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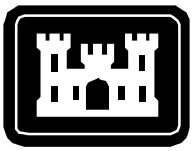

US Army Corps
of Engineers
New Orleans District

Louisiana Coastal Area, Louisiana – Ecosystem Restoration

Barrier Island Restoration, Marsh Creation, and Mississippi River Diversion, Barataria Basin Feasibility Study

Project Study Plan

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LOUISIANA COASTAL AREA, LOUISIANA -- ECOSYSTEM RESTORATION

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PROJECT STUDY PLAN
LOUISIANA COASTAL AREA, LOUISIANA -- ECOSYSTEM RESTORATION

I. Introduction

This document is the Project Study Plan (PSP) for the Feasibility Study, *Barrier Islands, Marsh Creation, and Mississippi River Diversion, Barataria Basin.* This study is strategically planned as the first effort for coastal restoration under the parent study entitled *Louisiana Coastal Area, Louisiana – Ecosystem Restoration Feasibility Study*. These studies will be prepared in accordance with Engineering Regulation (ER) 5-2-1 dated July 1989, ER 1105-2-100 dated 28 December 1990 and EC 1105-2-208 dated 23 December 1994, for conducting an environmental study to further develop and evaluate ecological restoration works within the confines of Louisiana coastal area, Louisiana. This PSP was developed by the New Orleans District (NOD), of the U.S. Army Corps of Engineers (USACE), and the non-Federal sponsor, the Louisiana Department of Natural Resources (LADNR).

The plan details the scope, schedule, and budget for accomplishing feasibility tasks. This document also includes a critical path method (CPM) network which shows the logic and interrelationship of tasks; a cost summary table and detailed work task descriptions; a work breakdown structure; and division of responsibilities to be accomplished during the study by the NOD and the non-Federal sponsor, and their respective consultants and contractors.

This PSP document has been prepared by the NOD. Upon approval by Washington Level Higher Authority, the plan will be implemented by the NOD and the LADNR, the prospective non-Federal sponsor.

II. General Description.

A. Location of Study Area.

The study area includes coastal Louisiana's Barataria Basin (see Figure 1), which is located in the following Louisiana parishes: Ascension, Assumption, Jefferson, Lafourche, Orleans, Plaquemines, St. Charles, St. James, and St. John the Baptist.

B. Background History.

1. Identified problems: Coastal land loss in Louisiana began to exceed levels normally associated with the delta cycle and natural coastal ecosystem change during the 1950's (Britsch and Dunbar 1993). The magnitude of the changes in the landscape and their pervasive nature became clear during the 1970's when the first of several mapping studies (Gagliano and van Beek 1970) quantified the scale of the problem. The habitats that are most commonly recognized by the public and by conservation agencies as threatened in the United States are wetlands (Noss, LaRoe, and Scott, 1995). The recognition of the problem led to growing public concern that coastal land loss be addressed.

(a) Existing Conditions: The Louisiana coastal plain remains the largest expanse of coastal wetlands in the contiguous United States. It comprises 25 and 69 percent of the fresh and salt marshes, respectively, found on the gulf coast. This respectively translates to 15 and 40 percent of those ecotypes remaining in the contiguous United States. The future of Louisiana's coastal marshes is therefore vitally important to the ecological future of the Nation.

The deterioration of these wetlands is now understood to be greatly accelerated by human activities, which is critical to the economic growth of the Nation. The unforeseen loss of these coastal wetlands now threatens the future of this region and will have national implications. Arresting and reversing the loss of the Mississippi River's deltaic wetlands has become a new national priority, as witnessed by the statement made by the Honorable Bruce Babbitt, Secretary of the Interior, at his 1993 visit to the region:

> "The coastal wetland issue I would characterize as simply the single most important environmental issue of our times. The wetlands are, without any question, the richest and most threatened ecosystem in this country. And in turn the coastal wetlands, where fresh water meets salt water, where land meets sea, are truly the most fragile, delicate, and important link of all … it's every bit the equal, if not greater than the Florida Everglades."

Honorable Mr. Babbitt reinforced the importance of Louisiana's coastal wetlands on July 22, 1999, on his tour of the lower Mississippi River with Assistant Secretary of the Army, Honorable Joseph Westphal, by stating that Louisiana's adoption of a far-reaching, long-term plan for restoring coastal wetlands, known as Coast 2050, has elevated solving the state's wetland loss problem to the national agenda, alongside restoration of the Florida Everglades.

The cumulative effect of human activities has been to tilt the balance between land building and land loss drastically in the direction of loss. As recently as the 1970's the loss rate for Louisiana's coastal wetlands was as high as 40 square miles per year. The current rate of loss is about 25 square miles per year. Much of this is due to the residual effects of past human activity, which is directly related to management decisions of the recent past.

Present-day Louisiana, which contains about 40 percent of the estuarine wetlands in the lower forty-eight states, is suffering approximately 80 percent of all coastal wetlands losses. Noss, LaRoe, and Scott (1995) have categorized ecosystem decline in Louisiana as follows: the wet and mesic coastal prairies in Louisiana as a critically endangered ecosystem of the United States (>98% of area in decline), fleming glade is endangered (85-98% decline), and saline prairie, baldcypress-hardwood (Pinus elliottii-Taxodium ascendens) forest, (P. glabra)-hardwood flatwoods in Louisiana, as threatened (70-84% in decline). Decline refers to destruction, conversion to other land uses, or significant degradation of ecological structure, function, or composition since European settlement. The table below categorically illustrates these loss rates in Louisiana:

46% loss of wetlands between 1780s and 1980s (Dahl, 1990)
25-50% loss of most estuarine communities (salt marsh, brackish marsh, intermediate marsh, intertidal salt flat)
<25% loss of vegetated pioneer emerging delta (Smith, 1993)
50-75% loss of freshwater marsh, interior saline soil marsh, scrub/shrub swamp, baldcypress/baldcypress-tupelo swamp, bottomland hardwood forest, bayhead swamp, and small-stream forest;
25-50% loss of hillside seepage bog, interior salt flat, gum swamp, seepage slope shrub thicket, and upland depressional swamp (Smith, 1993)
25-50% loss of coastal dune grassland, Catahoula sandstone glades, and coastal dune shrub thicket (Smith, 1993)

Currently, land building has virtually stopped in the deltaic plain and amounts to only a few hundreds of acres each year in the Atchafalaya River delta and along the eastern shoreline of the chenier plain. Land loss, while most dramatic in several inland hot spots, is ubiquitous and takes many forms, including the destruction of barrier islands; shoreline retreat along the margins of lakes, canals, and the gulf coast; and, perhaps more importantly, in the formation, expansion, and coalescing of ponds in the marsh. Paradoxically, deterioration of the system is believed to have contributed to a short-term increase in fisheries production, but the long-term prospect is for catastrophic decline (more than 70 percent over the next 50 years) and a future shoreline far inland of its present location.

The State of Louisiana's recognition of this problem can be traced through the success of its Coastal Zone Management program, established in 1980. Since its inception, the program has helped reduce wetlands loss due to development from 3,000 to 800 acres per year. The concern of private citizens and landowners was made clear in 1989 when an amendment to the Louisiana constitution establishing a dedicated trust fund for coastal wetlands restoration was adopted by a three to one margin. Congress, recognizing the environmental and economic threat posed by the continued loss of these coastal wetlands, was quick to act on this declaration of public support through the passage of the Coastal Wetlands Planning, Protection and Restoration Act in 1990.

(b) Expected Future Conditions: When Louisiana became a state in 1812, over 16 million acres of wetlands were incorporated into the resources of the United States. Approximately 4.5 million acres of this total were what would now be considered coastal wetlands. Approximately 74 percent, or 3.3 million acres, of Louisiana's coastal wetlands were still inventoried as such in 1989. However, more than a million acres of coastal wetlands have been lost just within the last 60 years. Current estimates of the loss rate range between 25 and 35 square miles annually (16,000 to 22,000 acres), or about an acre every 25 minutes. This

accounts for nearly 80 percent of all coastal wetlands loss in the United States today. Even with current restoration efforts, Louisiana is projected to lose nearly 400,000 acres of marsh and 232,000 acres of swamp by the year 2050.

Louisiana's coastal wetland losses will have impacts well beyond the borders of Louisiana. The impact on commercial fisheries alone will be enormous: by the year 2041, the harvest will decline by 70 percent. Loss of this resource will aggravate our Nation's trade deficit and place at risk the nearly 50,000 jobs directly related to fishing, processing, and wholesaling activities. In addition, populations of migratory birds and other animals directly dependent on the marsh and swamp will decrease dramatically, an impact which will be felt in much of North America, where these species spend part of their life cycle.

A number of other food staples or basic minerals, such as sugar, rice, salt, sulphur, and lime, are also produced in coastal Louisiana. Lost production of these basic items will impact national markets.

The coastal marshes help protect southern Louisiana from flooding and are integral to the design of the $12 billion worth of flood control works that protect the regional infrastructure. Continued loss of these wetlands will lead to loss or increased maintenance and replacement costs for highways, ports, waterways, railroads, pipelines, oil and gas facilities, and other features. As the coast deteriorates, billions of dollars of infrastructure will be surrendered to the Gulf of Mexico, and billions more will be spent protecting the remainder. Ultimately, consumers and taxpayers will pay these costs.

The consequence of not meeting this challenge would be the loss, forever, of an additional 630,000 acres of wetlands over the next 50 years. Along with this natural asset would go their potential to produce billions of dollars in renewable resources on into the future. Ultimately, the Nation would lose billions more in commercial productivity and infrastructure. Fifty years from today, the same decision will have to be addressed, but with far fewer options. By acting now, there are more choices available, and the information to make an informed decision.

(c) Planning Parameters: The Mississippi River built the coastal wetlands of Louisiana by depositing enormous volumes of sediment and nutrients, eroded from the vast interior of North America, on the continental shelf at its mouth. For the last several thousand years, dominance of the building process resulted in a net increase of more than four million acres of coastal wetlands. In addition, there was the creation of an extensive skeleton of higher natural levee ridges along past and present channels in the deltaic plain and the beaches of the chenier plain. The landscape this produced gave rise to one of the most productive ecosystems on earth. Only the most intensively managed agricultural systems, artificially subsidized by large inputs of energy and fertilizer, can rival the ability of these estuarine wetlands to convert sunlight and carbon dioxide into food.

The natural processes that produced the Mississippi River deltaic plain, first through the creation of the land and later through its maintenance by overflow of sediments and nutrients, are at odds with man's desire to comfortably inhabit the area and

develop its economic resources. In the eighteenth century, when Europeans began settling in significant numbers along the region's numerous low natural ridges, they began constructing local levees to protect themselves from the annual floods of the river. Later, in the nineteenth century, when the power of steam was harnessed for navigation, Congress initiated actions to clear the Mississippi and maintain it as the nation's most important commercial waterway. In the twentieth century, oil and gas exploration, land reclamation projects, and construction of ports and navigation channels further developed the economic potential of the region and the Nation. By the 1940's, massive flood control levees along the entire course of the Lower Mississippi had effectively confined it to a single channel and controlled the threat posed by annual river floods.

Today, flood control projects (such as levees), serve in large measure as an artificial constraint to deltaic processes. Most fresh water and sediment now bypass the area where they would naturally build and nourish wetlands. These valuable resources, by virtue of flood control project construction, are channeled out to the deep waters of the Gulf of Mexico. The wetlands continue to sink or subside as they have always done. Deprived of their natural sustenance, primarily consisting of sediment input, the plants that define the surface of the land die off. For this reason, the marshes are unable to maintain themselves within the subsiding, intermittently flooded zone in which they are adapted to live. Once denuded, the fragile substrate is left exposed to the erosive tidal environment.

The ecosystem problems are compounded by existing and continued infrastructure and inland waterways development. This is especially detrimental, where in many locales artificial channels dredged for navigation and oil and gas development provide efficient conduits for seawater to penetrate far inland. Also, adverse impact is experienced in coastal wetlands that receive either too much or limited amounts of fresh water provided by local rainfall. Due to disturbance of natural conditions, in these respective cases, there is either ponding or rapid water draining seaward. The banks of dredged material piled along man-made channels, water control structures, as well as embankments constructed for roads and railroads, obstruct natural cycles of flooding and draining and isolate large areas of estuaries from the remaining non-riverine sources of sediments and nutrients. Many coastal Louisiana resources have been affected by USACE projects as well as by channels constructed for oil and gas exploration and extraction. These affects include: saltwater intrusion; freshwater marsh loss; deterioration of mature stands of cypress; disruption of natural drainage patterns and tidal exchange processes; escalation of bank erosion as a result of navigation traffic wave action; and restriction of natural tidal flows. Several projects constructed by the USACE have contributed to these effects, such as the: Mississippi River – Gulf Outlet, Gulf Intracoastal Waterway and navigation lock system, Calcasieu River and Pass Ship Channel, along with the water control structures in the Mermentau Basin.

(i) Constraints: Harmonious consideration of ecosystem restoration will be necessary for coexistence with other coastal uses and resources such as infrastructure, fish and wildlife, public safety, and navigation, and oil and gas industries.

(ii) Goals and Objectives: The overall study goal would be to provide synchronization of ecosystem restoration project implementation. Focus will be in minimizing the amount of time from the start of study to that of critical, first construction, then ramping up into a sequence of uninterrupted, comprehensive restoration construction.

The first objective would be to identify and substantiate ecosystem restoration strategies that operate relatively independent, but in support of, the remainder of ecosystem restoration strategies of the Barataria Basin. In large, this consists of land building in the basin using sediment from the Gulf of Mexico, coastal bays, and the Mississippi River. For this, existing hydrologic and hydraulic models of the basin will be used to demonstrate relatively independent function of these key ecosystem strategies in the basin.

The second objective is to complete partial responses during the course of the feasibility study to expedite construction projects for the ecosystem restoration process. Strategically, in the short-term, these restoration projects of a less complex nature would be quickly planned, implemented and operated effectively.

In the long-term, success of projects resulting from this study would be measured by their contribution, as integral, sustainable parts of the Coast 2050 Plan for this area, to the long-term sustainability of this coastal ecosystem. These benefits will result in enhanced protection against storms and floods, production of fisheries and wildlife resources, protection of water supply and wastewater assimilation capacity, and support to activities such as oil and gas development, navigation, and ecotourism. This will be assimilated through accomplishment of a third objective: development of a systems approach to evaluate the non-independent ecosystem restoration strategies. Systematic evaluation of these strategies will be conducted through the development and use of hydrologic and hydraulic modeling of the Barataria Basin.

All three aforementioned objectives will be initiated in the beginning of and concurrently during the study.

The unprecedented scale of action required will test our ability to understand, predict, and manage the effects of restoration actions on coastal ecosystems. In response to this, another objective of this effort would be to expand the knowledge base, develop the predictive tools, and make the technological advances necessary to implement Coast 2050 strategies. For this, it will be necessary to inventory wetland acreage, measures of secondary productivity, biodiversity indices, and population/infrastructure development. It will be imperative to support the study process through an extensive study management program that: (1) catalogues lessons learned that would be queried and selectively employed in the study process, in order to make future planning and implementation efforts more effective, (2) acquires data on coastal resources, processes, and existing restoration project performance, (3) interprets these data through state-of-the-art hydrologic and ecological models, (4) develops safety net features to address risks and unintended consequences, and (5) applies the results of our knowledge through adaptive management of restoration projects and activities. In addition, a state-of-the-art approach must be used to facilitate overcoming the impediments to the

implementation of restoration projects, such as: (1) determination of land ownership, (2) resolution of surface-mineral rights and oyster lease conflicts, (3) compensation for damages, and (4) access to public resources. In order to address all of the issues and concerns of the former, it is envisioned that a multi-dimensional Geographic Information System technology would be employed to manage the effective and efficient use of data and information acquired through both routine- and research and development-level efforts.

Decisions on specific Coast 2050 actions will require a planning and implementation process that has extensive public involvement and effective incorporation of public values. Therefore, a process-oriented objective of this study would be to develop the highest achievable level of consensus among the major affected interest groups. There would be a technical review committee organized to guide the study, which would include members of Federal and state representatives, academia, and the Coalition to Restore Coastal Louisiana.

(d) Concise Statements of Specific Problems and Opportunities Warranting Federal Interest: By themselves, these economic and habitat values, which depend on the biological productivity of Louisiana's coastal wetlands, merit national attention. An equally important dimension of their value derives from the fact that these wetlands protect an internationally significant commercial-industrial complex from the destructive forces of storm-driven waves and tides. This complex includes deep-draft ports carrying 25 percent of the nation's export commodities by tonnage, and the most active segment of the nation's intracoastal waterways. Natural gas fields in the coastal zone and adjacent offshore areas produce 21 percent of the nation's annual output, valued at $7.4 billion. Petroleum refining industries in the coastal zone produce $30 billion annually for the domestic market nation-wide. In addition, coastal Louisiana is home to over 2 million people who, ultimately, convert these resources into the products the nation consumes. When investments in facilities, supporting service activities, and the urban infrastructure are totaled, the capital investment in the Louisiana coast adds up to more than $100 billion. The benefit to all these factors of protecting and restoring the coastal Louisiana ecosystem are assessed to far exceed the cost.

2. Coast 2050 Strategies: A wide variety of projects would be investigated, aimed at addressing the problems facing Louisiana's coastal wetlands, from both a defensive, protective posture and a more pro-active, restorative stance. It was recognized early in the development of the *Coast 2050 Plan* that the small project orientation of the priority project program could not, of itself, give rise to a comprehensive coast-wide restoration. Accordingly, a regional planning initiative, distinct from the priority project program, was initiated. Nine watersheds, or basins, were distinguished in Louisiana's coastal zone on the basis of their geology and hydrology (see Figure 3), which were assimilated to develop restoration strategies. These nine basins are grouped into four regions, as shown in Figure 3, based on geological/hydrological inter-functionality, in order to sustain their respectively similar ecosystems. A team of academic and professional scientists was retained to facilitate and advise this process, and an extensive effort was undertaken to solicit input from local government officials and the public. The result was a set of nine distinct strategic plans reflecting the significant differences among the region.

Through this process the restoration priorities in each region were established. Marsh restoration tools such as hydrologic restoration, shoreline protection, marsh creation with dredged material, marsh management, etc. will be used in each region to preserve or create marsh. In most regions, there are major projects that collectively form the major long-term components geared toward ecosystem restoration.

The plan presented here represents the first increment of several anticipated, subsequent major efforts that will collectively address coastal wetland loss in Louisiana, through the re-establishment of sustainable ecosystems. The goal of the proposed battery of studies will be to restore the natural processes that can bring about sustainability with the lowest requirement for future manipulation. The measures recommended in these plans will collectively contribute towards environmental sustainability. All this is developed based on a thorough alternatives analysis of various scales and technical approaches that lend themselves to each proposed strategy, within the context of a realistic understanding of the countering effects of subsidence and projected sea level rise.

In the scenario that all strategies in Coast 2050 Plan were implemented, coastal Louisiana would achieve the overarching goal of Coast 2050: sustaining a coastal ecosystem that supports and protects the economy and culture of southern Louisiana and contributes greatly to the economy and well being of the nation. Across the coast of Louisiana, there would be about 425,000 acres of wetlands preserved or created by the year 2050, with the implementation of ecosystem restoration measures, compared to the amount that would be lost through the year 2050 with only existing restoration efforts. The marshes that would be preserved would have the functions and values of natural ecosystems. A good estuarine gradient would be achieved in many areas of coastal Louisiana, where there would be a restoration of extensive habitat diversity. Across most of the Louisiana coastal area, there would be essentially no barriers to exchange of energy and materials between the wetlands and the estuary. One step towards the ecosystem objective of vertical accumulation would be to create and preserve marsh. Extensive use of Mississippi River water would accentuate vertical accumulation but reduce the estuarine gradient by limiting future areas of saline marsh. Critical landscape features that contribute to the hydrologic integrity and contribute to the sustainability of these systems will also be repaired and protected as necessary. Coastal Louisiana would have renewed habitat diversity from bottomland hardwoods and swamps in the upper end through extensive marshes to barrier islands and shorelines near the gulf. Implementation of some strategies have the potential to produce short-term adverse impacts to fisheries, however, ecosystem restoration project implementation would prevent long-term significant decline or collapse in fisheries production.

3. Preliminary Evaluation of Alternatives: Study of measures for ecosystem restoration in the Louisiana coastal area will include: (1) consensus-building through interdisciplinary planning and inter-agency and public involvement, (2) a systems approach to evaluation and development of ecosystem restoration projects, and (3) a rigorous approach of plan formulation, incremental analyses of

Coast 2050 strategies, and comparison of Coast 2050 strategies, with respect to environmental benefits of each Coast 2050 strategy.

The *Coast 2050 Plan* will serve as a framework for the definition of ecosystem resources and the identification of activities in the Barataria Basin, in order to develop an ecosystem benefit evaluation framework process. The resources of the Barataria Basin will be inventoried, and existing conditions will be surveyed, with the *Coast 2050 Plan* used as a template. A forecast (1) without-Coast 2050 strategies conditions and (2) with-plan conditions will each be conducted incrementally, in order to respectively identify, describe, determine the relative significance of, and assess the effects. Appraisal of these effects will be completed next, in order to establish benefits and/or consequences of action/non-action.

The study will involve a detailed review of pertinent past studies and monitoring data/new data as deemed necessary of existing projects, with a view towards developing a comprehensive, large-scale, systemic approach to a sustainable ecosystem restoration in coastal Louisiana that supports and protects the regional and national economy. The vision of this approach is to establish a system of over-arching and collaborative ecosystem projects in the study area, for conservation, restoration, and protection, that would together act with more accentuation than that possible by smaller, separately operating, and non-connected efforts.

Alternative plans will be developed for each Coast 2050 strategy. Formulation and comparison of alternative plans for ecosystem restoration will be conducted using IWR-PLAN Decision Support Software, which was developed by the USACE Institute for Water Resources. Briefly, IWR-PLAN assists with plan formulation by combining user-defined solutions to planning problems and calculating the effects of each combination, or "plan." The program can assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are best financial investments and displaying the effects of each on a range of decision variables.

IWR-PLAN employs user-defined solutions for planning problems and externally-generated estimates of each solution’s effects to formulate all possible combinations of those solutions, considering user-defined relationships between solutions. IWR-PLAN will then identify which combinations are the best financial investments through cost effectiveness and incremental cost analyses. Each combination of solutions is also an alternative plan. If alternative plans have already been formulated outside IWR-PLAN, the user can bypass the routine for building combinations and still use IWR-PLAN to assist in identifying which plans are the best investments.

In the implementation phase of constructed projects, there would be a detailed monitoring program established for the restoration projects, which will ensure accountability by objectively determining the degree to which programmatic and project-specific goals are achieved. The plan would also provide a basis for improved project design and operation. Monitoring should adhere to rigorous protocols, with input from a steering committee. Monitoring and research results would be incorporated into the GIS for the study, so that the ecosystem

management techniques developed in Louisiana can be made available to, and be peer-reviewed by, a national and international audience.

The final obstacles that must be addressed in the implementation of many projects involve social and legal issues. As a result, it is imperative that emphasis be placed on actively involving the public and all stakeholders in the restoration process to retain and build public support and confidence as difficult decisions are faced.

C. Results of Reconnaissance Phase for Louisiana Coastal Area.

The reconnaissance phase is the first phase of the Corps of Engineers' two-phase planning process. The purpose of the reconnaissance phase is to identify and evaluate environmental improvements; to determine whether there would be sufficient Federal interest in the environmental improvements to warrant continuation of the study; to determine if there is local support for a potential project; and to develop a scope of study and cost estimate for a cost-shared feasibility study. The Reconnaissance study for Louisiana Coastal Area, resulted in recommending the further development and evaluation of a plan of improvement for Louisiana Coastal Area.

III. Plan Formulation and Development

A. Proposed Plan Development, Study Purpose and Methodology.

1. The Feasibility Phase: The Feasibility Study is the second phase of the Corps of Engineers' planning process, and follows a favorable Reconnaissance Report and execution of a Feasibility Cost Sharing Agreement between the USACE and the non-Federal sponsor. The purpose of the Feasibility Study is to fully evaluate all reasonable solutions to the problems identified during the reconnaissance phase. The feasibility report documents the study, and this phase includes all further planning, engineering, design and real estate activities required to provide a basis for a decision on Federal participation in the construction of a project. The Feasibility Report is a complete decision document which presents the results of the reconnaissance and feasibility phases and provides the basis for recommending the construction of a project and preparation of a Design Memorandum (if necessary) and Plans and Specifications during the Preconstruction Engineering and Design (PED) phase.

A feasibility study is organized in a logical progression of these tasks required to fulfill the scope and purpose of the study. The major tasks begin with the study initiation period, data collection, and an assessment of the "without project" conditions. These tasks are then followed by the plan formulation process, which is based on the results of modeling, benefit and cost estimating, detailed design analyses and environmental impact assessment. The last portion of the study consists of report preparation, review and approval by higher authority, and culminates in the potential initiation of the Plans and Specifications (P&S) Phase during the Preconstruction Engineering and Design (PED) phase.

2. Study Scope: The study area for this first Coast 2050-based feasibility study will be the Barataria Basin (Figure 2). The Reconnaissance report contains the *Coast 2050 Plan*, which identifies sites across the coast of Louisiana for habitat restoration. The State of Louisiana, together with the LADNR, the Coalition to Restore Coastal Louisiana (CRCL), and the New Orleans District, recognized that two tiers of evaluation are imperative for expediting implementation of restoration measures. The first tier of evaluation will be for the following three major Coast 2050 strategies:

(a) R2-16 -- Dedicated Dredging along Hwy. 1,

(b) R2-17 -- Dedicated Dredging at Caminada Bay, and

(c) R2-22 -- Restore/Maintain Barrier Shoreline.

Existing model results suggest that implementation of the afrementioned strategies would not impact the remainder of strategies in the Barataria Basin. For this reason, strategies R2-16, R2-17, and R2-22 can be pursued independently of the remainder of the strategies for the Barataria Basin system, with the intention of proceeding with a recommendation on these strategies for construction at an interim point during the course of study.

The second tier of evaluation planned is geared towards a systems approach for study, where a comprehensive hydrologic and hydraulics model of the Barataria Basin will be developed to evaluate dependent strategies of the Barataria Basin. Both tiers of evaluation will commence upon initiation of the study, with study results anticipated within about 18 months for the independent strategies, and within approximately 3 years for the dependent strategies. The systems study would examine Coast 2050 sites in the Barataria Basin in detail, with a view towards identifying alternative plans for each Coast 2050 strategy having high quality restoration outputs to achieve Coast 2050 strategies. Detailed restoration designs will be developed for selected alternative plans.

3. Restoration Strategies: The Feasibility Study will initially focus on the Barataria ecosystem due to the very high rate of wetland loss, and the tremendous potential offered by the Mississippi River to address this problem. The Coast 2050 strategies for ecosystem restoration of the Barataria Basin are described in Attachment 2. The philosophy of the Coast 2050 strategies is that each strategy is critical to ecosystem restoration, where alternative measures will be investigated for the implementation of those strategies. In the investigation of alternative measures for each strategy, it is recognized that outputs, cost, and implementability will have to be quantified for these strategies to be shown effective, both individually and in analysis of the Barataria Basin system.

In the interest of implementing a controlled diversion project quickly, a high quality, comprehensive hydrologic model of the area would be needed -- both for design, and operations -- before proceeding with that, given the fact that a significant diversion potential already exists in the area. One concern here is that of the cumulative effect of existing, under construction, and planned diversions.

Extensive monitoring data for the area exists, which will be incorporated into model development and review -- as well as any modeling work done to date by the District or Louisiana State University (LSU), or other identified source.

In view of these concerns, the Feasibility Study will proceed with a comprehensive model for the Barataria. In order to achieve the best model in the shortest time frame, the Feasibility Study will investigate the possibility of expediting work product development via contract of private firms.

Simultaneous with the above work, the Feasibility Study will vigorously pursue investigation of alternative plans for each Coast 2050 strategy that would promote land building in Barataria using sediment from gulf, bay, or Mississippi River source(s). Three potential projects of the *Coast 2050 Plan* having the desired sediment source and location of benefits would be: R2-16 (Dedicated Dredging along Hwy. 1), R2-17 (Dedicated Dredging at Caminada Bay, R2-22 (Restore/Maintain Barrier Shoreline), and/or R2-11 (Delta Building Diversion at Basion Bay). As appropriate for these investigations, the effects of the borrow site would be evaluated and borrow location, depth, and configuration would be optimized in view of potential effects on benthic conditions, wave dynamics, slumping of adjacent water bottoms, and water column aeration.

In general, experts of coastal restoration in Louisiana summize that dedicated dredging is not a sustainable solution, but that in this instance this approach has several advantages: (1) a strategically placed project could yield benefits to other coastal resources such a infrastructure associated with transportation, and (2) oil and gas extraction, utilities, etc, and could also provide additional benefits in terms of important landscape structural features that function as important hydrological features for such projects.

For R2-11, some interest is shown in dedicated pumping from the river (possibly in the vicinity of 60-mile Point) rather than the traditional crevasse channel approach. The feasibility analysis would look at this as an alternative, along with various channel configurations, and determine the overall effects in terms of oysters, rate of marsh building, cost, etc.

For R2-22, investigation will be made of locating the project in an area that would be most complimentary, in terms of freshwater and sediment retention in the system, to existing or planned diversion projects, such as West Point a la Hache or R2-11.

The Coast 2050 strategies of interest have been sequenced qualitatively by a panel of experts in coastal restoration in Louisiana, according to potential for producing the most high quality outputs for the cost. Interim studies under an overarching parent study for Louisiana Coastal Area Feasibility Study would be published about every one-and-one-half to three years throughout the 10-year study period, in order to initiate authorization and funding for construction and implementation as expeditiously as possible.

4. Selection and Evaluation of Restoration Alternatives: Existing conditions at the habitat restoration sites would be determined by field investigations that would document vegetative cover, fish and waterfowl use, benthic communities, waterbird and song bird use and other resources on a seasonal basis. A habitat evaluation procedure (HEP) would then be applied to determine current value. Physical and chemical characteristics of each site would be determined by collection and analysis of surface sediments (grain size and bulk sediment analysis for commonly occurring contaminants), local water quality (dissolved oxygen, organics, chlorophyll) and site-specific physical conditions (salinity, temperature, water level, tide ranges, inundation periods, hydrology, depth, bathymetry). This data would be used to determine and prioritize the limiting factors responsible for degraded conditions of each site. A HEP analysis would be conducted on those alternatives that best address these limiting conditions, and selections made on the basis of which alternatives (methodology, size, location) produces the better overall increase in habitat value for the targeted species.

A survey of restoration sites within the Louisiana Coastal Study Area would be conducted. This would include an analysis of aerial photos and a one-time field survey of the benthic community (most directly effected by impacts to hydrology and sediment). These data would be used to identify degraded areas that would be subjected to follow-up field trips to visually screen sites for more intensive site-specific investigations and evaluations described above.

A series of plans will be evaluated to determine the optimal actions which could be implemented in order to improve the environmental quality of Louisiana Coastal Area. A 3 cycle process of plan formulation will be employed. An initial screening of alternatives (cycle 1) will be conducted using data and information collected to assess (inventory and analyze) the ecosystem (key controlling factors, functions, and structure) against criteria to include that of Coast 2050, as follows:

1. Assure vertical accumulation to achieve ecosystem sustainability
2. Maintain estuarine gradient to achieve ecosystem diversity
3. Maintain exchange and interface to achieve ecosystem linkages
4. Cost
5. Implementability

This stage will be followed by a more detailed screening (cycle 2) according to the following criteria: technical feasibility, environmental considerations, socio-economic considerations and institutional considerations. Input from the study sponsor and the public will also be used as an aid in identifying desirable alternatives. Subsequently, detailed analysis (cycle 3) of different scales of the selected alternatives will be performed. These detailed plans will be finalized an presented in the Louisiana Coastal Area feasibility report. The final plans will be described at a sufficient level of detail to provide an appropriate basis for the initiation of the PED phase.

Alternatives to divert freshwater, sediment, and nutrients from the Mississippi River into coastal Louisiana regions currently deprived of these resources will be

evaluated through use of appropriate hydrology/hydraulics modeling. Various scenarios will be executed using the model to determine optimal location(s) for environmentally sustainable and cost-effective improvements, and to determine which existing features are most directly impacted or adversely effect the overall sediment transport, water movement and quality within the Louisiana coastal region. An extensive field data collection program of key controlling factors, functional features, and structural features is needed as input to develop and calibrate the model. The model will also be used to characterize flow and salinity patterns and tidal ranges at the restoration sites, and predict levels of improvement from the various restoration measures considered at each site.

5. Restoration Goals and Outputs: The bulk of the habitat impacted by past disturbances are wetlands, tributaries, shallow water bottoms (fish and shellfish habitat), lake and bay shorelines, marsh fringes, waterway banklines, and barrier islands/shorelines. The site-specific restoration Coast 2050 strategies primarily target the protection of wetlands and adjacent shallows, while construction of diversions and construction/restoration of barrier islands/shorelines address the larger issues of subsidence, faulting, shoreline and bank erosion, storm protection, and sea level rise. Restoration of the coastal Louisiana ecosystem, as described in the *Coast 2050 Plan*, would produce about 600,000 to 800,000 acres of wetlands at an estimated cost of $14 billion by the year 2050. This approach will use sites where possible already owned by governments (city, state, and Federal) or managed by environmental groups (Audubon), thereby minimizing the amount of land/easement that would have to be purchased. In addition to the wetlands and littoral habitat restored, the sites would also restore adjacent upland and, in some cases, barrier island/shorelines that would provide their own unique habitat value, as well as increasing both the functional values and protection of the coastal wetlands. These wetland values would be even further compounded in consideration of the contiguous nature of these wetlands, both among each other and in conjunction with remaining wetlands in the basin. By linking projects together the habitat value of the larger combined area will generally exceed that of both individual habitats. Finally, the sites identified are adjacent to or in close proximity of other, similarly degraded areas being restored under other coastal restoration efforts, such as through the Continuing Authorities Program (CAP), and the Louisiana Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA), or Breaux Act. During the feasibility phase such sites would also be examined to expand or be added to the total restoration acreage recommended for construction, if the incremental cost analysis shows such expansion to be cost effective. Even if additional areas are not recommended for inclusion in construction, these other areas would still benefit from the plans developed for recommended alternatives.

With respect to diversions and barrier islands/shorelines, cost estimates will vary greatly, depending on the geographical extent targeted, structural dimensions and requirements for infrastructure, utility, and oyster lease relocations, as well as real estate costs and mineral rights ownership settlement. The level of impact of diversions and barrier islands/shorelines would be felt on a wide scale, significantly improving both the aquatic and wetland habitats currently in place, and laying an excellent ground work for ensuring the success of all future restoration efforts.

B. Study Components. Items which are to be addressed in the Feasibility Study phase include the following:

1. Develop detailed descriptions of baseline water circulation and current patterns in Barataria Basin.
2. Develop detailed habitat descriptions and values of existing degraded areas identified by the *Coast 2050 Plan*.
3. Assess existing resource usage within the Barataria Basin to determine needs and opportunities on an ecosystem basis, and set priorities accordingly.
4. Identification of activities and efforts to restore fisheries and other aquatic habitats through the improvement of hydrology and tidal flushing of currents within coastal areas of the basin.
5. Utilization of hydrodynamic models to assess basin strategies.
6. Development of measures to restore degraded wetland and waterfowl habitats at selected sites.

Tasks listed under Section IV of this report ("Major Activities and Product Deliverables") describe actions that would address the aforementioned items. All study components are described in detail in the Tasks Descriptions section of this report.

1. Environmental Studies -- Environmental studies will be conducted in order to develop conceptual plans of improvement for the Louisiana coastal area ecosystem. Environmental studies will include coordination with Federal, state, and local agencies to incorporate existing data into the conceptual plan designs. Environmental studies will also include the examination of existing vegetative coverage, sampling of aquatic vertebrate and invertebrate species, use of hydrologic/hydraulic models to describe current flows and hydrologic functions within the Louisiana coastal area, water quality analysis, and survey of existing wildlife throughout the coastal wetlands and barrier island/shoreline areas. Draft and Final conceptual restoration plans will be developed in association with environmental studies tasks. Many of the hydrologic studies are expected to be provided as "in-kind" service by the local sponsor. Computer modeling developed by the local sponsor will meet guidelines under EC 1110-1-83, "Policies, Guidance, and Requirements for Geospacial Data and Systems".

2. Cultural Resources -- Cultural resource activities include coordination with the State Historic Preservation Office (SHPO), field reconnaissance of proposed restoration sites, and activities undertaken to satisfy requirements under section 106 of the National Historic Preservation Act (1966 as amended).

3. Benefit/Economic Analysis -- A cost analysis will be generated in association with activities planned and identified under the environmental studies tasks. While a benefit/cost ration is not necessarily developed; an analysis of estimated costs in association with expected benefits of the project will be presented in the Feasibility Report; along with discussion on the value of anticipated outputs.

4. Real Estate -- Real Estate tasks will include the approximate costs for acquiring property (if any) in association with the recommended restoration plan. Rights of entry (if required) for environmental studies will be carried out through the Real Estate Division, in coordination with the non-Federal Sponsor's real estate element.

5. Project Management -- Project Management efforts will ensure that the study progresses according to schedule and within budget. Tasks will include interagency coordination, institutional studies, resource management, plan formulation, and report preparation.

6. Engineering – The majority of the engineering field data collection, analyses, design, and cost estimating will be conducted by either the LADNR or contracted Architect/Engineer (A/E) firms. The New Orleans District's Engineering Division will review and comment on the engineering work products throughout the study.

C. Non-Federal Sponsor

The Louisiana Department of Natural Resources (LADNR) has indicated its support for the Louisiana Coastal Area Restoration Project based on a letter sent to the New Orleans District office signed on March 2, 1999 by Dr. Len Bahr, Chair of the Louisiana Coastal Wetlands Authority. Local interests, including the CRCL, strongly support a feasibility study for the restoration of Louisiana Coastal Area.

D. Obligations of the USACE and the Local Sponsor

The USACE shall:

1. Expeditiously conduct the study under the leadership of a Senior Project Manager (SPM) and Project Manager (PM). The study will be overseen by the NOD Project Review Board (PRB), as discussed in the FCSA, which will meet periodically to review progress and findings.

2. Develop and monitor a detailed schedule and network for execution of the study as a basis for determining the work effort to be accomplished by the USACE, the non-federal sponsor, and their respective contractors. This network will form the basis for determining study budget requirements and milestones. It will be modified and updated as necessary to reflect study findings, budget considerations, scope modifications and other changes as the study progresses.

3. Identify and manage study task contingencies in order to effectively manage the study budget and finances.

4. Develop a range of alternatives with Federal regulation criteria to address the environmental problems in the study area. This range of alternatives will form the basis of a federally preferred plan. Locally preferred plans, if any, will be identified. In order for the locally preferred plan to be recommended for implementation, it must be in compliance with Federal rules and statutes applicable to the Corps' project development principles and guidelines cited in the FCSA and granted approval by the Assistant Secretary of the Army (Civil Works).

5. Develop project cost estimates using the M-CACES and Code of Accounts, identifying contingencies as separable items, and coordinate with the Non-Federal sponsor as a basis for planning project financing.

6. Manage and report on the study compliance with regulation in ER 1105-2-100 and ER 5-7-1. This includes the required upward reporting through the New Orleans District Project Review Board (PRB) and the USACE hierarchy, as well as coordination with the Non-Federal sponsor on project cost and schedule changes, the study progress, key project issues and other sponsorship matters such as financing and local cooperation requirements.

The Local Sponsor shall:

1. Appoint representatives to coordinate on scheduling, study management of in-kind services and other matters related to the study conduct. Representatives will also participate on the Executive Committee to oversee the study progress and review findings.

2. Accomplish in an expeditious manner all activities to be provided as in-kind services including participation in management activities; review of key products and accomplishment of tasks identified as in-kind services.

3. Notify the USACE at least 90 days in advance of task initiation if any change of in-kind services is planned, so that appropriate steps can be taken to accomplish the work without affecting the overall study schedule.

4. "In-Kind" Services: The sponsor, through its own contract, is expected to undertake tasks 18, 19 and 20 (Develop Hydrodynamic Model, Water Quality Sampling Program, and Develop Water Quality Modeling) as listed on Table 2. The percentage of task completion and projected value of "in-kind" service dollars is presented in Attachment 2. The water quality model will aid in determining the extent fisheries habitat can be restored to Louisiana Coastal Area. The New Orleans District's Engineering Division will evaluate the development of the hydrodynamic models developed by the local sponsor.

IV. Major Activities and Product Deliverables

The activities and anticipated delivery of products reflects the New Orleans District's capability to initiate the study in January of Fiscal Year 2000. This PSP will cover the development of products for the Louisiana Coastal Area, Louisiana -- Ecosystem Restoration Parent and Interim Feasibility Studies, prior to the initiation of the Plans and Specifications Phase. A product based approach will be emphasized with regard to the study execution, and also for purposes of helping track progress and performance. The feasibility study results and the products are summarized below:

A. Draft & Final Feasibility Report. All study activities will lead to the approval of a Final Feasibility Report by the Office of the Chief of Engineers. The document will entail all problem identification and formulation activities, required to identify and recommend a plan of improvement. The documentation for the report is coordinated with all interested parties, and is reviewed by higher authority (Washington level) review. Then, ultimately upon certification, the report is transmitted to Congress. The feasibility phase culminates in the Notice of the Division Engineer, where interim reports will be issued as phases of study are completed, with the and is scheduled for completion by the end of the fourth quarter of Fiscal Year 2010.

B. Draft & Final Environmental Documents. This product includes all activities leading to the assessment of environmental impacts related to proposed plans. This includes scoping and preparation of the appropriate environmental document, public coordination and review, and notification of findings. Preparation of an Environmental Assessment (EA) and possibly and Environmental Impact Statement (EIS) will be needed to meet National Environmental Protection Act (NEPA) requirements. Completion of the appropriate interim report environmental documents, along with a filing of the Records of Decision (ROD), if necessary, will be completed concurrent with each Interim Report that is issued throughout the 10-year study period.

C. Feasibility Study Cost Share Agreement (FCSA) and Financing Plan. As the details of the PSP are finalized, coordination will be undertaken with the non-Federal sponsor to review the model language for a FCSA for construction, implementation, operation and maintenance, monitoring (engineering and environmental), and adaptive management of ecosystem restoration projects in the Louisiana coastal area. A letter of intent will be provided by the non-Federal sponsor which acknowledges the requirements of local cooperation and expresses a good faith intent to provide the items of cooperation for the recommended project. Additionally, a preliminary financing plan will be developed by the non-Federal sponsor to detail plans for financing costs. As assessment of this plan will then be completed by the New Orleans District. Coordination of the FCSA model and preliminary financing plan are scheduled for completion by the end of FY 1999.

D. Draft Project Management Plan (PMP). As part of the feasibility effort, a draft PMP will be prepared based on the recommended project and baseline cost estimates. The draft PMP will address the schedule of the Plans and Specifications activities for the initial construction products and more detailed plans, construction bid documents, real estate and permit acquisitions for the successful management and completion of the project. The draft PMP will serve as the basis for the finalizing the PMP, which shall be used for project construction, implementation, operation and maintenance, monitoring (engineering and environmental), and adaptive management of ecosystem restoration projects in the Louisiana coastal area, assuming initiation of the PED phase. A draft PMP will submitted with the each Draft Interim Feasibility Report, and for the Draft Parent Feasibility Report.

E. Other Supporting Documents and Plans. Other supporting documents and plans will be developed as needed during the progress of the study including an interim progress report on the formulation methods and to address specific items as needed such as local cooperation, right-of- entry permits, real estate acquisition, quality control, value engineering, environmental and cultural resources matters, safety and security, and operation and maintenance.

V. Feasibility Study Tasks, Schedule and Budget.

In accordance with current budgetary policy, this PSP reflects the NOD's capability to initiate the study in January of Fiscal Year 2000, subject to availability of funds as well as an executed FCSA. However, if funds should become available prior to this anticipated start date, then the schedule can be adjusted accordingly. The following attachments are provided for further details on the study tasks, costs and schedule:

Attachment 1 -- Feasibility Task Descriptions and Costs
Attachment 2 -- Fiscal Year Costs
Attachment 3 -- Project Schedule
Attachment 4 -- Cost-sharing tasks
Attachment 5 -- Milestone Schedule

The following is a breakdown structure of the study products:

A.	The Study
A.1	Feasibility Report
A.1.a	Plan Formulation and Evaluation
A.1.b	Public Involvement
A.1.c	Recommendation
A.2	Engineering Appendix
A.2.a	Engineering Studies, Investigation, and Design
A.2.a.1	Hydraulic Design
A.2.a.2	Civil Design
A.2.a.3	Topographic and Bathymetric Surveying
A.2.a.4	Geotechnical Investigations, Testing, and Design
A.2.b	Plates
A.2.c	Cost Estimates
A.2.d	Recommendations
A.3	Real Estate Appendix
A.3.a	Real Estate Evaluation
A.3.b	Recommendations
A.4	Environmental Impact Statement/Rpt (EIS/EIR)
A.4.a	Alternatives analysis
A.4.b	Social studies
A.4.c	Mitigation planning
A.4.d	Cultural Resources
A.4.e	Hazardous, Toxic, Radiological Waste study
A.4.f	Fish & Wildlife study
A.4.g	Permits
A.5	Economics Appendix
A.5.a	Current economic analysis of the project, incl. NER plan
A.5.b	Socio-ecomomic study
A.5.c	Financial Analysis
B.	Institutional Documentation
B.1	Feasibility Study Cost Share Agreement (FCSA)
B.2.a	Financial Plan
B.2.b	Draft FCSA
B.2.c	Certificate of Legal Authority
C.	Information Management Platform
C.1	Website
C.2	Geographic Information System
C.3	Database

Attachment 1
Feasibility Task Descriptions and Costs

The following paragraphs provide estimates of the proposed level of effort for the tasks to be performed as part of the Louisiana Coastal Area, Louisiana -- Ecosystem Restoration Feasibility Study. For ease of review, the tasks have been grouped under general task descriptions according to the relevant code of accounts. The majority of the work to be performed during this study is composed of environmental analysis.

Feasibility Task Descriptions and Costs

The Feasibility Phase is organized to represent the progression of tasks required to fulfill the scope and purpose of study. The progression is depicted in the Project Schedule in this report. Following is a listing of the general task descriptions and costs that will be required to conduct the feasibility report for the restoration project. The majority of the work to be performed during this study is composed of Hydrologic and Hydraulic Investigations, Design Engineering, and Environmental Studies. The sub-accounts for all assignments to be completed within the District is described below including a detailed description of tasks associated with each sub-account as itemized in Table 2. These tasks are also listed on the Project Schedule -- Attachment 5, presented with this report. Some items in Attachment 5 are listed as milestones, therefore all numbered tasks are listed below. Tasks which are divided into 2 or more sub accounts have the financial portions of their costs listed in parenthesis under each associated sub-account.

22A -- PUBLIC INVOLVEMENT

Public Involvement includes the interagency coordination between the District, Louisiana Department of Natural Resources (LADNR), the Coalition to Restore Coastal Louisiana (CRCL), and other interested parties. Project scoping and status meetings will be held with the non-Federal sponsor (LADNR) and the CRCL. Additional public meetings will be held to discuss data collection and restoration opportunities with various organizations as applicable. Newsletters, fact sheets, individually written letters, and/or websites, may be generated to keep interested parties updated on the status of the project. The District will provide the local sponsor with minutes of meetings and forward appropriate information regarding the project schedule. Presentations and updates will be presented to the Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Louisiana Coastal Wetlands Authority. Tasks to be completed under sub account 22A include:

Task 6 -- Inter-Agency Coordination $

The Coordination and Public Involvement Task involves the coordination of meetings with the public as required under the NEPA documentation process; meetings with the local sponsor to evaluate and examine the out-puts and development of "in-kind" services; coordination with the U.S. Fish & Wildlife Service (USFWS) and Louisiana state officials to complete any permits which are required; and additional meetings

with agencies and organizations with property or vested interests in the Louisiana coastal area.

An additional item to be performed with this task is the formation of a technical review committee which will be comprised of members of the District, the Governor's Office of Louisiana, LADNR, CRCL. This committee will meet quarterly (at a minimum) to review data collected by various technical studies and assess their use in the Plan Formulation Process. It is likely that some of these members will also be on the Habitat Evaluation Procedures (HEP) team or similar team performing the actual studies on prospective restoration areas.

Total cost for sub account 22A is expected to be $.

22B -- INSTITUTIONAL STUDIES

An investigation will be conducted to identify the jurisdictions, concerns, authorities and financial capabilities of the Sponsor and interest of agencies and organizations that may be involved with the study. Tasks to be completed under sub account 22B include:

Task 5 -- Gathering of Existing Written Data $

The District will evaluate the non-Federal sponsor's financial capability for project construction and for handling post-construction project costs such as implementation, operation and maintenance, vegetative or structural repairs or replantings, and long term replacements to project features. The District will prepare a financing plan for the project construction, including Government outlays, non-Federal sponsor cash and credit contributions, use of lands and disposal areas by Fiscal Year. The District will also collect and/or review pertinent written data and photographs required to assist in the completion of a variety of socio-economic and environmental studies. It is expected that the District's Planning, Programs, and Project Management Division (PPPMD) will complete Task 5.

The total cost for sub account 22B is $.

22C -- SOCIAL STUDIES

The existing sociological, economic and demographic conditions for Louisiana Coastal Area will be documented for the final report. The "with" and "without" project conditions will be defined and documented. The "without" condition should reflect habitat restoration projects which are most likely to be constructed and other actions that may be taken in absence of a Federal Project. Tasks to be completed under sub-account 22C include:

Task 47 -- Prepare Draft/Initiate Incremental Cost Analysis $

Although most of the data for incremental cost analyses of the alternative plans for each Coast 2050 strategy will be based on environmental data, some socio-economic data will need to be included into the incremental cost analyses. Both positive and negative socio-economic impacts will be considered in producing the incremental cost analyses. The District's PPPMD will perform the incremental cost analyses.

Task 49 -- Development of Alternatives Analysis $

Similar to items to be considered in incremental cost analysis, alternative analysis will involve socio-economic input. Aesthetic impacts or benefits created by proposed restoration activities will be examined. The District's PPPMD will perform this alternatives analysis.

The total cost for sub account 22C is $.

22D -- CULTURAL STUDIES

Cultural investigation will include evaluation of various sites throughout Louisiana coastal area for historic and prehistoric archaeological data. History of vessel activity within the study area will also be examined to determine the probability and possibly location(s) of abandoned or wrecked vessels. Investigative studies will be completed to evaluate the potential impact of recommended restoration activities on sites eligible for the National Register of Historic Places. Field reconnaissance and coordination with the State Historic Preservation Office (SHPO) will be required to complete the aforementioned tasks. Tasks completed under sub account 22D include:

Task 33 -- Cultural Investigations $

Cultural Investigations consist of 2 separate types of studies.

1) A preliminary assessment of known historic or cultural sites or structures within the study area will be performed. This data will be presented to the Technical Review Committee and used in the plan formulation process to determine what areas should be used for restoration.

2) Once specific restoration sites have been selected, additional cultural examinations may be required by the State Historic Preservation Office (SHPO) on these sites to verify the presence or absence of historic or archaeological material.

All studies will be preformed to meet NEPA and section 106 of the National Historic Preservation Act (1966) requirements. Studies will be performed by the District's PPPMD.

The total cost for sub account 22D is $.

22E -- ENVIRONMENTAL STUDIES

The environmental study activities are categorized as follows:

1) The *Coast 2050 Plan* identifies sites for potential ecosystem restoration. These sites are located across the coast of Louisiana. These sites will be evaluated by the District.

2) Consultation with the non-Federal sponsor, the CRCL, with the support of existing data suggests that there are Coast 2050 strategies of interest in the *Coast 2050 Plan*, which have great potential to provide extensive and sustainable ecosystem restoration of the Louisiana coastal area. The District proposes to sequence these alternatives at the beginning of the studies, in order to advance for recommendation of construction and implementation, widely-impacting and sustainable ecosystem restoration measures. The District will evaluate these alternatives through a variety of environmental and engineering studies, which include: a review of past studies in
the area; water sampling at various depths throughout the Louisiana coastal area; development of a hydrodynamic model to assess water flow, circulation, salinity control, and sedimentation within the study area; and identification of locations and scale of measures for implementation for greatest overall effect.

Environmental Studies include describing and assessing existing and future ecological, biological, aesthetic, and recreational conditions; assessing adverse and beneficial impacts of proposed projects through the use of a habitat analysis study; identify restoration activities; provide an incremental cost analysis of project benefits and costs; describing the proposed restoration activities; and evaluation of proposed activities under the following regulations: Clean Water Act Section 404 (b) (1), Endangered Species Act Section 7, the state water quality certificate, permitting action initiation and produce an Environmental assessment and, if necessary, Environmental Impact Statement (EIS) as required under the National Environmental Policy Act. Environmental Studies also include obtaining tidal flow and salinity information, creation of conceptual restoration plans, and review of the draft and final Feasibility Reports. All computer modeling efforts will comply with EC 1110-1-83, "Policies, Guidelines, and Requirements for Geospacial Data and Systems". Tasks completed under sub account 22E include:

Tasks 9 and 10 -- Investigations of Identified Restoration Sites $

Tasks 9 and 10 are investigations of sites in coastal Louisiana identified by the *Coast 2050 Plan* reviewed during the Reconnaissance phase as likely areas for ecological restoration. The District will collect existing and limited field data (sufficient to characterize sites broadly, but not for detailed analysis) on these sites which will include the following information:

1) Locations of wetlands
2) Locations of hydrologic and hydraulic sources
3) Mapping and inventory of existing terrestrial and subaqueous vegetation
4) Existing usage by the public and wildlife species

5) Listing of unique features, infrastructure, utilities, oyster leases, real estate, or potential constraints to restoration activity

6) Identification of physical conditions defining each site.

This data will be evaluated in Task 13 of this study. The District's PPPMD will complete tasks 9 and 10. The remaining funds for this study are presented under sub account 22F as some of the stages of the study are from a wildlife perspective as opposed to an environmental perspective.

Tasks 11 and 12 -- Sequencing of Coast 2050 strategies of Interest $

In the interest of prioritizing the study of potential restoration sites identified by the *Coast 2050 Plan*, the District, in coordination with the LADNR and CRCL, will conduct a brief sequencing of the Coast 2050 strategies in the *Coast 2050 Plan*, examining barrier islands/shorelines, interior wetlands, tributaries, lakes, bays, and waterways within the study area. During these tasks, the District will coordinate with The non-Federal sponsor, the CRCL, and various Federal, state, and local agencies, where they will and examine existing data and information, aerial photos, and field surveys to identify in descending order of study priority those sites having potential for ecosystem restoration. This examination will be conducted according to criteria as follows, which includes that of Coast 2050:

1) Assure vertical accumulation to achieve ecosystem sustainability
2) Maintain estuarine gradient to achieve ecosystem diversity
3) Maintain exchange and interface to achieve ecosystem linkages
4) Cost
5) Implementability

Steps 1 through 6 listed in tasks 9 and 10 above will be undertaken for ecosystem restoration sites identified in tasks 11 and 12. The data obtained under these tasks will be evaluated in task 13. The remaining funds for this study are presented under sub account 22J as some of the stages of the study are from a hydrologic perspective, as opposed to an environmental perspective. The District's PPPMD will complete tasks 11 and 12.

Task 13 -- Technical Evaluation of Alternative Plans $

The District, in coordination with the non-Federal sponsor and the CRCL will evaluate the data obtained in tasks 9, 10, 11, and 12. From this data, the District will examine alternative plans for each Coast 2050 strategy in descending prioritized order according to potential for ecosystem restoration. These sites will be evaluated using the Coast 2050 criteria, along with that below:

1) Existing and potential usage by fish and wildlife species
2) Existing and potential usage by the public
3) Evaluation of surrounding habitat
4) Examination of any constraints to construction, implementation, operation and maintenance, monitoring, and adaptive management, potentially required for execution of restoration activities.
5) Size and location of restoration site.
6) Potential presence or absence of HTRW contaminants.

7) Locations of known historic or archaeological sites.

Once the sites have been selected, tasks 14, 15, 23 and 24 can be initiated. The District's PPPMD, in conjunction with the Technical Review Committee described under sub account 22A will perform task 13.

Task 14 -- Detailed Site Investigation of Sequenced Sites $

Once the sites have been identified under task 13, they will be examined through detailed investigation. Items to be completed during this investigation include:

1) Identification of areas of significant vegetative growth to be bio-benchmarked by a survey team. Biobenchmarking consists of selecting specific points of thriving vegetation and surveying the elevation of these points. The known elevations of existing thriving vegetation is critical to the restoration design of certain sites as tidal innundation regulates the growth of certain plant species.

2) The existing and potential tidal inundation of some sites will also be critical to restoration design. Selected sites will have tidal gauges installed, and tidal data collected.

3) Habitats will be classified under the Cowardine system for use in HEP studies or similar evaluation procedure.

4) Wetlands will be delineated at the selected sites.

The District's PPPMD will complete Task 14.

Tasks 25, 26, 27 -- Benthic Analysis $

The District's PPPMD will perform an analysis of microinvertebrates located along site waterbottoms. Emphasis will be given to waterbottom areas selected in task 13 for this inventory. Benthic grabs and similar devices will be operated from vessels or shoreline for this analysis. Additional biological analysis will be conducted under this study. Biological analysis involves mapping primary production areas, mapping plankton concentrations, and mapping of benthos production.

Task 29 -- Habitat and Wetland Functional Analysis $

Utilizing information gathered from tasks 9, 10, 11, 12, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, and 27; the District's PPPMD will conduct a Habitat Evaluation Procedure or similar analysis to assess the Value of existing conditions at the selected sites. Both terrestrial and waterbottom sites will be evaluated. The District's PPPMD will complete task 29 augmented by the USFWS, LADNR and other members of the HEP team. This requirement is outlined in EC 1105-2-206.

Task 30 -- Develop Habitat Analysis Draft Report $

A draft report for activities completed in task 29 will be developed. This report will be reviewed by the technical review committee described in sub account 22A.

Task 31 -- Develop Final Habitat Analysis Report $

A final report incorporating comments from the technical review committee will be developed.

Task 37 -- Develop Existing Conditions Draft Report $

An existing conditions report summarizing the environmental findings under tasks 9,10,11,12,13, 14, 25, 26, 27 and 29; engineering findings under tasks 16, 21, 22, 23 and 24; socio-economic findings under task 5, cultural findings under task 33; and hydrologic findings under tasks 18 and 19 will be summarized in a report. This report will be generated by the District's PPPMD and subject to review by the technical review committee.

Task 38 -- Prepare Final Existing Conditions Report $

A final report incorporating the committee's comments will be produced by the District's PPPMD. The results of this report will be utilized in the development of the conceptual mitigation plans, the incremental cost analysis, and the alternatives analysis (tasks 42, 47 and 49 respectively).

Task 42 -- Develop Conceptual Restoration Plans as Selected Sites $

Based on the results of the existing conditions report and the Habitat Analysis, the District's Planning Division will prepare Conceptual restoration plans which will be forwarded to the District's Engineering Division for specific site drawings, and cost estimates (tasks 44 and 45).

Task 43 -- Habitat Restoration Analysis $

The District's PPPMD will predict increases in habitat value based on the plans developed under task 42. The results of this analysis will be used in the incremental cost analysis (task 47).

Task 49 -- Development of Alternatives Analysis $

The District's PPPMD will complete an alternatives analysis. As the bulk of the analysis will be dependent on environmental inputs, the majority of the study funds for this task lies under sub account 22E. Inputs from the existing conditions report (task 38) and other tasks will be used to develop the alternatives analysis. The results of this task will be used in the preparation of NEPA documentation (task 50).

Task 50 -- Preparation of Environmental Permits $

Once the incremental cost analysis has been completed (task 48) and the final conceptual restoration plans are selected, the NEPA documentation process can be initiated. The District's PPPMD will prepare the NEPA documentation and initiate application and review process for all other necessary permits and actions required for construction. Likely actions include the preparation of Water Quality Certificate documentation, a Clean Water Act section 404 evaluation, and potential section 7 of the Endangered Species Act required coordination, as well as compliance with other Federal and State statutes.

Task 65 -- Vehicle / Vessel Use $

This funding is to be used for the District's PPPMD's use of vehicles or vessels as necessary to complete environmental studies.

Task 69 -- Field Supplies and Equipment $

This funding will be used by the District to complete environmental studies, and support field studies and data storage/processing.

The total cost for sub account 22E is $.

22F -- FISH AND WILDLIFE STUDIES

Fish and Wildlife studies consist of screening studies performed by the District, and a Fish and Wildlife Coordination Act Report generated by the USFWS as required under NEPA. The following tasks will be completed under sub account 22F:

Tasks 9 and 10 -- Biological Investigations of Identified Terrestrial Sites $

As described under sub account 22E, portions of this task are set aside specifically for the examination and identification of wildlife species.

Task 34 -- Statement of Work for the USFWS $

The District's PPPMD will complete a scope of work for the United States Fish and Wildlife Service (USFWS) to complete a Fish and Wildlife Coordination Act Report (FWCAR).

Task 35 -- USFWS Contract Execution $

This is the estimated cost for the USFWS to complete the FWCAR.

Task 36 --NOD Review of USFWS FWCAR Report $

The District's PPPMD will review the FWCAR.

The total cost for sub account 22F is $.

22G -- ECONOMIC STUDIES

This work effort includes an economic assessment of the benefits of the "without-project" condition and "with-project" alternatives under consideration for the study. This involves some additional data collection and assessments of economic impacts based on findings of the Reconnaissance study. A detailed examination of the problem area and appropriate economic analyses will be conducted. The following tasks will be completed under sub account 22G:

Task 47 -- Prepare Draft/Initiate Incremental Cost Analysis $

In addition to summarizing "with" and "without" project conditions, the District's PPPMD will prepare an incremental cost analysis based on values obtained through the habitat analysis in order to determine which restoration activities will be selected for the Construction phase.

Task 48 -- Prepare Final Incremental Cost Analysis Report $

A final report and plan selection will be prepared for higher authority review.

The total cost for sub account 22G is $.

22H -- REAL ESTATE STUDIES

Real Estate Studies will include the involvement and coordination with the Corps of Engineers, New Orleans District, Real Estate Division. Integral to this work effort, as outlined in draft ER 405-1-12 dated January 1991, is the preparation of a Baseline Cost Estimate for Real Estate in M-CACES format and a Real Estate Supplement (RES). These items are required for inclusion in the final report. The following tasks will be completed under sub account 22H:

Task 32 -- Real Estate Evaluation of Selected Sites $

Real Estate will evaluate the selected sites for restoration in preparation of a Gross Appraisal (task 51). The District's Real Estate Division will also obtain rights-of-entry as is necessary for various studies.

Task 51 -- Real Estate Preparation of Gross Appraisal $

This will involve a detailed accounting of property ownership, property evaluation for possible easement rights or acquisition of impacted project lands, preparation of a Gross Appraisal, and assessment of LERD requirements. The final RESs will be provided to Project Management and incorporated into the PMPs. Real Estate representatives will also attend meetings and conferences with the sponsor when necessary. The NOD will also be involved with preparing, modifying and revising the

Feasibility Study Cost Share Agreement (FCSA) in cooperation with the non-Federal sponsor, Project Manager, and all other affiliated or concerned agencies.

The total cost for sub account 22H is $.

22J -- HYDROLOGY & HYDRAULIC INVESTIGATIONS

Hydrology and Hydraulic Investigations comprise the largest task efforts in this study. Sub-aquatic as well as terrestrial studies will be required. Hydrogeologic studies include the analysis of tidal movements, wave actions, and location of groundwater as necessary to construct terrestrial and waterbottom restoration plans. The majority of tasks initiated under this sub account will be completed by the non-Federal sponsor; with technical review by the District's Engineering Division (task 70). Tasks under sub account 22J include:

Tasks 11, 12 -- Preliminary Screening for Additional Sites $

As described in sub account 22E, some items undertaken in this task include studies of a hydrologic nature. Components of these tasks include a background physical analysis. Physical analysis is based on existing data to the extent possible and includes mapping tidal and non-tidal currents and salinities, identify water mass distribution patterns, identification of fronts, identification of vertical mixing rates, characterizing air-waterbody exchange process, and mapping of meteorological and climatological patterns. Chemical analysis includes mapping of water quality characteristics of water column, mapping sediment contaminant distribution patterns, and Identification of biochemical processes and rates of exchange.

Task 18 -- Develop Hydrodynamic Model $

In order to assess water circulation at a site-specific scale throughout Louisiana Coastal Area, consideration will be given to developing a fine-grid model will be developed using curvilinear 3-dimensional hydrodynamic models. This will require extensive computer programming to create such a model and address required outputs for an environmental analysis, both on a site-specific scale and a ecosystem-wide scale.

Task 19 -- Water Quality Sampling Program $

A water quality sampling program to assess the existing conditions of coastal waters will be completed. The quality sampling program is necessary to both develop and calibrate the hydrodynamic modeling (task 18) and to describe existing conditions of fisheries habitat within the Bay.

Task 20 -- Develop Water Quality Modeling $

Once the hydrodynamic model and water quality sampling program have been completed, a water quality model assessing the locations of water throughout the coastal area can be developed. This model is required to predict not only the

present circulation patterns, but also future water movement patterns based on various measures of proposed alternative plans for each Coast 2050 strategy. The outputs from this model will be used in the Habitat Evaluation Process. Hydrodynamic tasks (listed as 18, 19 and 20) will be performed by the non-Federal sponsor as "in-kind" services. These "in-kind" services will total up to 25% of the non-Federal sponsor's total cost of the project. The total cost for tasks 18, 19, and 20, however, could exceed the limit for "in-kind" services allowable under this authority. Additional costs will be paid out of authorized study funds.

Task 70 -- Model Evaluation by District Engineering Division $

The District's Engineering Division will be used to evaluate "in-kind" service activities performed by the LADNR. The hydrodynamic studies and programs being developed by the non-Federal sponsor (namely tasks 18, 19 and 20) require the technical review of an expert at the Federal level. Representatives from the District's Engineering Division will serve in this capacity.

The total cost for sub account 22J is $.

22K -- GEOTECHNICAL INVESTIGATIONS

A comprehensive investigation of rivers, coastal waterbottoms, and in Gulf of Mexico offshore will be conducted in the study area, in order to inventory suitable sediment sources for coastal restoration. Soils-related engineering activities for study of coastal restoration sites include the initial, and detailed, subsurface investigations and the soils handling operations. The focus will be in providing a guide for design of barrier islands, marsh creation, terracing, and as fill in a retaining dikes, where: (a) the quality, quantity, and location of borrow sources will be determined, (b) foundation conditions will be assessed for potential restoration sites, and (c) various construction techniques considered advantageous to the implementation of each alternative considered. The significant engineering, and plant-growth, characteristics of the existing near-surface soils must be identified, described, and classified. Determinations of soils handling and earthworks construction for attainment of restoration strategies will be made during the study, for the purpose of providing input to the preparation of plans and specifications for the excavation, transportation, and deposition of the soil.

Geotechnical investigations will include evaluation of grain size distributions, sedimentation rates, material classification, soil strength determination, soil erodability determination, and estimated volume of material at selected sites. Soil testing at selected restoration sites will be conducted as part of the geotechnical investigations. Design guidance will be provided for: the various alternatives to be investigated for terrestrial restoration using available subsurface information and existing site conditions. Tasks completed under sub account 22K include:

Task 16 -- Sediment Analysis at Selected Sites $

Terrestrial sites identified under Task 13 will be analyzed. Such analysis will be used to determine both the presence or absence of contaminants potentially limiting vegetative growth and the naturally occurring conditions (nitrogen and phosphorus) elements needed for plant vitality. It is estimated that 30 samples will be tested.

Tasks 21, 22 -- Sediment Analysis at Selected Aquatic Sites $

Waterbottom sites identified under task 13 will be analyzed to determine existing fisheries habitat. Sediment analysis at these sites is critical to determining the existing conditions within waterbottoms. The information gathered in this task will be used in the habitat evaluation study. It is estimated that 10 samples will be collected and analyzed.

The total cost for sub account 22K is $.

22N -- SURVEYING AND MAPPING

Surveying of specific sites will be required for conceptual restoration design. Sediment data and beach data for grain size will be collected for use in design, if current information is unavailable or deemed insufficient. Tasks completed under sub account 22N include:

Task 15 -- Detailed Topographic Design Survey $

In order to develop conceptual restoration plans and costs, terrestrial sites identified in Task 13 will be required to be surveyed at sufficient detail to produce an accurate cost estimate for 1 ft. topographical contours. Tidal gauges and bio-bench marked flags placed during environmental studies will also be surveyed.

Tasks 23 and 24 -- Map Bathymetry of Aquatic Sites $

Waterbottom sites selected in task 13 will be mapped. This will aid in re-contouring designs which will then be inputted into the hydrodynamic modelling (task 20) to determine water circulation and habitat reconfiguration within waterbottoms. Surveys of selected sites will be performed by the New Orleans District and related field offices.

The total cost of sub account 22N is $.

22P – ENGINEERING DESIGN, QUANTITY, AND COST ESTIMATES

Design efforts for the Louisiana Coastal Area Study consist of coordinating with involved parties relating to the surveying and mapping tasks, with the study team, and the various technical elements for determination and design of the proposed restoration features for the project. Proposed conceptual restoration plans developed through Environmental Studies will be evaluated and a cost for the implementation of these plans will be developed. Items evaluated during this process include: Topographic surveys, vegetation mapping, tidal range estimates,

water quality analysis, estimate of borrow excavation quantities, construction excavation costs, sediment analysis, habitat and wetland analysis, analysis of soil suitability, estimate of demolition and removal of structures costs (as appropriate), estimate of dredge and fill volume and costs, erosion and stabilization control measure evaluations, and estimations on removal of bulkheads, concrete and fill material as appropriate. It is envisioned that up to 40 conceptual plans will be submitted for initial cost estimates. After the incremental cost analysis is completed, terrestrial and waterbottom sites will be selected for design sheets and M-CACES studies which are described below:

Task 44 -- Develop Engineering Plans for Selected Sites $

Detailed design drawings of conceptual ecosystem restoration plans developed in Task 42 will be created by the District's Engineering Division. These plans will meet Corps' specifications and be used in developing the cost estimate for restoration activities.

Task 45 -- Develop Projected Construction Costs For Restoration Plans $

The District's Engineering Division will estimate the construction and implementation costs using M-CACES procedures based on the plans developed in task 44.

Task 52 -- Determination of Post-Construction Costs $

The District's Engineering Division will estimate post-construction costs associated with the restoration plans. Post-construction costs are likely to include vegetative monitoring, re-planting costs, and maintenance of restoration property.

The total cost for sub account 22P is $.

22Q -- PROJECT MANAGEMENT

Project management involves coordinating all aspects related to the management of the Louisiana Coastal Area Study, including scheduling, coordination, budget preparation, correspondence, etc., from the point of initiation through the review process and completion. Tasks to be completed under sub account 22Q include:

Task 46 -- Engineering Management $

This is management of engineering tasks 44 and 45 for the work of A/E firms and for management of the review and comment of A/E work products by the District's Engineering Division.

Task 66 -- Technical Program Management $

This includes coordination and implementation of the study team and scoping meetings, executive committee meetings, communication with Mississippi Valley Division (MVD) and the study non-Federal sponsor (cash contributions will be

coordinated into the overall study budget). Technical Program Management also includes management of environmental studies and other technical evaluations. A Senior Project Manager and Project Manager is identified under the plan formulation management task (task 67).

The total cost for sub account 22Q is $.

22R -- PLAN FORMULATION AND EVALUATION

Plan Formulation refers to the formulation and evaluation of alternative solutions to the problems initially identified during the Reconnaissance study and subsequently refined during the feasibility study. "Without" project future conditions will be assessed for each selected site for comparison with the "with-project" future conditions. Planning objectives and constraints and plan formulation rationale and criteria will be developed. The evaluation of alternatives will compare the costs and benefits associated with each plan for implementation. The following tasks will be completed under task 22R:

Task 39 -- Establish Without Project Conditions $

"With-out" project conditions are briefly been described in the Reconnaissance report and *Coast 2050 Plan*. Additional "with-out" project conditions will be described for each selected restoration site based on environmental and socio-economic input. This task will be completed by the District's PPPMD.

Task 67 -- Plan Formulation Management $

Plan Formulation management will result in the managing of the incremental cost analysis report, and associated restoration site selection. Additionally, a Project Manager will be assigned from the District's PPPMD. A separate project biologist, who will lead data gathering and field operations, will also manage all environmental studies listed under 22E. The Project Manager will develop a detailed study plan and monitor funds and work progress to ensure tasks are completed on time and within budget. Project Management will ensure that all data collection activities are proceeding as scheduled and that the information collected is properly disseminated. Project Management includes frequent coordination with technical elements, response to Congressional or other study related inquiries, annual preparation of the budget testimony and maintaining open dialogue with the non-Federal sponsor and the MVD. This effort also entails preparation for, attendance when necessary and associated documentation for milestones as follows:
P3 Milestone -- District Coordination Meeting
P4 Milestone -- Formulation to MVD
P5 Milestone -- Approval of Formulation Material
P6 Milestone -- Submission of Draft Feasibility Report
P7 Milestone -- Approval of Draft Report
P8 Milestone -- Submission of Final Feasibility Report
P9 Milestone -- Approval of Final Feasibility Report

Project Management also involves the preparation and review of a draft and final Project Management Plan for any recommended water resources project which would enter the Plans and Specifications phase.

Task 71 -- Prepare Formulation $

The plan formulation items taken into consideration are inputs from the incremental cost analysis (task 48), an analysis of "with" and "with-out" project conditions, and analysis of socio-economic data (tasks in sub accounts 22C and 22G). This formulation will be presented in the Feasibility Report. This task will be completed by the District's PPPMD.

The total cost of sub account 22R is $.

22S -- REPORT PREPARATION

This feature includes assembling, writing, editing, typing, drafting, reviewing, reproducing and distributing draft and final study reports, environmental assessments and other related documentation required for transmittal by USACE to higher authorities and for use as a decision document. Tasks included in sub account 22S include:

Task 54 -- Prepare Draft Feasibility Report and DEIS $

A draft feasibility report and draft Environmental Impact Statement (DEIS) will be prepared by the District's PPPMD. The contents of the Feasibility Report are summarized as follows:

(1) Brief, concise main report summarizing the technical findings, conclusions and recommendations;

(2) An Environmental Impact Statement (EIS) or Environmental Assessment (EA) with a Finding of No Significant Impact (FONSI);

(3) Technical appendices presenting the detailed backup and results to individual work tasks;

(4) Appendix containing the sponsor's financial capability statement and preliminary financing plan; and

(5) Other supporting documentation including the Project Management Plan (PMP).

The steps necessary for producing a final report will include the following phases: Finalize draft Feasibility Report for internal/sponsor review; conduct review board meeting and revise and reproduce draft report for submission to MVD; revise draft report in response to MVD comments; reproduce draft for coordination with agencies and public; modify draft report in response to comments during agency and public comment; and coordinate with the non-Federal sponsor and internal elements and reproduce final District report for distribution.

Task 58 -- Prepare Final Feasibility Report and FEIS $

This report will incorporate comments from higher authority review.

Task 63 -- Prepare Record of Decision $

Once the NEPA documentation has been reviewed and approved, a Record of Decision will be prepared.

The total cost of sub account 22S is $.

22T -- PROGRAM AND PROJECT MANAGEMENT

This task involves macro-level tracking, monitoring and upward reporting of the study progress through MVD and Washington levels of the Corps of Engineers. Tasks included under sub account 22T are:

Task 68 -- Program Administration $

This money is used by the District's PPPMD, who will track monetary obligations and expenditures for each fiscal year, for the study and information management platform. In addition, program administration covers management of the information management platform by the LADNR and U.S. Geological Survey. This also covers MVD and HQUSACE involvement for review and approval of work products and studies.

Task 80 – Project Management $

This task involves leadership, management, decision-making, and communication with study participants to ensure achievement of study goals, objectives, and milestones.

Task 82 – Contract Management $

This task involves leadership, management, decision-making, and communication with Contracting Division and contractors (Architect/Engineer, technical services) to ensure achievement of study goals, objectives, and milestones.

The total cost for sub account 22T is $.

22U -- INFORMATION MANAGEMENT

This task is for the development and maintenance of the study Data Information Management System (DIMS). This feature includes developing a Geographic Information System (GIS) based central data management system for the first study, and anticipated subsequent studies (approximately 10 in total). The system will be based on the GIS that has evolved over the last 6 years to support CWPPRA planning and monitoring activities. Technology will probably evolve very rapidly over

the life of the study and will necessitate constant upgrading of equipment/software and staff acquiring new skills to implement the technological changes. The DMS will evolve over time. The data generated by the study will be carried forward as the DMS evolves.

The system shall:

1) Provide data compilation, data storage, data retrieval, data analysis, and data management support for the study
    a) Serve as a mechanism to produce high quality output products (maps, figures, graphics, etc.) to support needed components of the study.
    b) Distribute information and output products to study participants and to the general public through the internet
    c) Have the capability to adapt incorporate evolving management objectives and technology changes over the life of the study to provide needed information to study participants.

Task ?? -- Information System Development

Design and implement a data management system (DMS) for the study based on review of anticipated task products as outlined in the draft plan. The DMS consists of 1) a GIS component to manage and manipulate spatial data; 2) a database component to manage manipulate, and catalog non-spatial information, 3) and a web based distribution mechanism to provide simplified data access to plan participants and the public. Provide labor, equipment, and materials costs to develop and implement the DMS.

Task?? -- Information System Management and Update

Update and manage the DMS for the study's duration. Insure all relevant information produced for other tasks are incorporated in to the DMS. Identify and discriminate between unique data gathering/conversion tasks vs. data management tasks that must be maintained for several years or for the duration of the study. Determine DMS ongoing support costs (personnel, equipment, maintenance, and supplies) for the duration of the plan. Insure the DMS is capable of adapting to changes as needed to support the study and that study data is readily available to plan participants via a request mechanism or through the web.

Task?? -- Information System Output Products

The DMS must provide a wide variety of high quality output products consisting of maps, figures, digital images, and reports. Output products will be classified as:

1) Work products created for ad-hoc requests (ex. working maps for study planning purposes or a habitat acreage summation for a portion of the plan area)

2) Identified standard final output products consisting of recurring (ex. standard map or report generated on a yearly basis to reflect some aspect of the plan

3) Unique final products (ex. individual map to depict geologic conditions within the study area

All product requests and associated output products will be tracked using a request database to catalog product deliverables. The DMS will retain high-resolution digital images/postscript files/pdf files of all hardcopy maps and figures created for the study for product reproduction/reprints and product archival purposes. Low-resolution copies of the original source output products will also be maintained in a format suitable for digital presentations and for web publishing.

Report products will be maintained in their original source format and in a pdf format for later web downloading

Task?? -- Information Distribution

The DMS must provide a mechanism to allow study members and the general public access to study data. A web based data distribution system will form the key information distribution component of the study's DMS. The web-based system will organize study products and allow for study participants to easily access products either created for study tasks (reports, CAD drawings, etc.), or specifically generated by the DMS (GIS output products), and will allow study participants to share data. The system will be designed for both public and restricted access, depending on whether or not the product data has been approved for public release by study participants. This web DMS component must be designed to easily interface with the DMS to allow for rapid updating and easy maintenance. The web DMS component will require dedicated staffing and equipment support for the duration of the study

The total cost for sub account 22U is $.

22V -- DRAFT FEASIBILITY COST SHARE AGREEMENT (FCSA)

A Draft Feasibility Cost Share Agreement for restoration activities of selected alternatives will be included in the feasibility report. The FCSA is a legally binding agreement the sets forth the terms of the relationship between the Federal Government and the non-Federal sponsor for construction, operation and maintenance of projects approved through the feasibility process. Tasks included in this sub account include:

Task 60 -- Preparation of Draft Feasibility Cost Share Agreement $

A draft FCSA will be created by the District for higher authority review.

Task 61 -- Finalize Project Feasibility Cost Share Agreement $

A final FCSA will be created by the District incorporating comments form higher authority and the non-Federal sponsor.

The total cost for sub account 22V is $.

22Y -- WASHINGTON LEVEL REVIEW

This item is included to ensure the non-Federal sponsor is afforded the opportunity to participate in any significant effort as a result of the review by the Washington Level Review Center (WLRC). This is to cover expenses for the District and non-Federal sponsor associated with the review and processing the feasibility report subsequent to the Division Commander's Notice announcing the completion of the feasibility report. Additionally, representatives of the non-Federal sponsor, along with representatives from the District, shall attend a site visit by WLRC during the processing of the report. By regulation, this item is set a 5% of total study cost or $50,000 whichever is less, and is to be cost-shared equally.

The total cost for sub account 22Y is $.

Attachment 2
Descriptions of Coast 2050 Strategies for the Barataria Basin

a. Alternative Plan R2-1 -- Small Diversion (into the swamps in the vicinity of Logan and Edgard). The wetlands located adjacent to the Mississippi River at present receive an insufficient amount of freshwater, sediment, and nutrients. Introduction of these resources through these diversions would enhance the quality of these ecosystems.

(1) Description of Features. Several small diversions from the Mississippi River have been suggested as Breaux Act projects or are being studied in the Mississippi River Sediment, Nutrient, and Freshwater Redistribution Study. The most effective of these small diversions for this area should be planned and built.

(2) Benefits and Costs. The above-mentioned diversions are projected to prevent a moderate amount of marsh loss by 2050. Compared to no action at the end of 60 years, there would be about 2,500 to 4,500 additional acres of wetlands. The estimated cost for implementing these measures of $18 million.

(3) Increments for Consideration in Analysis. Several discharge flows would be analyzed incrementally for these diversion alternatives and their potential alignments. About 2 to 3 flow increments would be investigated for each location/alignment.

b. Coast 2050 Strategy R2-2 -- Restore Natural Drainage Patterns (vicinity of St. James and Lac Des Allemands). In some swamps, it is not a possibility to provide freshwater diversions. In these cases, other measures would be investigated to reduce wetland losses.

(1) Description of Features. This strategy consists of restoring natural drainage patterns by gapping spoil banks and plugging canals where these actions would not cause adverse effects. These measures would be less effective in preventing swamp loss than strategies that would convey fresh water and sediment to target sites.

(2) Benefits and Costs. The cost for implementing these measures is estimated at $15 million. An additional acreage at the end of 60 years would amount to about x,000 to x,000, compared to the no action alternative.

(3) Increments for Consideration in Analysis. The width, depth, and spacing, of spoil bank gaps would be analyzed incrementally for a number of target locations. About 2 to 3 increments would be investigated for each measure. Combinations of canals to be plugged would be investigated, in order to determine the most suitable number and locations of these plugs.

c. Coast 2050 Strategy R2-3a & R2-3b -- Remove Flood Waters from the Upper Basin
(north of U.S. Highway 90, vicinity of St. James Parish and Lac Des Allemands). In order to add water to the swamps, flood protection must be provided for developed areas, and drainage improvements must be made so the diverted water can exit the upper basin.

(1) Description of Features. Local forced drainage would be provided at the wetland/non-wetland interface so the swamps would be separated from the developed regions. Environmentally sound pumping plans should be developed so storm water is filtered through the swamps. U.S. Highway 90 should be raised and sufficient flap-gated culverts should be installed so that rainfall and the additional river water could drain south by gravity.

(2) Benefits and Costs. Implementation of these flood protection measures in the vicinity of the developed areas would make possible the diversion of freshwater from the Mississippi River into the adjacent wetlands. The estimated cost for implementing these measures is $35 million.

(3) Increments for Consideration in Analysis. Flood protection measures would be analyzed for several discharge flows of the planned diversions. These measures would be analyzed incrementally for a number of potential diversion locations and alignments. About 2 to 3 increments would be investigated for each location/alignment. The possibility of constructing a hurricane protection levee south of U.S. Highway 90 will be considered. This alternative would require forced draingage of the area north of U.S. Highway 90.

d. Coast 2050 Strategy R2-4 -- Divert through Existing Locks.[1] The wetlands located adjacent to the Mississippi River at present receive an insufficient amount of freshwater, sediment, and nutrients. Introduction of these resources through opportunistic use of existing locks would enhance the quality of these ecosystems.

(1) Description of Features. The existing locks on the Mississippi River (Algiers, and Empire) could be used to divert as much water as possible. At the present time, the USACE is releasing fresh water through the Algiers Lock whenever the stage is low on the marsh side. The existing Harvey Lock cannot be used for small diversions, but when a replacement lock is needed for navigation, it should be also designed so that small diversions would be feasible.

(2) Benefits and Costs. Implementation of this strategy is projected to preserve a moderate amount of marsh by 2050. About 250 to 1,300 additional wetland acres would be realized by this time. The estimated cost for implementing these measures of $1 million.

[1] Half of this alternative lies in the study area for Barrier Island Restoration, Diversions, and Ecosystem Restoration, Barataria (Region 2). The other half of this alternative is located in the study area for and described in Mississippi River Diversions and Ecosystem Restoration, Breton Sound and Mississippi River Delta Study.

(3) Increments for Consideration in Analysis. Two to three discharge flows would be analyzed incrementally, in order to optimize the effects of freshwater, sediment, and nutrient flow concentrations.

e. Coast 2050 Strategy R2-5 -- Manage Outfall of Existing Diversions.[1] There are existing diversions located at Naomi and West Pointe a la Hache, which are at present managed by Plaquemines Parish. The Breaux Act outfall management projects will last for 20 years.

(1) Description of Features. The Breaux Act outfall management plans for the siphons at Naomi and West Pointe a la Hache (20-year plans) could be continued through 2050. The authorized Breaux Act outfall management plan at Caernarvon should be implemented. An outfall management plan would also be investigated for the Davis Pond diversion.

(2) Benefits and Costs. With about 1,700 to 2,800 acres of wetlands gained by 2050, this strategy is estimated to moderately reduce marsh loss by 2050. The estimated cost for implementing these measures of $4 million.

(3) Increments for Consideration in Analysis. The management plan for the Breaux Act would be evaluated and if necessary modified to optimize the diversion flows.

f. Coast 2050 Strategy R2-6 -- Enrich Existing Diversions with Sediment.[1] Increased sediment concentrations introduced through existing diversion structures, such as Caernarvon, would enrich adjacent wetlands that are undergoing subsidence and erosion.

(1) Description of Features. This concept would be investigated at Caernarvon. Design and implementation of measures for enrichment through this existing structure would be a challenge to engineer, since the additional sediment load could cause clogging in the structures.

(2) Benefits and Costs. Additional sediment is expected to preserve about 150 to 250 acres of marsh by 2050, for an estimated cost of implementation totaling $8 million.

(3) Increments for Consideration in Analysis. About 2 to 3 flow rates would be analyzed incrementally for Caernarvon, in order to determine the optimal flows and sediment concentrations to sustain the adjacent wetlands. The structure would undergo a design review, in order to determine the existing capabilities for increased sediment concentrations, and what modifications would be necessary for flow and concentrations beyond the limit of this Caernarvon's current capacity.

g. Coast 2050 Strategy R2-8 -- Small Diversions (into marshes in the vicinity of Upper Oak River, Amoretta, and Empire).[1] The wetlands located adjacent to the Mississippi River at present receive an insufficient amount of freshwater, sediment,

and nutrients. Introduction of these resources through these diversions would enhance the quality of these ecosystems.

(1) Description of Features. Several small diversions from the Mississippi River have been suggested as Breaux Act projects or are being studied in the Mississippi River Sediment, Nutrient, and Freshwater Redistribution Study. The most effective of these small diversions should be planned and built (Upper Oak River, Amoretta, west of Empire).

(2) Benefits and Costs. The above-mentioned diversions are projected to prevent a moderate amount of marsh loss by 2050. Compared to no action at the end of 60 years, there would be about 1,500 to 2,500 additional acres of wetlands. The estimated cost for implementing these measures is $18 million.

(3) Increments for Consideration in Analysis. Several discharge flows would be analyzed incrementally for these diversion alternatives and their potential alignments. About 2 to 3 flow increments would be investigated for each location/alignment.

h. Coast 2050 Strategy R2-10 -- Delta-Building Diversion at Myrtle Grove. The Mississippi River levees prevent natural bank overtopping events, which nourished the wetlands in the vicinity of Myrtle Grove and Naomi. Without nourishment of sediment and nutrients from the Mississippi River, these marshes will continue to deteriorate as a result of subsidence. Additionally, tidal-based salinity intrusion will degrade these marshes if unbuffered by freshwater flows of the Mississippi River.

(1) Description of Features. A delta-building diversion from the Mississippi River would be built in the vicinity of Myrtle Grove or Naomi. Various sill elevations would be considered, in order to optimize the effects of freshwater, sediment, and nutrient flow concentrations.

(2) Benefits and Costs. Such a diversion is estimated to have significant benefits by creating land and preventing loss in the central basin by 2050. At the end of 60 years there would be about 11,000 to 13,000 additional wetland acres in place, compared to no action. The estimated cost for implementing these measures of $35 million.

(3) Increments for Consideration in Analysis. Several discharge flows would be analyzed incrementally for a number of potential diversion locations and alignments. About 2 to 3 flow increments would be investigated for each location/alignment.

i. Coast 2050 Strategy R2-11 -- Delta Building Diversion at Bastion Bay.

(1) Description of Features. This strategy must address oyster lease issues. There is a borrow pit in the outfall region of this diversion alternative, which was left from the construction of the New Orleans-to-Venice hurricane protection

levee. Local interested parties are concerned that the existence of this borrow pit is increasing marsh loss and causing increased salinities in the developed area. Along with providing freshwater, sediment, and nutrients to the wetlands of the region adjacent to the structure, implementation would partially fill in this borrow pit.

(2) Benefits and Costs. A delta-building diversion of about 15,000 cfs into Bastion Bay would create land and significantly reduce land loss in the vicinity. By 2050, there would be about 9,000 to 11,000 additional wetland acres in place, compared to no action. The estimated cost for implementing these measures of $35 million.

(3) Increments for Consideration in Analysis. Several discharge flows would be analyzed incrementally for this diversion location and its potential alignments. About 2 to 3 flow increments would be investigated for each location/alignment.

j. Coast 2050 Strategy R2-16 -- Dedicated Dredging for Marsh Creation along Hwy. 1. Currently, wave action is eroding an area of wetlands located adjacent to Hwy 1 in the Caminada Bay area. This strategy would protect a vulnerable 1,000-acre band of marsh and the highway.

(1) Description of Features. Alternative borrow sources would be investigated in the region, in order to determine the most suitable materials and quantities available for this measure. Comparisons between the borrow sources would be made, relative to quality and quantity of the materials, and their respective distances between the borrow and placement sites.

(2) Benefits and Costs. The cost for implementing these measures is estimated at $15 million, for an additional acreage at the end of 60 years amounting to about 200 to 500, compared to the no action alternative. This measure would also protect the adjacent highway route.

(3) Increments for Consideration in Analysis. An incremental analysis would be performed, respectively, for a number of placement heights, widths, and lengths. About 2 to 3 increments would be investigated for each borrow source, depending on materials quality, quantity, and distance from the borrow to placement sites.

k. Coast 2050 Strategy R2-19 -- Gap Spoil Banks/Plug Canals in Lower Bay Marshes. In some swamps, it is not a possibility to provide freshwater diversions. In these cases, other measures would be investigated to reduce and/or prevent wetland losses.

(1) Description of Features. This strategy consists of restoring natural drainage patterns in marshes by gapping spoil banks and plugging canals where these actions would not cause adverse effects. Where determined to be appropriate, spoil banks would be gapped and canals plugged to maximize sediment

deposition in marshes adjacent to the bays in the lower portions of Breton and Barataria Basins.

(2) Benefits and Costs. The cost for implementing these measures is estimated at $4 million, for an additional acreage at the end of 60 years amount to about 600 to 1,000, compared to the no action alternative.

(3) Increments for Consideration in Analysis. The width, depth, and spacing, of spoil bank gaps would be analyzed incrementally for a number of target locations. About 2 to 3 increments would be investigated for each measure. Combinations of canals to be plugged would be investigated, in order to determine the most suitable number and locations of these plugs.

l. Coast 2050 Strategy R2-20 or R2-21 -- Wave Absorbers or Reef Zones. Fragile marsh fringes in the vicinity of Barataria Bay (at head of bays) are fast deteriorating from wave action originating in the Gulf of Mexico. Wave energy absorption measures would aid in protecting these wetlands from loss.

(1) Description of Features. Low breakwaters would be built at the heads of bays, as described in the Barrier Shoreline Feasibility Study, to protect fringing marshes. Reef zones would be constructed across bays. The possibility of continuing these wave absorbers across the southern rim of the Lake Washington/Grand Ecaille unit and also across the mouth of the Breton Basin would also be considered.

(2) Benefits and Costs. With an estimated additional acreage at the end of 60 years amounting to about 5,500 to 7,500, compared to the no action alternative, this strategy is projected to preserve a major amount of marsh. The estimated cost for implementing these measures of $125 million.

(3) Increments for Consideration in Analysis. An incremental analysis would be performed, respectively, for a number of breakwater and reef zone crown heights, bottom widths, and lengths. About 2 to 3 increments would be investigated for each measure.

m. Coast 2050 Strategy R2-22 -- Restore/Maintain Barrier Shoreline. The Fourchon headland, barrier islands, and barrier shoreline are among the most rapidly retreating shorelines in the region. All of these barrier islands and much of the back bay marshes that they protect are expected to disappear early into the next century.

(1) Description of Features. These areas would be investigated for restoration by the most cost-effective of the alternatives from the Barrier Shoreline Feasibility Study. Sand sources would be located through explorations conducted through the Louisiana Coastal Area studies. Shallow open water regions that have appeared where barrier islands and shorelines once were would be filled to dune and marsh elevations to create barrier habitat.

(2) Benefits and Costs. This strategy is projected to create moderate amounts of marsh and beach habitat by 2050. Additional unmappable benefits would be gained by protecting, restoring, or creating wooded areas critical for neotropical migrants. The cost for implementing these measures is estimated at $2.9 billion, for an additional acreage at the end of 60 years amount to about 3,000 to 5,000, compared to the no action alternative.

(3) Increments for Consideration in Analysis. An incremental analysis would be performed, respectively, for a number of dune heights; several island widths; varying sand quantities; and several proportions of rock revetment in combination with sand placement. About 2 to 3 increments would be investigated for each measure stated in the former.

An incremental approach for analysis would be used to determine the extent of effectiveness and cost that modifications to the Empire Waterway Jetties, sand bypassing operations, and detached, segmented breakwaters would have on promoting system sustainability.

n. Coast 2050 Strategy R2-23 -- Extend Barrier Shoreline from Sandy Point to Southwest Pass. This strategy includes a 6-mile extension of shoreline from Sandy Point to Double Bayou at Mississippi River, Southwest Pass. This alternative would replace a shoreline that was lost recently as well as an area from Tiger Pass to Southwest Pass.

(1) Description of Features. Material from the sediment trap (see Coast 2050 Strategy R2-9, para. X.x.), or offshore, could possibly be used to build such a shoreline. Focus of the material source studies would be on quality, quantity, and distance from the source to the placement area.

(2) Benefits and Costs. By 2050, this strategy is intended to create moderate amounts of marsh and beach habitat. Additional unmappable benefits, considered critical for neotropical migrants, would be gained by protecting, restoring, or creating wooded areas. At the end of 60 years there would be about 1,000 to 3,000 additional acres in place, compared to no action. The cost for implementing these measures is estimated at $1.5 billion.

(3) Increments for Consideration in Analysis. An incremental analysis would be performed, respectively, for a number of dune heights; several island widths; varying sand quantities; several proportions of rock revetment in combination with sand placement; and different numbers of wave absorbers near mainland marsh. About 2 to 3 increments would be investigated for each measure stated in the former.

o. Coast 2050 Strategy R2-24 -- Preserve Land Bridge. Fragile wetlands north of the Bayou Perot/Rigolettes area are vulnerable to loss with the deterioration of the land bridge separating the northern and southern portions of the Barataria Basin. The southern portion of the Perot/Rigolettes unit must be kept intact to protect the marshes farther north.

(1) Description of Features. Because of the challenging subsurface conditions of the region, studies of alternative measures will be conducted, which will focus on determining the most suitable treatment(s) necessary to protect the land bridge.

(2) Benefits and Costs. Protection of the land bridge features is expected to preserve about 1,000 to 3,000 acres of marsh by 2050, for an estimated cost of implementation totaling $35 million.

(3) Increments for Consideration in Analysis. An incremental analysis would be performed, respectively, for a number of bank protection measures, of their heights, widths, and lengths. About 2 to 3 increments would be investigated for each measure.

p. Coast 2050 Strategy R2-25 -- Maintain Shoreline Integrity. The southern shores of Little Lake are in danger of breaching into interior marsh, and the Gulf Intracoastal Waterway is about to breach into Lake Salvador on the south shore of the lake. Stabilization of these shorelines would protect the endangered wetland features.

(1) Description of Features. Investigation of alternative measures will be conducted to determine the best treatment for wetland protection.

(2) Benefits and Costs. Protection of these wetlands is expected to preserve about 3,000 to 5,000 acres of marsh by 2050, for an estimated cost of implementation totaling $8 million.

(3) Increments for Consideration in Analysis. An incremental analysis of heights, widths, and lengths would be performed for a respective number of shoreline protection measures. About 2 to 3 increments would be investigated for each measure.

q. Coast 2050 Strategy R2-26 -- Dedicated Dredging (vicinity Barataria Land Bridge). At present, the wetlands north of Bayou L'Ours ridge are in a state of deterioration. This strategy consists of dedicated dredging to create about 1,000 acres of marsh north of the Bayou L'Ours ridge to help stabilize the land bridge.

(1) Description of Features. Alternative borrow sources would be investigated in the region, in order to determine the most suitable materials and quantities available for this measure. Comparisons between the borrow sources would be made, relative to quality and quantity of the materials, and their respective distances between the borrow and placement sites.

(2) Benefits and Costs. The cost for implementing these measures is estimated at $15 million, for an additional acreage at the end of 60 years amounting to about 200 to 500, compared to the no action alternative.

(3) Increments for Consideration in Analysis. An incremental analysis would be performed, respectively, for a number of placement heights, widths, and lengths. About 2 to 3 increments would be investigated for each borrow source, depending on materials quality, quantity, and distance from the borrow to placement sites.