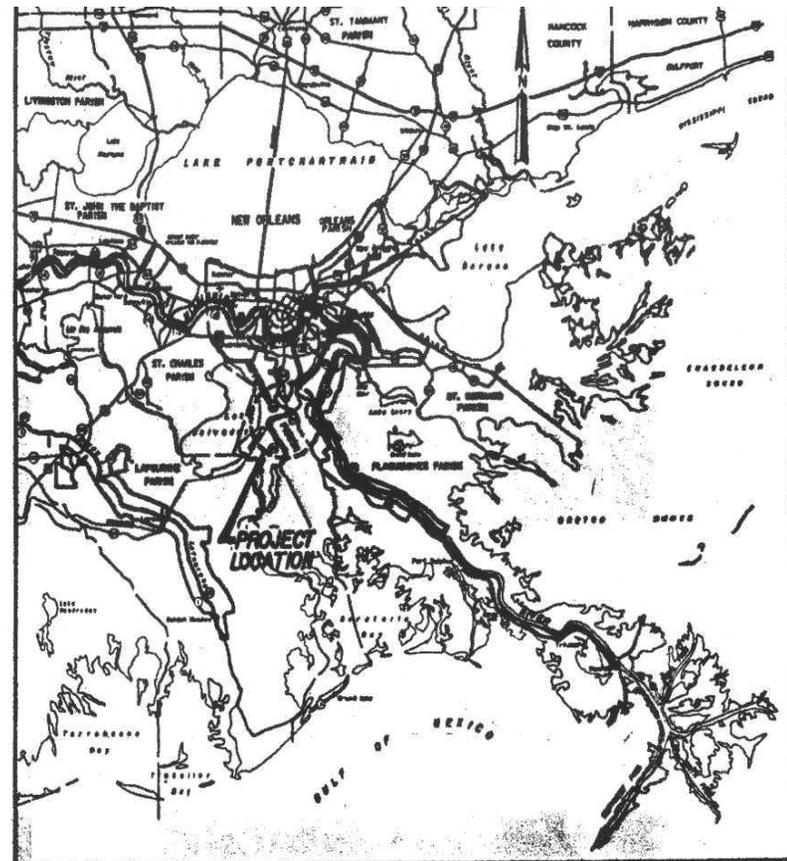


LOCATION MAPS

SCALE: 1" = 500'



VICINITY MAP

SCALE IN MILES



**DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED ONE
HALF THE ORIGINAL SCALE**

JEAN LAPITTE, LOUISIANA
FLOOD PROTECTION LEVEE
ROSETHORN BASIN
FEASIBILITY STUDY
JEFFERSON PARISH, LOUISIANA

LOCATION AND VICINITY MAPS



U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY: A.C.S.	FILE SCALE: 1/4" = 1000'	DATE: JUL 1999	FILE NO. H-2-45046
DRAWN BY: A.J.A.	9000	13 JUL 99	
CHECKED BY: A.C.S.		DATE: JULY 1999	

Rosethorn Basin, Jean Lafitte, Louisiana

If you have any questions or require additional information, please contact Mr. Chris Gilmore, Project Manager, U.S. Army Corps of Engineers, New Orleans District, P.O. Box 60267, New Orleans, LA 70160-0267, Telephone number (504) 862-1961.

SYLLABUS

This report presents the results of a feasibility study to provide flood protection for the Rosethorn Basin, located in the town of Jean Lafitte, Louisiana. The study was conducted as part of the Continuing Authorities Program (CAP), under the authority of Section 205 of the 1948 Flood Control Act, as amended.

The Rosethorn Basin is located on the southeastern bank of Bayou Barataria in Jefferson Parish, Louisiana and is protected from Mississippi River overflow by the mainline Mississippi River and Tributaries (MR&T) levee system. The desire for improvement in the study area stems from the development of lands that are more vulnerable to flooding from storm tides and rainfall events. Recent growth in residential and commercial development is occurring on the west bank of the Mississippi River, particularly within the proximity of Bayou Barataria.

The study area encompasses suburban land with approximately 190 residential and commercial structures. Rainwater is captured in a series of drainage canals and pumped out of the basin via two drainage pump stations located in the existing levee alignment. An earthen levee was constructed by the West Jefferson Levee District, along the southern project limit, in response to emergency flooding and provides some protection from the surrounding wetlands, but not from Bayou Barataria overflow. Tidal flood waters emanating from the Gulf of Mexico and nearby Lakes Salvador and Cataouatche travel across the marsh, through Bayou Barataria and other natural and manmade channels to the study area. The most recent flooding occurred during Tropical Storm Frances in September 1998.

In feasibility, the study team identified and analyzed both non-structural and structural alternatives for providing flood protection in addition to the alternative of “no action”. Small walls and structure raising are economically justified non-structural alternatives for the study area. However, the net benefits provided by both non-structural alternatives is less than that provided by the structural alternatives. In developing a structural alternative, the high bank of Bayou Barataria and the existing levee alignment were followed as closely as possible in order to minimize adverse impacts to the natural environment and social well being.

The recommended plan consists of hauling in approximately 100,000 cubic yards of earthen material for construction of an earthen levee at elevation +7.0 feet NGVD. Approximately 8,010 linear feet of concrete capped, steel sheetpile floodwall will be installed along Bayou Barataria due to the limited right of way available. The plan also contains nine floodgates to maintain pedestrian and vehicular access to Bayou Barataria. Any changes in the existing levee alignment were based on social, environmental, or cost related concerns.

The incremental total project first cost is estimated to be \$8,662,000, which includes an estimated \$2,664,300 in Lands, Easements, Rights-of-Way, Relocations, and Disposals (LERRD's). The non-Federal sponsor is required to provide all LERRD's for construction and any project costs beyond the \$7,000,000 Federal limit under Section 205. Annual operation and maintenance costs are approximately \$19,000. The costs are based on 1999 price levels at an interest rate of 7-1/8 percent with a project life of 50 years. The benefit-to-cost (B/C) ratio is 1.49 to 1. The annual net benefits, the difference in equivalent annual benefits and annual costs, are \$360,500. The fully funded project cost is currently estimated to be \$9,196,900. The fully funded project costs for the recommended plan would be apportioned \$5,978,000 Federal and \$3,218,900 non-Federal.

The primary environmental impact of the recommended plan would be the direct loss of approximately 19.8 acres of existing forested wetlands. Acquiring approximately 8 acres of forested wetlands from the outfall area of the Davis Pond Freshwater Diversion Project mitigation area, or some equivalent mitigation bank/area would mitigate the project-induced losses. The estimated cost of the mitigation plan is \$28,000.

ROSETHORN BASIN FLOOD PROTECTION PROJECT

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INTRODUCTION

STUDY AUTHORITY

The New Orleans District conducted the Rosethorn Basin feasibility study under the authority of Section 205 of the 1948 Flood Control Act, as amended, in response to requests for Federal assistance from officials of the town of Jean Lafitte by letter dated June 24, 1994.

STUDY PURPOSE AND SCOPE

The purpose of this study is to investigate measures to alleviate flooding and determine the feasibility of continued Federal involvement in developing and implementing a solution. The objective is to develop an economically feasible and environmentally acceptable flood protection plan that will enable the area to adequately withstand a 10- to 25-year design storm event, as a minimum, without substantial residual flooding. In feasibility, an interdisciplinary team performs detailed engineering, economic, and environmental investigations to identify problems and needs of the area. The study recommends the best solution for the identified problems according to Federal guidelines. The National Economic Development (NED) plan reasonably maximizes net benefits and minimizes adverse impacts to the environment and social well being. Both non-structural and structural alternatives were considered in addition to the “no action” alternative. The Rosethorn Basin study area encompasses approximately 610 acres and contains approximately 190 residential and commercial structures. A vicinity map and description of the study area are enclosed as Plate 1.

STUDY PARTICIPANTS AND COORDINATION

The New Orleans District of the U.S. Army Corps of Engineers is responsible for overall study management and report preparation. The West Jefferson Levee District, as the non-Federal (local) sponsor for the study, provided input to the feasibility report by completing the draft Environmental Assessment in coordination with members of the New Orleans District. The study was coordinated with interested Federal, state, and local agencies, and the public.

OTHER STUDIES AND REPORTS

A number of studies and reports on water resources development in the vicinity of the Rosethorn Basin and the town of Jean Lafitte have been prepared by the U.S. Army Corps of Engineers (Corps), other Federal, state, and local agencies, research institutes, and individuals. Previous Federal and non-Federal studies have established an extensive amount of data for this study. The West Jefferson Levee District maintains a comprehensive regional evacuation plan for a wide range of storms. The Corps of Engineers, in conjunction with the Federal Emergency Management Agency (FEMA) and the National Weather Service (NWS), completed a hurricane preparedness study in August 1994 describing hurricane evacuation plans for southeast Louisiana. The more relevant studies, reports, and projects are described in the following paragraphs.

a. Studies conducted in the vicinity of the Rosethorn Basin

- (1) A feasibility report entitled Fisher School Basin, Jean Lafitte, Louisiana was published by the U.S. Army Corps of Engineers in November 1998. The report investigated structural and non-structural alternatives to provide flood protection to the Fisher School Basin also located in Jean Lafitte. The report recommends the construction of an earthen levee and reinforced concrete floodwall at elevation +7.0-feet NGVD. The Preconstruction Engineering and Design (PED) phase is underway with construction scheduled to begin in early 2001.
- (2) The U.S. Army Corps of Engineers published a feasibility report entitled West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, in December 1986. The report investigated the feasibility of providing hurricane surge protection to that portion of the West Bank of the Mississippi River in Jefferson Parish between the Harvey Canal and Westwego and down to the vicinity of Crown Point, Louisiana. The report recommended implementing a plan that would provide hurricane protection to an area on the West Bank between Westwego and the Harvey Canal north of the Fisher Basin. The project was authorized by the Water Resources Development Act of 1986, Public Law 99 - 662. Project construction was initiated in early 1991, with the West Jefferson Levee District as the non-Federal sponsor.

- (3) The U.S. Army Corps of Engineers completed a feasibility report entitled West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal), in August 1994. The study investigated the feasibility of providing hurricane surge protection to that portion of the West Bank of metropolitan New Orleans from the Harvey Canal eastward to the Mississippi River. The final report recommended that the existing West Bank Hurricane Protection Project, authorized by the Water Resources Development Act of 1986, Public Law 99-662, approved November 17, 1986, be modified to provide additional hurricane protection east of the Harvey Canal. The report also recommended the level of protection for the area east of the Algiers Canal deviate from the NED level of protection and provide protection for the Standard Project Hurricane (SPH). The Division Engineer's Notice was issued on September 1, 1994. The Chief of Engineer's report was issued on May 1, 1995. The project was authorized by the Water Resources Development Act of 1996.
- (4) A Post Authorization Change report entitled Westwego to Harvey Canal, Louisiana Hurricane Protection Project Lake Cataouatche Area was published by the U.S. Army Corps of Engineers in December 1996. The report investigated the feasibility of providing hurricane surge protection to several communities on the west bank of the Mississippi River bounded by Bayou Segnette to the east, Lake Cataouatche to the south, the Mississippi River to the north, and the St. Charles Parish line to the west. The recommended plan would provide for the construction of levees and floodwalls extending from Bayou Segnette State Park to the St. Charles Parish line. The protection would tie into the authorized Westwego to Harvey Canal project that was authorized by the Water Resources Development Act of 1986. Overall construction of the Westbank, Vicinity of New Orleans Hurricane Protection Project (items 2-4) is scheduled for completion in 2014.
- (5) The U.S. Army Corps of Engineers completed a reconnaissance report, Jefferson and Orleans Parishes Louisiana Urban Flood Control and Water Quality Management in July 1992. The study was authorized by Senate and House resolutions to investigate rainfall flooding and water quality problems associated with storm water runoff in Jefferson and Orleans Parishes. Both Orleans and Jefferson parishes agreed to participate in four-year urban flood control

feasibility studies beginning in 1994. Due to a catastrophic rainfall event on May 8-9, 1995, Section 108 of the Energy and Water Development Appropriations Act of 1996, directed the Corps to proceed with engineering, design and construction of economically justified alternatives identified by the reconnaissance study, as well as other reconnaissance reports for St. Tammany Parish. The individual flood control features in the three parishes are a part of a single project known as the Southeast Louisiana (SELA) Project. Pre-construction engineering and design (PED) and construction are underway for several project features in Orleans and Jefferson parishes.

b. Other studies and reports

(1) The Mississippi River and Tributaries project, the comprehensive flood control project for the lower Mississippi Valley below Cairo, Illinois, has had a significant impact on the water and land resources in the study area. The Flood Control Act of 1928, and subsequent amendments authorized this project. Features of the project pertinent to the study are listed below.

- a) The Mississippi River levees extend from Baton Rouge, Louisiana, to Bohemia, Louisiana, on the west bank. They provide protection from the standard project flood on the Mississippi River and Tributaries system. These levees are essentially complete in the study area.
- b) The Bonnet Carre Spillway is located upstream of New Orleans, Louisiana, on the east bank of the Mississippi River in the vicinity of Norco, Louisiana. The purpose of the spillway is to divert Mississippi River flows into Lake Pontchartrain to lower flood stages on the Mississippi River in the New Orleans area. The spillway was completed in 1932.
- c) Revetments and foreshore protection were constructed along the Mississippi River in the study area. Revetments are constructed where levees or development is threatened

by bank caving or where unsatisfactory alignment and channel conditions are developing. Foreshore protection is constructed where the erosion of the batture threatens levees. Construction of these features is continuing as needed.

- (2) The Louisiana Department of Natural Resources published a report entitled Louisiana's Eroding Coastline: Recommendations for Protection in June 1982. The report recognizes that future losses of coastal wetlands are unavoidable and will require either retreat of development from the coastal zone or increasingly greater levels of protection. The report recommends development and implementation of a shoreline protection plan and proposes a number of pilot projects using water and sediment diversions, dredged material placement, and planting vegetation as a means to reduce erosion. A study to determine future coastal conditions, including changes in shoreline configuration and impacts on developed areas, is also recommended.
- (3) The U.S. Army Corps of Engineers prepared a final feasibility report, Louisiana Coastal Area - Freshwater Diversion to Barataria and Breton Sound Basins in September 1984. The report recommends diverting Mississippi River water near Caernarvon into the Breton Sound Basin and near Davis Pond into Barataria Basin to enhance habitat conditions and improve fish and wildlife resources. The report also recommends implementation of the plan under the authorized Mississippi Delta Region Project, which is identical in purpose. The diversions would reduce land loss and save about 99,200 acres of marsh. The construction of the Caernarvon structure was completed in early 1991. Construction is underway for the Davis Pond project.
- (4) The Barataria-Terrebonne National Estuary Program, nominated by Governor Roemer in October 1989, received funding under Section 320 of the 1987 Water Quality Act on April 20, 1990, to enhance, protect and maintain the water quality, habitat integrity and natural resources of the Estuarine Complex. The Act authorized the EPA to develop a Comprehensive Conservation and Management Plan which recommends priority corrective actions and compliance schedules addressing point and non-point sources of pollution to restore and maintain the chemical, physical and biological integrity of the estuary: including

restoration and maintenance of water quality, a balanced indigenous population of shellfish, fish, and wildlife, and recreational activities, and assuring that the designated uses of the estuary are protected.

- (5) The Louisiana Coastal Wetlands Restoration Plan, a comprehensive plan for restoring and conserving the coastal wetlands of Louisiana, was mandated by the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA). The final report was submitted to higher authority in December 1993 and the Record of Decision on the Programmatic Environmental Impact Statement was signed in March 1994. The report details the process by which wetlands restoration plans were developed for the nine hydrologic basins in the coastal zone. Therefore, the projects presented in the report far exceed the CWPPRA's funding capacity (approximately \$40 million per year from 1991 to 1997, including 25 percent cost sharing by the state of Louisiana). The task force established by CWPPRA is initiating feasibility studies with a view toward securing Congressional authorization and funding for a number of large-scale projects.

THE STUDY PROCESS

The feasibility study process requires several iterations during plan formulation to identify a selected plan, sufficient to proceed into the preparation of a design report followed by plans and specifications. The process begins with a preliminary assessment of the Rosethorn Basin, which concluded that improvements to provide flood protection from tidal and rainfall events were economically feasible according to Federal guidelines. As the feasibility study progressed, a range of improvements and their effectiveness at providing adequate flood protection to the residents of the study area were considered. An assessment of environmental, social, and local economic effects of those improvements determined to be most viable from a national economic perspective was performed. The results of this study form the basis for a decision on project implementation.

The study process utilizes the following functional planning steps:

PROBLEM IDENTIFICATION

INVENTORY AND FORECAST

FORMULATION OF ALTERNATIVES

PLAN EVALUATION

PLAN COMPARISON

PLAN SELECTION

The preliminary assessment emphasized problem identification and formulation of alternatives. The overall feasibility study process focused on evaluation of alternatives, assessment of impacts, and selection of a recommended plan.

PROBLEM IDENTIFICATION

This section of the report shall address: National Objectives; Existing Conditions; Future Conditions without project; Problems, Needs, and Opportunities; and Planning Objectives.

NATIONAL OBJECTIVES

The fundamental national objective of Federal participation in water resource development projects is to ensure that an optimum contribution is made to the welfare of all people. This requires contributing to economic development consistent with protecting the Nation's environment, while at the same time protecting national environmental statutes, applicable executive orders, and other national planning requirements.

The plan that reasonably maximizes net economic development benefits, consistent with the national objective is to be identified as the national economic development (NED) plan. National objectives are designed to ensure systematic interdisciplinary planning, assessment and evaluation of plans that will be responsive to Federal laws and regulations.

PLANNING CONSTRAINTS

This study was conducted within the constraints described by the Economic and Environmental Principles and Guidelines for Water and Related Land Implementation Studies, and by applicable Department of the Army regulations and other documents which provide guidance pertaining to the implementation of these principles and guidelines. Plans were developed with due regard to the benefits and costs, both tangible and intangible, as well as associated effects on the ecological, social and economic well-being of the region. Federal participation in any improvement should also ensure that the plan is complete in itself, efficient and safe, economically feasible in terms of current prices, environmentally acceptable, and consistent and acceptable in accordance with local, regional, and state plans and policies. As far

as practical, plans should be formulated to maximize the beneficial effects and minimize the adverse impacts.

PLANNING OBJECTIVES

The following planning objectives were established in response to the identified problems, needs, and opportunities:

- Provide improved flood protection for the Rosethorn Basin in the town of Jean Lafitte, Louisiana;
- Structural alternatives should follow the Bayou Barataria stream bank and existing levee alignment to minimize adverse impacts and project costs;
- Ensure that the hurricane evacuation routes remain operable throughout construction;
- Minimize adverse environmental impacts associated with the implementation of flood control measures;
- Minimize the destruction of archaeological and historical resources;
- Minimize particularly the loss of bottomland hardwood forests or if not possible, mitigate those losses “in-kind” to the extent practicable; and
- Mitigate for all unavoidable impacts to significant fish and wildlife resources.

PROBLEMS, NEEDS, AND OPPORTUNITIES

The problems, needs, and opportunities identified are all related to a basic need for improving flood protection in the Rosethorn Basin.

General

The Rosethorn Basin is located in southeastern Louisiana, approximately 33 miles north of the Gulf of Mexico and is bounded on the north and west by Bayou Barataria and the Gulf Intracoastal Waterway (GIWW) and in the south and east by numerous oil field canals and wetland habitat (see Plate 1). Exterior tidal stages that frequently accompany tropical storm events will overtop the natural high bank of Bayou Barataria and the existing levee causing widespread flooding.

Early residential development within the study area occurred primarily along the banks of Bayou Barataria and consist of wood frame and brick structures constructed on slab and pier foundations. As development expanded away from the bayou and into lower, more vulnerable areas, it became necessary to construct interior drainage canals with pumping stations. Approximately 85 percent of the residential and commercial structures in the study area were constructed prior to Jefferson Parish participating in the National Flood Insurance Program. The high rate of ground consolidation and subsidence increases the problem of flooding by decreasing efficiency of interior drainage systems and lowering structure elevations below sea level in some areas. As a result, most of the structures located within the Rosethorn Basin, experience considerable and repetitive flooding damages.

If no Federal action is taken to provide increased levels of flood protection to the Rosethorn Basin, the study area will continue to experience flooding because the local governments do not possess the financial resources to construct the recommended plan without Federal assistance. Currently, there are no federally authorized hurricane or tidal flood protection projects for the Rosethorn Basin study area.

Floods and Storms of Record

Most of the flooding in the Rosethorn Basin results from high tides caused by hurricanes and tropical storms tracking in the Gulf of Mexico. The most recent flooding in Jean Lafitte occurred from 11-13 September 1998 during Tropical Storm Frances. Bayou Barataria stages were 2-to-4 feet above normal for approximately five days forcing residents to battle tidal flooding under a mandatory evacuation order that was issued Friday, September 11, 1998. Local officials in Jean Lafitte reported that flood waters overtopped the bank along Bayou Barataria and covered parts of LA 45 and 303 leaving many residents stranded in those areas. Federal and State agencies provided portable drainage pumps to relieve some low-lying areas that flooded, but as late as Wednesday, September 16, 1998 the hurricane evacuation routes had up to two feet of water still remaining and several homes could only be reached by boat.

Hurricane season typically extends from June through November with the greatest number of storms expected during the first two weeks of September. Hurricane force winds exceed 74 mph and may extend 100 miles from the center of the storm (the eye). In some cases, extreme gusts may exceed 200 mph at a distance of 20 to 30 miles from the eye. Most hurricanes approach the Louisiana coast from the south or southeast and cross the shoreline at a high angle before moving inland. Occasionally, however, a storm will parallel the shoreline, lingering for days and causing unexpected damages. Such was the case in 1985 when Hurricane Juan looped twice south of Morgan City, Louisiana before paralleling the shoreline and crossing the mouth of the Mississippi River and continuing to the east.

Surveys estimated that 140 of the 190 residential structures in Rosethorn, experienced damage from Tropical Storm Frances in 1998 and Hurricane Juan in 1985. And in 1992, Hurricane Andrew caused widespread flooding of residential and commercial structures. Statistical data concerning these and other hurricanes that have affected the study area is presented in Appendix A.

Existing Protection

The study area is protected from Mississippi River overflow by the mainline Mississippi River and Tributaries (MR&T) levee system. Land elevations slope gently from an average elevation of +4.0 feet NGVD along the natural banks of Bayou Barataria to approximately -1.0 foot NGVD in portions of the leveed area. The West Jefferson Levee District has constructed an earthen levee in response to Hurricane Juan and performed additional improvements following Hurricane Andrew. The non-Federal levee varies in elevation from +3.0- to +4.0 feet NGVD and forms the southern study boundary, south of Louisiana Highways 45 and 303. Interior drainage for the Rosethorn Basin consists of a system of drainage canals and two-drainage pump stations that were determined to be adequate for a 10-year rainfall event.

The non-Federal levee does not cross the main highway to tie into the banks of Bayou Barataria and form an enclosed system of protection for the Rosethorn Basin. As a result, overflow frequently occurs across low spots along Bayou Barataria and interior drainage problems are exacerbated when rainfall is accompanied by high tides. Although the levee is relatively well maintained by the levee district, its integrity is questionable due to recent failures in similar levees during tropical storms and hurricanes.

Socio-Economic Impacts

Surveys of estimated damage to residential property from recent flood and hurricane events indicate that approximately 419 of the 508 residents in the study area have experienced losses from recent flood events. This estimate is based on the general pattern of single-family dwelling units in the community, the number of residential structures and mobile homes (140) impacted by recent events, and the 1990 census estimate of the size of an average household in the town of Jean Lafitte (140×2.99 persons/ household = 418.6 persons).

The needs of the study area related to tidal flood protection can be demonstrated by the fact that 109 of the 190 residential and commercial structures located within the study area are vulnerable to the 5-year design storm event. The total average annual damages for the without

project conditions are estimated to be \$1,159,600. Flood damage to new development should be moderated by participation in the National Flood Insurance Program, which requires the construction of new structures above the 100-year base flood elevation.

EXISTING CONDITIONS

Physical Setting

(1) Physiography. The dominant physiographic features in the project vicinity typically include abandoned distributaries of the Mississippi River, natural levees, inland lakes and bayous, low lying swamps and marshes, and small interconnected lakes, bayous, and man-made canals. The project area is located on the deltaic alluvial plain of the Mississippi River and is generally characterized by low relief and gentle slope. Elevations of natural ground typically range from a maximum of approximately 5 feet National Geodetic Vertical Datum (NGVD) along the levee ridges of Bayou Barataria to a minimum of approximately one-foot below sea level within the southern part of the study area.

The physiographic and topographic features of the study area create an environment which has been extremely prone to flooding from elevated Mississippi River stages, storm induced tidal stages, and rainfall. At present, the threat of Mississippi River flooding has been alleviated by levees constructed as part of the Mississippi River and Tributaries Flood Control Project. Storm surges and rainfall-induced flooding events are a continuing threat to the study area. The storm surges, usually related to tropical storm systems originating in the Gulf of Mexico, can easily travel across the broken marsh and through Bayou Barataria and numerous other natural and man-made channels thereby threatening the study area with inundation. To combat the effects of tidal and rainfall flooding, local interests have constructed a small levee for interim protection.

(2) Geology. The geologic history of primary significance to the study area is that which has occurred since the end of the Pleistocene Epoch. A shift of the Mississippi River brought the flow into its present course forming the Plaquemine Delta just south of New Orleans, and the present Balize Delta below the Plaquemine Delta. During the last 1,000 years the

Plaquemine-Modern Delta Complex continued to supply minor amounts of sediments into the study area until that supply was interrupted by construction of the artificial levee systems along the Mississippi River resulting in the gradual degradation of the study area through subsidence and shoreline retreat.

(3) Subsidence. Subsidence, which generally refers to the loss of surface elevation, is an ongoing occurrence within the deltaic alluvial plain of the Mississippi River and consequently, within the study area. . Subsidence, and the subsequent land loss associated with the transgression of Gulf waters, are the results of both natural and man-made processes that include:

Consolidation/Compaction of Soils;
Reduced Sediment Supplies to the Marsh Areas;
Crustal Deformation;
Groundwater and Hydrocarbon Withdrawal; and
Biochemical Oxidation.

Subsidence in the study area is estimated to occur at a rate of 0.50- to 1.0 feet per century within a levee system and from 0.6 to 1.2 feet per century in unleveed areas. This rate of subsidence is and will continue to be exacerbated by eustatic/global sea level rise that has been estimated to be 0.5 feet per century. As a result of subsidence and sea level rise, the study area will become increasingly vulnerable to flooding, particularly along Bayou Barataria.

(4) Mineral Resources. Extensive oil and gas exploration and production has occurred in south of the study area. While the majority of the local oil production facilities are presently suffering limited production, geophysical exploration activities were reportedly undertaken by Shell Oil Company in 1997. No active exploration or production wells were identified within the study area. An existing pipeline is known to traverse the project area near Rosethorn Park. The pipeline orientation is roughly north-south. Two abandoned pipelines have also been identified west of Rosethorn Park. Continued exploration and production of mineral resources in the vicinity of the study area will not be adversely affected by the project, nor will the project be adversely affected by oil and gas operations.

(5) Soils. At the project site, the subsurface consists of Holocene deposits approximately ninety feet thick with natural levee clays and silts approximately ten feet thick adjacent to Bayou Barataria. Moving south from Bayou Barataria, the flanks of these natural levees have subsided and approximately five feet of swamp and marsh clays and peats have been deposited on top of the natural levee. Natural levee, swamp, and marsh deposits overlie interdistributary clays and silts that can be found to elevation -60.0 feet NGVD. Below the interdistributary deposits is approximately 20 feet of prodelta clay.

Barbary Muck - Barbary Muck is a very poorly drained soil at low elevations between the natural levee of the streams and marshes. The water level is at or above the surface most of the year. Surface runoff is almost nonexistent and permeability is very slow.

Sharkey Silty Clay Loam - Sharkey Silty Clay Loam is a firm soil on the low natural levees of the Mississippi River and its distributaries. The water table is within 15 inches of the surface during rainy seasons. Permeability and surface water runoff are very slow.

Lafitte-Clovelly Association - Lafitte-Clovelly Association is a level, very poorly drained soil that occurs at low elevations on subsided natural levees and interleave basins. This soil is frequently flooded. The water table, under normal conditions, ranges from a low of 0.5 foot below the surface to a high of 1.0 foot above the surface. Soil permeability is high in organic layers and very low in clayey layers.

The United States Department of Agriculture - Soil Conservation Service has surveyed and classified the soils within the study area. According to this survey, the study area is comprised of three soil series, which include Barbary Muck; Sharkey Silty Clay Loam; and Lafitte-Clovelly Association.

Most of the soil types in the study area will settle upon loading, will shrink and oxidize upon dewatering, and have low shear strengths. Therefore, settlement sensitive structures should be pile supported.

Climatology

(1) Climate. The study area has a subtropical marine climate. Located in subtropical latitude, its climate is influenced by the many water surfaces of lakes, streams, and the Gulf of Mexico. Throughout the year, these waterbodies modify the relative humidity and temperature conditions decreasing the range between the extremes. When southern winds prevail, these effects are increased, imparting the characteristics of a marine climate.

Climatic conditions in the area from April through September are influenced by tropical air masses from the Gulf of Mexico and, from October through March, by cold air masses from the northern continental United States. The result is a humid, subtropical climate with mild winters and long, hot summers. During the summer, prevailing southerly winds produce conditions favorable for afternoon thundershowers. In the colder seasons, the area is subjected to frontal movements that produce squalls and sudden temperature drops. River fogs are prevalent in the winter and spring when the temperature of the Mississippi River is somewhat colder than the air temperature.

(2) Precipitation. Precipitation in Louisiana results from storms commonly associated with polar fronts, squall lines, tropical fronts, tropical weather systems, and showers and thunderstorms. Extreme monthly rainfalls exceeding 12 inches are not uncommon within the study area, and as much as 20 inches have been recorded in a single month. The heaviest rainfall typically occurs in the summer. Precipitation in the form of snow, sleet, or hail seldom occurs.

Precipitation data pertinent to the study area has been collected from the National Climatic Center for the LSU Citrus Research Station. The station is located approximately 20 miles southeast of the study area. The monthly and annual norms for the station are listed on Table 1. The maximum monthly rainfall and the maximum daily rainfall totals recorded between 1984 and 1992 are listed on Table 2.

TABLE 1
MONTHLY PRECIPITATION (Inches)
30 Year Average (1961-1990)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
LSU CITRUS	5.05	5.83	4.99	4.06	5.08	5.59	6.82	6.67	5.89	3.40	4.26	5.21	62.85

Source: National Climatic Center

TABLE 2
MAXIMUM PRECIPITATION TOTALS (Inches)
(1984-1992)

STATION	MONTHLY	DATE	1 DAY	DATE
LSU CITRUS	20.00	APR 91	8.73	2 AUG 84

Source: National Climatic Center

The annual normal precipitation at the LSU Citrus Research Station over the 30-year period from 1961 to 1990 is 62.85 inches. July is the wettest month with an average monthly normal of 6.82 inches. October is the driest month, averaging 3.40 inches. The maximum monthly rainfall at the station between 1984 and 1992 occurred in April 1991 when a total of 20.00 inches was recorded. The maximum daily rainfall at the station during the referenced period occurred on August 2, 1984 when a total of 8.73 inches was recorded.

(3) Temperature. Records of temperatures are available from "Climatological Data" for Louisiana, published by the National Climatic Center. Mean temperatures within the study area can be described using data observations from the LSU Citrus Research Station. The annual normal temperature at this station during the period from 1961 to 1990 is 60.1 degrees Fahrenheit (°F) with monthly mean temperature norms varying from 42.5 °F in January to 73.7 °F in July. Temperature extremes occurring at the station between 1984 and 1992 were 97°F for a high and 12 °F for a low on December 23, 1989. Average temperatures are shown in Table 3.

TABLE 3
MEAN MONTHLY and ANNUAL TEMPERATURES (°F)
30 Year Average (1961-1990)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
LSU CITRUS	42.5	45.1	51.9	60.2	67.0	72.5	73.7	73.6	71.6	62.4	54.1	46.4	60.1

Source: National Climatic Center

(4) Wind. Wind data taken at New Orleans is used to describe the study area. The average wind velocity is 8.0 miles per hour (mph) over the period 1973-1992. Southeast winds predominate in the spring and summer with the prevailing winds of the fall and winter blowing from the northeast. The strongest winds are associated with the high-pressure systems that penetrate the Gulf of Mexico area in winter and with hurricanes in summer. The winter storms have produced wind speeds up to 47 mph, and hurricanes have generated winds in excess of 190 mph in the area. Since 1893, records show a total of 75 tropical storms and hurricanes landed on the coast while another 103 passed offshore and still affected the tidal range in the study area. The maximum wind speed observed (highest one-minute speed) since 1963 was 69 mph at New Orleans and was the result of Hurricane Betsy in September 1965.

(5) Stages, Frequencies and Duration. Stage data is recorded at two gage stations in the vicinity of the study area. The station nearest the Rosethorn Basin is identified as "Bayou

Barataria at Barataria", and is located near the confluence of Bayou Barataria and the Gulf Intracoastal Waterway. The second station, identified as "Bayou Barataria at Lafitte", is located near the confluence of Bayou Barataria and Bayou Rigolettes. Stream gage data for these stations, including period of record and maximum and minimum stages, is presented in Table 4.

**TABLE 4
STREAM GAGING DATA**

MAP NO.	STATION	PERIOD OF RECORD	MAXIMUM STAGE		MINIMUM STAGE	
			FEET NGVD	DATE	FEET NGVD	DATE
1	Bayou Barataria at Barataria	1950-92	4.25 ¹	29 Oct 85	-0.58 ¹	10 Sept 65
2	Bayou Barataria at Lafitte	1963-92	5.05 ¹	29 Oct 85	-0.95 ²	23 Dec 89

¹ Caused by Hurricane Juan in 1985

² From Incomplete Record

Source: U.S. Army Engineers District, New Orleans

Tides in the study area can be diurnal or semi-diurnal depending on astronomical conditions. The tidal range at Barataria is 0.25 feet with the mean high water being approximately 1.47 feet NGVD and the mean low water approximately 1.22 feet NGVD. The average high stage at Barataria is 3.34 feet NGVD, and the average low stage is 0.72 feet NGVD. At Lafitte, the tidal range is 0.35 feet with the mean high water measuring approximately 1.49 feet NGVD and the mean low water approximately 1.14 feet NGVD. The average high stage is 2.87 feet NGVD, and the average low stage is -0.13 feet NGVD.

Within the study area, wind effects can mask the daily ebb and flow variations, and during periods of sustained southerly winds, tides rise in direct response to the duration and intensity of the wind stress. Intense hurricanes such as Betsy have caused high stages along the coastal area of Louisiana (10.5 feet NGVD at Grand Isle) and moderately high stages inland (3.2 feet NGVD at the Harvey Lock). Although a relatively weak storm in terms of maximum sustained windspeed, Hurricane Juan caused higher stages in the study area than the more intense

Hurricane Betsy, due to Hurricane Juan's erratic, almost stationary, path across southern Louisiana. Examination of gage records at the gaging stations for the study area reveals that Hurricane Juan caused the highest stage of record on October 29, 1985, along Bayou Barataria at both Barataria (4.25 feet NGVD) and Lafitte (5.05 feet NGVD). Gale force winds over a period of five days caused tides 3 to 6 feet above normal across the entire coastal area of southern Louisiana.

Biological Resources

(1) Wetlands. Forested wetlands within the project area include approximately 62 acres of fresh swamp located on the western portion of the study area and approximately 332 acres of bottomland hardwoods located over the eastern two-thirds of the study area. The study area is partially enclosed within an existing levee system and is under forced drainage. Continued pumping of the area has contributed to subsidence throughout the area.

The tree canopy of the fresh swamp area includes approximately 80 percent tupelogum and red maple and 20 percent baldcypress. As a result of persistent pumping, understory vegetation including red mulberry, sugarberry, boxelder, elderberry, Chinese tallow tree, and black willow is rapidly invading.

Predominant species of the bottomland hardwood area include black willow, red maple, waxmyrtle, elderberry, sugarberry, green ash, and groundsel bush. Ground cover includes poison ivy, elderberry, lizard tail, palmetto, Virginia creeper, and trumpet creeper.

(2) Wildlife. The forested wetlands in the project area are of relatively low quality and have been adversely affected by forced drainage; hence, they are considered of low value as wildlife habitat. Nevertheless, the area provides habitat typically used by numerous resident and migratory passerine birds, amphibians, reptiles, and mammals. Among the mammals the project area could be expected to support are rabbits, squirrels, nutria, mink, raccoon, the nine-banded armadillo, and various species of bats and rodents.

(3) Fisheries. The only open water remaining in the project area occurs in the borrow canal along the protected side of the levee. For the most part, the borrow canal is shallow and congested with vegetation and debris. The only fish species that is likely to occur with some regularity within the leveed system is the mosquitofish.

Bayou Barataria, which is adjacent to the northern perimeter of the project area, supports a number of recreationally important fishes and shellfishes. These include blue and channel catfish, various sunfishes, freshwater drum, buffalo, largemouth bass, and spotted, long nose and alligator gars.

(4) Essential Fish Habitat. The Magnuson-Stevens Fishery Conservation and Management Act, as amended through October 11, 1996, requires that Federal agencies consult with the National Marine Fisheries Service (NMFS) regarding any action or proposed action that may adversely affect essential fish habitat. In compliance with this Act, the USACE, New Orleans District, assessed the study area and concluded that there are two areas that would be potentially impacted by the proposed action and that could be considered essential fish habitat. These areas include: (1) Bayou Barataria, located along the northern border of the study area; and (2) fresh marsh located adjacent to, but outside, the existing levee along the southern border of the study area. These areas are not expected to be adversely impacted by the proposed action. There is no essential fish habitat within the leveed and forced drainage system.

(5) Threatened and Endangered Species. According to the U.S. Fish and Wildlife Service, no federally listed threatened or endangered species presently occur within the study area. There is, however, a pair of nesting bald eagles in the vicinity of the study area. However, the nest tree is located over 1,500 feet from the proposed action area and is not expected to be adversely impacted by the proposed action.

Water Quality

(1) Water Use Support Classification. LDEQ classifies water use support based upon either an evaluation of land use, citizen complaints, etc., or upon actual monitored data. Only an

evaluated assessment is available for the study area, and the results of this evaluated assessment are summarized below and discussed in more detail in Appendix D.

(2) Existing Water Quality Data. The water quality data collected from local stations are listed in Appendix D. There is one active water quality monitoring station located within the study limits, that has collected and tested samples monthly since June 1997. The station is identified as Station 7 and is located adjacent to the study area, below the Crown Point Bridge. No exceedences of either the LDEQ acute or chronic criteria were detected for any of the metals. No pesticides were above detectable limits. Fecal coliform in the sample collected 18 Jun 97 was 60,000 mpn, which is well above the state standard of 400 mpn. However, the standard states that levels must exceed 400 mpn in a 10% minimum of 5 samples collected over a 30-day period. Since only 1 sample was collected for this study, a determination could not be made regarding violation of the fecal coliform standard. Additional samples were not collected because the flood control project should not impact fecal coliform levels. All pH measurements were within the state standards, as were all dissolved oxygen measurements.

Cultural Resources

The Barataria region has been used by man in both prehistoric and historic times. Archaeological records concerning prehistoric sites in the region indicate that extensive colonization was initiated during the Marksville period (200-400 AD) and continued throughout much of the prehistoric period. Historical records concerning the region indicate that European settlement in the region began in the early 1700's. Both prehistoric and historic sites are known to exist within the vicinity of the project area.

A cultural resources survey of the project area has been completed by Earth Search, Inc. through primary source document research, intensive pedestrian survey, and fieldwork consisting of a program of shovel testing and auguring. Through these efforts, data detailing the environmental setting, prehistoric occupations, historic occupations, previous investigations, and existing archaeological sites and conditions has been collected. The report of the findings is on file at the U.S. Army Corps of Engineer, New Orleans District.

An examination of the cultural resources survey report indicates that there is one reported site, known as the Rosethorn School Site (16JE50), which is located within the project area between Bayou Barataria and Louisiana Highway 303 approximately 0.5 miles east of the Louisiana Highway 45 Bridge. The Rosethorn School Site was recorded in 1975 by archaeologists of Coastal Environments, Inc. The site was interpreted as a prehistoric extraction locale and was recommended as ineligible for nomination to the National Register of Historic Places (NRHP). A subsequent visit, by archaeologists from R. Christopher Goodwin & Associates, Inc., in 1985 found no evidence of the site and it was presumed to have been destroyed. This conclusion was supported by 1994 correspondence from the Louisiana Department of Culture, Recreation and Tourism that was obtained during preliminary coordination of the Rosethorn Basin Project. An attempt to relocate the Rosethorn School site (16JE50) in January 1998 was made by archaeologists from Earth Search, Inc. The site was not relocated, and no intact cultural deposits associated with the site were found within the project corridor. The site appears to have been destroyed. Therefore, the site was deemed not eligible or potentially eligible for nomination to the NRHP. Consequently, the proposed project will not impact any significant cultural resources at this site.

Recreation Resources

The study area is located in the less populated southern reaches of Jefferson Parish where recreational access is available to both urban activities and natural resource related activities. Urban type facilities, found both within and north of the study area, include: National and State Parks; local parks, playgrounds, and swimming pools; and ball parks and tennis courts. Natural resource related facilities, found within and surrounding the study area, include: picnic areas, camp sites, and hiking trails; wildlife refuges, management areas, and numerous waterbodies; and private and public fishing piers and boat launches.

Louisiana is a "sportsman's paradise" that sustains millions of man-days of recreational use annually for hunters, fishermen, boaters and other recreationists who enjoy the outdoors. The primary users of the outdoor recreational resources provided near the project area are residents of

southeast Louisiana; however, residents throughout Louisiana as well as tourists from out-of-state also frequent the areas. Predominant recreational activities are freshwater and saltwater fishing, including finfishing, crawfishing, crabbing, and shrimping. Other recreational activities include big game, small game and migratory bird hunting, boating, swimming, and camping. The three major recreational areas of significance adjacent to the area are the Lake Cataouatche - Lake Salvador complex (which includes the Salvador Wildlife Management Area), the Jean Lafitte National Historical Park and Preserve, and the Bayou Segnette State Park.

Hazardous, Toxic, and Radioactive Wastes (HTRW)

A land use history evaluation, regulatory agency coordination, and site inspections have been accomplished to assess the potential for hazardous, toxic, and radioactive wastes (HTRW) within the project area. A full report of the Preliminary HTRW Site Assessment is contained in the Environmental Appendix.

The results of historic land use characterization indicates that the study area was generally undeveloped prior to the mid- to late-twentieth century; however, agricultural activities did occur in the vicinity in the early nineteenth century when the Mavis Grove Plantation was in operation. Sugar was grown in the region and the lumber industry boomed in the late nineteenth century. Jean Lafitte can be labeled a line settlement, having expanded down the high land along the natural levee of Bayou Barataria. Development has been both residential and commercial. Industry in the area is associated with fishing or with oil and gas support services. Industrial development in the project area is predominantly concentrated along Louisiana Highway 303 east of the Louisiana Highway 45 Bridge.

The Environmental Protection Agency (EPA) National Priorities List (NPL - Superfund Sites) of the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) was investigated through personal contacts with Mr. Don Markham of EPA Region 6 on January 23, 1998. According to Mr. Markham, there are no Superfund Sites within the project area or its immediate vicinity. The EPA Resource Conservation and Recovery Information System (RCRIS) list for Jean Lafitte, Louisiana was obtained from Mr. Jeff Riley of

EPA Region 6 on February 2, 1998. The list indicated that no hazardous waste treatment, storage, disposal, or transportation facilities are located within the project vicinity; however, the list reveals that six reportable hazardous waste generators are located within the general vicinity of the study area. Of the six facilities, one is listed as a large quantity generator; two are listed as small quantity generators; two are listed as conditionally exempt small quantity generators; and one is listed as never having generated hazardous waste. Only two facilities, a small quantity generator (LASH Marine Services) and a large quantity generator (Watts Corporation), were determined to be located within the project area. A review of the Watts Corporation site indicated that this business is now defunct; therefore, LASH Marine Services is the only active generator listed in the project area. A search of Louisiana Department of Environmental Quality (LDEQ) Hazardous Waste Division files for LASH Marine Services found only copies of waste generator notification report. The reports stated that the facility generates between 220 and 2,200 pounds of waste per month. The files contained no indication of any prior or ongoing contaminant concerns. No other active generators were identified within 2 miles of the project area.

The LDEQ, Louisiana Site Remediation Information System (LASRIS) list, which shows inactive and abandoned sites, lists one location (Watts Construction Company) in Jean Lafitte. The site is located within the project area near the eastern end of Louisiana Highway 303. As noted above, the Watts site was determined to have been a former large quantity generator that has apparently gone out of business. In order to establish the reason for the facility listing, an attempt was made to review LDEQ Hazardous Waste Division files. The attempt was unsuccessful as the LDEQ does not maintain a file for the facility. Based upon further investigation, it is believed that the facility is listed as a result of a failure to meet reporting requirements. This situation likely occurred when the business closed and failed to notify the LDEQ.

Inspections of the proposed project alignment and adjacent areas were accomplished on May 13 and May 18, 1998. The inspections were completed on foot and by vehicle and included all accessible portions of the alignment. Based upon these inspections, the risk of encountering an HTRW site during construction is believed to be minimal throughout most of the project. The

only areas identified to be of potential concern included two fabrication facilities on the eastern end of Louisiana Highway 303 and two facilities on Louisiana Highway 303 east of the Louisiana Highway 45 Bridge crossing. Since current project plans indicate that the flood protection alignments will traverse the perimeters of these properties, the risk of encountering HTRW during construction in these areas appears to be nominal. Other areas identified were either outside of the alignment, or were not a significant HTRW concern.

Economic Resources

(1) Population and Land Use. The Rosethorn Basin and town of Jean Lafitte, are located in Jefferson Parish, Louisiana which is one of eight parishes making up the New Orleans Metropolitan Statistical Area (MSA). Jean Lafitte was incorporated, and Rosethorn annexed, between 1970 and 1980. The population of Rosethorn increased from 936 to 1,496 between 1980 and 1990 while the total population of both Jefferson Parish and the New Orleans metro area slightly declined. The population increase in Rosethorn, as in other suburban communities is due in part to the lower cost of single-family housing and other properties such as: the appeal of lower population densities, new construction of or improvements to rapid transportation systems, and increasing crime rates in large metropolitan areas. Construction of an additional Mississippi River bridge near the New Orleans central business district is believed to have a positive impact on residential developments in Rosethorn. Since the population of Rosethorn is still relatively small, the availability of published data on land use and other socio-economic conditions is limited. The 1990 census reported that the political boundaries of Jean Lafitte covered approximately 6.3 square miles, including 6.0 square miles of land area.

(2) Businesses and Employment. The businesses and related employment within the incorporated limits of Rosethorn include the markets and services traditionally required maintaining a small suburban community in close proximity to a much larger urban center. Businesses include such things as retail stores that sell food, clothing, medical supplies, and various service establishments providing health care, sanitation, and automobile and boat maintenance. Other business activities more unique to the local area include the operation and

maintenance of the commercial fishing vessels docked along the bayou and activities in support of oil and gas production. Table 5 compares employment, and unemployment rates, and the median family income in Rosethorn and Jefferson Parish. The data has not been adjusted to reflect the unusual pattern of inflation, which occurred nationally between 1979 and 1989.

TABLE 5
Civilian Labor Force, Employment, Unemployment and Income

AREA	1980/a	1990/b	1994/c (April)
Jean Lafitte:			
Civilian Labor Force	*	571	*
Employed	*	531	*
Unemployed	*	40	*
Unemployment Rate	*	7.0%	*
Median Family Income	*	\$22,125	*
Jefferson Parish:			
Civilian Labor Force	214,909	222,939	226,700
Employed	205,987	207,556	212,600
Unemployed	8,922	15,383	14,100
Unemployment Rate	4.2%	6.9%	6.2%
Median Family Income	\$21,920	\$32,446	*

* Not available

a/ U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, "General Social and Economic Characteristics, Louisiana". Income data are for the entire previous (1979) year, and unadjusted for changing price levels.

b/ U.S. Department of Commerce, Bureau of the Census, 1990 Census of Population and Housing, "Summary Social, Economic, and Housing Characteristics, Louisiana". Income data are for the entire previous (1989) year and unadjusted for changing price levels.

c/ Louisiana, Department of Labor, unpublished data.

The 1990 census appears to be the first published information providing employment and median family income data for communities with populations of less than 2,500. The 1980 census indicated that Jefferson Parish ranked first among all Louisiana parishes in median family income. In 1990, it ranked slightly behind three other parishes in the New Orleans MSA: St. Charles Parish with \$35,355, St. Tammany Parish with \$35,033 and East Baton Rouge Parish with \$34,198.

(3) Structure Inventory and Contents Valuation. A comprehensive field survey (100% inventory of all of the structures within the alignment) was conducted for the Rosethorn Basin to identify every structure at risk in the study area. Contained in the survey is an estimate of the number, value, and elevation of all structures. First floor elevations above natural ground were estimated using a hand level to ensure accuracy and ground elevations were obtained from 1-foot contours provided by Jefferson Parish's contractor, Vernon F. Meyer and Associates, Inc.

Structure and content values are major elements impacting depth-damage relationships and the magnitude of flood damage to urban structures. For the purposes of estimating urban flood damages, a structure is defined as a building and any attached components, such as built-in appliances, shelves, carpeting, etc. Contents represent furnishings and equipment, or all items within the structure that are not permanently attached. The value of land is excluded in the determination of urban structure values.

Residential structure values were calculated using the Marshall and Swift Residential Estimator Program. This continually price-adjusted computer program uses cost per square foot, geographically localized by zip code, to calculate a depreciated replacement value for each structure. Mobile homes within the area were assessed using an average value per structure based on size. A summary of the major structure types and structure values is depicted in Table 6.

**TABLE 6
STRUCTURE INVENTORY**

CATEGORY	NUMBER	VALUE
Residential (1-story)	81	\$ 3,291,300
Residential (2-story)	4	\$ 288,700
Mobile Homes	88	\$ 727,000
Commercial	17	\$ 1,314,000

(4) Damage evaluation. In order to determine the number of structures flooded, economist used the Urban Flood Damage Program to correlate structural elevations and replacement values to hydrologic stage-frequency data. Within the program, nine different types of urban structures were evaluated using hydrologic profile data, structure locations, first floor elevations, depth-damage relationships, and structure and content values to compute the depth of flooding and resulting damages for selected flood events. Table 7 shows the number of structures damaged by flood frequency for the study area.

**TABLE 7
TOTAL NUMBER OF STRUCTURES FLOODED BY FREQUENCY**

DESIGN STORM FREQUENCY	# OF STRUCTURES FLOODED
1	45
2	50
5	109
10	146
25	166
50	167
100	167
200	167
500	167

(5) Automobile Damages and Valuation. Damage to other property in the flood plain, such as automobiles, are directly related to the structural flood damages. The elevation of each automobile is determined by its corresponding structure elevation. Automobile damage estimates are then calculated by correlating depth of flooding, depth-damage per automobile, and damage per automobile. The 1990 census indicated that there were 1.8 vehicles per household in Jefferson Parish. It was assumed that each residence had one automobile that was susceptible to damage. The current average damage per automobile was estimated to be \$10,757, based on the replacement value of a depreciated used automobile according to the Louisiana Motor Vehicle Division and Census Data.

(6) Expected Flood Damages. The results of the flood damage analysis for existing conditions are presented in Table 8 for structures and automobiles.

**TABLE 8
EXPECTED ANNUAL FLOOD DAMAGES**

DAMAGE CATEGORY	EXPECTED ANNUAL DAMAGE
Residential	\$ 538,940
Commercial	\$ 36,381
Automobiles	\$ 584,258
TOTAL	\$1,159,579

FUTURE CONDITIONS WITHOUT PROJECT

Having explored the past and present condition of Jean Lafitte, the next step is to forecast future conditions if no improvements are made. This forecast of conditions under the no-action scenario will provide the basis for analysis of project improvements.

Flood Control

The Rosethorn Basin area is partially protected by an existing local levee system that provides nominal protection from elevated tidal stages and rainfall flooding due to its varying height and gaps in the alignment. No levees presently exist along the shoreline of Bayou Barataria; however, the natural levee of Bayou Barataria exhibits elevations ranging from +3 to +5-feet NGVD. Historical evidence of sea level rise and subsidence indicates the need for a projection of storm surge stages and their effect on this project's effectiveness. Sea level rise of 0.5 feet per century along the Gulf Coast is recommended by the latest Corps' guidance. Corps' of Engineer geologists from radio carbon dating of buried marsh deposits developed estimates of subsidence in coastal Louisiana and compiled this data on quadrangle maps. Using the projected sea level rise of 0.2 feet in the next 50 years and the appropriate subsidence rate in the coastal zones bordering the project area, the WIFM model was employed to compute the hurricane surge heights which could be expected in the year 2040. Stages for pertinent locations in the area that would accompany the standard project hurricane (SPH), 100-year and 10-year hurricanes are described in Table 9.

TABLE 9
PREDICTED HURRICANE SURGE HEIGHTS IN 2040

Location	STAGES IN FEET NGVD		
	SPH	100-year	10-year
Bayou Barataria	9.6	7.7	4.2

Levee elevations for future conditions were determined by adding wave runup from the appropriate storm condition to the design stillwater level (SWL). Wherever protective structures are sheltered against significant wave runup, wave runup from the small locally generated wave climate was used to determine levee height. On the eastern side of the study area wave berms should be added to maintain the same level of protection as the original project due to the loss of bottomland hardwood and marsh habitat on the flood side of the levee. In these areas where significant wave action will occur because of an available fetch, levee heights were designed

using wave heights determined from methodologies described in the Coastal Engineering Center's Shore Protection Manual. Design elevations of protective structures in each reach are given in Table 10.

TABLE 10
DESIGN ELEVATION OF PROTECTIVE STRUCTURES IN 2040

Location	SWL (ft. – NGVD)	WAVE RUNUP (ft.)	10-YEAR DESIGN* (ft.- NGVD)
Bayou Barataria	4.25	2.0	6.5
Eastside Levee (w/berm)	4.25	2.5	7.0

*Ground surface elevation is 0.2 ft lower

Biological Resources

(1) Wetlands. A field reconnaissance of the Rosethorn Basin area, conducted in August 1998 by biologists representing the U.S. Army Corps of Engineers (USACE), New Orleans District, the U.S. Fish and Wildlife Service (USFWS), and the local sponsor (West Jefferson Levee District) confirmed that forested wetlands within the study area are currently enclosed within a levee system and are under pump drainage. Based upon this reconnaissance and current patterns of development in the area, it was concluded that the enclosed forested wetlands would be lost to development within 15 to 25 years under current conditions.

It is unlikely, however, that the existing wetlands (i.e., predominantly fresh swamp and marsh) located on the unprotected side of the existing levee will be cleared for development. Levee systems, such as that currently being proposed for upgrading, have historically become the line of demarcation precluding future developments on the unprotected side. As such, they serve to protect adjacent, functionally valuable wetlands. The currently existing levee provides such a benefit to adjacent non-protected wetlands.

(2) Wildlife. Wildlife habitat within the levee system, albeit of low to moderate quality, is expected to be virtually eliminated within the next 15 to 25 years as a result of development. Because of the degree of subsidence that has occurred within the leveed area, a large amount of fill material will be required as a base for residential or other proposed developments. Even though the total removal of trees may not be required for future developments, it is likely that mature mast-bearing trees will be killed as a result of filling and will be unavailable, even for squirrels and passerine birds. As the existing levee will likely serve as a firm line of demarcation eliminating the future encroachment of development into adjacent wetlands, those wetlands will likely remain valuable and productive wildlife habitat. The same species assemblages that occur there now are likely to occur there in the future.

(3) Fisheries. Fishery conditions in area waters and wetlands are likely to become more saltwater oriented during the next 50 years. Freshwater benefits from operation of the Davis Pond Structure, however, may enhance area fishery production.

(4) Threatened and Endangered Species. The U.S. Fish and Wildlife Service reports that no federally listed threatened or endangered species occur within the project area. However, there is a pair of nesting bald eagles in the general vicinity of the project area. It is anticipated that this nest would continue to be used for the foreseeable future unless encroaching developmental stresses cause the eagles to relocate.

Water Quality

Projected water quality for the study area is expected to remain similar to current conditions. The Rosethorn Basin is partially protected by an existing non-Federal levee, and stormwater will continue to be pumped in the absence of the proposed Federal project. Minor industrial point sources, package plants, petroleum activities, channelization, spills, contaminated sediments, siltation, salinity, total dissolved solids, chlorides, and oil and grease are the major factors which currently affect water quality in the study area. These are expected to continue to be the major factors affecting water quality in the study area. Recent increased regulation and legislation as well as an increase in public awareness of environmental issues may result in slight

reductions in the amount of pollutants released, which would result in slight improvements in its water quality.

Cultural Resources

The Rosethorn School site (16JE50) was evaluated in January 1998 and could not be relocated. The site appears to have been destroyed as a result of the construction of the Gulf Intracoastal Waterway and or subsequent developments.

It is probable that both the known and unknown cultural resources in the project vicinity will eventually be impacted by urban growth, since residential development is proceeding rapidly in the area. Other adverse impacts resulting from indiscriminate human actions would most likely increase with the corresponding increase in population. Not only could potential vandalism of cultural properties occur, but also both recorded and unrecorded sites could be unknowingly destroyed.

Recreation

Future recreational use of the study area should increase due to: the proximity of natural areas such as Lake Cataouatche-Lake Salvador (including the Salvador Wildlife Management Area), Jean Lafitte Natural Historical Park, and Bayou Segnette State park; the availability of numerous access points to the areas natural resources; and the rapid rate of development presently occurring in the vicinity. These anticipated increases in recreational use would not significantly affect any of the Federal and State parks or management areas in the vicinity; however, public facilities at the Parish and local levels could eventually be strained by increasing usage demands. Commercial facilities would likely adapt, on the basis of supply and demand, to meet future recreational access demands. Continued flooding, experienced without the proposed project, would adversely affect existing and future recreation opportunities by limiting accessibility during and immediately following such events. Expenditures related to flood recovery could also limit the feasibility of providing viable recreation opportunities at the local and commercial level.

Hazardous, Toxic, and Radioactive Wastes

The risk of encountering hazardous, toxic, and radioactive waste (HTRW) problems within the proposed alignment is nominal. No change in the likelihood of occurrence or location of toxic materials would be expected without this project.

PLAN FORMULATION

This section describes the process of developing plans to address the flood protection needs of the study area.

POLICY REGARDING EXISTING LEVEES

The Corps, Policy Guidance Letter (PGL) No. 26, Benefit Determination Involving Existing Levees (dated December 23, 1991) provides guidance for determining without-project conditions and with project flood damage reduction benefits for feasibility studies involving existing non-Federal levees that do not meet Corps criteria. Problems have arisen in the evaluation of flood damage reduction studies when there are existing non-Federal levees of uncertain reliability. Specifically, the problem is one of engineering judgement on the ability of the levees to contain flows with water surface elevations of given height. Following a careful evaluation of the segmented levees in the Rosethorn Basin, the New Orleans District has determined the following:

- 1) The existing non-Federal levees do not form a closed flood protection system
- 2) The level of protection provided by the existing levees is estimated to be at or below a 5-year design storm event

Integrity of the local levee system is questionable in view of failures that occurred during recent hurricanes and tropical storms. The close proximity of many residences to Bayou Baratavia prevents construction of a significant earthen levee in many areas, therefore, a flood protection levee does not actually exist along the bayou. However, the bank elevation varies from +1.0 to +4.0 feet NGVD. Along the southern project limits, the levee constructed by West Jefferson Levee District stops approximately 150 feet south of Louisiana Highways 45 and 303 providing a fairly large gap that allows overflow from Bayou Baratavia to inundate the study area.

The non-Federal levees were disregarded in the existing condition analysis due to the minimal level of protection provided by the existing levee and the nature of recent flooding experienced in the study area. PGL No. 26 guidelines were not applied to the engineering and economic benefit calculations for this study.

INITIAL PLAN DEVELOPMENT

The Guidance for Conducting Civil Works Planning Studies (ER 1105-2-100) requires the systematic development of alternative plans that contribute to the Federal objective. The objective of this study is the development of an economically feasible and environmentally acceptable flood protection plan that will enable the area to adequately withstand a 10- to 25-year design storm event, as a minimum, without substantial residual flooding.

In feasibility, both structural and non-structural alternatives were considered to address the problems and needs of the study area. Structural measures typically consist of levees, floodwalls, floodgates, and pumping stations and other available means to reduce flooding from storm driven tides and rainfall. non-structural measures include flood proofing, small walls, and raising structures. Jefferson Parish currently participates in the national flood insurance program and employs non-structural measures such as flood forecasting and evacuation procedures to reduce flood damages.

Economic Benefit

The National Economic Development Procedures Manual for Urban Flood Damage recognizes four (4) primary categories of benefits for urban flood control plans: inundation reduction, intensification, location and employment benefits. Inundation reduction is the only category of National Economic Development (NED) benefits for urban areas considered in this analysis. In addition to damage reduction caused by inundation, this category also includes the reduction of emergency costs, evacuation and subsistence costs, reoccupation costs, and Federal Insurance Administration costs saved. The evaluation involved the formulation and assessment of flood control improvements, the identification of categories of possible flood control benefits,

the determination of without- and with-project damages, project costs, and standard benefit-cost comparisons.

The estimated benefits and costs at the time of accrual were made comparable by conversion to an equivalent time basis using a designated interest rate of 7-1/8 percent. The period of analysis, or project life, used in the economic calculation is 50 years. The benefits and costs are expressed as the average annual value of the present worth of all expenditures and all planned outputs. These projected costs and benefits are measured at a base year for this project of 2003, which represents the year in which the project becomes operational or when significant benefits begin to accrue.

Plan Assessment and Evaluation

The final phase of the plan formulation process is refinement. Detailed procedures for cost and benefit evaluations are summarized in the Economic Analysis (Appendix B). A summary of plan assessment and evaluation follows:

No Action. Under the no action alternative, the Corps would not participate in any protective measures to protect the Rosethorn Basin. As stated earlier in this report under future conditions without project, the study area would continue to be inundated by rainfall events and tidal stages.

Non-structural Alternatives. Non-structural measures either reduce or avoid flood damages without significantly altering the nature or the extent of flooding. Such measures reduce flood losses by either (1) changing the use of floodplains (e.g., from residential to recreational use), or (2) retaining existing flood plain use with some accommodation of the flood hazard (e.g., elevating a structure). Non-structural measures include, but are not limited to, such actions as floodproofing of structures, regulation of floodplain use, temporary evacuation of hazard areas, relocation of activities to non-floodplain sites, acquisition of land or easements, redevelopment in a manner compatible with the flood hazard, and flood forecasting and warning.

Basically, two types of non-structural measures for flood protection exist – those that reduce existing damages and those that reimburse for existing damages and reduce future damage potential. Only those non-structural measures that reduce damages were investigated to varying degrees in this study and include the following:

- a. Raising structures in place.
- b. Constructing small walls or levees around structures.

The analysis of non-structural alternatives shown in Table 11, revealed that non-structural alternatives are economically justified.

**TABLE 11
NON-STRUCTURAL ANALYSIS**

Description	First Costs	Avg. Ann. Cost	Avg. Ann. Benefit	B/C Ratio	Net Benefits
Small Walls	\$4,339,601	\$341,178	\$507,237	1.49	\$166,059
Raise Structures	\$2,020,874	\$158,881	\$468,196	2.95	\$309,315

Structural Alternatives. The proposed structural alternatives consist of earthen levees and floodwalls with floodgates that allow vehicular and pedestrian access to Bayou Barataria. The basin’s interior drainage system consists of several drainage canals and two pump stations that are adequate for a 10-year rainfall event, if the study area is protected from tidal inundation. In order to identify the optimal plan, three levels of protection were considered. Rather than use design storm events, the levels of protection were represented by three levee elevations: +6.0-, +7.0- and +8.0 feet NGVD. Each of these levees will provide sufficient protection from a 10-year design storm event, but only one levee elevation maximizes net benefits. The results of this NED analysis using the base year cost estimates are shown in Table 12.

TABLE 12
BENEFIT-COST SUMMARY

Levee Elevation (NGVD)	+6.0-ft	+7.0-ft	+8.0-ft.
First Costs	\$4,144,500	\$4,564,500	\$5,705,600
Real Estate	1,745,000	1,745,000	1,960,000
Relocations	919,300	919,300	1,103,000
Mitigation	28,000	28,000	35,000
Engineering & Design	741,200	741,200	741,200
Supervision & Administration	664,000	664,000	664,000
Interest During Construction	<u>1,205,700</u>	<u>1,205,700</u>	<u>1,384,800</u>
Total First Costs	\$9,447,700	\$9,867,700	\$11,593,600
Average Annual Costs	\$ 674,000	\$ 704,000	\$ 827,000
Operation and Maintenance	<u>19,000</u>	<u>19,000</u>	<u>19,000</u>
Total Average Annual Costs	\$ 693,000	\$ 723,000	\$ 846,000
Average Annual Benefits			
Total Average Annual Benefits	\$ 956,300	\$1,083,500	\$1,201,700
Benefit-Cost Ratio	1.37	1.49	1.42
Net Benefits	\$ 236,600	\$ 360,500	\$ 355,700

ENVIRONMENTAL EFFECTS

An assessment of the likely environmental effects of the proposed plans is described in detail in the Environmental Assessment (EA) and the Water Quality Appendix (Appendix D). The study area south of Louisiana Highways 45 and 303 encompasses approximately 331.8 acres of bottomland hardwood habitat and 62.2 acres of swamp habitat. A brief summary of the significant environmental concerns for this portion of the study area is provided in this section.

No Action: As stated previously, within the next 15 to 25 years , all of the forested wetlands (394 acres) that would be enclosed by the proposed levee alignment would be lost to development in the future without-project condition.

Levee and Floodwall: The existing non-Federal levee would be enlarged, on the protected side resulting in the direct loss of approximately 19.8 acres of swamp and early successional bottomland hardwood habitat (BLH). The estimated loss in habitat values associated with the direct project-induced loss of 19.8 acres of swamp and early successional BLH will be mitigated through purchase of approximately 8 acres of mitigable lands at a cost of \$3,600 per acre. The estimated project cost for mitigation of the levee induced damage is shown in Table 12 and varies by levee elevation from \$28,000 to \$31,000. The project induced effects on wildlife, fisheries, threatened and endangered species, cultural resources, water quality, air quality, recreational resources and HTRW are summarized in detail in the EA and Appendix D of this document.

DETERMINATION OF THE RECOMMENDED PLAN

This section evaluates the NED results for each plan developed separately in relation to the no-action plan. It draws on the results obtained for the three benefit types and costs developed in other sections and appendices.

A traditional analysis was performed using annualized benefit and cost estimates, therefore, the results are sufficiently accurate to allow elimination of plans that are infeasible.

As indicated by Table 11, the proposed non-structural alternatives were determined to be feasible, however, the higher level of protection provided by the levee plan provide superior net benefits compared to the non-structural alternatives. Therefore, the non-structural alternatives were eliminated from further consideration.

The proposed levee design contains similar floodwall, floodgate, and earthen levee features for each level of protection. While all appear economically justified, an enclosed levee system constructed to elevation +7.0- feet NGVD would maximize net benefit. The recommended levee elevation should not only maximize net benefit, but also minimize implementation costs. Thus, a levee construction to elevation +7.0-feet NGVD is the NED plan.

RECOMMENDED PLAN DESCRIPTION

Construction of an earthen levee at elevation +7.0 feet NGVD with 1-on-4-side slopes and a 5-foot wide levee crown will involve hauling approximately 100,000 cubic yards of earthen fill material via Louisiana Highway 45 and Louisiana Highway 303 from an offsite commercial source. The remaining flood protection consists of a reinforced concrete capped sheetpile floodwall and five (5) swing-type floodgates.

CONSTRUCTION COSTS

The flood protection levee will be constructed in one lift with a total duration of approximately 2 years, but will be limited to a maximum of six months in any one location based upon prior construction projects of this nature. A five-foot wide temporary construction easement is required for a period of three years, in addition to a perpetual flood protection easement, to accomplish the described work. Based on the types of construction involved it is recommended that work be accomplished using multiple contracts. Cross-sectional diagrams of the proposed earthen levees, floodwalls, and floodgates are presented in Plates 2 through 16.

The levee construction will require approximately 100,000 cubic yards of earthen material. There are special right-of-way circumstances in Rosethorn. A number of private residences are in close proximity of the construction site, thus minimizing impacts to those residents will require implementation of various techniques to reduce noise and avoid damage to private property. A summary of the construction costs for the proposed earthen levee and floodwall is provided in Table 13.

Table 13
Construction Cost Estimate

Code	Item	Qty	Unit	Unit Price	Amount	Contingency	Project Cost
1	Mob/Demob		LS	\$75,000	\$75,000	\$18,750	\$93,750
2	Earthwork for structure						
	Clearing and Grubbing	8	ACRE	\$2,000	\$16,000	\$4,000	\$20,000
	Excavation (I-Wall/Gate)	2750	CUYD	\$6	\$16,500	\$4,125	\$20,625
	Backfill-Fully Compacted	1410	CUYD	\$12	\$16,920	\$4,230	\$21,150
	Seeding and Fertilizing	8	ACRE	\$500	\$4,000	\$1,000	\$5,000
3	Foundation Work						
	Timber Piling (12" dia)	2320	LNFT	\$12	\$27,840	\$6,960	\$34,800
	Timber Piling (18" dia)	1600	LNFT	\$20	\$32,000	\$8,000	\$40,000
	Steel Sheetpiling (CZ-101)	94200	SQFT	\$12.5	\$1,177,500	\$294,375	\$1,471,875
	Pile Test	2	EACH	\$20,000	\$40,000	\$10,000	\$50,000
4	Structural Work						
	Reinf. Conc. Slabs	145	CUYD	\$250	\$36,250	\$9,063	\$45,313
	Reinf. Conc. Walls	3000	CUYD	\$400	\$1,200,000	\$300,000	\$1,500,000
	Reinf. Conc. Stairs	30	CUYD	\$400	\$12,000	\$3,000	\$15,000
	Stab Slab Concrete	280	CUYD	\$100	\$28,000	\$7,000	\$35,000
	**3-Bulb Waterstop and Expansion Joint Filler included in concrete work						
5	Misc. Metals (Handrails)	630	LNFT	\$50	\$31,500	\$7,875	\$39,375
6	Steel Swing Gates						
	Structural Steel	21600	LBS	\$2.5	\$54,000	\$13,500	\$67,500
	Embedded Items	10200	LBS	\$1.5	\$15,300	\$3,825	\$19,125
	**Rubber seals included						
7	Levee Embankment - North of Hwy 45 & 303 (See Appendix for details)				\$47,740	\$11,935	\$59,675
8	Levee Embankment - South of Hwy 45 & 303 (See Appendix for details)				\$821,000	\$205,250	\$1,026,250
TOTALS					\$3,651,550	\$912,888	\$4,564,438

During construction of the proposed floodwall, the existing bulkheads along Bayou Barataria will be left in place and the new floodwall constructed on the floodside, following the existing bulkhead alignment wherever possible. The floodwall shall be constructed from the waters edge using a barge to drive sheetpile. Once the floodwall is in place, backfill will be placed between the existing bulkhead and the new floodwall. The total length of floodwall is estimated to be 4,200 feet. Included in the floodwall design are five (5) swing-type floodgates that allow vehicular and pedestrian access to Bayou Barataria. In addition, reinforced concrete stairs will be installed to maintain pedestrian access to Bayou Barataria for each residence along the bayou (approximately 15 total).

REAL ESTATE REQUIREMENTS

There are no existing Federal interests associated with this project. The estates required for this project include a Perpetual Flood Protection Levee and/or Floodwall Easement consisting of approximately 28.23 acres, a Temporary Work Area Easement consisting of approximately 7.07 acres, and a Perpetual Drainage Ditch Easement consisting of 7.92 acres. Along Bayou Barataria, construction will require the removal of several piers and boathouses affecting approximately 35 ownership's, as well as one trailer and one storage shed. Landowners are entitled to compensation for the value of their structures removed, and/or relocated, therefore these costs have been included in the real estate estimates. A summary of the Real Estate costs using an August 27, 1998, valuation date is shown in Table 14. A detailed description of these requirements is presented in the Real Estate Plan (Appendix C).

TABLE 14
Real Estate Cost Estimate

(A) LANDS AND DAMAGES (TITLE III)			
Perpetual Flood Protection Levee Easement	Acres	Unit Value	Total Value
Residential (Waterfront)	6.53	\$ 60,984	\$398,226
Residential	4.34	\$ 19,602	\$85,073
Woodland	17.36	\$500	\$ 8,680
Temporary Work Area Easement (3 years)			
Residential (Waterfront)	2.63	\$16,924	\$44,510
Residential	0.69	\$ 5,440	\$ 3,754
Woodland	2.75	\$ 139	\$ 382
Road Right-of-Way	1	N/A	\$1,000
Drainage Ditch Easement			
Potential Residential	1.58	\$19,602	\$30,971
Woodland	6.34	\$500	\$3,170
(B) Improvements (Abandoned mobile home and shed)			\$3,000
(C) Severence Damage (25 docks/ 10 boathouses)			\$97,500
TOTAL LANDS & DAMAGES			\$676,000
(D) Contingencies 25%			\$169,000
TOTAL LANDS, EASEMENTS AND RIGHTS-OF-WAY			\$845,000
(E) Acquisition Costs			\$875,000
(F) PL 91-646 (URA), Title II payments			\$25,000
TOTAL ESTIMATED REAL ESTATE COST			\$1,745,000

RELOCATIONS OF AFFECTED FACILITIES

The total cost for relocation of Louisiana Highway 45, Louisiana Highway 303, several oil and gas pipelines, power and communication lines, and drainage pump station discharge pipes for the proposed project is currently estimated to be \$919,311.00. This total includes approximately 10% for the owners engineering and design and 12% for the owners contract administration. Twenty-five percent (25%) for contingencies is added to the total for all relocation items except the sewer lines, highway ramps and detours. Contingencies for the sewer lines are 24% and contingencies for the ramps and detours are 30% and 35% respectively. Future Government expenditures in the areas of engineering, design, and contract administration have not been included in these estimates. A detailed description of the facilities to be relocated is provided in the Engineering Investigation (Appendix A).

MITIGATION

Implementation of the proposed project would require mitigation for unavoidable project-induced impacts to 19.6 acres of existing forested wetlands. Based on a Wetlands Value Assessment (WVA) conducted by the U.S. Fish and Wildlife Service, the impacted forested wetland habitat is valued at 4.7 Average Annual Habitat Units (AAHU's). The project-induced losses would be mitigated by acquiring approximately 8 acres of forested wetlands, with a WVA of 0.6 AAHU's, from the outfall area of the Davis Pond Freshwater Diversion Project mitigation area, or some equivalent mitigation bank/area. The 8 acres of mitigation lands would be purchased at a cost of approximately \$3,600 per acre, for a total cost of \$28,000.

OPERATION AND MAINTENANCE

The estimated annual operation and maintenance (O&M) costs of the recommended plan for the Rosethorn Basin are as follows.

**TABLE 15
OPERATION AND MAINTENANCE ESTIMATE**

<u>MAINTENANCE ITEM</u>	<u>COST ESTIMATE</u>
Levee Maintenance	\$ 7,500
Floodwall Maintenance	\$ 2,000
Floodgate Maintenance	<u>\$ 7,000</u>
Subtotal	\$16,500
15% contingencies	<u>2,475</u>
TOTAL	\$18,975

Operation and maintenance of this project involves mowing approximately 50 acres of earthen levee, mowing or spraying grass adjacent to 4,200 linear feet of floodwall, removing graffiti from floodwalls, cleaning floodgate sills, and greasing and spot painting the floodgates periodically.

ENGINEERING AND DESIGN

Engineering and Design (E&D) for this project consists of preparing a design report and plans and specifications for construction. Pending approval of this feasibility report, additional funding will be provided for E&D. The E&D cost estimate is as follows:

Geotechnical Br.	\$ 28,800.00
Structures Br.	\$ 28,800.00
General Engineering Br.	\$ 3,400.00
Cost Engineering Br.	\$ 17,300.00
Hydraulics Br.	\$ 2,900.00
Civil Br.	\$ 86,300.00
Design Services Branch	\$ 8,700.00
A-E Contract for P&S	<u>\$500,000.00</u>
Engr Div Total	\$676,200.00
Construction Div.	\$ 25,000.00
Project Mgmt. Div.	<u>\$ 40,000.00</u>
E&D TOTAL	\$741,200.00

SUPERVISION AND ADMINISTRATION

Supervision and Administration (S&A) of construction contracts for this project is the responsibility of the Corps. S&A cost estimates are as follows:

Construction Div.	\$624,000.00
Project Mgmt. Div.	<u>\$ 40,000.00</u>
S&A TOTAL	\$664,000.00

FULLY FUNDED PROJECT COST ESTIMATE

The cost estimates provided thus far attempt to present a complete and accurate picture of the costs of solving a water resources problem. This is necessary for Federal and non-Federal sponsor planning and budgeting processes. The incremental project cost estimate is prepared during feasibility. A fully funded project cost estimate accounts for the potential increase in labor and construction costs during the detailed design and construction phases due to inflation. Both the incremental and fully funded cost estimates include construction costs, lands, easements, rights-of-way, relocations, disposal, mitigation, E&D, and S&A costs. However, the Real Estate cost estimate is not subject to adjustment based on inflation. A summary of the incremental and fully funded cost estimates is provided in Tables 16 and 17, respectively.

TABLE 16
INCREMENTAL PROJECT COST SUMMARY

PROJECT FEATURE	COST EST.
Levee and Floodwall	\$4,564,500
LERRD's	\$2,664,300
Mitigation	\$28,000
Engineering and Design	\$741,200
Supervision and Administration	\$664,000
Total Estimated Incremental Costs	\$8,662,000

The project cost is adjusted for inflation during the design and construction phases. The result is a fully funded cost estimate, which is estimated using a base year of 2000 and the first year the project is operational as 2003.

TABLE 17
FULLY FUNDED PROJECT COST ESTIMATE

PROJECT FEATURE	COST EST.
Levee and Floodwall	\$4,961,600
LERRD's	\$2,744,300
Mitigation	\$28,000
Engineering and Design	\$741,200
Supervision and Administration	\$721,800
Total Estimated Fully Funded Cost	\$9,196,900

PLAN IMPLEMENTATION

The purpose of this section is to present pertinent information concerning the Federal and non-Federal responsibilities regarding cost apportionment and the division of responsibilities for construction and subsequent operation, maintenance, repair, replacement, and rehabilitation of the project. Such costs apportionment is based on Federal guidelines.

DIVISION OF PLAN RESPONSIBILITIES

FEDERAL RESPONSIBILITIES

The Federal government will be responsible for planning, engineering, design, and construction of the project in accordance with the applicable provisions of Public Law 99-662 (WRDA of 1986). The Government, subject to the availability of funds and using those funds provided by the non-Federal sponsor, shall expeditiously construct the Project, applying those procedures usually applied to Federal projects, pursuant to Federal laws, regulations, and policies.

NON-FEDERAL RESPONSIBILITIES

In accordance with Federal policy, non-Federal interests must, at the appropriate time, assure the Secretary of the Army that they will, without cost to the United States:

- A. Furnish all lands, easements, rights-of-way, and suitable borrow and dredged or excavated material disposal areas necessary for construction, operation, maintenance, repair and replacement of the Project, and shall perform or ensure performance of all relocations necessary for the construction, operation, maintenance, repair and replacement of the Project.
- B. The non-Federal sponsor shall contribute a minimum of 35 percent, but not to exceed 50 percent, of total project costs in accordance with the Federal regulations. Provided

however, that in accordance with Section 205 of the Flood Control Act of 1948, as amended, the Government's financial participation in the Project is limited to \$7,000,000 which shall include all Federal funds expended by the Government for planning, design, and implementation of the project except for coordination account funds expended prior to the first work allowance for study initiation.

Notwithstanding any other provisions of this document, the non-Federal sponsor shall be responsible for all costs in excess of this amount.

- C. The non-Federal sponsor shall provide a cash contribution equal to 5 percent of total project costs.
- D. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the Project, except for damages due to the fault or negligence of the United States or its contractors.
- E. Operate, maintain, repair, replace, and rehabilitate, as necessary, all features of the project, at no cost to the Government, in accordance with regulations prescribed by the Secretary of the Army, including levees, floodwalls, floodgates and approach channels, drainage structures, drainage ditches or canals, and all mitigation features.
- F. Publicize flood plain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the flood plain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project.
- G. Within one year after the date of signing a project cooperation agreement, prepare a floodplain management plan designed to reduce the impact of future flood events in the project area. This plan shall be prepared in accordance with guidelines developed by the Government. The plan must be implemented no later than one year after completion of construction of the project.

- H. Prescribe and enforce regulations to prevent obstruction of or encroachment on the project that would reduce the level of protection it affords or that would hinder operation and maintenance of the project.
- I. Assure that construction, operation, maintenance, repair, replacement, and rehabilitation of any non-federally constructed flood features do not diminish the flood protection provided by or jeopardize the structural integrity of the project.
- J. Assure compliance with applicable Federal floodplain management and flood insurance programs.
- K. The non-Federal sponsor may request the Government to accomplish betterments. Such requests shall be in writing and shall describe the betterments requested to be accomplished. If the Government elects to accomplish the requested betterments or any portion thereof, it shall so notify the non-Federal sponsor in a writing that sets forth any applicable terms and conditions. The non-Federal sponsor shall be solely responsible for all costs due to the requested betterments and shall pay all such costs.
- L. Not less than once each year the non-Federal sponsor shall inform affected interests of the extent of protection afforded by the project.
- M. Comply with the applicable provisions of the Uniform Relocations and Real Property Acquisition Policies Act of 1970 (PL 91-646), as amended by Title IV of the Surface Transportation and Uniform Relocations Assistance Act of 1987 (PL 100-17)
- N. Comply with Section 221 of Public Law 91-661, Flood Control Act of 1970, approved December 31, 1970, which provides that the construction of any water resources project by the Corps of Engineers shall not be started until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project.

- O. Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled “nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army,” and Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), requiring non-Federal preparation and implementation of flood plain management plans.

VIEWS OF LOCAL SPONSOR

The West Jefferson Levee District is the local agency responsible for providing hurricane protection to residents living on the westbank of the Mississippi River in Jefferson Parish. Mr. Gerald Spohrer, Executive Director of the levee district and his project management team at Coastal Engineers and Environmental Consultants were members of the Interdisciplinary Planning Team (IPT). Approximately twelve (12) IPT coordination meetings were conducted throughout the course of this feasibility study. The West Jefferson Levee District has expressed their support of the recommended plan and their intent to provide the non-Federal share of the project costs by resolution, enclosed as Exhibit 1.

STATEMENT OF FINANCIAL CAPABILITY

The New Orleans District has reviewed the West Jefferson Levee District’s financing plan to determine whether or not the local sponsor is financially capable of satisfying the project cost-share requirements. The West Jefferson Levee District receives revenue from several sources including, but not limited to, ad valorem taxes on property, state revenue sharing, interest income on fund balances, and other fees. In addition to these revenue sources, funds for the Rosethorn Basin Project are being requested in the State of Louisiana capital outlay budget and Statewide Flood Control Program.

SUMMARY OF COORDINATION, PUBLIC VIEWS AND COMMENTS

STUDY MANAGEMENT

The Corps, New Orleans District, was responsible for conducting and coordinating the feasibility study, consolidating information from other agencies and interested parties, preparing the feasibility report, and formulating alternative plans in conjunction with the non-Federal sponsor. During the course of this study, coordination was initiated and maintained with the U.S. Fish and Wildlife Service, Louisiana Department of Wildlife and Fisheries, Louisiana Department of Transportation and Development, Louisiana Office of State Parks, West Jefferson Levee District, Jefferson Parish Department of Drainage, Town of Jean Lafitte, local residents and other Federal, state, and local agencies.

TECHNICAL REVIEW

The Mississippi Valley Division office is concerned with providing Quality Assurance in the preparation, review, and approval of decision and implementation documents. The New Orleans District followed the guidance on Quality Assurance in developing technical products for this study. The significant issues and concerns were addressed in this report and are summarized in Appendix F.

PUBLIC INVOLVEMENT

Through the combined efforts of the New Orleans District and the West Jefferson Levee District, a public involvement strategy was developed to ensure that agencies, groups, and individuals most likely to be interested in the study are identified and contacted, and that their views and concerns relative to the study process and plan formulation are identified and addressed in the design. Digital photos of various locations in the study area were modified using computer visualization software to describe the proposed flood protection project for the public. A sample of these “computer visualizations” is included as Exhibit 2.

PUBLIC INFORMATION MEETING

On February 9, 1999, the New Orleans District and the West Jefferson Levee District hosted a public information meeting in the Jean Lafitte Town Hall to describe the proposed project to all affected individuals and interested groups and agencies. The participants in this meeting included landowners, representatives from local interest groups, business owners, and local, state and Federal officials or representatives thereof. Approximately 31 people were in attendance.

Many landowners expressed concern regarding interior drainage, access to Bayou Baratavia, and adverse impacts to existing private bulkheads, boat docks, and boat houses. The proposed project is designed for a 10-year design storm event. Hydraulic modeling efforts conclude that the existing pump stations and interior drainage system are adequate for a 10-year event. The project will connect the canals that parallel LA 303 and LA 45 into the large drainage canal in the southern-end of this project. The West Jefferson Levee District will make additional improvements to the adjacent interior drainage canals in the future.

The proposed floodwall design provides several public use floodgates for vehicular and pedestrian access. In addition, each residence along Bayou Baratavia affected by the floodwall will be provided a set of concrete stairs. In areas along the bayou where an earthen levee is proposed, pedestrian access is not inhibited by the final levee height.

With respect to the existing bulkheads, boat docks, boat houses, etc. along Bayou Baratavia, the method of construction currently involves the use of a barge to drive sheetpile from the bayou-side. This method may require the removal of approximately 25 docks and 10 boat sheds along the bayou. However, the Federal government will make every attempt to minimize the number of private structures affected during construction.

The participants in the public information meeting expressed satisfaction with the attempts being made to accommodate their interest and seemed optimistic about the project.

COORDINATION WITH INDIVIDUAL LANDOWNERS

Immediately following the public meeting, several landowners contacted the New Orleans District to discuss the proposed levee alignment. Representatives from the Corps visited five landowners located along Bayou Barataria to discuss potential impacts to their properties. The value of their existing boat houses and boat docks was the topic of discussion. The Corps' Real Estate Division explained that the non-Federal sponsor is responsible for assessing the value of each structure and coordinating with the Corps for crediting. In addition, any discussion of actual dollar values was premature considering the current status of this project. Following project authorization, each affected individual will be contacted by the non-Federal sponsor regarding compensation for affected facilities.

RECOMMENDATIONS

CONCLUSIONS

The Rosethorn Basin, located in the town of Jean Lafitte is subject to tidal and rainfall flooding caused by tropical storms and hurricanes tracking in the Gulf of Mexico. The most recent flooding event of any significance occurred in September 1998 as a result of Tropical Storm Frances. Local government agencies have constructed and continue to maintain an earthen levee and drainage pump station along the southern project limit. However, the levee does not form a closed system and has a maximum elevation of approximately +5.0-ft NGVD.

This feasibility study identified the potential problems, needs and opportunities of the study area. Both structural and non-structural alternatives were considered. A structural plan consisting of a closed levee system at elevation +7.0-ft. NGVD provided higher net benefits and was determined to be the NED plan.

RECOMMENDATIONS

As the District Engineer, I have considered the environmental, social, and economic effects, the engineering feasibility, and the comments received from other regulatory agencies, the Sponsor and the public and have determined that the recommended plan presented in this report is a justified expenditure of Federal funds.

I recommend that the Commander, Mississippi Valley Division, under the authority of Section 205 of the Flood Control Act of 1948, as amended, approve the recommended plan for implementation.

The non-Federal sponsor is required to provide all Lands, Easements, Rights-of-Way, Relocations, and Disposals (LERRD's) for construction. The incremental total project first cost is estimated to be \$8,662,000, which includes an estimated \$2,664,300 in LERRD's. Annual operation and maintenance costs, are approximately \$19,000 and are the responsibility of the non-Federal sponsor. All costs are based on 1999 price levels at an interest rate of 7-1/8 percent with a project life of 50 years. The benefit-to-cost (B/C) ratio is 1.49 to 1. The current maximum Federal contribution for Section 205 is \$7,000,000. The fully funded total project costs are currently estimated to be \$9,196,900. The fully funded project costs for the recommended plan would be apportioned \$5,978,000 Federal and \$3,218,900 non-Federal.

I further recommend that funding be allocated for the preparation of appropriate design documents and plans and specifications immediately upon approval of this feasibility report.

Thomas F. Julich
Colonel, Corps of Engineers
District Engineer