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BY THE U.S. GENERAL ACCOUNTING OFFICE

# Report To The Secretary Of The Army

# Improved Planning Needed By The Corps Of Engineers To Resolve Environmental, Technical, And Financial Issues On The Lake Pontchartrain Hurricane Protection Project


The Corps of Engineers has not resolved environmental, technical, and financial issues associated with the Lake Pontchartrain Hurricane Protection Project. Although the Corps considers this project a high priority, its progress has not kept pace with earlier completed plans. Also, estimated project costs have grown from about $85 million to $924 million.

GAO recommends that the Secretary of the Army require the Chief of Engineers to take specific steps to resolve the issues associated with this major project.


UNITED STATES GENERAL ACCOUNTING OFFICE

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MISSION ANALYSIS AND
SYSTEMS ACQUISITION DIVISION

B-207860

The Honorable John O. Marsh, Jr.
The Secretary of the Army

Attention: The Inspector General
DAIG-AI

Dear Mr. Secretary:

We reviewed the status of the Corps of Engineers' (Corps) Lake Pontchartrain Hurricane Protection Project which is intended to provide hurricane protection to the Greater New Orleans metropolitan area. Although the Corps' District Office in New Orleans considers this $924 million project a high priority, its completion date has slipped from 1978 to 2008. In the 17 years since congressional authorization in 1965, only about one-half of the project has been completed.

We believe that improved planning is needed by the Corps to resolve certain environmental, technical, and financial issues. Environmental concerns have remained unresolved for almost 5 years after a court injunction prohibited the Corps from constructing certain parts of the project. The Corps is considering a change in its solution of providing protection from constructing barrier structures at the entrance to the lake and the raising of some levee heights (the barrier plan) to constructing much higher levees with no barriers (the high-level plan).

Various problems and conditions have caused delays in the project. Specifically:

--Engineering and environmental concerns have caused delays in project completion.

--Costly project work at the drainage canals has not been reported to the Congress, and technical and financial concerns which may impede project completion remain unresolved.

--Current project financing by the local sponsors has not been assured because of limited resources.

--Project cost estimates are understated, and a project plan has not been formally adopted.

We recommend that you require the Chief of Engineers to develop (1) an acquisition strategy plan, and after approval, work closely with local sponsors to acquire the necessary rights-of-way, easements, and construction priorities for the remaining portions of the project, (2) an implementable technical approach to construction at the drainage canals that has concurrence from local sponsors, and (3) specific milestones for completing the remaining portions of the project. We further recommend that the Chief of Engineers estimate the cost to local sponsors if the high-level plan is adopted or the barrier plan is retained and obtain their concurrence on their financial shares.

Corps Headquarters officials believe that additional studies need to be completed before the Corps decides which plan to pursue--barrier or high level. Corps District officials believe that work on the project, except for the barrier complexes, has proceeded expeditiously. They attributed schedule delays primarily to unforeseen foundation problems, nonreceipt of rights-of-way, environmental concerns, and litigation. They agreed with the intent of our recommendations. They stated that they are already implementing our recommendations by (1) studying the details of the high-level plan and (2) planning to reinitiate technical and financial discussions with the local sponsors for work at the drainage canals. They believed, however, any change in the Hurricane Protection Plan could not be approved until the fiscal year 1985 budget is submitted to the Congress.

The local sponsors agreed with information in a draft of this report, but were concerned over their financial capability to meet their share of project costs. They believed the project construction could be pursued more expeditiously. One sponsor believed that Corps standards may be too high to obtain adequate, affordable, and speedy protection. Further details are contained in appendix I.

As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the cognizant House and Senate legislative and appropriation committees; the Director, Office of Management and Budget; and the Chief of Engineers.

Sincerely yours,

W. H. Sheley, Jr.
Director

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# THE LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY HURRICANE PROTECTION PROJECT

## OBJECTIVES, SCOPE, AND METHODOLOGY

Our review of the Lake Pontchartrain Hurricane Protection Project was directed toward evaluating the current status; causes of cost, schedule, and performance problems; and their associated impacts on the project. We reviewed the legislative history to determine the authorized project scope. We reviewed Corps studies, plans, reports, and financial records to ascertain whether (1) features of the authorized work were still considered essential in view of current conditions, (2) planning for the project was clearly defined and effectively implemented, and (3) the estimated project milestones and costs were reasonable and were adequately reported to the Congress.

We discussed various aspects of these matters with officials of the Corps of Engineers, the State of Louisiana, and levee districts. We also obtained information from the Office of the Chief of Engineers, Washington, D.C.; Army Corps of Engineers' District Office in New Orleans, Louisiana, and its Lower Mississippi Valley Division Office, Vicksburg, Mississippi; the Louisiana State Office of Public Works, under the Department of Transportation and Development, Baton Rouge, Louisiana; the Orleans Levee District, New Orleans, Louisiana; the Jefferson Levee District, Harahan, Louisiana; the Pontchartrain Levee District, Lutcher, Louisiana; the Lake Borgne Basin Levee District, Violet, Louisiana; the St. Bernard Parish, Chalmette, Louisiana; the City of Mandeville, Louisiana; and various project sites.

Our review was performed in accordance with our "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions."

## DESCRIPTION AND STATUS OF PROJECT

The Lake Pontchartrain Hurricane Protection Project was authorized by the Flood Control Act of 1965. Federal appropriations for the initial construction work were made available in May 1967. The Act did not specify a cost sharing ratio between federal and local jurisdictions. However, House Document 231, which preceded passage of the Act, specified that the local share would be 30 percent of the cost, which includes providing real estate and relocations.

After considering alternative plans, in 1965 the Corps prepared a plan for the project. This plan (the barrier plan) consisted of a series of levees and barriers at the tidal passes to Lake Pontchartrain which would, in the event of a hurricane, be

closed to control excessive overflow from the adjacent Lake Borgne. The Corps estimated a completion date of 1978. According to Corps officials, the project has been consistently ranked, within the Corps' New Orleans District, as one of their highest priorities.

After 15 years of trying to implement this plan, the Corps' New Orleans District is now considering a change in its approach to accomplish the project's goals by adopting a new plan known as the high-level plan. Initially, the high-level plan was a major competing alternative to the barrier plan; however, it was discarded by the Corps as being too costly. The high-level plan consisted of high levees and a floodwall system which would allow hurricane surges and waves into the lake. The surrounding areas would be protected by high levees ranging between 13.5 and 16.5 feet, as opposed to heights of 10 to 14 feet for the barrier plan. The Corps now estimates a completion date of 2008 for the project if the barrier plan is fully implemented.

In 1965 the cost of constructing the project in accordance with the high-level plan was estimated at 50-percent higher than the barrier plan. Also, the high-level plan would require more time to construct higher levees and would require more maintenance because of critical foundation problems.

Currently, the Corps' New Orleans District favors the high-level plan because it would cost less than the barrier plan. A cost estimate was prepared in 1981 which totaled $629 million for the high-level plan compared to $757 million for the barrier plan, excluding inflation. Also, Corps District officials now believe that the high-level plan would have fewer detrimental effects on Lake Pontchartrain's environment.

As of March 1982, about $171 million has been made available for the project--$131 million by the Corps and $40 million by the local sponsors. With the exception of certain project work which has been indefinitely deferred because of environmental concerns, all areas within the protective system have been enclosed by levees, providing varying degrees of hurricane protection. According to the Corps, all enclosed areas would escape flooding from all hurricanes, except for those whose intensity would occur about once every 60 years. When completed, the project is designed to provide for flood protection from all hurricanes, except for those whose intensity is expected to occur about once every 200-300 years.

## ENVIRONMENTAL ISSUES

In December 1977 the Corps was enjoined by the United States District Court from constructing the barrier complexes, the New Orleans East levee system, and the Chalmette Area Plan of the

Lake Pontchartrain Hurricane Protection Project until an environmental impact statement was revised and accepted. The court modified its order in March 1978 and lifted the injunction against all features other than the barrier complexes. Currently, almost 5 years after the injunction, the Corps is still studying the impacts and has not completed a revised statement. Nevertheless, the Corps' New Orleans District tentatively selected the high-level plan for providing hurricane protection.

The court enjoined the Corps from constructing the project under the barrier plan because it found the Corps' environmental impact statement to be deficient. According to the court, the statement did not adequately

--explore and evaluate alternatives,

--use an interdisciplinary approach in its formulation,

--address benefits and costs of the project,

--assess environmental impacts, and

--provide a complete description of the project.

Barrier plan

Since the injunction, the Corps attempted to revise the impact statement using an interdisciplinary approach and conducted hydrologic, biologic, and chemical studies of Lake Pontchartrain. These studies show that the barrier plan would restrict the tidal flow in and out of Lake Pontchartrain by less than 10 percent at maximum tide. But, according to the Corps, the full impact of the plan on the ecological and aquatic composition of the lake could not be conclusively determined without additional studies. The Corps recently suspended several studies being done to analyze environmental effects that the barrier structures would have on Lake Pontchartrain because the high-level plan appeared more viable. According to the Corps, studies concerning the barrier plan would require considerable additional time and expense to complete, and a resulting impact statement could not be completed until November 1985.

High-level plan

In December 1981 the Corps directed future study efforts on the high-level plan because it does not have the detrimental impacts of the barrier plan and it protects developed areas by surrounding them with higher levees. The Corps is now developing environmental data for an impact statement in support of the high-level plan. This effort is expected to be completed in November 1983, when the statement is to be filed with the Environmental

Protection Agency. Corps officials believe that the impact statement for the high-level plan will satisfy the District Court.

TECHNICAL ISSUES

While some levee construction has continued, the project continues to experience delays because of technical issues.

Corps officials said that the major technical problems in the early years of the project were:

--Increased construction time for floodwalls, levees, and roads as a result of foundation problems discovered after project initiation.

--Delays in obtaining rights-of-way for construction. Rights-of-way are to be provided by local interests. However, these groups have not always agreed with the Corps' construction priorities and were occasionally reluctant to provide the specific rights-of-way requested by the Corps.

Also, there were delays associated with completion of design, plans, and specifications.

More recently, the project has been delayed because of the District Court injunction that prohibited the Corps from building the barriers. Also, the Corps has been unable, after almost 5 years, to prepare a suitable revised environmental impact statement to get the injunction lifted.

In its fiscal year 1982 budget submission to the Congress, the Corps reported a completion date of 1991 excluding the barrier complexes and levees for Jefferson and St. Charles Parishes. These latter two features were reported with indefinite completion dates. (See map in app. II).

A Corps District official said that either the barrier or the high-level plan can be completed between 1995 and 2000. District officials estimate that the project is 49-percent complete. However, we learned that the completion date of the total project is currently estimated to be 2008. No definitive schedule is available and no priorities have been established or agreed to with local sponsors regarding completion of the tentative high-level plan. However, work on the high-level plan's design memoranda, essential for the development of the detailed designs and preparation of schedules, was recently initiated.

Work required at drainage canals may further impede project completion

Work to eliminate potential hurricane surges from overflowing the levees along drainage canals is necessary under both the barrier and the high-level plans. Depending upon whether the Corps decides to accomplish this work by raising the height of levees only or by installing flood gates and pumping facilities, the cost of this work is estimated to be $20 million to as much as $250 million. Although either option will add significantly to project costs, it has not been reported to the Congress as a part of the annual budget submissions. Technical issues concerning work at the drainage canals must be resolved by both the Corps and local sponsors if this project is to be completed.

Subsequent to project authorization and based on the Weather Bureau's new data pertaining to hurricane severity, the Corps determined that the levees along the three main drainage canals, which drain major portions of New Orleans and empty into Lake Pontchartrain, were not high enough since they are subject to overflow by hurricane surges. The need for additional work at these canals became apparent during Hurricane Betsy in 1965, when conditions indicated that the levees had to be raised. Also, the pumps that are used for pumping water from basin areas over the levees could not effectively handle the hurricane-induced floodwaters. According to Corps officials, this feature is essential if the project is to be completely effective.

Proposed Corps solutions included raising the levees, building floodgates at the mouths of the canals, building auxilliary pumping stations, and relocating the existing pumping stations near the lake. Solutions are needed on how to overcome the surge problem, how to improve drainage pump efficiency, and how to finance these improvements. According to Corps' District officials, the design considerations can readily be solved once a plan of improvement is selected. However, Corps officials said there is a wide disparity between the local sponsors and the Corps on what can be provided under the project.

We were advised by Corps District officials that discussions were held in 1980 with local sponsors about drainage canal alternatives, but the discussions were not conclusive. These officials said that they plan to reinitiate technical discussions with the local agencies and develop a recommended solution for the canal problem, with estimated costs, by the end of 1982. Even though a solution has not been identified, Corps officials believe that any one of the alternatives being considered could be constructed in far less than 10 to 15 years.

Corps District officials confirmed that the drainage canal issues have not been disclosed to the Congress. They recognized

the need for a solution to this problem, but they have not determined the type, cost, or the amount of funding needed for the canal work. They currently believe, however, that no new congressional authorization would be required for this work since the project's objective of flood protection has not changed.

## FINANCIAL ISSUES

Current project financing by the local sponsors is questionable because of escalating costs and limited resources. Also, reliable project cost estimates are needed for oversight, budgetary, and reporting purposes.

### Financial capability of local sponsors is questionable

Although local sponsors have assured the Corps that they will finance 30 percent of the project costs, some of them may lack the financial capability to pay their share of future costs.

In 1976 five state and local sponsors provided assurances to the Corps that they would pay $110 million, or 30 percent of the total project costs. This payment would include cash, in-kind work, value of land, relocations, easements, and rights-of-way. The assurors agreed to a schedule of estimated minimum payments of $500,000 to $3 million per year, including interest, from 1977 through 1990 and a lump-sum payment of about $41 million in 1991. Thus far, according to Corps officials, the local sponsors have met their financial commitments.

According to Corps estimates, the local sponsors are currently responsible for $295 million of the project's cost. However, this estimate does not include the locals' share of costs for work at the drainage canals, which could range from $6 million to as much as $75 million. Consequently, sponsors are not aware of the full extent of their financial obligations. For example, Orleans Levee District officials said that no one knows the precise cost of work at the drainage canals, what will be done, who will pay for the work, or what their share of payment will be.

Local project sponsors said that they would have a difficult time meeting their financial obligations in view of limited resources and the escalating costs of the project. The local officials expect Louisiana's Office of Public Works, a coordinating agency, to assist in obtaining the needed funds from the Louisiana State Legislature.

According to a Corps' District official, the Corps analyzes local sponsors' financial capability to meet their share of a project's cost by reviewing the sponsor's financial statements and taxing authority. This type of analysis was made for the barrier plan several years ago, but has not been updated. Accordingly,

Corps officials are unaware of the local sponsors' current financial capability.

If the high-level plan is adopted, assessments of the local sponsors' financial capability will be needed and new assurances from them may also be required. Corps officials said that these analyses will not be made, however, until the revised environmental impact statement is completed.

Project cost is understated

The estimated cost of the project under the barrier plan has increased from $84.8 million in 1965 to $924 million in 1982. The federal share is $629 million. This includes an estimate for inflation through 2008, the estimated completion date. Cost growth has occurred because the cost of the barrier structures, which represent about one-half of that plan's cost, increased as a result of enlarging their sizes to satisfy environmental concerns. Also, inflation has caused a considerable amount of the cost growth since the project's inception. However, these costs do not include estimates for work at the drainage canals.

Also, the cost estimates for the tentative high-level plan are preliminary and have not been definitized to show the total project costs, including inflation. Consequently, the Congress, the Office of Management and Budget, the state of Louisiana, the local sponsors, and the Corps do not have complete information to discharge their respective oversight and management responsibilities.

Omission of construction at drainage canals

The Corps prepared cost estimates under the barrier plan, but excluded costs of work that will be required at the drainage canals. Although the Corps considers this work an essential feature of the project, it was excluded from program cost estimates in 1976 because of uncertainties over (1) the Corps' authority to do this work as part of the project and (2) the best technical means to solve the potential overflow problem and provide needed interior drainage. Work at the drainage canals is now estimated to cost from $20 million to as much as $250 million, excluding inflation. This critical feature was excluded from the estimates provided to the Congress. The Corps states that a more accurate estimate cannot be made until it decides whether it will use levees only or a combination of levees, gates, and pumping stations to accomplish this work.

## VIEWS OF RESPONSIBLE OFFICIALS

### Office of the Chief of Engineers

Officials of the Corps' Office of the Chief of Engineers believed additional engineering, environmental, and cost studies need to be completed before the Corps decides which plan to pursue--barrier or high level. They said this effort includes clarifying the work to be done at the drainage canals, as well as understanding the local sponsors' ability to share in these costs. They stated that because of the environmental litigation, the Corps has had a general reluctance to proceed with the project, since it had a lack of in-house capability to determine how to perform the required environmental studies to satisfy the court. These factors contributed to project delays despite the high priority designation by the Corps. Corps officials believed sufficient funds would be available to complete the project by 1991. However, until the Corps' studies are completed, reviewed, and approved by late calendar year 1983, they stated they would not report any tentative change in the project plan to the Congress.

### New Orleans District

Corps District officials believed that work on the project, except for the barrier complexes, has proceeded expeditiously. They recognize, however, that there is a residual threat to the area after several years of work. They pointed out that no significant flooding occurred during Hurricane Camille in 1969 and estimated that $100 million in damages was prevented. Design and construction progress, they said, has been influenced by public policy which resulted in legal action against the barrier portion of the project. District officials further stated that the levee and floodwall portions are now 70 percent complete.

The officials said that schedule delays are not correctable by more intensive management. They attributed the delays primarily to unforeseen foundation problems, nonreceipt of rights-of-way, environmental matters, and litigation. With respect to work at the drainage canals, they stated that a number of technically feasible solutions are implementable, but there is a wide disparity between local desires and what can realistically be provided for under the project.

District officials agreed with the intent of our recommendations and said that the following actions are being taken or planned: (1) studies are being made on whether to pursue the high-level hurricane protection plan, considering the engineering, economic, and environmental aspects, and a recommendation is expected to be provided to higher authority by December 1982, if necessary, (2) the Corps plans to reinitiate technical discussions with local sponsors and develop a recommended solution for the

drainage canal problem, with estimated costs, by the end of 1982, and (3) when a plan is adopted by the Corps and cost estimates are developed, meetings with local sponsors are planned to get their concurrences on their respective cost shares. Because of the review and approval processes within the Corps, they believe any change in the plan could not be disclosed to the Congress until the fiscal year 1985 budget submission. In the meantime, they said that they are pursuing completion of those features common to both the high-level and barrier plans, primarily the construction of levees.

State and local sponsors

State and local sponsors generally agreed with our findings, conclusions, and recommendations. They believed the Corps has not pursued this project with the expediency necessary to protect the New Orleans area and that only another disaster resulting from a hurricane and heightened public interest would probably expedite project completion. The sponsors' major concerns were escalating project costs and their limited financial capability to pay for their share under either plan.

Orleans Levee District officials believed that the Corps' standards may be too high for what is really needed for adequate protection and for what is affordable by local sponsors. For example, they said that Corps standards required widening the levee base by 200 feet to raise the levee height by 1.5 feet. They recommended that the Corps lower its design standards to provide more realistic hurricane protection to withstand a hurricane whose intensity might occur once every 100 years rather than building a project to withstand a once in 200- to 300-year occurrence. This, they believe would make the project more affordable, provide adequate protection, and speed project completion.

CONCLUSIONS

Seventeen years after project approval, residents of the New Orleans area are still without the hurricane protection anticipated when the project was initiated. Although a large portion of levee construction has been done, the project is still in the planning stage, since another project plan is under consideration and a revised environmental impact statement has yet to be completed and approved. The project is not likely to be completed until all project features have definite completion schedules, the drainage canal problems are resolved and considered in the overall schedule, and additional funding is provided.

While we recognize that the Corps has been enjoined from construction until a revised environmental impact statement is accepted, there has been no strong effort to complete this project until recently, when preparation of design memoranda was initiated. Construction at the drainage canals represents an

essential project feature which should have been considered earlier. This feature should be recognized and finalized with local sponsors to ensure effective hurricane protection. If technical and financial issues associated with the drainage canals are not resolved, project completion will be further impeded.

Questions remain as to whether local sponsors will be able to adequately finance their share of the project. Financing has not been assured because project costs have increased, the local sponsors may have limited financial capabilities, and State assistance is not certain. Work at the drainage canals will result in an additional financial burden on the local sponsors. Furthermore, sponsors will be expected to bear higher financial burdens if the high-level hurricane protection plan is adopted or if the barrier plan is retained.

## RECOMMENDATIONS

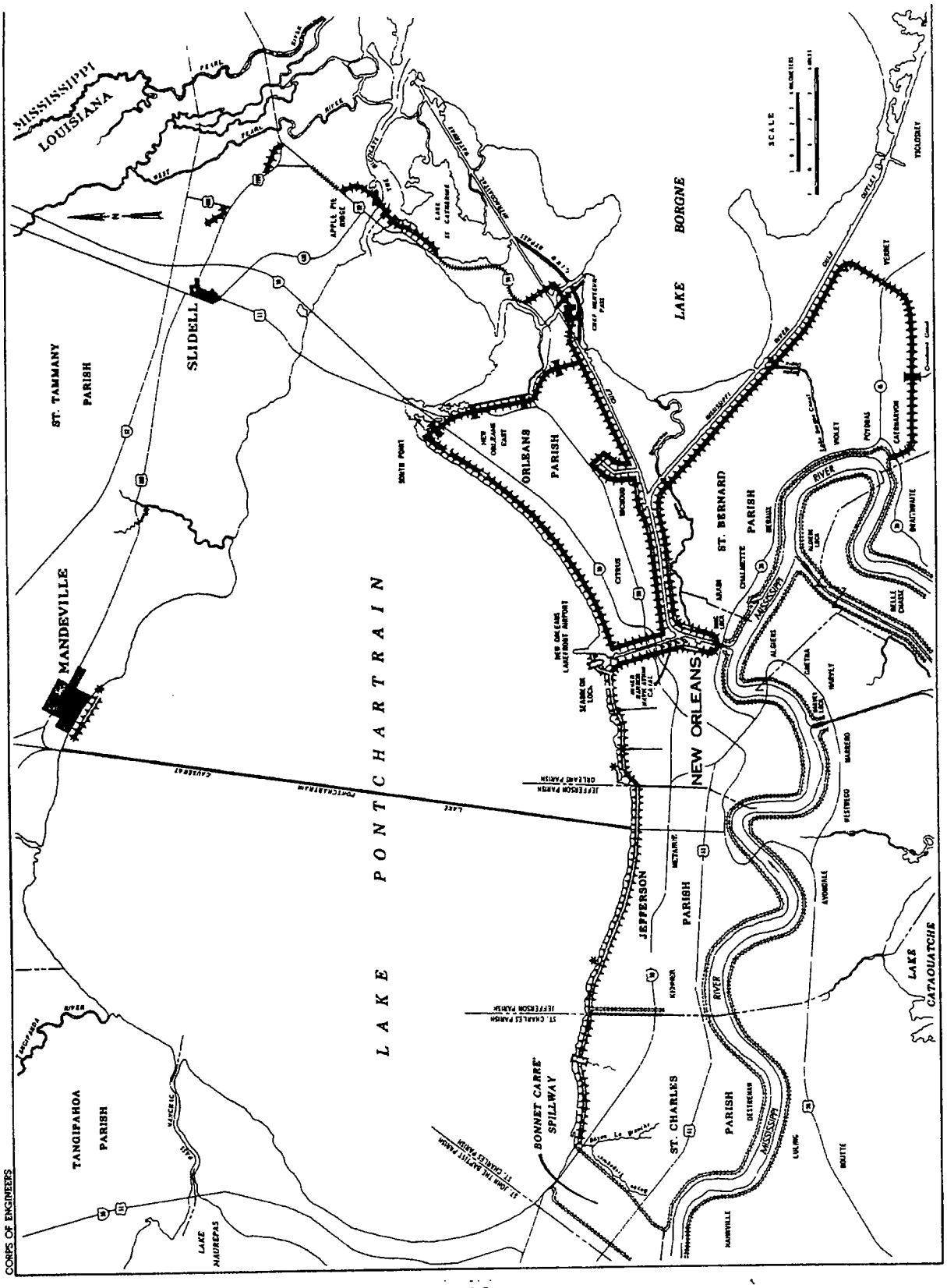
To resolve environmental and technical issues, we recommend that the Secretary of the Army require the Chief of Engineers to develop (1) an acquisition strategy plan, and after approval, work closely with local sponsors to acquire the necessary rights-of-way, easements, and construction priorities for the remaining portions of the project, (2) an implementable technical approach to construction at the drainage canals that has concurrence from local sponsors, and (3) specific milestones for completion of the remaining portions of the project.

To ensure adequate financing by local sponsors of their share of project funding, we recommend that the Secretary of the Army require the Chief of Engineers to

--estimate the cost to local sponsors if the high-level plan is adopted or if the barrier plan is retained and

--obtain local sponsors' concurrences on financial shares to be borne by them.

# LAKE PONTCHARTRAIN, LOUISIANA, AND VICINITY HURRICANE PROTECTION PROJECT



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