sediment system. Doing so builds upon the USACE's strategies emphasizing the connection between maintenance dredging requirements of the Bay channel, beneficial uses for purposes of ecological restoration, and RSM philosophies.

The proposed project has the continued involvement of the IWG established to evaluate and provide guidance pertaining to alternative sediment management practices in Mobile Bay. The project offers substantial opportunities to document and build on these collaborative efforts with different missions and purposes. Opportunities that could be applied in other areas of the southeast and the nation include: collaboration and support; fine grained sediment transport modeling; information exchange and dissemination; knowledge management; training; and integration of the regulatory, planning, engineering, and operational processes. The RSM approach for beneficially using dredged material for conducting restoration practices provides the ability to coordinate and collaborate; integrate numerous tools, technology, and data;

leverage funding; and enhance partnerships. A regional approach to restoration more effectively leverages the resources of the Gulf Coast and promotes holistic Gulf Coast recovery.

B. Specific Requirements

1. Comprehensive Plan Goals

a. Restore and Conserve Habitat. The primary goal of this project is to restore and conserve habitat by creating and restoring an estimated 1,200 acres of estuarine tidal marsh through the placement of readily available sediment material from the Mobile Bay navigation channel, ASPA terminals, and local private dredging activities into the upper bay BU area. This project is a significant step toward restoring the ecosystem diversity to a region containing tidal marsh and open water estuarine habitats. The project will enhance utilization of navigation maintenance sediment and contribute to maximizing use of dredge material for effective and sustainable coastal restoration.

b. Restore Water Quality. Improving water quality would be a secondary goal by improving water in providing high density marsh vegetation that acts as a natural sink for nutrients and promotes sedimentation. This natural process improves the Bay's overall water quality resulting in enhanced water quality entering the Gulf of Mexico (Carter 1997).

c. Replenish and Protect Living Coastal and Marine Resources. The BU of dredged material in existing shallow water will be converted to emergent tidal marsh. The project will provide a transition into productive higher quality fish habitat by protecting healthy, diverse, and sustainable living coastal resources. The emergent marsh and associated vegetation is vital to juvenile fish species that depend on such areas for nursery habitat. Intertidal marshes supports plant species that provide nursery and foraging grounds for a variety of economically important marine species including red drum, black drum, sand trout, spotted seatrout, southern flounder, Atlantic croaker, striped mullet, menhaden, white shrimp, brown shrimp, and blue crab. The project would also be beneficial a variety of other wildlife species in that would utilize the project area.

d. Enhance Community Resilience. An extensive and healthy tidal marsh will provide a degree of storm protection. Enhancing and maintaining the supply of sediment to the Bay's sediment system will provide hurricane and storm damage protection by reducing the damaging effects of hurricanes and severe storms to properties and environmental resources along the coastal region and help to stabilize adjacent shorelines and protecting against long-term erosion.

e. Restore and Revitalize the Gulf Economy. The proposed project will serve to restore and revitalize the Gulf economy by providing the habitat necessary for growing and sustaining fish species critical to recreational and commercial fishing industries. Recreational and commercial fishing is a prominent industry vital to the local and regional economies. Estuarine marsh habitats provide food sources and natural protection from predators (U.S. DOI FWS 1983). Restoring coastal estuarine habitats for fish and wildlife species dependent upon such habitat for nursery, shelter, food, nesting, cover, and other life requirements will benefit the Gulf economy. In addition, creation of the BU site provides for long-term cost effective placement of dredged material for the economically vital navigation industry base of the area.

2. Comprehensive Plan Objectives

a. Restore, Enhance, and Protect Habitats. The primary objective of the proposed project is to Restore, Enhance, and Protect Habitats by restoring approximately 1,200 acres of coastal

wetland habitat through the construction of a semi-submerged containment area and placement of dredge material at a cost of about $23,000 per acre. In addition to the primary objective of restoring habitats, the project will support most of the remaining Comprehensive Plan Objectives. The project will enhance utilization of navigation maintenance sediment and contribute to maximizing use of dredge material for effective and sustainable coastal restoration.

b. Restore, Improve, and Protect Water Resources. A secondary objective of restoring water resources will be accomplished by providing a transition of open bay bottom habitat to open shallow estuarine tidal marsh. The project would provide numerous benefits to a variety of other wildlife species that would utilize the project area.

c. Protect and Restore Living Coastal and Marine Resources. As outlined in the discussion on Comprehensive Plan Goals, restoration of emergent tidal marsh will protect healthy, diverse, and sustainable living coastal habitat essential for benthic invertebrates, fish, and various avian wildlife species.

d. Restore and Enhance Natural Processes and Shorelines. In addition to maintaining and protecting adjacent shorelines of the Mobile Bay, the project would support the protection of existing estuarine configuration through the BU of dredged material. In doing so, the project will restore and enhance ecosystem resilience, sustainability, and natural defenses through the restoration of natural processes and shorelines. In addition, tidal marshes and their associated vegetation stabilize the shoreline by holding sediments in place and buffering wave energy.

e. Promote Community Resilience. An extensive and healthy tidal marsh will provide a degree of storm protection. Enhancing and maintaining the supply of sediment to the Bay's sediment system will provide hurricane and storm damage protection by reducing the damaging effects of hurricanes and severe storms to properties and environmental resources along the coastal region and help to stabilize adjacent shorelines and protecting against long-term erosion.

f. Improve Science-based Decision-making Processes. The science associated with dredge material placement is well established, as demonstrated by the USACE, Mobile District's ongoing sediment management efforts in Mobile Bay as discussed above. The project offers substantial opportunities to document and build on collaborative efforts with different missions and purposes. The RSM approach for beneficially using dredged material for conducting restoration practices provides the ability to coordinate and collaborate; integrate numerous tools, technology, and data; leverage funding; and enhance partnerships. Activities associated with this effort will leverage existing tools from ongoing research while providing capabilities to evaluate probable consequences of natural change and specific project actions to make informed decisions associated with similar restoration practices. Scientific and engineering efforts associated with this proposal are include elsewhere in the document.

3. RESTORE Act and Comprehensive Plan Priority Criteria

The proposed project demonstrates a contribution to restoring and protecting the natural resources, ecosystems, fisheries, marine and wildlife habitats, shorelines, and coastal wetlands of the Gulf Coast region, without regard to geographic location within the Gulf Coast region by beneficially utilizing dredged material (refer to Section 9 below). Information and lessons learned from this action can be applied to similar projects along the coastal areas throughout the Gulf of Mexico. Creating and restoring a large scale tidal marsh contributes substantially to restoring and protecting the natural resources of Gulf Coast ecosystem. The Alabama Coastal Plan recognizes the need for wise use of natural resources including sediments. The Coastal

Zone Agency of the State initiated and directs the work of the IWG. Emergent wetlands throughout the Gulf were heavily impacted by the Deepwater Horizon Oil spill.

4. **Comprehensive Plan Commitments**

The proposed project demonstrates how the creation and restoration of a large scale tidal marsh will achieve the commitments in the Comprehensive Plan, which includes:

a. Commitment to Science-Based Decision-Making. - The decisions made pursuant to the project will be based on the best available science, and this project will evolve over time to incorporate new science, information, and changing conditions. Commitment to best available science is evidenced in the previously conducted hydrographic, SAV, and cultural resources surveys.

b. Commitment to a Regional Ecosystem-based Approach to Restoration. – While the project promotes ecosystem-based restoration within a specific geographic area it is a foundational project that could be expanded or combined with other projects to elicit Gulf wide benefit (Refer Section 9).

c. Commitment to Engagement, Inclusion, and Transparency – The proposed project includes the support and participation from the diverse stakeholders who live, work, and play in the Gulf Coast region through the establishment of the IWG.

d. Commitment to Leveraging Resources and Partnerships. - The proposed project has the continued involvement of the IWG established to evaluate and provide guidance pertaining to alternative sediment management practices in Mobile Bay. The IWG consists of local, State and Federal agencies as well as academia and other non-governmental entities. The project offers substantial opportunities to document and build on these collaborative efforts with different missions and purposes. The approach taken to beneficially use dredged material in conducting restoration practices provides the ability to coordinate and collaborate; integrate numerous tools, technology, and data; leverage funding; and enhance partnerships. A large portion of the project i.e. long-term creation of wetlands, are leveraged against funds provided through a number of interests including USACE, ASPA, and local navigation industry.

e. Commitment to Delivering Results and Measuring Impacts. - The proposed project which includes monitoring and adaptive management shows the importance of achieving tangible results over a specified time frame and ensuring that funds are invested in a way to benefit the ecosystem of the Gulf of Mexico.

(4) LOCATION INFORMATION

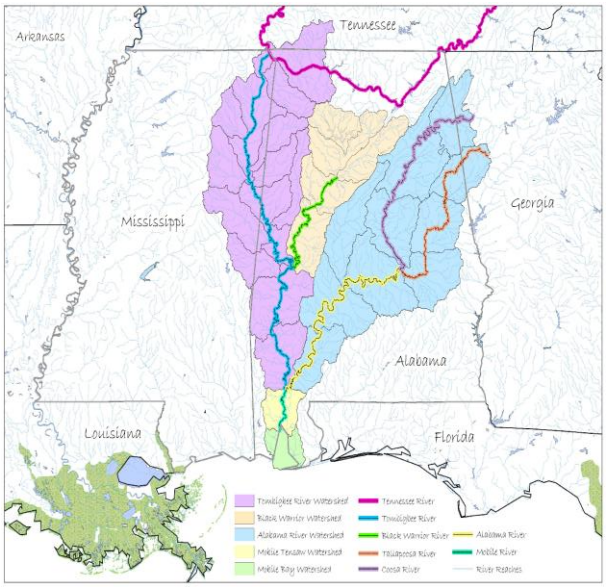

Figure 1. Mobile Bay Watershed Area

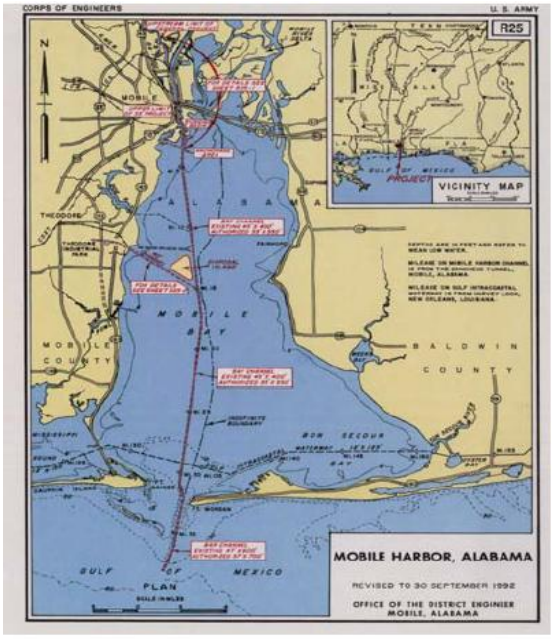

Figure 2. Location of the Mobile Bay navigation channel

Figure 3. Location of the Black Warrior Tombigbee Waterway and example of one of the disposal areas

Figure 4. Mobile Harbor River and Upper Channel.

Figure 5. Prioritized locations of the beneficial emergent tidal marsh sites.

Figure 6. Approximate location of project tidal marsh footprint.

Figure 7. Aerial view of Gaillard Island

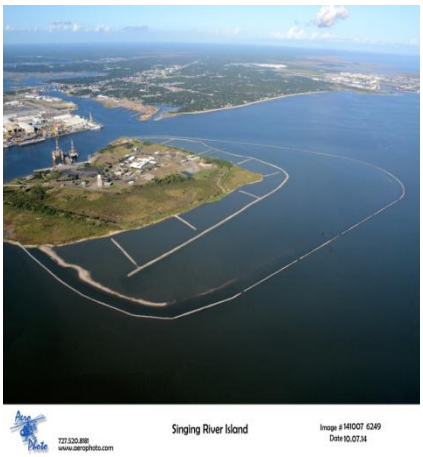

Figure 8. Aerial view of Singing River Island

(5) Budget Narrative

Phase 1 – Design $2.5M (2 yrs to complete) – RESTORE funds

Phase 2 – Containment Construction $25M (2 yrs to complete) – RESTORE funds
Phase 2 – Wetland Creation (100 acres) – USACE funds

The timeframe for the entire marsh to filled will be approximately 20 years based on known channel maintenance requirements. A minimum of 100 acres of wetland expected to be added per year. Design life of the project is 50 years with no additional maintenance.

(6) ENVIRONMENTAL COMPLIANCE
This project is still in the planning, engineering and design phase. All required coordination will be completed prior to construction.

(7) DATA INFORMATION SHARING PLAN
The project offers substantial opportunities to document and build on Federal, State, local, non-profit, and academia collaborative efforts with different missions and purposes. Opportunities that could be applied in other areas of the southeast and the nation include: collaboration and support; watershed technology; information exchange and dissemination; knowledge management; training; and integration of the regulatory, planning, engineering, and operational processes. The approach taken will provide the opportunity to coordinate, collaborate and share tools, technology and data; leverage funding; and enhance partnerships. Information, data, and tools generated through the implementation of the project will be made available to state and Federal agencies, academia, and other stakeholders interested in conducting similar projects towards improving the use of sediment resources. The data can provide managers with information and tools necessary to make more informed decisions concerning BU opportunities associated with dredged material. A web site, building on ongoing efforts in Alabama, will be established to facilitate sharing of information.

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(9) OTHER

1. Gulfwide Beneficial Use of Dredged Material

Overview

During the last three decades of the 20th century, the standard perception was that dredged material was "spoil" or waste material that had no value or needed to be handled as a pollutant. However, as we move into the beginning of the 21st century, issues such as sea level rise, subsidence, loss of habitat, development, and pervasive storm damage in coastal areas has changed that perception. Most coastal managers now recognize that dredged material is frequently uncontaminated, and should be used as a resource to compensate for coastal erosion, to nourish beaches, to build habitat, and to return areas that have subsided below sea level back to an elevation within the tidal range. Even with this change in the way dredged material is valued, challenges remain. For example:

- Dredged material comes in various types from rock to fine grained silts and clays to 'fluff' or 'fluid mud'. Beneficial use of each requires different engineering approaches resulting in wide differences in cost;
- The location of the dredging or dredged material stockpile may not be in a location where there is a need for beneficial use;
- The timing of the dredging requirement is out of sync with the availability of a beneficial use site; or
- Project specific funding and/or overall funding may limit the range and/or extent of beneficial use.

While the function or value of individual beneficial use projects may be only local in scope, for instance, a new wetland area may help protect a particular stretch of levee around a small community, restore a section of critically eroded beach, or provide habitat for a specific population of estuarine organisms, cumulatively, multiple beneficial use projects across a wide geographic area could significantly offset coastal wetland loss, provide nursery areas or other habitats for important commercial species or species of concern such as sea turtles and neotropical migrants and minimize salt water intrusion by reestablishing estuarine boundaries through construction of spits and barrier islands.

The northern coast of the Gulf of Mexico is an ideal location to augment existing beneficial use efforts that are based only on individual projects and elevate them to a programmatic effort. The need and feasibility of a programmatic beneficial use program in the northern Gulf is due to the natural and man-made stresses on the coastal environment experienced in the recent decade, resulting in considerable habitat and wetland loss with subsequent impact on marine and coastal resources, and increase in water quality issues, which may be offset by the proximity of many authorized Federal navigation channels that are dredged on a regular basis as well as local or privately maintained channels, thus providing substantial quantities of materials for use.

Current Conditions in the Gulf of Mexico

The coastal region of the northern Gulf of Mexico owes its current landscape structure to an array of tectonic, erosional and depositional, climatic, geochemical, hydrological, ecological, and human processes that have resulted in some of the world's most complex, dynamic, productive, and threatened ecosystems (Brock et al. 2013). These ecosystems and the resources they support are vulnerable to man-made and natural events such as development, catastrophic hurricane landfalls, ongoing subsidence and erosion exacerbated by sea-level rise, disintegration of barrier island chains, and high rates of wetland loss. Improving the resiliency of these ecosystems is a critical component of restoring the Gulf of Mexico as a whole.

Following the Deepwater Horizon oil spill, an assessment of the most pressing challenges facing the Gulf of Mexico ecosystem described the following (Mabus 2010):

- *Loss of wetland habitats, including coastal marshes, forested wetlands, barrier islands, and coastal shorelines that form the Mississippi River Delta and Chenier Plains*. While an issue in every Gulf state, the loss of coastal habitat has been most dramatically illustrated in Louisiana and highlights the need to maintain freshwater and sediment flows to the Gulf of Mexico. Since the 1930s, the coast of Louisiana has lost nearly 2,000 square miles (approximately 25 square miles per year) of wetlands. Causes of this loss include a combination of erosion, storm damage, land subsidence, alterations to natural freshwater and sediment flow from the Mississippi River, dredging of canals for oil and gas exploration and pipeline installation activity. Climate change (including the impacts of inundation and sea-level rise) threatens to accelerate the loss of these habitats.
- *Erosion of barrier islands and shorelines throughout the Gulf Coast*. From Florida to Texas, continued erosion of the coastal barrier island system

undermines storm protection for coastal communities, threatens the beaches that support the local tourism economy, and affects numerous species that rely on these barrier islands for habitat (e.g., Kemp's Ridley and loggerhead sea turtles, numerous shorebirds and the Alabama beach mouse).

- *Loss and degradation of coastal estuarine habitat*. The estuaries and coastal systems of the Gulf Coast—such as Mobile Bay, Apalachicola Bay, Galveston Bay, Tampa Bay, Florida Bay, the Mississippi Sound, Barataria Bay and others—provide the nursery habitat for most of the fishery resources in the Gulf and support a nationally important oyster industry. These estuaries are impacted by a variety of stressors, including pollution, coastal development, energy development, erosion, hydrological alteration, changes in freshwater inflow, structural marsh management and overfishing.
- *Imperiled fisheries.* Several of the major commercially and recreationally important finfish species are currently experiencing pressures from overfishing or have been overfished. In some cases, these conditions have persisted for many years. Additionally, contaminants such as methyl-mercury in fishes, and red tide organisms and human pathogens in shellfish, reduce fishery values and endanger human health.
- *Hypoxia (low oxygen) in the Gulf of Mexico.* Hypoxia occurs where the concentration of dissolved oxygen in the water column decreases to a level that reduces the quality of habitat, resulting in death or migration away from the hypoxic zone. The northern Gulf of Mexico adjacent to the Mississippi River is the site of the largest hypoxic zone in the United States and the second largest hypoxic zone worldwide. This Gulf of Mexico "Dead Zone" is caused by input of excess nutrient pollution to the Gulf most of which comes from upstream through Mississippi River drainage.
- *Climate change*. Our changing climate is already altering, perhaps irreversibly, the physical, chemical and biological characteristics of our oceans, coasts and adjacent watersheds. Increasing air and water temperatures, changing precipitation patterns, rising sea level, and ocean acidification will increasingly confound efforts to restore or sustain system states.

Sediment, delivered by the Gulf river systems, built much of the Gulf Coast and continues to be essential to the health of the Gulf ecosystem. The utilization of dredged materials can offset some of the challenges listed in the Mabus report above, specifically those associated with erosion of barrier islands, loss of habitat and relative sea level rise mitigation. Accordingly, the Gulf Coast Ecosystem Restoration Task Force proposed a sediment management approach to address land loss through sustainable resource management and land building and restoration. The 2011 Gulf of Mexico Regional Ecosystem Restoration Strategy (GCERTF 2011) recommended 3 actions, two of which are related to dredged material:

- Maximize beneficial use of navigational dredged material, where practicable and ecologically acceptable, for effective and sustainable habitat restoration.
- Increase dedicated dredging of river and other sediment sources, such as permitted offshore sediment shoals, for use in habitat restoration projects.

Beneficial Use

Beneficial use is defined as the productive use of material produced during the authorized maintenance dredging of navigation channels. Dedicated dredging on the other hand while having the same purpose does not have the same required link with authorized navigation dredging. Selection of a beneficial use methodology is governed by the Federal Standard which is defined as the disposal alternative(s) identified by the USACE and its partners which represents the least costly alternative consistent with and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria. Many states believe that the Federal Standard impede the beneficial use of dredged material, however, opportunity exists for a non-federal sponsor to pay the incremental cost between the Federal Standard established for the project and the actual cost of the beneficial use project.

Estimating cubic yards required to create BU acreage depends, among other things, on the placement site conditions (i.e., substrate, water depth, etc.), dredged material characteristics, and the use/non-use of containment. Applying one site's results to another site for predictive purposes is difficult and not entirely reliable. However, a reasonable estimate in a location such as coastal Louisiana is that 1 million cubic yards of material can create approximately 100 acres of wetland when using unconfined placement and between 150 and 200 acres for confined placement.

USACE activities in the Gulf of Mexico

Combined, the four Corps Districts covering the Gulf of Mexico (Galveston, New Orleans, Mobile, and Jacksonville) dredge approximately 123 million cubic yards from coastal Federal navigation projects on an annual basis[1]. Approximately 22 million cubic yards of this material is used beneficially as the least cost placement option or when a local sponsor is able to contribute funds to cover the incremental of the more costly beneficial use option. Details of the Corps dredging program are provided in the table below.

District	State	Annual Quantity	% Sand	% Fines	Current BU
Galveston	Texas	20 – 30 mcy	2.8%	97.2%	15 – 20% (3-4.5 mcy
New Orleans	Louisiana	41 mcy*			39% (16 mcy)
Mobile	Mississippi	8.5 mcy	2.9%	97.1%	3.2%[2] (270 kcy)
Mobile	Alabama	6.5 mcy	3.8%	96.2%	19%[2] (1.25 mcy)
Mobile	Florida panhandle	700,000 cy	70%	30%	50% (350 kcy)
Jacksonville	Florida	875,000 cy	28.1%	62.9%	37%[2] (325 kcy)

[1]Louisiana dredging totals approximately 78 mcy annually, however 37mcy is determined unsuitable for coastal restoration because it is fluff or the dredging location is remote from the coast.

[2]All sandy material is beneficially used

In addition, several Federal inland river navigation systems dredge sediments that could be suitable material for coastal restoration and place this material on 'upland' disposal areas. For example, approximately 18 million cubic yards is present in existing disposal areas along the Black Warrior – Tombigbee Waterway below the first dam. This material is predominately

coarse grained sand and some of the areas have a high percentage of gravel which would make excellent containment features or be suitable to establish substrate suitable for oyster reef establishment.

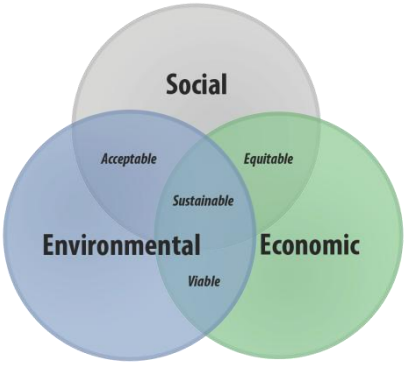
The USACE has an established track record in the area of beneficial use. For instance, the New Orleans District is responsible for the largest Federal channel maintenance dredging program in the nation. On average, the New Orleans District annually dredges approximately 78 million cubic yards (mcy) of material during routine maintenance of federally authorized navigation channels, of which approximately 41 mcy is currently suitable for beneficial use. The remainder of material is either dredged from remote locations that are too distant from beneficial placement sites to be economically used, or the material is physically unsuitable for beneficial use.

Of the 41 mcy of material available for beneficial placement, approximately 16 mcy, or nearly 40 percent, is used beneficially by existing MVN programs. Since 1976, the New Orleans District has beneficially used dredged material to create over 48 square miles (31,693 acres) of coastal habitat, including nearly 15,600 acres using material from the LMR. These beneficial use projects not only benefit the ecosystem by restoring habitat diversity to its historical marsh-ridge-open water configuration, which benefits commercial and recreational significant finfish, wildlife and water fowl species, but also abates saltwater intrusion into historically freshwater and brackish wetlands. Beneficial use projects may also promote community resilience by preventing further coastal retreat, dampen storm surges, and reduce storm damages providing economic and social benefits to the region.

Within the boundaries of the Mobile District, use of dredged material as a resource began in 1979 with the creation of Gaillard Island in Mobile Bay. Today this 1300 acre island serves as an active disposal area while at the same time serving as a nesting haven for shore and seabirds. In 1983 four brown pelicans were noted nesting on the island which was the first sighting in Alabama since their decline due to hunting and use of DDR. Recent surveys have estimated over 80,000 nesting pairs of birds utilizing the island. More recently dredge material was used beneficially in the restoration of Deer Island off the coast of Biloxi, MS and will be used over the next 20 years to establish a 400 acre wetland adjacent to Singing River Island in Pascagoula, MS.

Beneficial use of dredged material builds on the foundation of Working with Nature and Engineering with Nature principles as discussed in the Deer Island Aquatic Ecosystem Restoration Project report (Gerhardt-Smith, et al. 2014).

- Use science and engineering to produce operational efficiencies supporting sustainable infrastructure.
- Use natural processes to maximum benefit, thereby reducing demands on limited resources and enhancing the quality of project benefits.
- Broaden and extend the base of benefits provided by projects to include substantiated economic, social, and environmental benefits ("triple-win" benefits).



- Use science-based collaborative processes to organize and focus interests, stakeholders, and partners to reduce social friction, resistance, and project delays while producing more broadly acceptable projects.

Navigation in the Gulf Coast region will continue to require dredging, and the implementation of projects that use dredge material to restore coastal habitats will provide a cornerstone for coastal ecosystem restoration in the Gulf region. Sediment delivered by the many rivers draining into the Gulf is essential to the health of the Gulf Coast ecosystem. One component of a strategic approach to sediment management is maximizing the beneficial use of dredge material, where ecologically acceptable, for effective and sustainable habitat restoration. While not all dredge material may be the right consistency or composition to be used beneficially for ecosystem restoration, some sediment that is available is currently being underutilized for effective beneficial use in ecosystem restoration. By beneficially utilizing dredge material to create coastal wetlands, the project will restore habitat.

As mentioned earlier in this Introductory Summary, The northern coast of the Gulf of Mexico is an ideal location to augment existing beneficial use efforts that are based only on individual projects and elevate them to a programmatic effort. The project described below, along with others submitted separately for inclusion in the RESTORE Funded Priority List is intended as a first step and a foundational element toward restoring the value of the Gulf of Mexico to the Nation and the World.

2. Support

The ADCNR, State Lands Division has indicated their support for this project by email dated 10 October 2014 and is included with this proposal.

Appendix A

Gulf Coast Ecosystem Restoration Council
Environmental Compliance Checklist

Please check all federal and state environmental compliance and permit requirements as appropriate to the proposed project/program

Environmental Compliance Type	**Yes**	**No**	**Applied For**	**N/A**
Federal				
National Marine Sanctuaries Act (NMSA)		X		
Coastal Zone Management Act (CZMA)	X			
Fish and Wildlife Coordination Act		X		
Farmland Protection Policy Act (FPPA)		X		
NEPA – Categorical Exclusion	X			
NEPA – Environmental Assessment				
NEPA – Environmental Impact Statement				
Clean Water Act – 404 – Individual Permit (USACOE)	X			
Clean Water Act – 404 – General Permit(USACOE)				
Clean Water Act – 404 – Letters of Permission(USACOE)				
Clean Water Act – 401 – WQ certification	X			
Clean Water Act – 402 – NPDES				
Rivers and Harbors Act – Section 10 (USACOE)	X			
Endangered Species Act – Section 7 – Informal and Formal Consultation (NMFS, USFWS)	X			
Endangered Species Act – Section 7 - Biological Assessment (BOEM,USACOE)	X			
Endangered Species Act – Section 7 – Biological Opinion (NMFS, USFWS)		X		
Endangered Species Act – Section 7 – Permit for Take (NMFS, USFWS)		X		
Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) – Consultation (NMFS)	X			
Marine Mammal Protection Act – Incidental Take Permit (106) (NMFS, USFWS)		X		
Migratory Bird Treaty Act (USFWS)		X		
Bald and Golden Eagle Protection Act – Consultation and Planning (USFWS)		X		
Marine Protection, Research and Sanctuaries Act – Section 103 permit (NMFS)		X		
BOEM Outer Continental Shelf Lands Act – Section 8 OCS Lands Sand permit		X		
NHPA Section 106 – Consultation and Planning ACHP, SHPO(s), and/or THPO(s)	X			
NHPA Section 106 – Memorandum of Agreement/Programmatic Agreement		X		
Tribal Consultation (Government to Government)	X			
Coastal Barriers Resource Act – CBRS (Consultation)		X		
State				
As Applicable per State	X			

Parson, Larry E SAM

From: Ferraro, Carl [Carl.Ferraro@dcnr.alabama.gov]
Sent: Friday, October 10, 2014 2:46 PM
To: Parson, Larry E SAM
Subject: [EXTERNAL] BU RESTORE Proposals

Larry,

The ADCNR-State Lands Division Coastal Section has reviewed the draft proposals, CREATION OF EMERGENT TIDAL MARSH IN UPPER MOBILE BAY and SAND BYPASSING FOR THE REESTABLISHMENT OF SAND ISLAND, ALABAMA, which we understand the Corps -Mobile District intends to submit to the Gulf RESTORE Council for consideration for funding.

As a member of the Mobile Harbor Navigation Project Interagency Working Group, the Department support the implementation of the beneficial use of dredged materials. As such, we fully support these proposals and we encourage the Corps-Mobile District to pursue funding for these projects.

Thank you,

Carl Ferraro

Biologist III

ADCNR-State Lands Division

Coastal Stewardship Office

31115 5 Rivers Blvd.

Spanish Fort, AL 36527

Phone: 251-621-1216

Fax: 251-621-1331

Email: Carl.Ferraro@dcnr.alabama.gov

ELIGIBILITY REVIEW

Bucket 2 – Council Selected Restoration Component

PROPOSAL TITLE

Beneficial Use of Dredged Material to Create Emergent Tidal Marsh in Upper Mobile Bay

PROPOSAL NUMBER

ACOE-5

LOCATION

Mobile County, AL

SPONSOR(S)

Department of the Army

TYPE OF FUNDING REQUESTED (Planning, Technical Assistance, Implementation)

Planning, Implementation

REVIEWED BY:

Bethany Carl Kraft/ Ben Scaggs

DATE:

November 18, 2014

1. Does the project aim to restore and/or protect natural resources, ecosystems, fisheries, marine and wildlife habitat, beaches, coastal wetlands and economy of the Gulf Coast Region?

(●) YES ( ) NO

Notes:

Establish a large-scale semi-contained dredged material placement area to create approximately 1200 acres of brackish tidal marsh and submerged aquatic vegetation habitats in Northern Mobile Bay.

2. Is the proposal a project?

( ) YES (●) NO

If yes, is the proposed activity a discrete project or group of projects where the full scope of the restoration or protection activity has been defined?

( ) YES ( ) NO

Notes:

3. Is the proposal a program?

(●) YES ( ) NO

If yes, does the proposed activity establish a program where the program manager will solicit, evaluate, select, and carry out discrete projects that best meet the program's restoration objectives and evaluation criteria?

(●) YES ( ) NO

Notes:

4. Is the project within the Gulf Coast Region of the respective Gulf States?

(●) YES ( ) NO

If no, do project benefits accrue in the Gulf Coast Region?

( ) YES ( ) NO

Notes:

Eligibility Determination

ELIGIBLE

Additional Information

Proposal Submission Requirements

1. Is the project submission overall layout complete? ***Check if included and formatted correctly.***

A. Summary sheet	☑	F. Environmental compliance checklist	☑
B. Executive summary	☑	G. Data/Information sharing plan	☑
C. Proposal narrative	☑	H. Reference list	☑
D. Location information	☑	I. Other	☑
E. High level budget narrative	☑		

If any items are NOT included - please list and provide details

2. Are all proposal components presented within the specified page limits (if applicable)?

◉ YES ○ NO

Notes: