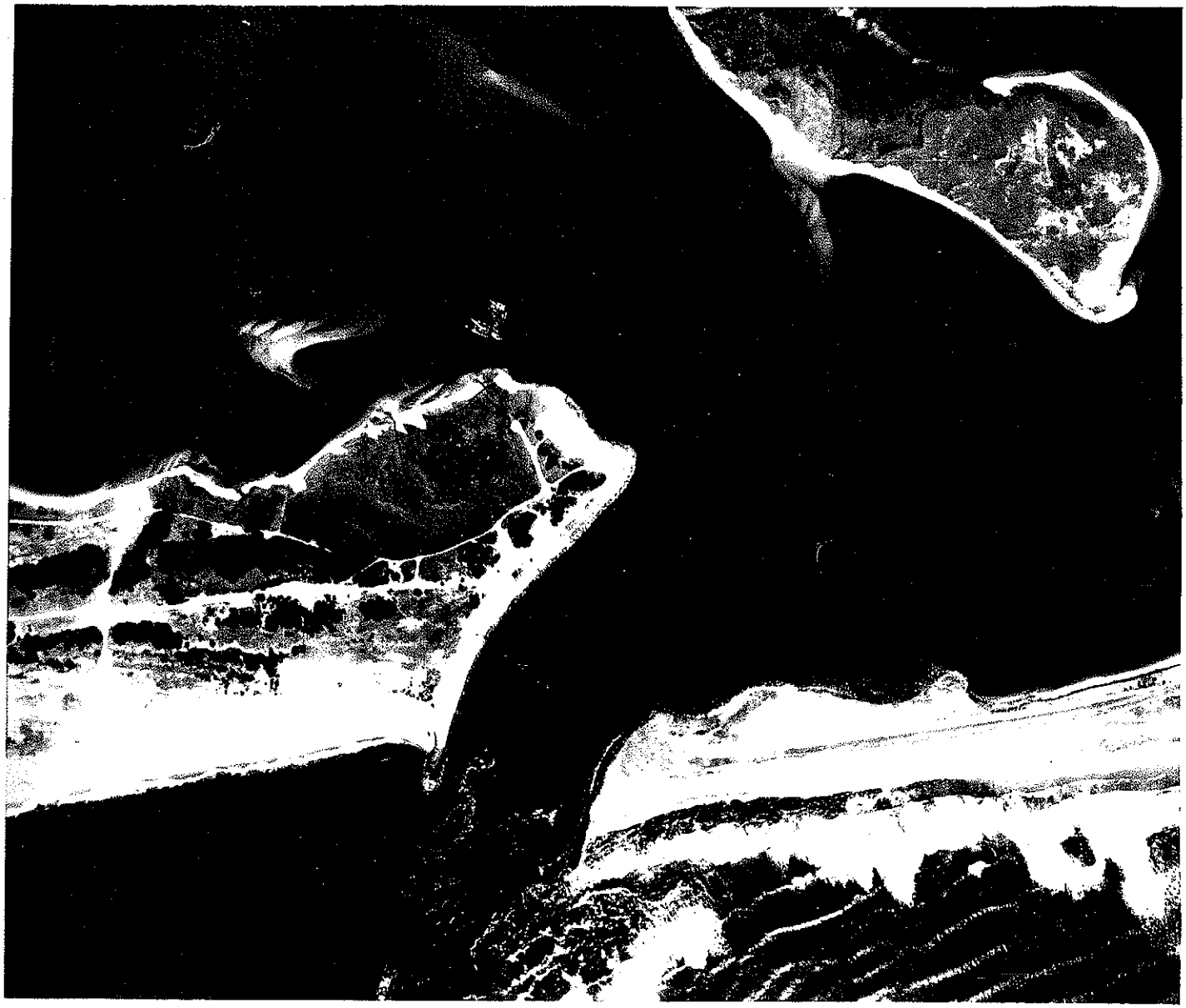
ENVIRONMENTAL SCOPING DOCUMENT
ATLANTIC COAST OF LONG ISLAND
FIRE ISLAND INLET TO MONTAUK POINT, NEW YORK
STORM DAMAGE REDUCTION
REFORMULATION STUDY



JULY, 1997

U.S. Army Corps of Engineers
New York District
Planning Division

Executive Summary

The U.S. Army Corps of Engineers (Corps), New York District (District) is conducting a reformulation study for the Atlantic Coast of Long Island from Fire Island Inlet to Montauk Point, Suffolk County, New York. The purpose of the reformulation study is to identify a long term solution to reduce storm damage along the south shore of Long Island from Fire Island Inlet to Montauk Point.

The originally authorized project was formulated and authorized for construction in 1960, prior to the enactment of the National Environmental Policy Act (NEPA). Based upon shortcomings in the original EIS prepared in 1978 for the authorized project, it was decided to reformulate the project from Fire Island Inlet to Montauk Point utilizing a holistic approach. The Corps has no commitment to the originally authorized plan; the reformulation study investigates all possible alternatives for storm damage reduction.

The United States Army Corps of Engineers (Corps), New York District (District) is the Federal Lead Agency, under the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.), for conducting the environmental impact statement (EIS) process for the reformulation of the Fire Island Inlet to Montauk Point shore protection and storm damage reduction project for the south shore of Long Island, New York. The District has requested the following agencies to participate as cooperating agencies for this study:

United States Fish and Wildlife Service (USFWS)
National Park Service - Fire Island National Seashore (FINS)
U.S. Geological Service - Biological Resources Division (BRD)
U.S. Geological Service - Marine and Coastal Geology Program (MCGP)
New York State Department of Environmental Conservation (NYSDEC)

Under NEPA, Federal officials are tasked to make decisions that are based on understanding of environmental consequences, and take actions that protect, restore and enhance the environment.

Regulations at Title 40 Code of Federal Regulations, Part 1501.7 (40 CFR 1501.7) calls for scoping, defined as an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. In an effort to focus discussion as a part of this process, this document proposes a framework upon which the Environmental Impact Statement (EIS) for the Reformulation Study could be based, subject ot comment by cooperating agencies and the public. This scoping document provides a history and description of the originally authorized project, and describes the formulation process for developing the optimized plan. This document also proposes, on the basis of previous studies and comments received, a methodology for characterizing the existing environment in the project area. It also includes a series of studies which will furnish additional data needed to refine and expand the description of existing conditions, and conduct impact analyses of the alternatives under consideration.

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Section 1.0
Introduction

1.1 Purpose

The U.S. Army Corps of Engineers (Corps), New York District (District) is conducting a reformulation study of shore protection and storm damage reduction for the Atlantic Coast of Long Island from Fire Island Inlet to Montauk Point. The overall purpose of the reformulation study is to formulate a plan, based upon the latest engineering and environmental information, to provide a long term solution to reduce storm damage along the south shore of Long Island from Fire Island Inlet to Montauk Point. The currently authorized plan will be analyzed as one potential alternative among a wide range of structural and non-structural solutions.

In compliance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) and Corps regulations, the District has prepared this draft scoping document. As of this writing, the participating cooperating agencies are: U.S. Fish and Wildlife Service, National Park Service - Fire Island National Seashore, and the New York State Department of Environmental Conservation.

A series of public meetings will be held to encourage interested parties to participate in the EIS process, to finalize this scoping document, and to establish a mechanism for public input throughout the EIS preparation. Corps representatives will be available throughout the scoping meetings to respond to comments and discuss the needs and scope of the project. Written and verbal comments regarding the project and the scope of the related EIS can be presented at the meeting or in writing. Comments on the EIS scoping should discuss environmental concerns and issues, suggested analyses and methodologies for inclusion in the reformulation study, or sources of relevant data. Written comments should be addressed to:

Mr. Stuart Piken, P.E.
Chief, Planning Division
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0090

The District, in conjunction with the Cooperating Agencies, is also seeking nominations of persons to participate in either the Technical Review Group or Senior Executive Review Group, which are being established to facilitate public involvement into the conduct of this study.

The District requests your comments on the adequacy and utility on the overall approach, and specific studies and analyses proposed in this document. Recommendations for additional studies are also requested. The Corps, with the Cooperating Agencies, will finalize this document based upon finalized coordination with the cooperating agencies, and based upon input received via information sessions, and written comments.

1.2 Project History

A chronological history of the project leading to the reformulation study, is summarized below. A timeline outlining the history of the project is provided in Figure 1.2.1.

- The overall Fire Island Inlet to Montauk Point, New York, Combined Beach Erosion Control and Hurricane Protection Project was authorized by the River and Harbor Act of 1960 in accordance with the recommendations of the Chief of Engineers in House Document No. 425, 86th Congress dated June 21, 1960. House Document 425, was based on a survey report which separated the 83 miles of shoreline from Fire Island Inlet to Montauk Point into 5 distinct reaches:

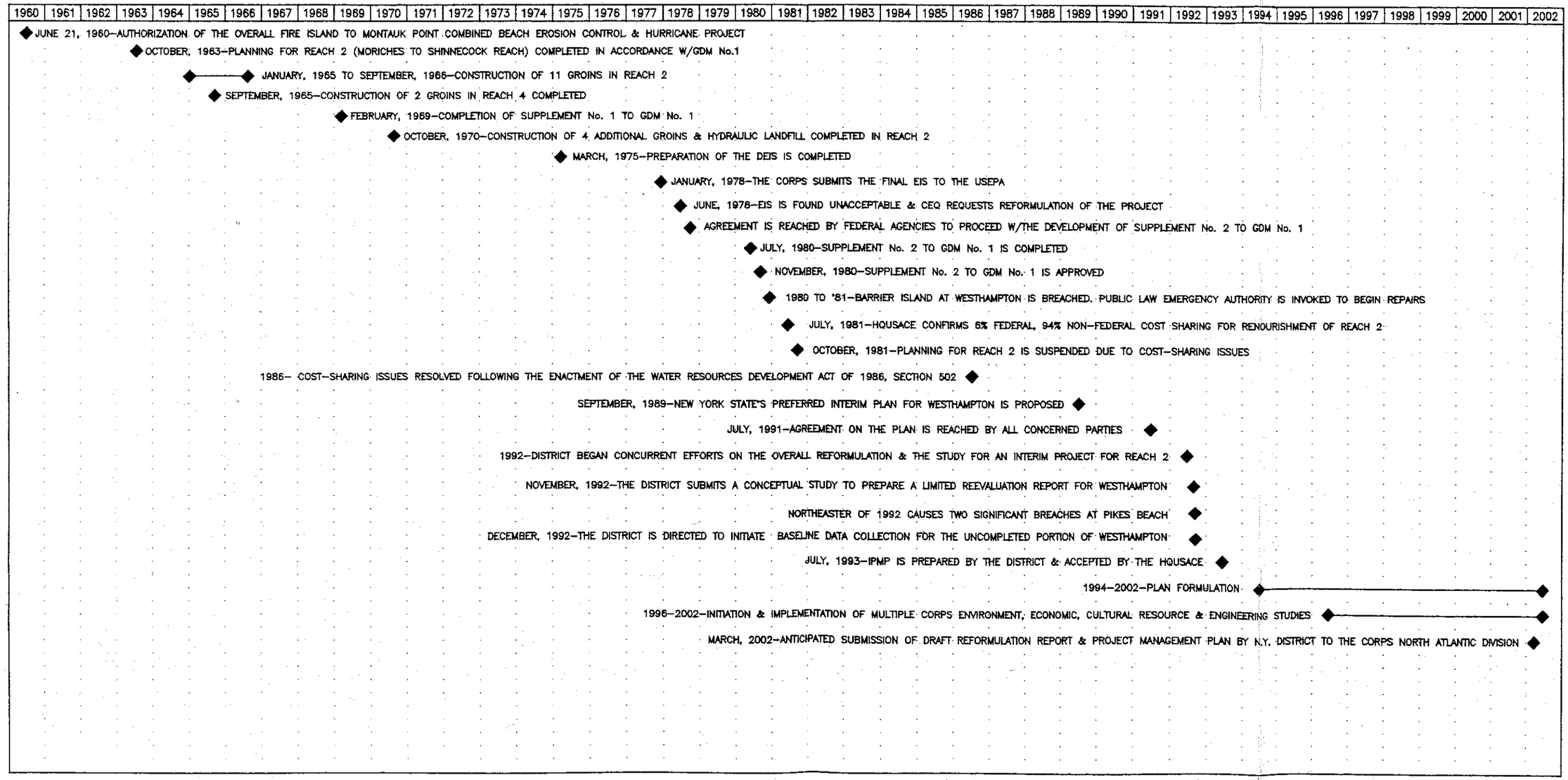
  Reach 1 - Fire Island Inlet to Moriches Inlet
  Reach 2 - Moriches Inlet to Shinnecock Inlet
  Reach 3 - Shinnecock Inlet to Southampton
  Reach 4 - Southampton to Beach Hampton
  Reach 5 - Beach Hampton to Montauk Point

- The original authorized project provided for beach erosion control and hurricane protection along the five reaches by means of widening the beaches along the developed areas, raising the dunes by artificial placement of suitable sand, grass planting on the dunes, and construction of interior drainage structures at Mecox Bay, Sagaponack Lake, and Georgica Pond. The project authorized construction of 50 groins subject to determination of their actual need.

- The authorization was subsequently modified by Section 103 of the River and Harbor Act of October 12, 1962, Section 31 of the Water Resources Development Act of 1974, Section 502 of the Water Resources Development Act of 1986, and Section 102 of the Water Resources Development Act of 1992. These modifications were made primarily to adjust the cost sharing provisions of the authorized project.

- Planning for Reach 2 was completed in October, 1963 in accordance with General Design Memorandum (GDM) No. 1, Moriches to Shinnecock Reach. This GDM recommended improvements for the Moriches to Shinnecock Reach and recommended inclusion of 13 of the 23 groins authorized for construction in this reach. The Chief of Engineers concurred with the State of New York's request to initially construct 11 groins in Reach 2 and 2 groins in Reach 4, with beach fill to be added as necessary.

- Construction of 11 groins in Reach 2 was initiated in January, 1965 and completed in September, 1966. Construction of 2 groins in Reach 4 was also completed in September, 1965.



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NEW YORK DISTRICT

FIGURE 1.2.1

HISTORY OF AUTHORIZED
PROJECT TIMELINE

Drawn By: H.C.	Checked By: DG	Date: 10/18/96

- In February 1969, Supplement No. 1 to GDM No.1 (Moriches to Shinnecock Reach) was prepared which recommended the construction of 4 more groins west of the 11 groin field, and placement of dune and beach fill within these four groins. These 4 additional groins and hydraulic sandfill in Reach 2 were completed by 1970.

- The originally authorized project was developed prior to the enactment of the National Environmental Policy Act (NEPA) of 1969, but prior to construction the Corps was required to prepare an EIS. In accordance with NEPA requirements, the New York District of the Corps prepared a Draft Environmental Impact Statement (DEIS) on the project, dated March 12, 1975. The final EIS was submitted to the United States Environmental Protection Agency (USEPA) on January 28, 1978. The Department of the Interior, supported by the Department of Commerce and the USEPA, referred the final EIS to the Council on Environmental Quality (CEQ) as unacceptable because the agencies felt the EIS did not adequately address all alternatives and their impacts.

- On June 6, 1978, the CEQ requested that the Corps reformulate the project. In November, 1978, the Chief of Engineers agreed to project reformulation, and advised concerned environmental agencies of the Corps' intention to develop a plan of corrective measures for the critical area at Westhampton in Reach 2 of the project area. The CEQ decision on the EIS allowed for construction of interim measures for critical areas within the barrier island provided they were: (1) in essential areas, (2) environmentally responsible, and (3) consistent with the reformulation effort.

- In November, 1978, concerned Federal agencies agreed to proceed with the development of Supplement No. 2 to GDM No. 1, independent of the overall Fire Island Inlet to Montauk reformulation effort due to critical erosion in the Westhampton area. Supplement No. 2 to GDM No. 1 (Moriches to Shinnecock Reach), dated July, 1980, noted the severe erosion which had occurred during storms in January and February of 1978. The plan provided for beach fill and dune construction in the area west of the groin field to mitigate erosion and provide storm surge protection, and for beach fill and dune construction in the existing groin field. The GDM Supplement No. 2 was approved on November 5, 1980.

- In 1980, the barrier island was breached 2,600 feet eastward from the east jetty at Moriches Inlet. Emergency authority was invoked to repair the breach. The repair was completed in 1981.

- In July, 1980, the Corps submitted the Plan of Study for Project Reformulation for Fire Island Inlet to Montauk Point, NY. The plan was scheduled to be completed in 1986 and the study was initiated and proceeded as scheduled until 1984. Due to lack of local government support related to cost-sharing issues, planning for construction for completion of the Moriches to Shinnecock reach was suspended. Since Reach 2 was considered the most vulnerable section within the project area, all work regarding the reformulation effort was suspended in light of lack of support for this most critical area of the project.

- The periodic renourishment, cost sharing issue was resolved following the enactment of the Water Resources Development Act of 1986, Section 502. This provided for 70% Federal funding to be applied to periodic nourishment of continuing construction at Westhampton, for a period of 20 years following the Act. Upon this resolution, the State was willing to participate in a plan for Reach 2 and coordination between the State and the New York District resumed for Reach 2 and the overall reformulation effort.

- In September, 1989, New York State proposed a plan which became known as the State's preferred interim plan for Westhampton. This interim plan was a variation of Supplement No. 2 to GDM No. 1 but provided for beachfill with a lesser level of protection. The plan included modification of existing groins whereas Supplement No. 2 to GDM No. 1 provided only for beachfill.

- In July, 1991, the Corps issued a Public Notice of a conceptual preferred interim plan for Westhampton prepared by the State. USEPA responded to the public notice and agreed to endorse the plan following the preparation of an environmental assessment and reinstatement of the overall project reformulation.

- Meanwhile, the Northeaster of December, 1992 caused two significant breaches in the area of Pikes Beach. In response to this, the Corps utilized approximately 60,000 cubic yards of material dredged from the Intracoastal Waterway and placed it within the western most breach (Pikes Inlet breach). The placement of this material was completed in January, 1993. Construction of the closure of the eastern most breach (Little Pikes Inlet, which had widened as much as 3000 ft), utilizing material obtained from an offshore borrow area, was completed in November, 1993.

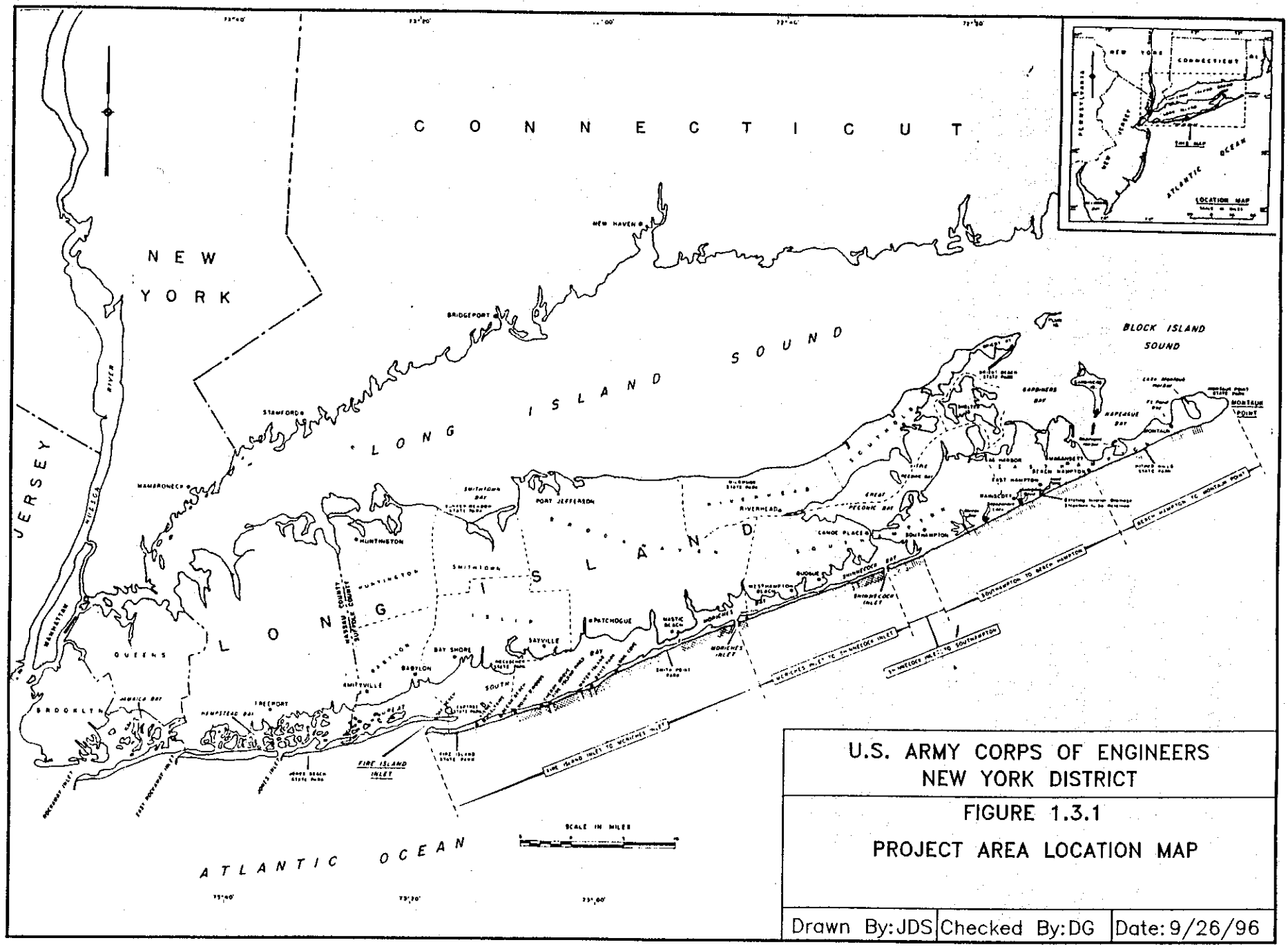
- In December, 1992, the District was directed to initiate baseline data collection, including review of previous reports, on the uncompleted portion of Westhampton. As the baseline data was collected, the District also prepared a reformulation study plan which provided the guidelines for the reformulation. This plan, known as the Initial Project Management Plan (IPMP), dated June, 1993, revised September, 1993 was approved by the Headquarters of the U.S. Army Corps of Engineers (HQUSACE) in January, 1994.

- Through local government support, the Acting Assistant Secretary of the Army also requested the New York District to evaluate the possibility of developing additional interim projects under the reformulation effort. Specific areas being considered for interim actions include: Fire Island Inlet to Moriches Inlet (Fire Island Interim Project) and the area west of Shinnecock Inlet (West of Shinnecock Interim Project). The Westhampton Interim Project and the Breach Contingency Plan have both been approved and the Westhampton Interim Project is currently under construction.

1.3 Description of Study Area

The project area, extending from Fire Island Inlet easterly to Montauk Point along the Atlantic Coast of Suffolk County, is approximately 83 miles long and comprises approximately 70% of the total ocean shoreline of Long Island (see Figure 1.3.1). The study area is comprised of a diverse geography, ranging from barrier islands, transitional beaches, and headlands. The study area includes three large estuarial bays: Great South Bay, Moriches Bay, and Shinnecock Bay. The project area includes the ocean shoreline, barrier beaches, Fire Island, Moriches and Shinnecock Inlets, bay areas and mainland areas as well as suitable offshore borrow areas for beach restoration along the south shore of Long Island from Fire Island Inlet to Montauk Point. The study area has previously been divided into five reaches, defined as follows:

- Reach 1: Fire Island Inlet to Moriches Inlet
- Reach 2: Moriches Inlet to Shinnecock Inlet
- Reach 3: Shinnecock Inlet to Southampton
- Reach 4: Southampton to Beach Hampton
- Reach 5: Beach Hampton to Montauk Point



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NEW YORK DISTRICT

FIGURE 1.3.1

PROJECT AREA LOCATION MAP

Drawn By: JDS	Checked By: DG	Date: 9/26/96

Section 2.0
Purpose of the Reformulation Study

The purpose of the reformulation effort is to identify a long term regional solution to offset the effects of storms and storm induced beach erosion along the south shore of Long Island from Fire Island Inlet to Montauk Point. The reformulation study will investigate the economic and environmental impacts of storm damage to the barrier islands, bays and mainland areas. Historically, storms have facilitated beach erosion and overwashing, and in several instances, have led to the breaching of barrier islands.

Severe storms can cause damage to structures along the mainland and barrier islands. The primary cause of damage along the mainland is inundation. As the water level rises due to storm tides, the mainland becomes flooded. Damages to the barrier island are a combination of damage mechanisms, including wave attack, erosion, and inundation. Besides damaging structures along the barrier island, severe storms erode the beach, thereby reducing the protective capacity of the barrier island to the mainland.

Barrier beaches serve many purposes in protecting the south shore of Long Island. In addition to providing habitats for human and ecological life, the barrier islands serve as buffers to the waters and wetlands of the back bays. Currently, low-lying areas exist along the barrier island which experience frequent overwash. Conditions indicate the potential of future breaches which may increase the vulnerability of the mainland communities to flooding, and potentially affect biological resources and physical parameters of the back bay areas.

Formulating a long term solution to this problem will identify alternatives which can optimize benefits by reducing economic loss to the mainland and barrier beaches, while preserving important human and ecological habitats.

Section 3.0
Plan Formulation

3.1 General

The intent of the reformulation study is to analyze a wide array of alternatives to select the optimal plan. The formulation of alternative plans is an iterative process, which is undertaken in a systematic manner to evaluate all reasonable alternatives. A number of alternatives are identified early in the formulation process, which become more refined throughout the process, as more information becomes available. The formulation process also includes screening and identification of potential mitigation measures, in concurrence with the formulation. The formulation process is divided into the following phases:

- Identification of Project Reaches / Project Constraints
- Identification of Alternatives
- Screening of Alternatives
- Design of Protection by Reach
- Optimization/Comparison of Alternatives
- Selection of a Recommended Plan

3.2 Identification of Project Reaches and Project Constraints

The Fire Island Inlet to Montauk Point Project Area consists of a variety of existing conditions, including barrier islands, transitional beaches, and headlands. The project area will be divided into design reaches, and subreaches, based upon coastal/geological characteristics, engineering considerations, economic considerations, environmental considerations, coastal zone management criteria, existing development, and local regulations. For each of these delineated subreaches, project constraints are identified to establish restrictions for alternative analysis.

3.3 Identification of Alternatives

The following alternatives have been identified for initial consideration. This range of alternatives seeks to include all reasonable alternatives, including those outside of the Corps of Engineers jurisdiction. All alternatives will be considered on a reach by reach basis, alone and in combination with other alternatives.

3.3.1 No Federal Action. Under this alternative, no Federal measures would be taken to provide for storm damage protection to the barrier island or mainland property within the project area. This alternative would include work done to date under this project authority, and would complete work already commenced (existing groins, continued nourishment of the Westhampton Interim), but assumes no further involvement by the Federal Government.

3.3.2 Removal or Modification of Existing Structures. This alternative will investigate the removal or modification of existing structures. This includes the existing groins in reaches 2 and 4. Modification could include tapering to mitigate the effects of non-uniform buildup of material. This alternative may include realignment / abandonment of existing inlets.

3.3.3 Buy-out Plan /Land Use Regulations / other non-structural measures. A buy-out plan includes the permanent evacuation of existing areas within the floodplain subject to erosion or inundation, including the mainland and barrier island. This involves the acquisition of this land and structures either by purchase or by exercising the powers of eminent domain. Following this action, all development in these areas would either be demolished or relocated. Other potential land use regulations may include a range of management techniques, including zoning, subdivision regulations, building codes, and setback ordinances. Other non-structural measures include raising structures or providing walls or floodshields around structures, in addition to relocations.

3.3.4 Sand Bypassing/Inlet Management. A sand bypassing alternative is considered to account for sand deficiencies downdrift of inlets. In general, littoral material is stored in or at the inlet in the form of flood- or ebb-tidal shoals, and material impoundment against updrift structures. Sand bypassing includes downdrift nourishment of this material by mechanical means utilizing fixed plants, semi-mobile plants, or by periodic dredging. The goal of inlet management is to balance the inlet navigational requirements with the alternatives for bypassing. This alternative may also include realignment of existing stabilized inlets.

3.3.5 Beach Restoration. Beach restoration involves placement of sand directly on an eroding shoreline to restore its form and subsequently maintain an adequate beach width by means of periodic renourishment fill. Beach restoration would include a sufficient berm width backed by a dune to reduce the storm damage potential to the barrier island and mainland areas.

3.3.6 Groins. Groins are coastal structures which are generally constructed perpendicular to the shoreline. They extend from the back beach area into the water and act to retard longshore sediment transport. Properly placed groins can reduce or eliminate erosion.

3.3.7 Groins with Beach Restoration. Groins alone, as described above, would not widen most of the existing beaches because of a deficiency of sand. Beach restoration would provide a wider dry beach area with reduced renourishment requirements from the erosion reduction by the groins.

3.3.8 Revetments. Revetments are a facing of resistant material such as rock built to protect shorelines from erosion and storm damage. They consist of an armor layer of rock placed over a dune or berm in the back portion of the beach. Erosion will continue

adjacent and in front of the revetment. The revetment must have a substantial toe foundation to resist undermining.

3.3.9 Revetments with Beach Restoration. Beach restoration combined with revetments, includes a revetment fronted by beach nourishment. Beachfill will provide protection against beach erosion, maintain the movement of littoral material, and act to protect the revetment from being undermined.

3.3.10 Seawalls. Seawalls provide upland erosion protection and are usually employed to protect upland structures from erosion damage.

3.3.11 Seawalls with Beach Restoration. With this option, seawalls would provide upland storm protection, while beach restoration would check erosion along the shoreline, and maintain the littoral movement of material.

3.3.12 Breakwaters. Breakwaters are structures which protect beaches from wave action by dissipating wave energy before it reaches the beach. A decrease in wave energy will reduce sediment transport thus reducing the erosion rate.

3.3.13 Breakwaters with Beach Restoration. To minimize the effect of breakwaters on downdrift beaches, these structures should be constructed in conjunction with beach restoration. This plan would effectively check erosion and also create a wider beach berm and dune system to provide storm damage reduction.

3.3.14 Ring Levees. This alternative includes incorporating structural measures along the mainland to prevent flooding to the low-lying areas, as a result of the storm surge associated with hurricanes and northeastern storms. This alternative includes incorporating earthen levees, floodwalls, rubblemound structures, and canal gates for upland levee structures, closure of canals, canal gates, or offshore levee structures.

3.3.15 Tidal Gates. This alternative includes the assessment of various flood control gate designs at Fire Island Inlet, Moriches Inlet, and Shinnecock Inlet. The purpose of the flood control gates is to minimize the water elevations during extreme hurricanes and northeaster storms, while not restricting tidal flow, or impacting navigation requirements.

3.4 Screening of Alternatives

Based upon the overall project constraints, and individual constraints for each reach, the above alternatives will be evaluated, individually and in combination, to determine the acceptability of the alternative for each design reach, and for the overall project area. If an alternative, or combination of alternatives is unacceptable based upon the project constraints, the alternative will be eliminated from further consideration.

Prior to proceeding to the next stage of formulation, meetings will be held to verify the project constraints identified, and identify alternatives which will be dropped at this phase of the study. Federal, State and local agencies, and the public will be invited to the meeting. Based upon input received, alternatives could be considered further.

In concurrence with the screening process, the process for developing mitigation alternatives will be initiated. This includes an identification of potential impacts, and identification of mitigation alternatives. The following are described below:

Preliminary Identification of Environmental Impacts. This includes a preliminary investigation into the impacts associated with the complete range of project alternatives. This phase is conducted in concurrence with the screening of alternatives, to assist in the screening of alternatives.

Preliminary Identification of Mitigation Alternatives. This preliminary identification phase is based upon the outcome of the screening of alternatives conducted in the plan formulation. This phase will identify a range of conceptual mitigation alternatives, for further development.

3.5 Design of Protection by Reach

Based upon elimination of alternatives in the screening phase, remaining alternatives and combinations of alternatives will be carried forward with the preliminary design of each alternative by reach. This includes utilization of preliminary coastal processes analysis, economic, and environmental data in the layout of project alternatives. This phase also includes preliminary screening of possible mitigation measures. Based upon the relative costs associated with these alternatives, or combination of alternatives, project alternatives will be further refined to eliminate those unacceptably costly.

Prior to proceeding to the next phase of formulation, meetings will be held to obtain input into the alternatives which are being carried forward in the final stage of alternative analysis.

3.6 Optimization/Comparison of Alternatives

Based upon the remaining project alternatives for each reach, the alternatives will be further refined to optimize the alternatives based upon refined coastal, and environmental information available. This will include variations in the combination of design elements, and variability in design protection. Mitigation measures will also be incorporated into the decision matrix. The costs and benefits associated with each alternative will be utilized to compare plans.

3.7 Selection of a Recommended Plan

Based upon the comparison of plans, the plan which provides the greatest net benefits will be selected as the recommended plan.

Section 4.0
Environmental Setting

4.1 Biological Resources

4.1.1 Barrier Island and Coastal Zone Vegetation

American beach grass (*Ammophila breviligulata*) is the dominant plant species on the primary dunes. It is capable of tolerating burial by shifting sand. Several other species occupy dunes, including sea rocket (*Cakile edentula*), seaside goldenrod (*Solidago sempervirens*) and beach heather (*Hudsonia tomentosa*) (Corps, 1996).

On the leeward side of the primary dune, the swale zone is characterized by woody and herbaceous plants, including beach plum (*Prunus maritima*), bayberry (*Myrica pennsylvanica*), and poison ivy (*Rhus radicans*). Bearberry (*Arctostaphylos* spp.) may also be present on the leeward side of undisturbed primary dunes. However, in disturbed swale zones, early successional species predominate, for example seaside goldenrod and beach heather *(Hudsonia tomentosa*) (Corps, 1996).

Saltmarsh flora often form clear zones, determined by inundation and salt tolerance. The low marsh habitat is dominated by a tall and short form of smooth cordgrass (*Spartina alterniflora*), although saltwart (*Salicornia virginica*) occurs here to a small degree. More salt tolerant species and less inundation tolerant species occupy high marsh habitats, including salt hay (*Spartina patens*), spike grass (*Distichlis spicata*), big cord grass (*Spartina cynosuroides*), sea blight (*Suaeda linearis*), glasswart (*Salicornia europa*), and sea lavender (*Limonium nashii*) (Corps, 1996).

In addition to the above barrier island vegetation, Reach 1 contains maritime forests. Fire Island contains maritime forests, which are protected from sea spray and may form dense transition zones, consisting of red cedar (*Juniperus virginiana*), pitch pine (*Pinus rigida*), wild black cherry (*Prunus serotina*) and winged sumac (*Rhus copallina*). Broadleaf forests consist of winterberry holly (*Ilex verticillata*) and sassafras (*Sassafras albidum*). Understory habitats typically include highbush blueberry (*Vaccinium* spp.) and other tall shrubs (Corps, 1996).

4.1.2 Mammals

Twenty seven species of marine mammals utilize offshore waters of Long Island, including representatives of Cetaceans (whales and dolphins) and Pinnipeds (seals). Although some of these species only enter this region on rare occasions, fifteen species commonly occur here (Okeanos, 1996). These species are presented in Table 4.1.2.1.

Table 4.1.2.1
Marine Mammals Occurring in Offshore Waters of Long Island

Common Name	Species Name
Fin Whale (C,E)	*Balaenoptera physalus*
Minke Whale (C,P)	*Balaenoptera acutorostrata*
Sei Whale (C,E)	*Balaenoptera borealis*
Blue Whale (E)	*Balaenoptera musculus*
Humpback Whale (C,E)	*Megaptera novaeangliae*
Right Whale (E)	*Eubalaena glacialis*
Sperm Whale (C, E)	*Physeter catodon*
Pygmy Sperm Whale (C, P)	*Kogia breviceps*
Blainville's Beaked Whale (P)	*Mesoplodon densirostris*
Cuvier's Beaked Whale (P)	*Ziphius cavirostris*
True's Beaked Whale (P)	*Mesoplodon mirus*
Bottlenosed Dolphin (C,P)	*Tursiops truncatus*
Common Dolphin (C,P)	*Delphinus delphis*
Striped Dolphin (C,P)	*Stenella coeruleoalba*
Atlantic Spotted Dolphin (C,P)	*Stenella plagiodon/attenuata*
White Whale (P)	*Delphinapterus leucas*
Harbor Porpoise (E)	*Phocoena phocoena*
Atlantic White-Sided Dolphin (C,P)	*Lagenorhynchus acutus*
White-Beaked Dolphin (C,P)	*Lagenorhynchus albirostris*
Long-Finned Pilot Whale (C,P)	*Globicephala melaena*
Killer Whale (P)	*Orcinus orca*
Risso's Dolphin (C,P)	*Grampus griseus*
Harbor Seal (C,P)	*Phoca vitulina*
Harp Seal (C,P)	*Phoca groenlandica*
Ringed Seal (P)	*Phoca hispida*
Grey Seal (C,P)	*Haliochoerus grypus*
Hooded Seal (P)	*Cystophora cristata*

Source: Okeanos, 1996

C=Common in Long Island Offshore Waters

E=Federally Endangered

P=Federally Protected

In the dune/swale community of the barrier islands, white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes fulva*), rabbits (*Sylvilagus* spp.), and white-footed mice (*Peromyscus leucopus*) can be found within the forests and tall grasses of Fire Island (Corps, 1995). Two species of bats and muskrats (*Ondatra zibethica*) have also been recorded on the island (Denver Service Center, 1977).

A population (20-40 individuals) of harbor seals (*Phoca vitulina*) regularly enter Shinnecock Inlet and "haul out" on sand bars near the inlet (Corps, 1996).

4.1.3 Shorebirds

The barrier islands provide essential nesting sites and foraging areas for several species of resident and migratory shorebirds, including the Federally and State-endangered roseate tern (*Sterna dougallii*), the Federally-threatened and State-endangered piping plover (*Charadrius melodus*), and the State-endangered least tern (*Sterna antillarum* formerly *S. albifrons*). These species construct nests on high ocean beaches, seaward sides of primary dunes and in back bay salt marsh communities (pers. comm. NYSDEC, 1996). Common terns (*Sterna hirundo*), listed as a State-threatened species, utilize similar habitats within this region (Corps, 1996). Other species occupying adjacent barrier island communities are summarized in Table 4.1.3.1 (Corps, 1995). It is important to note that more than 100 species of birds are routinely found in this area during some portion of their life cycle (pers. comm. DOI, 1996).

Table 4.1.3.1
Avifauna in the Shinnecock Region

Common Name	Species Name
Black-Bellied Plover	*Pluvialis squatarola*
Ruddy Turnstone	*Arenaria interpres*
Red Knot	*Calidris canutus*
Double-Crested Cormorant	*Phalacrocorax auritus*
Killdeer	*Charadrius wilsonia*
Red-Winged Blackbird	*Agelaius phoeniceus*
Common Grackle	*Quiscalus quiscula*
Northern Mockingbird	*Mimus polyglottos*
Osprey	*Pandion haliaetus*

The intertidal zone of the barrier islands provides foraging areas for a variety of more abundant species including a variety of gulls, sanderlings (*Calidris alba*), semipalmated sandpipers (*Calidris pusilla*) and semipalmated plovers (*Charadrius semipalmatus*). Willet (*Catoptrophorus semipalmatus*) and dunlins (*Calidris alpina*) also utilize ocean beach communities on these barrier islands (Corps, 1996).

The back bay communities in Great South Bay, including salt marshes, eelgrass beds, intertidal flats, and shallows provide important feeding and nesting habitats for migratory birds throughout the year (NYSDOS, 1987). In a survey conducted by the New York State Department of Environmental Conservation (NYSDEC) in 1995, back bay communities were common breeding sites for a variety of species, including green heron (*Butorides striatus*), glossy ibis (*Plegadis falcinellus*), black skimmer (*Rynchops niger*), roseate tern (*Sterna dougallii*), great egret (*Casmerodius albus*), snowy egret (*Egretta thula)* and American oystercatchers (*Haematopus palliatus*).

These sites also serve as important wintering areas for many waterfowl species, including populations of brant (*Branta bernicla*), scaup (*Aythya* spp.), black ducks (*Anas rubripes*), Canadian geese (*Branta canadensis*), mallards (*Anas platyrhynchos*), buffleheads (*Bucephala albeola*) and red-breasted merganser (*Mergus serrator*). These birds utilize open water areas and salt marshes for feeding in the winter and spring, respectively (Denver Service Center, 1977; NYSDOS, 1987). Many of the species inhabiting barrier island beaches including common terns, piping plovers, and semipalmated plovers, forage and nest in back bay communities (Corps, 1996).

Canvasbacks (*Aythya valisineria*) and the waterfowl species listed for the Great South Bay utilize similar habitats adjacent to Moriches Bay during the spring and winter (NYSDOS, 1987).

Shinnecock Bay has fewer salt marshes in the transition zone between the barrier island and the back bay, therefore, the extent of spring waterfowl feeding is less than in the other two embayments (NYSDOS, 1987). Although fewer individual visit these communities within Shinnecock Bay, it hosts the same species as Moriches Bay.

Resident and migratory species of barrier islands and back bay communities may use the respective back bay regions as foraging areas, especially in the winter when salt marshes, intertidal flats and shallows are frozen over (NYSDOS, 1987).

4.1.4 Finfish

The National Marine Fisheries Service (NMFS) conducted a survey within three miles offshore for fish species occurring within this region, revealing several species utilize offshore reaches (NMFS, 1993). The species common to offshore waters of the Atlantic Coast of Long Island are summarized in Table 4.1.4.1.

Table 4.1.4.1
Finfish Species Common to the Offshore Waters of the South Shore of Long Island

Common Name	Species Name
Anglerfish	*Lophius americanus*
Bluefish	*Pomatomus saltatrix*
Butterfish	*Peprilus triacanthus*
Atlantic Cod	*Gadus morhua*
Winter Flounder	*Pleuronectes americanus*
Summer Flounder	*Paralichthys dentatus*
Yellowtail Flounder	*Limanda ferruginea*
Atlantic Mackerel	*Scomber scombrus*
Scup	*Stenotomus chrysops*
Striped Bass	*Morone saxatilis*
Atlantic salmon	*Salmo salar*
Atlantic herring	*Clupea harengus*
Black Drum	*Pogonias cromis*
Black Sea Bass	*Centropristis striata*
Atlantic Halibut	*Hippoglossus hippoglossus*

A number of species utilize Great South, Moriches, and Shinnecock Bays as nursery areas (Gaffney, 1993) and foraging grounds. These include bluefish (*Pomatomus saltatrix*), winter flounder (*Pleuronectes americanus*), summer flounder (*Paralichthys dentatus*), kingfish (*Menticirrhus saxatilis*), tautog (*Tautoga onitis*), and scup (*Stenotomus chrysops*) (NYSDOS, 1987). Piscivorous fishes feed on forage fish species that occupy back bay communities. Forage fish species typically occurring in the embayments are Atlantic silverside (*Menidia menidia*), mummichog (*Fundulus heteroclitus*), striped killifish (*Fundulus majalis*), four-spined sticklebacks (*Apeltes quadracus*) and northern pipefish (*Syngnathus fuscus*) (NYSDOS, 1987).

4.1.5 Herpetiles

Five species of sea turtles visit the waters off Long Island, including the Kemp's ridley sea turtle (*Lepidochelys kempi*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and the Hawksbill sea turtle (*Eretomochelys*

imbricata). It is important to note that the Hawksbill sea turtle is a rarely occurring species in the waters off Long Island (Okeanos, 1996).

Six species of herpetiles have been identified within Fire Island National Seashore. Spotted turtles (*Clemmys guttata*), a New York State species of special concern, are rare within barrier island communities, utilizing standing fresh water habitats which are sparsely located on the island. Eastern mud turtles (*Kinosternon subrubrum*), snapping turtles (*Chelydra serpentina*), and diamond back terrapin (*Malaclemys terrapin*), a New York State species of special concern, occupy similar habitats, primarily mosquito ditches. However, diamond back terrapin also enter deeper portions of back bays. Black racers (*Coluber constrictor*) occupy upland habitats, while Fowler's toads (*Bufo woodhousii*) are widespread, breeding in temporary fresh water pools (pers. comm. Caldecutt, 1996).

4.1.6 Algae

Plant species in the littoral zone usually drift in from other areas and may include sea lettuce (*Ulva lactuca*), Southern kelp (*Laminaria agardhii*), and dulse (*Rhodymenia palmata*) (Corps, 1996).

Although there are 34 species of benthic algae within the embayments along the south shore, the most common species include Agardh's red weed (*Agardhiella tenera*), barrel weed (*Champia parvula*), tubed weeds (*Polysiphonia harveyi*), sea lettuce and the filamentous seaweeds (*Chaetomorpha linum* and *Cladophora gracilis*) (Corps, 1996). Some of these algae support epiphytes, particularly tubed weeds and sea lettuce.

4.1.7 Plankton

Plankton communities are often characterized by a combination of assemblages, which vary due to changing environmental and seasonal influences. During summer months, temperate and tropical species are transported northward by the Gulf Stream into Fire Island, Moriches and Shinnecock Inlets. However, boreal species predominate during winter months.

4.1.7.1 Phytoplankton

Phytoplankton abundance decreases from the back bays to offshore, which is seaward of the littoral zone. Most of the 266 species reported within the project area occur within the embayments (Corps, 1977). Centric diatoms are the most abundant group of phytoplankton species within this region. Table 4.1.7.1.1 presents the most abundant species in embayments, and the nearshore and offshore Atlantic Ocean.

TABLE 4.1.7.1.1
Abundant Phytoplankton Species

SPECIES NAME	GROUP NAME
Skeletonema costatum	Centric Diatom
Leptocylindrus donicus	Centric Diatom
Nitzschia serriata	Centric Diatom
Nitzschia delicatissima	Centric Diatom
Asterionella japonica	Pennate Diatom
Prorocentrum micans	Dinoflagellate
Peridinium conicoides	Dinoflagellate
Ceratium lineatum	Dinoflagellate
Thalassiosira decipiens	Pennate Diatom
Nitzschia closterium	Centric Diatom

Novel phytoplankton blooms, specifically brown tide and red tide, continue to be a major concern to back bay communities. In 1985, the Great South Bay experienced brown tide blooms, reaching plankton densities as high as 10^6 cells per liter. This high concentration decreased light penetration in the bay, resulting in a decrease in eelgrass habitats (Schubel *et. al.*, 1991), and contributed to the crash of the Long Island hard clam fishery (Gaffney, 1993). Brown tide blooms result from the population growth of *Aureococcus anophagefferens* within a local area. Research continues on this problem in order to understand its effects and mechanisms. Currently, increases in estuary temperature and salinity, along with the availability of micronutrients are believed to be contributing factors to this problem (Beltrami, 1996).

Red tide blooms have also been a problem within the bays. But, unlike brown tide, red tide results from an assemblage of dinoflagellates. Red tide poisons affected organisms and has caused mortality in local fish and shellfish species (Perry, 1985).

4.1.7.2 Zooplankton

Offshore zooplankton species composition is only slightly influenced by back bay conditions (Corps, 1977). Oceanic zooplankton biomass primarily consists of calanoid copepods (*Calanus* spp., *Paracalanus* spp. and *Eucalanus* spp.), but arrow worms (*Sagitta* spp.) and appendicularians (*Oikopleura dioica* and *Frittilaria* spp.) have also been known to be present.

Within the embayments, zooplankton biomass is less than offshore communities, however, diversity is greater, consisting of meroplankton and copepods within these estuaries (Corps,

1977). Table 4.1.7.2.1 lists the abundant zooplankton species occupying the embayments. However, environmental factors, specifically temperature, salinity and nitrate-to-phosphate ratios alter species composition on local and seasonally scales.

TABLE 4.1.7.2.1
Abundant Zooplankton in Embayments (Summer and Fall Conditions)

SPECIES NAME	GROUP NAME
Acartia tonsa	Copepod
Oithona spp.	Copepod
Temora longicornis	Copepod
Acartia clausi	Copepod
Psuedocalanus minutus	Copepod
Paracalanus crassirostris	Copepod
Evadne nordmanni	Cladoceran
Penilla avirostris	Cladoceran
Oikopleura dioica	Appendicularian
Frittilaria spp.	Appendicularian

4.1.8 Benthos

Within the range of Fire Island Inlet to Montauk Point, near nut shell clams (*Nucula proxima*) and red-lined polychaete worms (*Nephtys incisa*) occupy the littoral zone (Corps, 1977). Additionally, several other macroinvertebrates occur, including American lobsters (*Homarus americanus*), hard clams (*Mercenaria mercenaria*), soft-shelled clams (*Mya arenaria*), Atlantic surf clams (*Spisula solidissima*), sand dollars (*Echinarachnius parma*) and starfish (*Asterias* spp.) (Corps, 1995; Denver Service Center, 1977). Nearshore reaches are occupied by sand dollars, tellin clams (*Tellina agilis)* and two species of amphipods (*Protohaustorius wigleyi*, *P. longimerus*) (Corps, 1995).

In the surf zone, which is defined as the intertidal zone where wave energy impacts the shore, benthic residents include surf clams, moon snails (*Polinices duplicatus*), and polychaete worms (*Nephtys picta*) (Corps 1995). Mole crabs (*Emerita talpoida*) forage on these beaches during the spring, summer and fall, but migrate nearshore in the winter. Additionally, four species of amphipods represent the majority of macrofauna biomass in surf zone benthos communities (Corps, 1977). Table 4.1.8.1 summarizes the macrofauna species occupying the surf zone.

Table 4.1.8.1
Intertidal Macrofauna

SCIENTIFIC NAME	GROUP NAME
Nephtys bucera	Polychaete worm
Nereis arenaceodonta	Polychaete worm
Scoloplos fragilis	Polychaete worm
Scolelepis squamata	Polychaete worm
Chiridotea caeca	Isopod crustacean
Chiridotea nigrescens	Isopod crustacean
Amphiporeia virginiana	Amphipod crustacean
Acanthohastorius millsi	Amphipod crustacean
Haustorius biarticulatus	Amphipod crustacean
Neohaustorius biartriculatus	Amphipod crustacean
Emerita talpoida	Mole crab
Limulus polyphemus	Horseshoe crab

Salt marsh and eelgrass bed communities contain a high diversity of invertebrates. Smooth cordgrass (*Spartina alterniflora*) provides structural support for the burrows of two species of fiddler crabs (*Uca pugnax* and *U. pugilator*). Salt marshes are also inhabited by ribbed mussels (*Modiolus demissus*), marsh snails (*Melampus bidentatus*) and horseshoe crabs (*Limulus polyphemus*) during the spring, summer and fall (Corps, 1977).

Eelgrass (*Zostera marina*) forms dense beds within the shallow embayments along the south shore, providing suitable habitats for benthic and epiphytic organisms. Typically, a variety of snails (*Bittium* spp., *Caecum* spp., *Crepidula* spp., *Littorina* spp.), amphipods and tanaids (*Corophium archerusicum*, *Cymadusa* spp., *Leptochelia* spp., *Microdeutopus* spp.), ostracods (*Cytherois* spp., *Loxoconcha* spp.) and polychaetes inhabit this community (Corps, 1977). Some species utilize eelgrass beds for a portion of their life history. For example, scallop larvae attach to the blades of eelgrass early in their ontogeny.

In open bay regions of Great South, Moriches and Shinnecock Bays, hard clams and the polychaete *Capitella capitata* predominate (Corps, 1977). Other prominent bivalve species in the bays include soft-shelled clams, bay scallops (*Aequipecten irradians*) and blue mussels (*Mytilus edulis*). Blue crabs (*Callinectes sapidus*) also use the embayments as nursery and feeding grounds (Corps, 1995).

4.2 Wetlands

In 1971, Suffolk County contained over 12,000 acres of intertidal and high marsh wetlands. To date, 2,035 acres of wetlands and adjacent upland have been acquired in Suffolk County by New York State. A loss of one to five acres of wetlands per year is typical. The NYSDEC estimates that an additional 2 to 3 acres of tidal wetlands is lost per year to illegal development. Over 18,000 acres of freshwater wetlands are present within Suffolk County (Gaffney, 1993). The southern reach of Long Island, extending from Fire Island Inlet to Montauk Point, has two types of wetlands, coastal salt meadow and regularly flooded salt marshes. These habitats, which may be considered portions of a larger wetland complex, also include mud flats, beaches, rocky areas, streams, guts and potholes. These areas provide nursery grounds for fishes and shellfishes, along with breeding and feeding grounds for shorebirds and waterfowl (O'Connor *et. al.*, 1972).

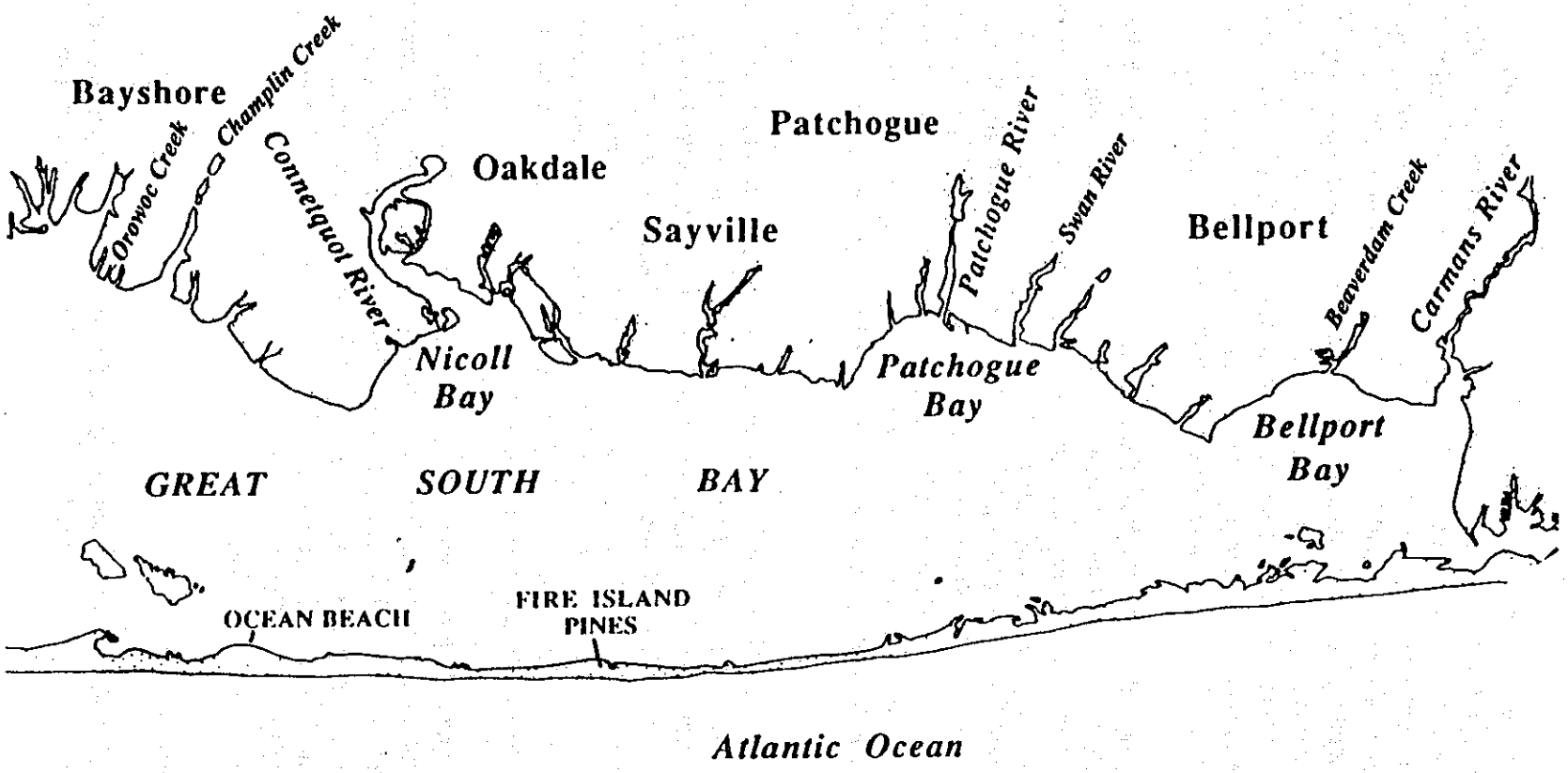
With the exception of Shirley and the Village of Bellport, the eastern portion of Great South Bay is generally undeveloped, consisting of tidal wetlands along back bay areas (Corps, 1996). The mainland along the north side of the embayment contains two river systems, Carmans and Connetquot Rivers, which contain extensive tidal and fresh water wetlands. The Great South Bay is listed as a significant fish and wildlife habitat by the United States Fish and Wildlife Service (USFWS). Sites designated by the New York State, Department of State as Significant Coastal Fish and Wildlife Habitats contained within the embayment include Great South Bay East, Great South Bay West, Beaverdam Creek, Swan River, Carmans River, Connetquot River, Champlin Creek, and Orowoc Creek (NYSDOS, 1987). A map of the Great South Bay area is provided in Figure 4.2.1.

In West Hampton and the Village of West Hampton Dunes, along Dune Road, coastal zones are highly developed (Corps, 1996). However, west of Moriches Inlet, the back bay has extensive wetlands, including many small streams that have tidal and fresh water wetlands along the north side of the embayment. Moriches Bay is a significant fish and wildlife habitat as designated by the USFWS . The Moriches Bay area contains five designated New York State, Department of State Significant Coastal Fish and Wildlife Habitats. These sites are Moriches Bay, Smith Point County Park, Cupsogue County Park, and a portion of Quantuck Creek and Quogue Refuge (NYSDOS, 1987). A map of the Moriches Bay area is provided in Figure 4.2.2.

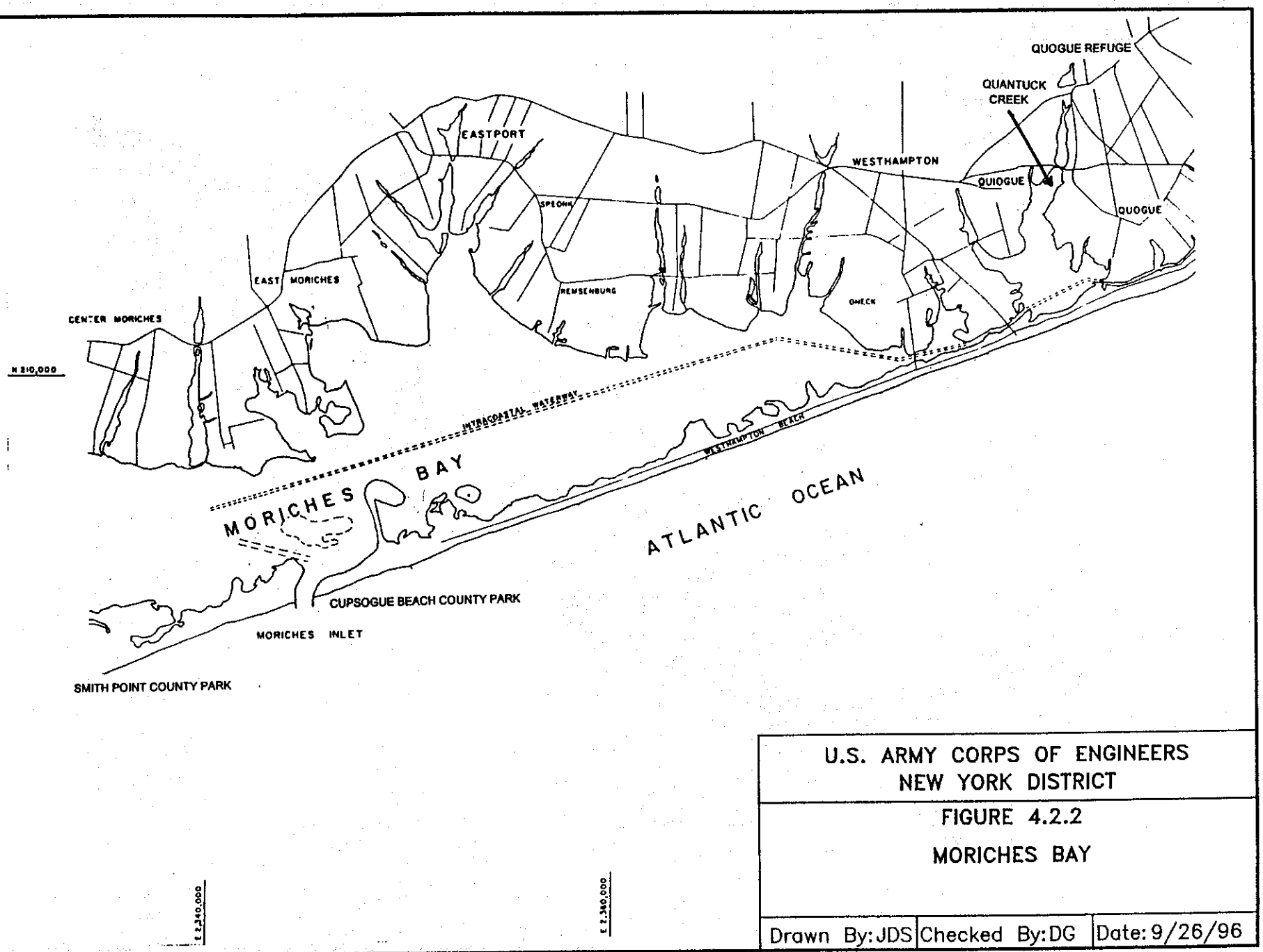
The Shinnecock area has tidal wetlands north of Tiana and Southampton town beaches in the back bay (Corps, 1996). The embayment contains large areas of open water, consisting of only limited amounts of salt marshes and mud flats. The Shinnecock bay area contains 8 sites designated as New York State, Department of State Significant Coastal Fish and Wildlife Habitats. These sites include Southampton Beach, Tiana Beach, Shinnecock Bay, Dune Road Marsh, Far Pond and Middle Pond Inlets, and portion of Quantuck Creek and Quogue Refuge (NYSDOS, 1987). A map of the Shinnecock Bay area is provided in Figure 4.2.3.

4.3 Threatened and Endangered Species

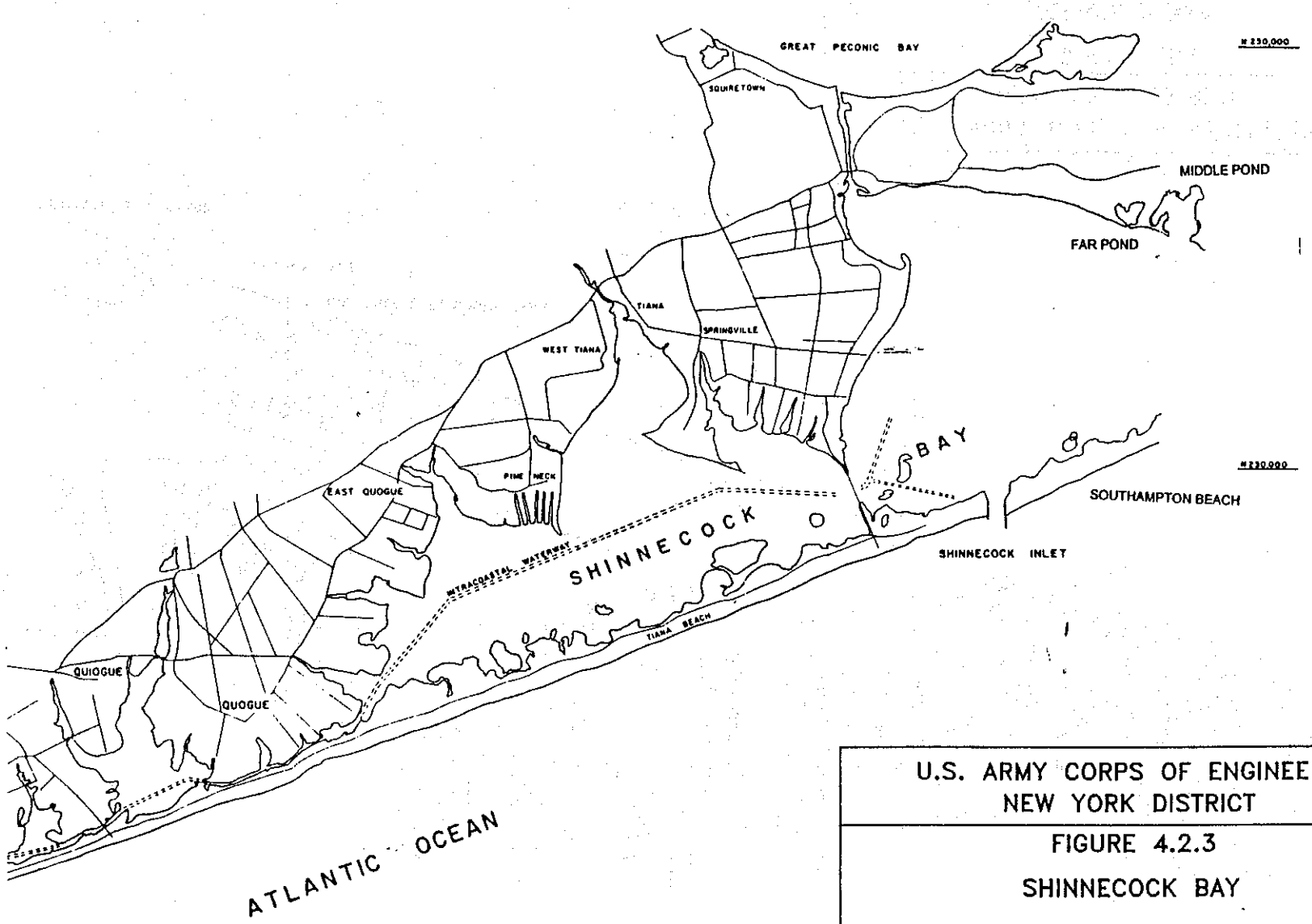
Currently, there are no State or Federally-listed endangered or threatened marine species that breed in Long Island's offshore waters, although, threatened and endangered species do use the



U.S. ARMY CORPS OF ENGINEERS NEW YORK DISTRICT		
FIGURE 4.2.1 GREAT SOUTH BAY		
Drawn By: JDS	Checked By: DG	Date: 9/26/96



U.S. ARMY CORPS OF ENGINEERS NEW YORK DISTRICT		
FIGURE 4.2.2 MORICHES BAY		
Drawn By: JDS	Checked By: DG	Date: 9/26/96



U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT

FIGURE 4.2.3

SHINNECOCK BAY

Drawn By:JDS	Checked By:DG	Date: 9/26/96

coastal waters for feeding and migration (Okeanos, 1996; Corps, 1996). Three endangered sea turtles, Kemp's ridley, leatherback and green sea turtles, regularly utilize coastal waters off Long Island (Gaffney, 1993; Okeanos, 1996; Corps, 1996). The threatened loggerhead also regularly occurs offshore (Okeanos, 1996; Corps, 1996).

Seven species of Federally-listed endangered Cetaceans and eighteen additional species that are protected utilize Long Island's offshore waters. There are five Federally-listed protected Pinniped species that visit this offshore region, including three species that commonly occur (Okeanos, 1996) (Refer back to Table 4.1.2.1 for a listing of these species) .

The Federally-threatened and State-listed endangered piping plover, State-listed threatened common tern, and State-listed endangered least tern arrive in the spring, primarily constructing nests on high ocean beaches on the seaward sides of primary dunes (Gaffney, 1993; Corps, 1996). Additionally, Federally and State-endangered roseate terns construct nests among American beach grass on barrier islands. Historically, the Federally-threatened beach tiger beetle (*Cicindela dorsalis dorsalis*) inhabited barrier island communities as well. State-listed threatened Eastern mud turtle occurs in barrier island and back bay communities. Also, the State-listed threatened Eastern Spadefoot toad (*Scaphiopus holbrookii*) is found in barrier island communities (Corps, 1996).

Plants of concern include the Federally-threatened seabeach amaranth (*Amaranthus pumilus*) (Corps, 1996; Gaffney, 1993) and the State-listed endangered plant, seaside knotweed (*Polygonum glaucom*), both found throughout the barrier island system (Corps, 1996).

4.4 Coastal Zone Management Issues

The State of New York has an active program of coastal zone management, created under the sponsorship of the Federal Coastal Zone Management Act of 1972. The purpose of this program is to conserve and sustain the coastal environment and to secure the economic and social well-being of the people of the State with respect to enjoyment of coastal resources (Schoenbaum, 1993). All the townships within the study area participate in the New York State Coastal Management Program and some are preparing or already have prepared a Local Waterfront Revitalization Program (LWRP). The LWRP involves compiling and analyzing information about the local waterfront area, and reviewing plan elements and EIS by the New York State Department of State (NYSDOS) (Gaffney, 1993). Once a municipality obtains NYSDOS approval of its LWRP, it is then eligible for a program implementation grant that may be used for any activity, other than construction, such as feasibility, design, and preliminary engineering studies (LoGrande, 1987). Both the Towns of Islip and East Hampton currently have an LWRP in draft form. The Town of Brookhaven currently does not have an LWRP in effect and the Town of Southampton has not yet adopted an LWRP.

The New York State Coastal Erosion Hazard Areas Act (Article 34 of the Environmental Conservation Law) gives cities, towns, and villages the first opportunity to regulate erosion hazard areas within their jurisdiction by enacting a local erosion management law. These local laws must be approved by NYSDEC as meeting minimum standards to ensure consistent implementation of

the provisions of Article 34. If local governments choose not to exercise jurisdiction, NYSDEC will regulate activities in the erosion hazard areas. The Town of Southampton, the Village of Southampton, and the Village of Westhampton Beach have elected to participate in the Coastal Erosion Hazard Management Program (Gaffney, 1993). The NYSDEC currently administers the Program for the Town of East Hampton (pers. comm. Liquori, 1996). The Town of Islip does not have Coastal Erosion Hazard Area Management Program regulations in effect (pers. comm. Town of Islip Planning Department, 1996). The Town of Brookhaven only has Coastal Erosion Hazard Area Management Program regulations in effect for the North Shore of Long Island (pers. comm. Town of Brookhaven Planning Department, 1996).

4.5 Navigational Issues

Boat usage in the Long Island area has resulted in the demand for navigation channel access, as well as the establishment of various support industries. A network of Federal, State, and County navigation channels has been developed in Suffolk County waters. Some of these channels aid navigation of all vessels, while others provide access to only a small area and benefit a limited segment of the population residing along the shoreline adjacent to such channels (LoGrande, 1987).

4.5.1 Reach 1: Fire Island Inlet to Moriches Inlet

The Long Island Intracoastal Waterway extends approximately 50 miles through the bays between the barrier beaches and the southern mainland shore of Long Island from Fire Island Inlet to the south end of Shinnecock Canal. The waterway is 100 feet wide and 6 feet deep. Maintenance dredging is generally required somewhere along the channel every two years (Corps, 1977). Fire Island Inlet is routinely dredged on a two year cycle (Coastal Science & Engineering, 1994). Since 1960, various dredging projects have been completed by Suffolk County within Reach 1. The majority of these occurred in Great South Bay, primarily in the back bay and tributary areas (SCPD, 1985).

The outer channel in Moriches Inlet was dredged by the Corps in March, 1996, and the inner channel was completed in December 1996 (pers. comm. Corps, 1996). The Corps began construction of the Moriches Inlet Navigation Project in 1987 with the reconstruction of the east jetty. Reconstruction of the west jetty, which began in May, 1988, came to a halt approximately one year later due to a shortage of funds. The Corps plans to complete work on the ocean end of the west jetty once additional funding from the State is secured (Gaffney, 1993).

In addition to this federally authorized navigation project, a significant number of dredging projects have already been completed by the County in Great South and Moriches Bay. These projects were primarily conducted in the back bay and tributary areas (SCPD, 1985).

4.5.2 Reach 2: Moriches Inlet to Shinnecock Inlet

Prior to Federal involvement at Shinnecock Inlet, navigation through Shinnecock Inlet was extremely dangerous due to the presence of an offshore sand bar at the oceanward entrance to the

inlet, which forced boaters to take a roundabout route in a southwestern direction. Boaters placed themselves at a dangerous angle to the ocean waves when navigating this winding passage to the inlet.(Corps, 1987). Dredging of the Shinnecock Inlet navigation channel was completed in November, 1990, to correct this situation. Safe navigation is maintained through a direct alignment of the navigation channel, through the ebb shoal. Approximately 1/2 million cubic yards of sand were dredged from the inlet during the winter of 1992 and placed on the barrier beach west of the west jetty (Gaffney, 1993). Varying amounts will be maintenance dredged every two years depending on need (pers. comm. Corps, 1996).

4.5.3 Reach 3: Shinnecock Inlet to Southampton

Suffolk County has completed several dredging projects within the eastern portion of Shinnecock Bay primarily in the back bay and tributary areas (SCPD, 1985).

4.6 Water Quality

4.6.1 Great South Bay

The Great South Bay covers an area of 80.7 square miles with an average depth of 4.3 feet (Goodhart Dietz, 1982). The Great South Bay is approximately 21 miles in length and has a maximum width of approximately 5.5 miles (Bokuniewicz et al. 1980). The bay receives freshwater input from adjoining rivers, runoff, rainfall and ground water flow. Due to its shallow depths, circulation in the Great South Bay is influenced by local winds moreso than tidal circulation (Goodhart Dietz, 1982). Tidal influx from the Atlantic Ocean is mainly restricted to the inlets. Although the tidal range in the Atlantic Ocean outside of the bay exceeds 3 feet, the tidal range in the Great South Bay is only less than 1 foot (Bokuniewicz *et. al.*, 1980).

The waters are generally turbid, however because of the GSB's shallowness. Light intensities are often higher than 1% surface irradiation at the bottom (Goodhart Dietz, 1982). Annual mean water temperatures are consistent between the surface and bottom but vary considerably by season (Denver Service Center, 1977). Historically, the average annual water temperature of GSB is approximately 62°F. Temperatures in the past have ranged from as low as 29°F during the winter months to as high as 85°F during the summer months. Historically, dissolved oxygen (DO) levels in the back bay tributary areas have ranged from as low as 3.6 mg/l to as high a 15.1 mg/l. DO levels in the central portion of the Great South Bay in the past have ranged from 4.5 mg/l to 14.8 mg/l. Total and fecal coliform counts in the vicinity of the tributary areas of the Great South Bay have ranged from as low as <2 to as high as 11,000 most probable number (MPN)/100ml and from <2 to 1,600 MPN/100 ml. Total and fecal coliform counts in the central Great South Bay in the past have ranged from <2 MPN/100 ml to 2200 MPN/100 ml and <2 MPN/100 ml to 300 MPN/100 ml, respectively (SCDHS, 1996).

Salinity in the bay is a result of a combination of the mixing of fresh waters derived from stream and groundwater flows, direct runoff, precipitation, and the high salinity ocean waters flowing into the bay on the flood tide (USEPA, 1981). Salinity values undergo seasonal fluctuations averaging about 27.7 parts per thousand (ppt) annually with lower values occurring at the mouths

of streams and during the fall (e.g., September) and higher values occurring at the inlets and during the early summer (e.g., June) (USEPA, 1981; SCDHS, 1996).

The bay water is slightly alkaline ranging from a pH of 7.8 to 8.6 (Denver Service Center, 1977). The pH of seawater is primarily controlled by bicarbonate/carbonate buffering which holds most saline water at a pH of approximately 8 (pers. comm. DOI, 1996). The pH of the bay water is largely affected by flushing action that takes place between the Great South Bay and the Atlantic Ocean and hence has pH values comparable to those of the Atlantic Ocean.

Seasonally certified areas, defined as areas open to shellfish harvesting for a limited time during the year based on water quality conditions, are usually closed from late spring to late fall. Many of these closures take place in the vicinities of marinas and boat mooring areas because of potential for sewage discharges from marine toilets. However, the vast majority of closings are in the back bay tributary areas especially during periods of heavy storm water runoff which results in elevated total and fecal coliform levels (NYSDEC, 1996).

4.6.2 Moriches Bay

Moriches Bay is approximately 9 miles long with widths up to 2.5 miles and covers an area of 13.6 square miles. The bay is shallow, especially along the south shore mainland, with about 42% of the bay at depths less than 3 feet. Freshwater input to Moriches Bay is provided by 15 streams which drain an area of approximately 47 square miles (Kassner, 1985) and also by the seaward flow of fresh water from the aquifers under Long Island (LIRPB, 1978).

Historically, the average salinity value in Moriches Bay is approximately 29 ppt (SCDHS, 1996) According to salinity distributions recorded in 1977, salinity values were the highest at the Inlet with levels decreasing east and west of the inlet (Kassner, 1985). The average annual temperature is approximately 58 °F. Historically, temperatures in Moriches Bay have ranged from as low as 31 °F during the winter months to as high as 85 °F in the summer months.

DO levels in the tributary areas of Moriches Bay have ranged from 4.8 mg/l to 13.3 mg/l and in central Moriches Bay from 4.5 mg/l to 13.4 mg/l. Total and fecal coliform counts in the tributary areas of Moriches Bay have ranged from <2 to 2800 MPN/100 ml and <2 to 1,600 MPN/100 ml, respectively. In the central portion of Moriches Bay, total and fecal coliform counts have historically ranged from <2 to 6200 MPN/100 ml and <2 to 2400 MPN/100 ml, respectively (SCDHS, 1996).

During the 1950s and 1960s, approximately 40 duck farms were situated in waters which are tributary to Moriches Bay. As a result, large quantities of nutrients were released into the bay during this time causing large blooms of phytoplankton. In 1951, New York State implemented a program prohibiting duck wastes from entering the bay. As a result of stricter regulations governing disposal of duck wastes and the stabilization of Moriches Inlet, water quality in the bay has steadily improved. The main body of the bay is classified by the NYSDEC as a Class SA saline surface water body. This classification means that the waters of Moriches Bay are suitable for shellfishing for market purposes and primary and secondary recreation. However due to total

and fecal coliform loadings from stormwater runoff, several bay tributaries and their mouths are subject to closure for shellfishing (Corps, 1983)

4.6.3 Shinnecock Bay

Shinnecock Bay covers an area of approximately 14.5 square miles with a width up to 2.9 miles. Like the other bays, Shinnecock Bay is shallow with maximum depths of 12 feet and 7 feet existing in the eastern and western sections respectively, and average depths of 5 feet being recorded at mean low water. Marshes and tidal flats cover 42 percent of the bay area. Shinnecock Inlet, open continuously since the hurricane of 1938, plays a major role in influencing the bay's hydrography (Kassner, 1985).

Water quality in Shinnecock Bay is considered excellent and is classified as a Class SA saline surface water by the NYSDEC. High water quality in the bay is partially attributed to the tremendous flushing action that occurs through the inlet (Corps, 1987). According to salinity levels recorded from 1977 to 1995, the average salinity levels at Shinnecock Inlet range from 29.23 ppt to 32.46 ppt with an average value of approximately 31 ppt. Average salinity values west and east of the Inlet are approximately 30 ppt. The average annual temperature in Shinnecock Bay is approximately 57°F with temperatures in parts of the bay historically ranging from as low as 30°F in the winter months to as high as 82°F in the summer months. DO levels in the back bay tributary areas of Shinnecock Bay have ranged from 4.1 mg/l to 13.8 mg/l. Total and fecal coliform counts in the back bay tributary areas have ranged from 2 to 300 MPN/100 ml and 2 to 130 MPN/100 ml, respectively. DO levels in central Shinnecock Bay have historically ranged from 5.1 to 28.4 mg/l. Total and fecal coliform counts in this region of the bay have ranged from <2 to 2,400 MPN/100 ml and <2 to 240 MPN/100 ml, respectively (SCDHS, 1996).

4.6.4 Coastal Ponds

There is little to no information on current water quality conditions for coastal ponds on the south shore, which include Mecox Bay, Sagaponack Lake and Georgica Pond (SCDHS, 1996).

Georgica Pond has a surface area of approximately 300 acres and has a watershed area of 10.6 square miles. In general, Georgica Pond is shallow except near its seaward end where depths exceed 40 feet. Georgica Pond is highly stratified with the less dense fresh water runoff overlying the more dense sea water with limited mixing of the two (Corps, 1977).

Mecox Bay is uniformly shallow with an average depth of 4 feet. The bay experiences mixing due to wind and therefore tends not to be stratified. The salinity of Mecox Bay depends on the status of its inlet (i.e. opened or closed) and is associated with flushing of sea water from the Atlantic Ocean (Corps, 1977).

4.6.5 Offshore Atlantic Ocean

Offshore waters in the proximity of Fire Island Inlet have an average temperature of approximately 59°F and an average salinity of approximately 31 ppt (SCDHS, 1996). It is presumed that the water quality of the offshore Atlantic Ocean is likely to be similar to that offshore Fire Island Inlet, for the rest of the project area.

4.7 Land Use

The study area encompasses four townships. These are, from west to east, Islip, Brookhaven, Southampton, and East Hampton. Lands and waters within the project area are owned by a variety of interests including the Federal Government, New York State, Suffolk County, and private landholders located in towns, villages, and local municipalities (Corps, 1977).

4.7.1 Reach 1: Fire Island Inlet to Moriches Inlet

Bounded by Robert Moses State Park on the western tip and Smith County Park on the east, the middle of Fire Island consists of private residential summer communities, public beaches and open space, and a large Federal wilderness area under the jurisdiction of the Fire Island National Seashore (LIRPB, 1984). This wilderness area is the only federally designated wilderness area in the State of New York (pers. comm. DOI, 1996). Robert Moses State Park is a highly developed, high intensity, beach oriented recreational development. Suffolk County owns Smith Point County Park, located within the boundaries of Fire Island National Seashore, which is a fully developed recreational facility (Corps, 1977). The back bay communities of reach 1 are primarily residential with some area devoted to recreational and open space (e.g., Heckscher State Park), commercial, and institutional uses (LIRPB, 1982).

4.7.2 Reach 2: Moriches Inlet to Shinnecock Inlet

The barrier island within Reach 2, where Westhampton Beach is located, is primarily residential with the exceptions of Cupsogue Beach and Shinnecock County Parks, located on the western and eastern tips of the barrier island respectively. The mainland area of Reach 2 is interspersed primarily with vacant, residential, commercial, and agricultural land (LIRPB, 1982).

4.7.3 Reach 3: Shinnecock Inlet to Southampton

Reach 3 is predominately residential with a significant portion classified as institutional and belonging to the Shinnecock Indian Reservation (LIRPB, 1982). Smaller portions of this reach are vacant.

4.7.4 Reach 4: Southampton to Beach Hampton

The land segment in this reach is primarily agricultural with smaller areas devoted to vacant and residential land use (LIRPB, 1982).

4.7.5 Reach 5: Beach Hampton to Montauk Point

Land in this area is predominately open space and recreational and vacant areas. Open space and recreational areas include Napeague State Park, Hither Hills State Park, Camp Hero State Park, Montauk County Park and Montauk Point State Park. There is a small area of this reach devoted to residential and commercial land use (LIRPB, 1982).

4.8 Socio-Economics

4.8.1 Present Economic Setting

The reformulation effort is located entirely within the boundaries of Suffolk County. Suffolk County occupies the entire eastern part of Long Island and includes the smaller islands off its coast. The land area of Suffolk County is approximately 922 square miles. The county seat is Riverhead, situated in eastern central Long Island. The county has two-thirds of all the salt water frontage in the Metropolitan Region and half of the ocean frontage. These geographic features make its potential for recreation and for sport and commercial fishing very great (Corps, 1977).

Long Island has approximately 32,000 acres devoted to agriculture and Suffolk County is the leading agricultural county in New York State based on the wholesale value of crops. However, the total number of acres devoted to agriculture has seen a substantial decline from 50,000 acres in 1982 to 32,000 acres in 1995. Historically, Suffolk County has always been a significant producer of potato crops within the United States. However, Suffolk County agriculture experienced a significant decline in potato plantings from 1982 to 1995. In 1982, 38% of the agricultural farm acres on Long Island were devoted to growing potatoes. As of 1995, only 20% of total farm acres were devoted to growing potatoes. Suffolk County also produces more than 50% of the total production of greenhouse and nursery stock in New York State (Long Island Business News, 1996).

The service, retail trade, and construction sectors rank the highest in the Suffolk County economy in terms of number of establishments. The service, retail trade, and manufacturing sectors are the largest employers in Suffolk County. In 1995, the unemployment rate in Suffolk County was 5.4%. It has been decreasing since 1992 when it peaked at 8.0% (Long Island Business News, 1996).

4.8.2 Population Characteristics and Trends

Since 1990, Suffolk County's year round population increase is indicated to be greater than in the previous decade. On January 1, 1995, the average household size in the Nassau-Suffolk area was estimated to be 2.95 persons per household. This figure is substantially above the national average of 2.62 persons per household. The 1995 Long Island Lighting Company (LILCO) population estimates for the four towns are as follows: Islip - 301,080; Brookhaven - 418,171; Southampton - 46,380; and East Hampton - 16,340. This annual estimate of population is derived from U.S. census data and LILCO records of active residential electrical meters (LILCO, 1995).

4.9 Commercial and Recreational Fisheries

According to the Suffolk County Annual Environmental Report (1993), nearly 40 million pounds of finfish and shellfish were harvested from Long Island regional waters. Trends over the last twenty years reveal that hard clam and lobster harvests have declined. Although, hard clam harvests have declined, it still remains the States most important fishery (in terms of dollars). Additionally, scallop and striped bass landings are also low compared to historic catches. Table 4.9.1 summarizes the shellfish production for the south shore of Suffolk County for 1993 to 1995.

Recreational fishermen surf-cast for striped bass and bluefish off the coasts of barrier islands and the south shore easterly to Montauk Point. Within the embayments, bluefish, winter flounder, fluke, tautog and porgies are caught from party boats and private vessels.

Table 4.9.1
South Shore of Suffolk County Shellfish Production, 1993-1995

Shellfish/Year	1993		1994		1995	
	Bushels	Value ($)	Bushels	Value ($)	Bushels	Value ($)
Hard Clams	68,285	5,040,903	63,901	4,801,982	55,754	5,042,333
Soft Clams	192	13,393	176	12,858	264	17,675
Oysters	122	3,294	- -	- -	6	210
Bay Scallops	- -	- -	39,356	255,812	3,199	22,044
Mussels	4,502	44,920	2647	27,523	6692	67,543
Conchs	807	17,700	134	2,835	8	144

- - indicates there is no data for a particular shellfish for the specified time period
Source: NYSDEC, 1996

4.10 Cultural Resources

The following description of cultural resources identifies sites that have been included on the National Register of Historic Places (NRHP). All sites mentioned are either within or near the study area. There also exist a number of sites, not mentioned here, which may be potentially eligible for listing on the NRHP. Submerged cultural resources in the project area consist of submerged prehistoric sites and shipwrecks. Studies indicate that land surfaces exposed during both the Pleistocene and post-Pleistocene epochs exist beneath the barrier islands and continue offshore. A number of shipwrecks have also been identified along the south shore of Long Island in both nearshore and offshore areas. A tracking/survey project is currently being undertaken by Fire Island National Seashore in order to identify the materials and locations of the shipwrecks. Physical evidence identified thus far consist mainly of ship fragments (Corps, 1996).

4.10.1 Reach 1: Fire Island Inlet to Moriches Inlet

Sites within this reach are listed on both the State and National Registers. Sites located within the Town of Islip include the Fire Island Light Station, the Southside Sportsmen's Club District, Cutting Bard Estate, Sagtikos Manor, John Ellis Roosevelt Estate, the United States Post Office in Bay Shore, Suffolk Marine Museum Basin, Hollins Estate Theme, Penny Boatbuilding Shop, Rudolph Oyster Cull House, Jacob Ocker's House, and St. John's Episcopal Church and Cemetery (New York State Office of Parks, Recreation and Historic Preservation, 1996).

Sites within the Town of Brookhaven include the William Floyd Estate, Masury Estate Ballroom, Old East Moriches School, Terry-Ketcham Inn, Smith Rourke House, and Havens Estate. Sites listed within the Village of Bellport include the Bellport Village Historic District and the Bellport Academy. Located within the Village of Patchogue are the United Methodist Church, United States Post Office, and Congregational Church of Patchogue (New York State Office of Parks, Recreation and Historic Preservation, 1996).

4.10.2 Reach 2: Moriches Inlet to Shinnecock Inlet

Listed sites within this reach include the Stephen Jagger House and the William Merrit Chase Homestead. Within the Village of Westhampton Beach are the Crowther House and the United States Post Office (New York State Office of Parks, Recreation and Historic Preservation, 1996).

4.10.3 Reach 3: Shinnecock Inlet to Southampton

Sites within this reach include the James L. Breese House, Balcastle, the Beach Road Historic District, Dr. Wesley Bowers House, the Southampton Village Historic District, the Captain Mercator Cooper House and the North Main Street Historic District. All of these sites are located within the Village of Southampton (New York State Office of Parks, Recreation and Historic Preservation, 1996).

4.10.4 Reach 4: Southampton to Beach Hampton

Listings in this reach include the Beebe Windmill, the Windmill in Watermill, and the Sagaponack Historic District. These sites are all located within the Town of Southampton. Sites located within the Village of Southampton include the Captain Goodale House, and the Wickapogue Historic District (New York State Office of Parks, Recreation and Historic Preservation, 1996).

Sites within the Town of East Hampton are the Wainscott Windmill, the Pleasants House, Miss Amelia's Cottage, and the Johnathan Schellinger Farm Complex. Within the Village of East Hampton are the Thomas Moran House, the East Hampton Village District, the Hayground and Hook Windmills, the Briar Patch Road, Egypt Lane, Jericho, Jones Road, North Main Street, and Pantigo Road Historic Districts, Aunt Phoebe's Saltbox, the Babock-Edelman House, the Campbell-Stokes House, the Coppell House, the Grantland Rice-Meyer House, the Hedges-Talmadge House, the Ellery James House, the Ring Lardner House, the Maidstone Club, the Delsener House, the Francis Newton House, the Olin House, the Ossorio Estate, the Beale House,

elevation of the Gardiners Clay ranges from approximately 40 to 80 feet below MSL. The Gardiners Clay, as with the Monmouth Group, does not exist in the vicinity of Beach Hampton.

The Pleistocene Upper Glacial Formation lies unconformably above the Gardiners Clay and consists of fine to coarse stratified sand and gravel. The elevation of this formation varies based on the thickness of the surficial deposits throughout the study area. The surficial geology of the eastern half of Reach 5 (Hither Hills State Park to Montauk Point) is composed of Pleistocene deposits consisting of undifferentiated till deposits and the Ronkonkoma Terminal Moraine.

Undifferentiated shore beach, shore, salt-marsh deposits, and artificial fill compose the surficial geology of the majority of the study area.

4.13.2 Barrier Island Dynamics

The long reach between Southampton and Coney Island exhibits characteristics of both a spit and an offshore bar. The present barrier beach is made up of four islands, two peninsulas, and Coney Island, which has been joined to the mainland of Long Island by fill operations. All barrier islands are long but narrow, varying in width from less than 200 ft to more than one mile. North from the beach is a belt of sand dunes which crest between 10 to 30 feet above MSL for most of the stretch between Jones Inlet and Southampton. North from the dunes, the barrier island slopes downward gently towards the waters of the bays. Fresh and salt water marshes are found along the northern shoreline of the barrier island as well as the southern shoreline of the mainland (Taney, 1961).

The location of the Long Island shoreline has not been constant throughout past geologic ages. The island has attained much of its present exterior form in the recent epoch, in the past 10,000 years. The fringe of barrier islands and spits along the south shore was formed subsequent to the end of the Pleistocene epoch. It appears though, that the headland section has suffered from continuing erosion with local deposition while the barrier beaches have built up since the end of the last glacial advance of the Pleistocene epoch. The shoreline has undergone minor changes in terms of the recent geologic past (since 1834-38) (Taney, 1961).

The existing sand beaches and barrier islands fronting the south shore of Long Island have been formed by wave and littoral forces. Possible supply sources of material are the headlands in Reach 5 and nearshore bottom and stream sediments. Under existing conditions, the bluff unit of the headlands appears to be the sole source of additional beach-size sediments to the foreshore and nearshore bottom. However, there is a large discrepancy between the estimated amount of sediment moving in the littoral drift and that supplied by the bluff unit, indicating that a source of beach material in addition to the bluffs is present. This supply of littoral materials is most probably the existing beaches and possibly a small portion of the nearshore bottom (Taney, 1961).

Barrier island systems are geologically dynamic. In areas where dunes are non-existent, overwashes tend to occur more frequently. Due to high energy storms, and bay and oceanic forces associated with the Atlantic barrier island shoreline, these areas will naturally have the potential of becoming unstable in some subtidal areas. Natural cross island topographical changes

occur as a result of longshore sand transport through the process of longshore drift and high energy storms. Sand is transported from the ocean side of the barrier island towards the center and eventually the bayside of the island. Over hundreds of years, these events will slowly shift the island towards the bay, a process known as barrier island migration (Corps, 1995).

4.14 Sediment Data

4.14.1 Offshore

Sediments along the south shore of Long Island predominately consist of sand. Sand content primarily exceeds 95% and there is a slight trend of increasing percentage of sand from west to east. Sand content is highest nearshore adjacent to Fire Island while the higher percentage of sand values occur further offshore easterly from Moriches Inlet onwards. Gravel content in sediments is typically less than 1% with some exceedances of this 1% value offshore the mid section of Fire Island and Beach Hampton. There are no discernible west to east trends along the south shore concerning percent gravel. Silt-clay content generally decreases from west to east and is typically highest nearshore from Moriches Inlet onwards in an easterly direction. Organic content rarely exceeds 1% and decreases slightly from west to east (Cerrato, 1983).

4.14.2 Bay Systems

The main source of marine sediments in the Great South Bay are materials that have been brought in by tidal currents through inlets from westward littoral currents in the ocean along Fire Island. These currents carry unsorted glacial material eroded from the headlands of eastern Long Island. Other sources transporting sediments into the bay include wave wash-over, wind, and streamflow off the mainland. The main factor affecting distribution of sediment within the bay is current velocity. Velocity closely correlates to grain size as larger particles are found at locations of higher velocities such as stream channels, deltas, and inlets. Much smaller grain sizes are found forming muds at the bottom of deeper basins and near salt marshes where current velocity is slower. Correlations between water depth and sediment size have also been shown. Deeper areas of the bay serve as settling basins for fine grained materials (USEPA, 1981).

In central Great South Bay, sediments are predominantly sandy, with less than 20% silt and clay. The vicinity of Fire Island Inlet consists of areas of coarse sand with low mud and organic content (USEPA, 1981). Sediments in eastern Great South Bay are predominantly sandy. Extensive areas with sand contents exceeding 90% exist primarily on the Fire Island side of the bay and the bottom immediately adjacent to the north shore of the bay. Areas containing high percentages of fine materials are found in basins west of Blue Point, Patchogue Bay and Bellport Bay. Correlations between percentage of fine material and depth are high. A gradual transition from sand to muddy sand along the south side of the bay reflects the very gradual increase in depth in this area. Current velocities at the bottom of the bay are reduced in many deeper parts of the bay, permitting settling of finer materials. Sediments found in creeks and tributaries have a high percentage of fine materials, usually greater than 95%. This is due to the fact that dredged channels and creeks apparently serve as settling basins for large amounts of fine-grained and organic materials, most of which originates from land runoff. Floating seagrass and algae pushed

into the creeks by winds also serve as another source of sediment (Greene *et. al.*, 1978). Sediments with high mud content are also found in channels and rivers. The high mud content in this area is primarily due to duck waste deposits (USEPA, 1981).

Approximately 49% of Moriches Bay bottom is overlain with sediment that is less than 20% fine material. Eighteen percent of the bay bottom exceeds 80% fine material. Shallow tributaries that feed into the Bay contain soupy, black, clayey silt while deeper portions of the central bay contain clayey silt with abundant shell fragments. A clayey silt is a silt with high percentages of clay thereby making it finer than a silt. Areas near Smith Point Bridge predominately consist of sand. The coarsest sediments are found closer to the Intracoastal Waterway and become finer towards the mainland. The southern areas of Moriches Bay along the barrier island primarily consist of sand (Greene *et. al.*, 1978).

Sediments within the central portion of Shinnecock Bay contain a high percentage of sand, primarily exceeding 95%. Areas along the north shore of the Bay are also characterized by high sand percentages however, silt and clay occur more frequently in these areas.

4.15 Aesthetics

The south shore of Long Island in Suffolk County is dominated by a vast expanse of natural shoreline. Much of it is undeveloped and retains its natural quality. A large portion of the south shore oceanfront is developed consisting of residences, jetties, groins, and other various structures. The aesthetic integrity of the natural environmental is not continuous along the entire south shore. Landscape scars, including cleared vegetation, graded fill areas, dune stabilizing devices, and development are frequently found along the stretch of coastline from Fire Island Inlet to Montauk Point (Denver Service Center, 1977).

Section 5.0
Proposed Studies

5.1 General.

This section identifies studies proposed by the Corps to obtain information pertinent to the description of baseline conditions and evaluation of potential impacts associated with the alternatives being investigated under the reformulation study. This section is subdivided into a list of tasks, followed by a description of tasks.

The Corps of Engineers, in conjunction with the cooperating agencies is seeking to establish a series of review groups, and an Interagency Reformulation Group to facilitate public involvement, communication, coordination, and decision making in the reformulation study. The groups to be established include the following:

- Interagency Reformulation Group (IRG)
- Senior Executive Review Group (SERG)
- Technical Review Group (TRG)

It is expected that the Interagency Reformulation Committee (IRG) will consist of Representatives of the involved Federal Agencies, including but not necessarily limited to: Corps of Engineers, and the Cooperating Agencies (USFWS, NPS-FINS, USGS), and other involved Federal Agencies (NMFS, FEMA). Subject to the Federal Advisory Committee Act, the reformulation committee will also include heads of the SERG, and TRG. The NY District, District Engineer will be the chairperson of the IRG. Acting chairperson will be Stuart Piken, Chief, Planning Division. The IRG will function as the overall decision making body for the reformulation study, upon advisement of the TRG and SERG.

The Senior Executive Review Group (SERG) will consist of State, County, and local representatives. The SERG will be headed by the Reformulation Study non-Federal Sponsor, the NYSDEC. The purpose of the SERG will be to provide and receive input from the State, County, and local municipalities, in addition to the general public.

The Technical Review Group (TRG) will include representatives in the fields applicable to the reformulation study, including, but not limited to: geologist, engineers, biologist, ecologists. The head of the TRG will be an independent participant, with experience relative to coastal projects. The purpose of the TRG will be to do the following:

1) provide recommendations regarding the type and scope of studies to be undertaken, and
2) to review and comment on the results of the studies.

5.2 List of Tasks.

5.2.1 Coastal/Geological

- Topographic Mapping
- Profile Surveys
- Storm Surge Modeling
- Sediment Budget / Shoreline Change Analysis
- Inlet Dynamics Modeling
- Shoreline Change Modeling
- Storm-induced erosion modeling
- Coastal Processes Analysis
- Offshore Borrow Area Seismic Investigations
- Offshore Borrow Area Coring
- Structure Inventory
- Storm Damage / Benefit Analysis
- Geological Analysis of Overwash/Breach
- Plan Formulation (Engineering Development of Alternatives)

5.2.2 Biological Studies

- Offshore Investigations
  - Benthic and Epibenthic Surveys
  - Finfish Use Survey
  - Surf Clam Inventory

- Terrestrial Species Investigations
  - Shorebird inventory / use survey
  - Barrier Island Species Inventory

- Benthic Sampling - Placement Area

- Endangered Species Investigations
  - Piping Plover Habitat Suitability Index (HSI) model construction
  - Shorebird Habitat Evaluation Procedure (HEP) Analysis
  - Piping Plover / Least Tern habitat use monitoring at Westhampton

- Vegetative Mapping

- Estuarine Investigations
  - Literature Search - Data Gap Identification
  - Existing Water Quality Analysis
  - Water Quality Model
  - Eelgrass & Eelgrass Fauna Inventory
  - Juvenile Fish Surveys
  - Plankton, Phytoplankton, and Fish Larva surveys

- Mitigation Analysis

5.2.3 Cultural Resources

- Remote Sensing Survey

- Shipwreck Inventory

- Terrestrial Cultural Inventory / Historical Land Use Inventory

5.3 Description of Tasks

The following give a general description of the study tasks being undertaken.

5.4 Coastal/Geological

5.4.1 Topographic Mapping An aerial survey has been performed and topographic mapping has been derived from the results. This work included establishing ground control, photo control, aerial photography, topographic mapping, location of roads, structures and cultural features, flood mark survey, and utilities survey. Products include 1"=800 ' photos, 1"=200 ' maps, and Intergraph-compatible files.

Purpose: Provides reference and base maps for the project plan, encompassing the project area, and area susceptible to flooding.

5.4.2 Profile Surveys. Long range profiles of the entire project area have been taken, at previously established stations from the initial reformulation effort. Profiles have been taken to depth of closure (approximately 2500 ft) to determine accurate beach and offshore geometry. This profiling has been conducted, with vertical and horizontal control. Beach sediment sampling has also been conducted, at the time of sampling for textural analysis.

Purpose: Provides survey information to be used for volume calculations in developing the project plan and for reference in shoreline change calculations, in addition to providing native material for determining compatibility with borrow area material.

5.4.3 Storm Surge Modeling. Using state-of-the-art storm surge modeling techniques recently developed, the global model and inlet and bay hydrography will be updated for the with- and without-project conditions. Current topography will be used in the without project condition, and the current suite of storms will be updated to include recent storm patterns. The inlet bay model will be calibrated to produce known tides and recent storm events. Selected hurricanes and northeaster hydrographs throughout the study area will be determined for various improvement alternative combinations, for different reaches. The development of dune overtopping and failure, and barrier island overwash and breaching will be included in the analysis of the bay frequency curves. The stage-frequency relationships will include considerations for risk and uncertainty in the development of the relationships.

Purpose: Identify the predicted storm surge in the ocean and bays, resulting from storm events for different barrier island configurations to determine damage potential for various scenarios.

5.4.4 Shoreline Change Mapping / Sediment Budget. This includes Compiling mapping of historic shorelines for use in determining long term erosion rates and placement of the current shoreline on historical shoreline mapping. Using historic and new data, long term

erosion rates will be determined for the without project conditions by reach. The without project sediment budget will be developed for the project reaches using previously developed sediment budgets, dredging and fill records, shoreline change data and new data. The sediment budget will be updated for the with-project condition, and downdrift impacts to inlets due to possible beachfill alternatives identified.

Purpose: To identify the historical movement of material, and quantify the movement of material anticipated under without project conditions, and various project alternatives.

5.4.5 Inlet Dynamics Modeling. For the project area inlets (Fire Island, Moriches and Shinnecock) under current conditions from recent project construction, inlet hydraulic and hydrodynamic parameters such as tidal prism, minimum cross-section area, ocean and bay tidal ranges will be investigated and updated. Inlet impacts such as changes in shoaling rate from plan improvement alternatives will be assessed, including impacts from nourishment or structural improvements.

Purpose: To refine the interaction of the inlets with the sediment budget, to better establish the impact of project alternatives on the inlet systems.

5.4.6 Shoreline Change Modeling. For the without-project and with-project conditions, the numerical model GENESIS will be developed to determine without-project future shoreline conditions and the with-project performance. The shore protection alternative designs will be modeled and evaluated, for future, with-project conditions using GENESIS model. Plan alternatives will be modeled to compare performance and develop shoreline renourishment requirements. Both existing condition and post-borrow excavation conditions will be modeled. Input into the model includes development of a nearshore wave database, through wave refraction modeling, based upon existing WIS Hindcast information. Calibration and verification of the model will be conducted. Considerations of uncertainty in shoreline evolution modeling results will be included.

Purpose: To model shoreline change, in order to refine the movement of material placed on the beach, taking into consideration changed conditions, due to the removal of material from the offshore borrow areas.

5.4.7 Storm-induced erosion modeling. For the without-project and with-project conditions, the numerical model SBEACH will be used to determine storm erosion losses for the entire range of storm frequencies for both northeasters and hurricanes for individual project reaches where appropriate. Products will include storm recession/frequency curves for both without- and with-project conditions (for areas using beachfill/dunes as plan improvement alternatives) which will be used in the development of plan economic benefits. Consideration of uncertainty will be included in the modeling results.

Purpose: SBEACH modeling is conducted to better establish the cross-shore movement of material, for existing conditions and for with-project alternatives.

5.4.8 Coastal Processes Analysis. Coastal Processes analyses including inundation, wave runup distances and wave impacts on structures will be developed, by reach, for the entire range of frequency events, as input into the economic development of plan benefits, for without project existing and future conditions. Other coastal processes, such as berm submergence and overtopping will also be developed.

Purpose: Modeling to determine the existing conditions, and with-project conditions for various alternatives.

5.4.9 Offshore Borrow Area Seismic Investigations. Based upon work conducted previously for the Fire Island to Montauk Point Study, including the 1981 borrow area analysis, and additional work conducted under the Westhampton Interim, Fire Island Interim, and West of Shinnecock Interim studies, additional work will be conducted to better establish the findings of these studies, and to identify additional borrow areas. This work will include broad spanning seismic sampling to better identify overall geomorphologic trends, in addition to identifying suitable material lenses, with data collection including a minimum of 2 seismic profilers of a range of frequencies, in addition to side scan sonar. It is likely that this effort will provide the United States Geological Service with information required for research for current investigations, and could potentially be cost-shared with the USGS.

Purpose: To identify regional geology, utilizing seismic, and side scan sonar. This information will be used to identify the geological features of the offshore area, for purposes of defining material availability, and determing the impact on current coastal processes along the shoreline

5.4.10 Offshore Borrow Area Coring. In order to ground truth the material lenses identified in the seismic analysis, additional core sampling will be undertaken to better identify borrow source material, and quantities of material available.

Purpose: The purpose of this effort is to groundtruth the results of the seismic investigations to refine the knowledge regarding the quality and quantity of fill material available for nourishment operations.

5.4.11 Structure Inventory. The total number of structures in the study area is estimated to be 50,000. A 3 percent sample survey of these 50,000 total structures would involve 1,500 on-site person to person interviews, which is a large enough sample to yield a statistically valid database. These interviews will involve a cross section of structure types and usages and will be used to develop damage functions (depth-damage relationships) which will relate depth of water above and below the first floor to expected damages. These damages will be ascertained for both the structures themselves and also the contents of the structures and will be specifically determined for a minimum of three depths of flooding. In conjunction with these interviews. contents-as-a-percent of structures will be established.

Purpose: The purpose of conducting the structure inventory is to identify the existing structures located within the flood plain, and to identify damages which could be incurred as a result of increasing water elevations.

5.4.12 Storm Damage / Benefit Analysis. Damages will be assessed for existing and future without project conditions, and alternative project conditions for a period of 50 years. These conditions will be assessed for three damage mechanisms of inundation, including tidal flooding, storm induced recession, and wave attack and runup. In addition, damages will be assessed for both residential and commercial structures and contents, as well as damages to boardwalks, roads, coastal structures, and utilities for improved conditions alternatives.

Purpose: The purpose of the storm damage analysis is to identify the potential for storm damages, due to storms of varying magnitudes. The storm damage analysis will determine the reduction in damages associated with various alternatives.

5.4.13 Geological Analysis of Overwash/Breach. This analysis includes an analysis of Barrier Island ocean and bay shorelines, and associated changes in shoreline position, and habitat change through the processes of barrier island overwash and breaching. The focus of this effort will be to update the efforts compiled in the 1980 Geomorphic Analysis, utilizing existing aerial photography, and digitized shorelines. An emphasis will be placed on recent changes, particularly in the vicinity of Westhampton Beach.

Purpose: The purpose of this effort is to better quantify the process of habitat change through episodic events associated with barrier island morphology.

5.4.14 Plan Formulation (Engineering Development of Alternatives). As described in detail in Section 3.0 of this document, the plan formulation is an iterative process, which is undertaken in a systematic manner to evaluate all reasonable alternatives. A number of alternatives, identified early in the formulation process, become more refined as more information becomes available. The formulation process includes the following phases: 1) Identification of Project Reaches / Project Constraints, 2) Identification of Alternatives, 3) Screening of Alternatives, 4) Design of Protection by Reach, 5) Optimization/Comparison of Alternatives, and 6) Selection of a Recommended Plan

Purpose: The purpose of this effort is to identify the optimal plan for the project area, by optimizing engineering, economic, and environmental considerations.

5.5 Biological Studies

5.5.1 Offshore Investigations. The following studies will be conducted to assess the potential for impact in the offshore borrow areas, where material would be removed for placement purposes, including benthic and epibenthic surveys, finfish use surveys, and surf clam surveys.

5.5.1.1 Benthic and Epibenthic Surveys. Benthic grabs and similar devices will be utilized from Corps ships or shoreline for this analysis. Biological analysis involves locating areas of high benthic production. Sampling will be taken in each identified borrow area in the spring and fall, over a two year period.

Purpose: Benthic sampling will provide an indication of the existing benthic and epibenthic organisms within the potential borrow area sites, to assist in borrow site selection, and to better identify the impacts associated with the removal of material from the borrow area.

5.5.1.2 Finfish Use Assessment. An assessment of the existing finfish usage will be used to assess the impacts of dredging on the finfish (feeding habitat) located within the designated borrow areas.

Purpose: The finfish assessment will provide an indication of the utilization of the borrow area by finfish to assist in borrow area selection and in determining the relative impacts to the fish associated with removal of material from the borrow area.

5.5.1.3 Surf Clam Inventory. A review of the existing surf clam surveys will be conducted to determine the existing information, and establish the potential need for supplemental surveys. Findings and recommendations will be coordinated with the NYSDEC. Additional surf clam inventories, using NYSDEC surveying protocol, will be performed via a NYSDEC recommended charter (commercial) boat, as necessary.

Purpose: The surf clam inventory will be conducted to assist in borrow area selection, better quantify the relative abundance of surf clams within the borrow areas, and to establish the relative impacts of the removal of material on the surf clam.

5.5.2 Terrestrial Species Investigations.

5.5.2.1 Barrier Island Inventory. Utilizing existing information available from FINS, USFWS, NYSDEC, and other sources, the district will conduct a literature search and establish an inventory of existing species. Based upon available information, the District will perform a survey of terrestrial wildlife species within the project area based upon data gaps. Emphasis will be given to Threatened and Endangered species. The following will be observed:

1) Existing and potential usage by wildlife species
2) Existing and potential usage by the public
3) Evaluation of surrounding habitat

Purpose: The species inventory will provide an updated listing of the species which utilize the project area, to define the existing conditions and assist in predicting future impacts.

5.5.2.2 Shorebird inventory / use survey. In cooperation with the FINS, USFWS and NYSDEC the Corps will conduct a specific shorebird survey along the project length. Based upon a literature search of existing information, surveys may be conducted to address the data gaps. This may entail periodic sampling throughout a one year period, with an emphasis on the summer season.

Purpose: The shorebird inventory, and shorebird use survey will be used to quantify the existing and historic shorebird populations along the project area. This information will be used to determine the existing conditions and assist in predicting future impacts.

5.5.3 Benthic Sampling - Placement Area. Sampling of potential intertidal placement areas will be undertaken utilizing corings. The effort will be to identify existing benthic organisms present in the beach face.

Purpose: The intertidal benthic sampling in the potential placement area will identify and quantify the existing benthic organisms. This information will be used to establish the existing conditions, and determine potential impacts associated with fill placement.

5.5.4 Threatened and Endangered Species.

5.5.4.1 Piping Plover Habitat Suitability Index (HSI) model construction. A piping plover HSI model does not currently exist. The development of this HSI model is a crucial step in the completion of the HEP analysis. The District's is performing this task in cooperation with the USFWS, and NBS and other members of the piping plover community.

Purpose: The piping plover HSI model is being developed to be used in combination with existing shorebird models for HEP analysis. Incorporation of the piping plover model will provide consideration of plover habitat quality into the HEP analysis.

5.5.4.2 Shorebird Habitat Evaluation Procedure (HEP) Analysis. The District's Planning Division, in conjunction with USFWS, NBS and NYSDEC, will conduct a Habitat Evaluation Procedure to assess the value of existing conditions at the selected sites. Terrestrial sites will evaluated. This includes three seasons of data collection for accurate calibration of the HEP model.

Purpose: The HEP analysis will provide an indication of the quality and quantity of the existing habitat. The analysis will provide an indication of the impact of each alternative on the habitat and assist in mitigation planning.

5.5.4.3 Piping Plover / Least Tern habitat use monitoring at Westhampton. This task is the continuation of the endangered species monitoring for construction of the Westhampton Interim Project. Data collection will continue for one additional season beyond that prescribed for the Westhampton Interim Project.

Purpose: The purpose of the continuation of this monitoring is to identify the impacts associated with construction activities and secondary impacts of the project on the piping plover and least tern populations.

5.5.5 Vegetative Mapping. This mapping is based upon interpretation of infrared aerial photography, verified by ground truthing existing vegetation. This mapping will be prepared as an overlay for the topographic mapping. The mapping will also provide mapping of the subaquatic bay vegetation.

Purpose: The vegetative mapping will identify the existing conditions of the project area, including the barrier island, mainland, and subaquatic vegetation in the bay.

5.5.6 Estuarine Investigations

5.5.6.1 Literature Search - Data Gap Identification. To focus the studies needed to characterize the existing condition of the bay, and to adequately determine the impacts of the project alternatives on the bay, literature research will be undertaken to compile the existing information, and to assist in prioritizing further efforts. This effort includes extensive coordination with FINS, NYSDEC, NYSDOS, Suffolk County, Towns, SUNY Stonybrook.

Purpose: The literature search on the bay will be conducted to identify the existing base of knowledge regarding the characteristics of the bays, and determine the studies necessary to sufficiently characterize the existing characteristics of the bays, and to determine potential changes as a result of project alternatives.

5.5.6.2 Estuarine Impact Survey. Surveys will be performed in the project area bays, (Fire Island, Moriches and Shinnecock) to update existing biological inventory, and to identify habitat value and potential mitigation/restoration needs. The potential impact if any, of the proposed project on the identified bays, will be assessed. An exact protocol will be finalized after input from agency coordination and scoping meetings, and a review of existing information. The range of variables for establishing the existing condition of the bay include the following:

- Temperature
- Salinity
- Turbidity
- Dissolved Oxygen
- Chlorophyll

Purpose: To supplement existing information, sampling will be undertaken to characterize the existing condition of the bays.

5.5.6.3 Water Quality Model. A model will be developed to determine the impact of changes in the barrier island configuration on the bay characteristics. This work will be an extension of the effort conducted for the hydrodynamic modeling of storm surges. This

effort will include synoptic data collection of the model parameters for model calibration. The model will identify changes in salinity, and impacts on bay residence times.

Purpose: The water quality model will determine the relative impact of project alternatives on the bay, including salinity and temperature, and assist in future impact predictions.

5.5.6.4 Eelgrass & Eelgrass Fauna Inventory. Based upon vegetative mapping, eelgrass beds will be delineated. For selected eelgrass beds, fauna inventories will be conducted, to establish eelgrass usage.

Purpose: The purpose of the eelgrass and eelgrass fauna analysis would be to establish the existing conditions in the bay, and identify the role of eelgrass beds in bay productivity and to assist in future impact prediction.

5.5.6.5 Juvenile Fish Surveys. Barrier island bayside habitat will be surveyed, utilizing seining nets to determine existing use in fish spawning. Seasonal surveys will be conducted at representative locations along the barrier island for a period of two years.

Purpose: Juvenile fish surveys serve to identify the existing usage of the bay, as nursery habitat, to identify the overall productivity of the bay and assist in future impact prediction.

5.5.6.6 Plankton, Phytoplankton, and Larval Fish Eggs Sampling. Plankton tows will be conducted in the bay to determine the extent of plankton, phytoplankton, and larval eggs Sampling will be conducted bimonthly from October through April.

Purpose: This sampling will serve to identify the existing conditions within the bay on a seasonal basis for plankton, phytoplankton and larval fish eggs.

5.5.7 Mitigation Analysis. Environmental screening of alternatives is an iterative process for evaluating the impacts associated with each potential alternative. The process for developing mitigation alternatives is described in detail in Section 3. Analysis of impacts will direct toward mitigation measures which may include.

a) avoiding the impact altogether by not taking certain actions or parts of an action;
b) minimizing impacts by limiting the degree or magnitude of the action and its implementation;
c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
d) reducing or eliminating impacts over time; and
e) compensating for impacts by replacing or providing substitute resources or habitats.

5.6 Cultural Resources. Cultural Resources investigations are under taken to ensure compliance with Sections 106 and 110 of the National Historic Preservation Act of 1966, as amended through 1992, 36 CFR Part 800, and the Abandoned Shipwreck Act of 1988. Investigations include surveys of the borrow areas and sand placement areas.

5.6.1 Remote Sensing Surveys. Remote sensing surveys will be undertaken for the borrow areas utilizing side scan sonar and magnetometer. Side scan sonar surveys are being undertaken by the USGS. Magnetometer surveys will be conducted for refined borrow area locations. In addition to borrow area surveys, side scan sonar and magnetometer investigations will be conducted for potential nearshore placement areas.

Purpose: The seismic and magnetometer survey will identify potential wrecks which will be avoided during construction. These studies will also recommend alternatives and mitigation measures, if avoidance is not feasible.

5.6.2 Shipwreck Inventory. A literature search and coordination with local experts is being undertaken to establish a database of existing known shipwrecks.

Purpose: The shipwreck inventory will refine the existing information regarding known wrecks which may fall within the project borrow areas, or within the nearshore placement areas.

5.6.3 Terrestrial Cultural Inventory / Historical Land Use Inventory. The terrestrial cultural resources investigation will identify areas of potential prehistoric and historic use and occupation. A methodology will be developed for required studies to be undertaken, for the range of alternatives which are considered. Further field investigations will be conducted, as necessary, depending upon the type of alternatives being considered in the optimization of alternatives.

Purpose: This investigation will identify known cultural resources through documentary research and archive investigations. This study will also serve to identify further investigations required for various project alternatives.

Section 6.0
Interagency Scoping Meeting
Summary of Written Comments

Pursuant to 40 CFR Part 1501.7 (a)(1), an interagency scoping meeting for the storm damage reduction reformulation study EIS was convened by the District on November 7, 1996 with general introductory comments on the purpose for the meeting and background information on the proposed project. The meeting introduction was followed by a detailed presentation on the proposed project. Following the presentation, scoping meeting attendees were given the opportunity to present oral comments.

Table 6.1 presents the list of interagency scoping meeting attendees and indicates if oral comments on the proposed project were presented at the time of the meeting. Table 6.2 presents the names, affiliations and addresses of those individuals who submitted written comments. Table 6.3 summarizes agency concerns and the Corps' response and/or proposed action.

Table 6.1
November 7, 1996 Environmental Scoping Attendees

Name	Affiliation	Address	Phone Number
Abell, Diane	Fire Island National Seashore	120 Laurel Street Patchogue, NY 11772	(516) 289-4810
Allen, Jim	National Park Service	15 State Street Boston, MA 02109	(617) 223-5058
Anders, Fred	NYSDOS - Coastal Management Program	162 Washington Ave. Albany, NY 12231	(518) 474-6000
Baker, Harry	Village of Saltaire	P.O. Box 5551 Bayshore, NY 11706	(516) 583-5566
Barton, William	NYSDOS - Coastal Management Program	162 Washington Ave. Albany, NY 12231	(518) 474-6000
Bender, W. Charles	Suffolk County Parks Superintendent	P.O. Box 144 W. Sayville, NY 11796-0074	(516) 854-4951
Bilecki, Michael	Fire Island National Seashore	120 Laurel Street Patchogue NY 11772	(516) 289-4810
Bloom, Jonathan	Representing NYS Assemblyman Phil Boyle	1 East Main St. Suite 219 Bay Shore, NY 11706	(516) 665-0125
Brinkman, Susan	Representing County Legislator Brian Foley	27 Havens Avenue Patchogue, NY 11772	(516) 854-1403
Brittingham, Cathy	The Nature Conservancy	250 Lawrence Hill Rd. Cold Spring Harbor, NY 11724	(516) 367-4715
Cannuscio, Vincent	Supervisor, Town of Southampton	Town Hall, 116 Hampton Road, Southampton, NY 11968	(516) 283-6000
Cerrato, Robert	Marine Sciences Research Center, SUNY Stony Brook	SUNY, Stony Brook, NY 11794-5000	(516) 632-8666
Cowen, Ray E.	Regional Director, NYSDEC	Bldg 40, SUNY, Stony Brook NY 11790-2356	(516) 444-0345
Daley, William W.	Chief, Coastal Erosion Management Section, NYSDEC	50 Wolf Road, rm. 388 Albany, NY 12233-3507	(518) 457-5620
Davies, Dr. Dewitt	Suffolk County Planning Department	220 Rabro DriveP.O. Box 6100, Hauppauge, NY 11788-0099	(516) 853-4865
Dean, Monica	Representing Stephen J. Yacubich, Village Clerk, Bellport	Incorporated Village of Bellport, 29 Bellport Lane, Bellport, NY 11713	(516) 286-0327
Doheny, Tom	Town of Hempstead Department of Conservation/Waterways	1 Parkside Dr. Pt. Lookout, NY 11564	(516) 897-4133
Dowhan, Joe	USFWS		

Table 6.1 (Continued)
November 7, 1996 Environmental Scoping Attendees

Name	Affiliation	Address	Phone Number
Dwar, Rameshwar	Planning Director, Town of East Hampton	159 Pantigo Road Easthampton, NY 11937	(516) 324-4140
Edelstien, Dave	USFWS	P.O. Box 608 Islip, NY 11751-0608	(516) 581-2941
Foley, Mary	National Park Service	15 State St. Boston, MA 02109	(617) 223-5024
Frank, Michael R.	Suffolk County Parks Department	P.O. Box 144 W. Sayville, NY 11796	(516) 854-4984
Fraser, Jim	Dept. of Fisheries & Wildlife, Virginia Tech	Dept. of Fisheries & Wildlife, Virginia Tech, Blacksburg, VA 24061-0321	(540) 231-6064
Georgeson, Thelma	Mayor, Village of Quogue	P.O. Box 926, 7 Village Lane Quogue, NY	(516) 653-4478
Gravens, Mark	USACE Waterways Experiment Station (CERC)	3909 Halls Ferry Road Vicksburg, MS 39180-6199	(601) 634-3809
Green, Ronald	Suffok County Planning Department	220 Rabro Drive, P.O. Box 6100, Hauppauge, NY	853-5512
Hanse, Gil	Town of Babylon, Dept. of Enforcement & Security, Division of Fire Prevention	200 E. Sunrise Highway Lindenhurst, NY 11757-2598	(516) 893-1092
Johnson Hughes, Christy	USFWS	P.O. Box 608 Islip, NY 11751	(516) 581-2941
Jones, Cliff	Corps	26 Federal Plaza NY, NY 10278-0090	(212) 264-2054
Kassner, Jeffrey	Town of Brookhaven Environmental Protection	3233 Rte. 112 Medford, NY 11763	(516) 451-6455
Kelly, David	Representing Deputy Commissioner Fred Daniels, S.C. Department of Fire, Rescue, and Emergency Services	P.O. Box 127 Yaphank, NY 11980-0127	(516) 852-4904
Lifford, William D.	Suffolk County Department of Public Works	335 Yaphank Ave. Yaphank, NY 11980	(516) 852-4078
Milazzo, John C.	Attorney for the SCWA	Suffolk County Water Authority, Sunrise Highway & Pond Road, Oakdale, NY 11769	(516) 563-0692
Martin Kovic, Patricia	USFWS, Project Leader	P.O. Box 21 Shirley, NY 11967	

Table 6.1 (Continued)
November 7, 1996 Environmental Scoping Attendees

Name	Affiliation	Address	Phone Number
McIntosh, Robert	National Park Service	15 State St. Boston, MA 02109	(617) 223-5001
McMahon, Thomas	Suffolk County Soil and Water Conservation District	Riverhead County Center, Rm.E-16, Riverhead, NY 11901	(516) 727-2315
Murray, Bob	USFWS	P.O. Box 608 Islip, NY 11751-0608	(516) 581-2941
Palleschi, Arnold	Commissioner, Dept. of Conservation & Waterways, Town of Hempstead	Town of Hempstead Lido Boulevard Point Lookout, NY 11569	(516) 431-9200
Penny, Larry	Director of Natural Resources, Town of East Hampton	159 Pantigo Road East Hampton, NY 11937	(516) 324-4140
Pfeifer, Tom	Corps	CENAN-PL-EN 26 Federal Plaza NY, NY 10278-0090	
Proios, George	Assistant County Executive	Suffolk County Executive Office, Hauppauge Office Park 888 Veterans Memorial Highway P.O. Box 6100 Hauppauge, NY1788-0099	(516) 853-4654
Psuty, Norbert	Associate Director, Institute of Marine and Coastal Sciences, Rutgers University	P.O. Box 231 New Brunswick, NJ 08903-0231	(908) 932-6555
Raddant, Andrew	Dept. of the Interior	408 Atlantic Ave., Rm. 142, Boston, MA 02210-3334	(617) 223-8565
Rasmussen, Christina	Corps		
Resler, Steven	NYSDOS - Coastal Management Program	162 Washington Ave. Albany, NY 12231	(518) 474-6000
Rosenberg, Neil	S.C. Office of Parks & Recreation		(516) 669-1000
Schwab, Dr. William C.	U.S. Geological Survey	384 Woods Hole Road Quissett Campus Woods Hole, MA 02543-1598	(508) 457-2299
Smith, Frank	Town of Islip, representing Supervisor McGowan	Town Hall, 655 Main St. Islip, NY 11751	(516) 224-5380
Southard, William	NYSDEC	Bldg 40, SUNY, Stony Brook NY 11790-2356	(516) 444-0422

Table 6.1 (Continued)
November 7, 1996 Environmental Scoping Attendees

Name	Affiliation	Address	Phone Number
Sutton, Jaye	FEMA	FEMA, Rm. 1338, 26 Federal Plaza, NY NY 10278	(212) 225-7201
Svoboda, Alan	Town of Islip	Town Hall, 655 Main Street, Islip, NY 11751	(516) 224-5380
Tanski, Joseph J.	NY Sea Grant Extension Program	125 Nassau Hall, SUNY @ Stony Brook, Stony Brook, NY 11794-5002	(516) 632-8730
Terchunian, Aram	Village of Westhampton Dunes	P.O. Box 728 Westhampton Beach, NY 11978	(516) 288-6571
Trepeta, Ken	Assistant to Congressman Rick Lazio NY02	126 West Main Street Babylon, NY 11702	(516) 893-9010
Vegliante, Gary	Mayor, Village of Westhampton Dunes	P.O. Box 728 Westhampton Beach, NY 11978	(516) 288-6571
Vietri, Joseph	Corps		
Weberg, Paul	FEMA	FEMA, Rm. 1338, 26 Federal Plaza, NY NY 10278	
Wilson, Robert	SUNY, Stony Brook-Marine Sciences Research Center		
Zimmerman, Brian	USDA Natural Resources Conservation Service	Riverhead County Center Riverhead, NY 11901	(516) 727-2315

Table 6.2
List of Agencies Submitting Written Comments

Name	Affiliation	Address
Brittingham, Cathy	The Nature Conservancy	250 Lawrence Hill Road Cold Spring Harbor, NY 11724
Connell, Allan S.	Natural Resources Conservation Service, U. S. Department of Agriculture	River head County Center Room E-16 Riverhead, NY 11901
Fraser, James D.	Professor, Department of Fisheries and Wildlife Sciences Virginia Tech	Department of Fisheries and Wildlife Sciences Virginia Tech Blacksburg VA, 24061-0321
Grucci, Felix J.	Supervisor, Town of Brookhaven	Department of Planning, Environment and Development Division of Environmental Protection 3233 Route 112 Medford, NY 11763
Hanse, Gilbert W.	Emergency Preparedness Coordinator, Town of Babylon	Town of Babylon 200 E. Sunrise Highway, Lindenhurst, NY 11757-2589
Kassner, Jeffrey	Town of Brookhaven	Department of Planning, Environment and Development Division of Environmental Protection 3233 Route 112 Medford, NY 11763
Krimm, Richard W.	Federal Emergency Management Agency	FEMA Washington, D.C. 20472
Murdas, Ramesh	Director, Planning Department, Town of East Hampton	Town of East Hampton 300 Pantigo Place, Suite 105 East Hampton, NY 11937-2684
Lyons, Thomas B.	Director, Environmental Management Bureau, NY State Office of Parks, Recreation and Historic Preservation	The Governor Nelson A. Rockefeller Empire State Plaza Agency Building 1 Albany, NY 12238
Ocker, Kevin E.	County of Nassau Department of Recreation and Parks	Eisenhower Park East Meadow, NY 11554

Table 6.2 (Continued)
Agencies Submitting Written Comments

Name	Affiliation	Address
Penny, Larry	Director, Natural Resources, Town of East Hampton	Town of East Hampton 300 Pantigo Place, Suite 105 East Hampton, NY 11937-2684
Pierpont, Ruth	Historic Preservation Field Services Bureau, NY State Office of Parks, Recreation and Historic Preservation	Historic Preservation Field Services Bureau Peebles Island P.O. Box 189 Waterford, NY 12188-0189
Raddant, Andrew L	U.S. Department of the Interior	U.S. Department of the Interior Office of the Secretary Office of Environmental Policy and Compliance 408 Atlantic Ave. - Rm. 142 Boston, Massachusetts 02210-3334
Reynolds, Thomas M.	The Assembly State of New York	Room 933 Legislative Office Building Albany, NY 12248
Stoddard, Gerard	Fire Island Association	P.O. Box 424 Ocean Beach, NY 11770
Wolff, Dr. Fred	Geology Department, Hofstra University	Hofstra University Hempstead, NY 11550-1090

Table 6.3
Agency Comments/Concerns and Corps' Responses

Agency	Comment/Concern	Response/Proposed Action
Fire Island Association, Inc.	1. The references Beach Nourishment and Protection (National Research Council, 1995) and "Technologies to Benefit Shoreline Property and Rare Species Habitat: An Atlantic Coast Example" (Office of Technology Assessment , 1995) should be consulted and referred to. 2. Clarify that hard structures are not contemplated for Reach 1. 3. The project will limit construction and the overall number of residences may be fewer than the number that existed prior to the onset of erosion. 4. Where there is no primary dune, the project should accept the southern building line as the northerly extent of the project and all newly viable properties should be north of the project boundary. 5. The consequences of breaching requires more attention. 6. The issue of borrow sites containing cultural resources should not be raised.	1. The references will be referred to for future consultation. 2. All alternatives are currently considered initially. Through the formulation proceess alternatives will be refined. 3. Real Estate analysis, and variations in project alternatives will determine the number of residential structures. 4. Project alignment will be optimized through the formulation process. 5. The consequences of breaching and all storm damage mechanisms will be considered in greater detail. 6. The issue of borrow site containing cultural resources needs to be addressed to ensure proper selection.

Table 6.3 (Continued)
Agency Comment/Concerns and Corps' Responses

Agency	Comment/Concern	Response/Proposed Action
Natural Resources Conservation Service, USDA	1. Nomination of Allan S. Connell, District Conservationist, to the Technical Advisory Committee (TAC).	1. All nominations to both the TAC and EMC are welcome and will be considered.
Nature Conservancy	1. A comprehensive, unbiased analysis of all environmental impacts be undertaken. 2. Inventory of plants and animals within the document are incomplete. 3. An ecological model for the ecosystems found within the project area should be developed. 4. Data of least tern reproductive success should be included in the Corps' BMP 5. The Technical Advisory Committee (TAC) should be comprised of interdisciplinary group without any geographical limitations.	1. A complete analysis of all environemtnal impacts will be undertaken. 2. Based upon existing data availablility, a suitable inventory of plants and animals will be undertaken. 3. A Habitat Evaluation Procedure (HEP) for shorebirds is being used to evaluate the impact of project alternatives. 4. The monitoring program for threatened and endangered shorebirds, currently being conducted as part of the Westhampton Interim Project will be expanded and be combined with other existing or additional studies as necessary. 5. All nominations will be considered.
Historic Preservation Field Services Bureau, (NY SHPO)	1. Request that the Corps forward cultural resources information when it becomes available.	1. NYSHPO coordination will continue as appropriate.
County of Nassau, Department of Recreation and Parks	1. Request that the Corps keep this agency informed of future meetings and correspondence.	1. All concerned agencies and individuals will be kept informed of future events concerning the reformulation effort.

Table 6.3 (Continued)
Agency Comment/Concerns and Corps' Responses

Agency	Comment/Concern	Response/Proposed Action
Department of Planning, Environment and Development, Town of Brookhaven	1. Nomination of James Graham, P.E., Town Commissioner of Engineering to the Executive Management Committee (EMC). 2. Nomination of Jeffrey Kassner, Director, Town of Brookhaven Division of Environmental Protection to the TAC. 3. An environmental analysis should consider how to restore the Great South Bay or at least be able to ensure that no additional stresses be placed on the ecosystem. 4. The impacts of breaches and storm events on the bay's ecosystem (w/focus on hard clams) should be evaluated depending on location of occurrence and distance from breach. 5. Biological monitoring of hard clams in the bays should be included as a component of the BMP, specifically: an inventory of the distribution of hard clam abundance and the use of a habitat model to evaluate the site specific impacts of breaches; modelling of how the frequency and intensity of storm induced tides in the south shore bays influence hard clam abundance and abiotic and biotic environments including successional state; assessing the impacts of hard clam abundance and distribution resulting from hydrographic changes in inlets due to sand bypassing projects.	1,2 All nominations to both the TAC and EMC are welcome and will be considered. 3. The environmental analysis will consider the impacts of project alternatives on the entire ecosystem. 4. The impact of breaches will be considered in greater detail once a more complete data set of baseline information is obtained through current and future studies. 5. Although hard clam studies are currently not included in the study effort as an indicator species, Your recommendeation will be taken under advisement
Federal Emergency Management Agency	1. Future nomination of individuals to both the EMC and TAC.	1. All nominations to both the TAC and EMC are welcome and will be considered.

Table 6.3 (Continued)
Agency Comment/Concerns and Corps' Responses

Agency	Comment/Concern	Response/Proposed Action
Department of the Interior	1. The barrier island system should not be treated as a static entity that must be shielded from change. The proposed stabilization poses a risk to the system ecology by interfering with changes that occur during storm events. 2. The shortage of baseline data makes any assessment of future states of the system impossible. 3. Inlet prevention is an unnatural change and would present a great risk to the barrier island ecosystem. 4. Corps efforts for modeling and additional studies should be coordinated with other agencies and individuals conducting research as some work of this type has already been performed. 5. Data for the BMP and habitat modeling should be specific to the study area and not extrapolated from New Jersey, unless clearly supportable. 6. Further review of the scientific literature on the biota of Fire Island, additional in-house studies, technical reports, and ecological surveys would be useful. 7. Potential effects of each alternative on the beach fauna (wrack fauna, burrowing invertebrates, and interstitial fauna) should also be considered. 8. Wave refraction analysis must be performed to provide inputs to improved conceptual and statistical/empirical models as well as GENESIS. Further study of critical offshore, nearshore, and upland morphologies favoring dune and island breaching is needed to develop a long-term management plan to reduce storm damage because existing data is dated or incomplete. 9. Numerous valid scientific questions are raised concerning the interrelationship between various ecological and biological habitats and species. The questions were raised primarily to assist in identifying data gaps.	1. Noted. Proposed impactts to system ecology will be undertaken. 2. The existing data, data gaps, and potential issues will be further refined in the data collection process. 3. Impacts of alternatives on the barrier island ecosystem will be explored further. 4. The Corps intends to coordinate extensively with other agencies throughout the duration of the reformulation effort. 5. Existing information obtained from the BMP conducted in New Jersey will not supersede site-specific information for the study area unless future studies reveal that this option is clearly supportable. 6. Numerous studies are planned and agencies will be consulted in order to reduce the deficit of baseline data. 7. To identify additional studies, the Corps will consider all data gaps together with the data quality objectives required to evaluate the impacts, as well as the cost of acquiring such data. 8. Wave refraction analysis is planned. 9. The studies undertaken will identify a methodlogy for determining interelationships between various ecological and biological habitats and species.

Table 6.3 (Continued)
Agency Comment/Concerns and Corps' Responses

Agency	Comment/Concern	Response/Proposed Action
Geology Department, Hofstra University	1. The language used in the scoping document seems as though it was written by coastal residents. 2. The impact of flood and ebb surge into and out of the present inlets (with no new breaches) must be addressed. 3. Bayside flooding from a storm surge with lack of a breach needs to be addressed.	1. The scoping document has been revised to provide an impartial view. The EIS will ensure a balance between economic and environmental concerns. 2,3 Hydrodynamic modeling will consider the various alternatives including the existing conditions.
Division of Fire Prevention, Town of Babylon	1. An emergency study to determine the environmental impact being caused by erosion of the sore thumb (Fire Island Inlet) be undertaken. 2. A detailed and comprehensive study of Fire Island Inlet should be undertaken.	1. All reasonable alternatives will be addressed in the Reformulation Study. 2. A detailed study of Fire Island Inlet Dynamics is scheduled to be undertaken.
Environmental Management Bureau, NY SHPO	1. Impacts to recreation be added as a separate scoping item, including facilities, programs, and recreational resources.	1. Impacts to recreation will be considered although it is not a primary benefit in the economic analysis.
Department of Fisheries and Wildlife Sciences, Virginia Tech	1. An important goal of the study should be to develop an understanding of the structure and function of overwash and breach ecosystems. 2. A system of information exchange among agencies and individuals involved in the project be set up (e.g., meetings, symposiums, and /or websites). 3. The project be undertaken in 2 phases: 1) a literature search be performed to uncover current information about differences between breach ecosystems, overwash ecosystems and their counterparts; and 2) fieldwork to fill important data gaps uncovered in Phase 1.	1. The effects of overwashes and breaches on the ecosystem will be considered in greater detail. 2. The Corps will investigate various means of information exchange following identification of the EMC and TAC members. 3. Existing information will be compiled prior to initiation of field data collection.

Table 6.3 (Continued)
Agency Comment/Concerns and Corps' Responses

Agency	Comment/Concern	Response/Proposed Action
Town of East Hampton	1. A procedure and design to mitigate the effects of the deposition of overwash sediments into Georgica Pond in conjunction with modifying the easterly groin that would reduce sediment overwash, or mitigate the effect of it, should be a task of the Reformulation Study. 2. The stretch of bluffs in Reach 5 and the business district of the Hamlet of Montauk and Ditch Plains are vulnerable to storm damage and special attention should be given to mitigating future economic losses and habitat losses in these vulnerable areas. 3. Mitigation for Napeague and the "Main Beach" are in East Hampton Village in terms of beach nourishment and dune building should be considered in the study. 4. Where the Town of East Hampton maintains comparable data (e.g., water quality and biological data for Georgica Pond, beach profile data, vegetative mapping, etc.), the Town's data should be incorporated into future reformulation study reports. 5. Studies performed within the Town of East Hampton by individuals outside the Town be coordinated with the Natural Resources Office. 6. Data from such studies should be made available and reproduced in a format accessible to all participating towns and villages. 7. Attention should be given to the numbers and significance of the seabeach interstitial and tidal wrack fauna, primarily arthropods, but other invertebrates as well. 8. The impacts of driving on beaches should be assessed in terms of: 1) the significance of seabeach interstitial and tidal wrack fauna and its relationship to the piping plover, and 2) beach stability. 9. A study or analysis is necessary to fully understand the impacts due to the placement of more hard structures in the shallow water - intertidal system. 10. Barrier island dynamics require more emphasis.	1,2,3All reasonable alternatives will be considered 4,5 Besides conducting studies, the Corps will rely heavily on data obtained by outside agencies and individuals including towns and villages. 6. All studies undertaken will be coordinated with the appropriate individuals. 7. Data Collection is currently planned for the intertidal placement area. 8. Information is available regarding the impact of beach driving on the beach stability. Vehicle traffic is a component of the HEP analysis. 9. The analysis of alternatives in combination with baseline data collection will refine the impacts of alternatives. 10. Sufficient studies will be undertaken to determine the impact of each alternative on the barrier island process.

Section 7.0
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METRIC CONVERSION TABLE

To Convert	Multiply By	To Obtain
feet (ft.)	3.048×10^{-1}	meters
miles	1.609	kilometers
fahrenheit (degrees)	(F x 5/9) - 32	celsius (degrees)
gallon	3.785	liter (l)
pound	4.54×10^{5}	milligram (mg)

Note: All measurements within the report are classified using the English system with the exception of water quality data which is provided in the standard metric units (i.e. mg/l).

APPENDIX A

ENVIRONMENTAL SCOPING LETTER

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090

REPLY TO
ATTENTION OF

September 18, 1996

Mr. Peter M. Weppler, EIS Coordinator
Environmental Assessment Section
Environmental Analysis Branch
U.S. Army Corps of Engineers, Room 2143
Jacob K. Javits Federal Building
New York, NY 10278-0090

Re: Environmental Scoping Document for the Storm Damage Reduction Reformulation Study, Atlantic Coast of Long Island, Fire Island Inlet to Montauk Point, New York FP&M Project No. 368-96-25F

Dear Mr. Weppler:

This is to notify all concerned agencies and regional academic institutions that an interagency scoping meeting is being planned to identify any environmental concerns associated with the Fire Island Inlet to Montauk Point, New York Reformulation Study. The purpose of the reformulation effort is to determine a long-term regional solution to the effects of storms and storm-induced beach erosion along the south shore of Long Island. A description of the project and background is presented in Attachment 1. The scoping process is an early step that will allow the Corps to determine the scope of issues to be addressed in the Reformulation Study.

The scoping meeting is being conducted pursuant to the National Environmental Policy Act of 1969 (40 CFR Parts 1500 - 1508) [NEPA], which requires that Federal agencies perform a full and adequate analysis of all environmental concerns associated with the implementation of its programs and actions in order to minimize any adverse environmental impacts and to preserve and enhance the environment.

A draft environmental scoping document is currently being prepared and will be circulated shortly. This document will present and discuss the following general areas: authorized project description and background; proposed preliminary project alternatives; baseline conditions (ecology, coastal zone management, navigational issues, construction issues, water quality, sediment, land use, socioeconomic, cultural resources, aesthetics, and air and noise); potential storm damages; potential environmental concerns; and potential mitigation measures.

To achieve extended agency involvement, assist with the reformulation effort, and solicit information feedback, the Corps plans to form both an Executive Management Committee (EMC) and a Technical Advisory Committee (TAC). The purpose of the EMC is to assist the Corps in setting planning priorities, facilitate public involvement, and recommend studies related to the reformulation effort. The purpose of the TAC is to review technical data, make recommendations to the Corps, and assist in developing and evaluating alternatives and impact mitigation measures. The EMC will be comprised of agency officials with regulatory responsibilities while the TAC will consist of specialists from various fields.

The agency scoping meeting will be held on November 5, 1996 at 10:00 AM at the Holiday Inn at MacArthur Airport, 3845 Veterans Highway, Ronkonkoma, NY. A Corps representative will preside over the meeting and address the needs and scope of the project. Written and oral comments regarding the draft environmental scoping document can be presented at the meeting or in writing by November 19, 1996. Comments should discuss environmental concerns and issues, suggested analyses and methodologies for inclusion in the Reformulation Study, or sources of relevant data. If written comments aren't anticipated, please notify the Corps of a point of contact to whom future correspondence can be sent. Written comments and nominations for the EMC and TAC should be addressed to:

U.S. Army Corps of Engineers-New York District
Environmental Analysis Branch
CENAN-PL-EA
Jacob K. Javits Federal Building
26 Federal Plaza
New York, NY 10278-0090
Attn: Mr. Peter Weppler

Questions concerning the proposed project should be directed to Mr. Peter Weppler at (212) 264-4663 or Mr. Steven Papa at (212) 264-6070.

Sincerely,

Stuart Piken

Stuart Piken, P.E.
Chief, Planning Division

Attachment 1
Project Background and Description

Project Location

The project area, extending from Fire Island Inlet easterly to Montauk Point along the Atlantic Coast of Suffolk County, is approximately 83 miles long and comprises approximately 70% of the total ocean shoreline of Long Island (see Figure 1). The project area includes: the shoreline, barrier beaches, three large estuarial bays: Great South Bay, Moriches Bay, and Shinnecock Bay, Fire Island, Moriches and Shinnecock Inlets, mainland areas as well as suitable borrow areas for beach restoration along the south shore of Long Island from Fire Island Inlet to Montauk Point.

Project Authorization and Purpose

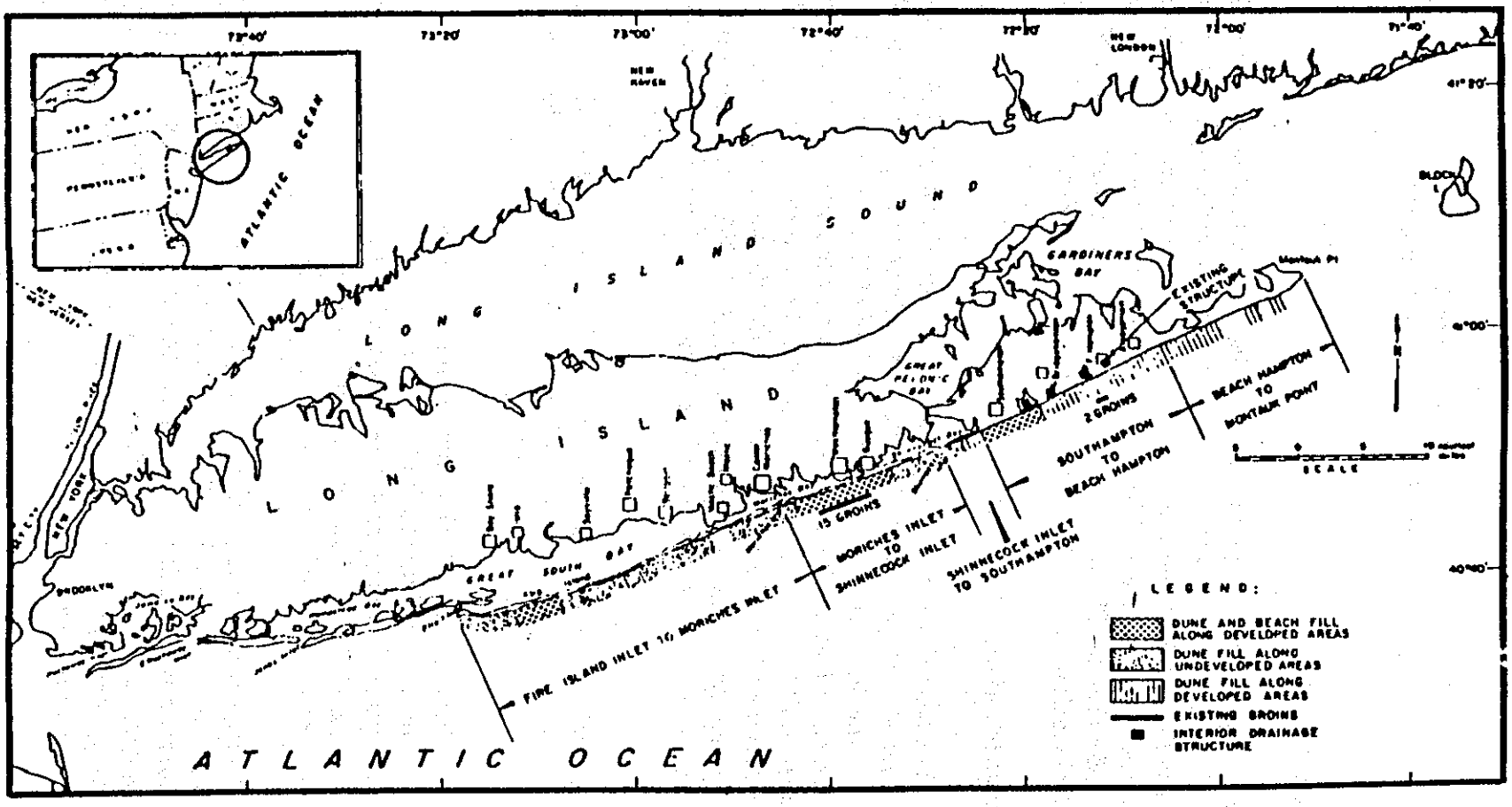
The overall Fire Island Inlet to Montauk Point, New York, Combined Beach Erosion Control and Hurricane Protection Project was authorized by the River and Harbor Act of 1960, substantially in accordance with the recommendations of the Chief of Engineers in House Document No. 425, 86th Congress dated June 21, 1960. This authorization was subsequently modified by Section 103 of the River and Harbor Act of October 12, 1962, Section 31 of the Water Resources Development Act of 1974, Section 502 of the Water Resources Development Act of 1986, and Section 102 of the Water Resources Development Act of 1992. The originally authorized project was developed prior to the enactment of the National Environmental Protection Act (NEPA) in 1969.

The congressionally authorized project provides for a long-term solution to mitigate the effects of storms and storm-induced beach erosion along five reaches of the Atlantic Coast of Long Island. The five reaches are defined as follows:

Reach 1 - Fire Island Inlet to Moriches Inlet
Reach 2 - Moriches Inlet to Shinnecock Inlet
Reach 3 - Shinnecock Inlet to Southampton
Reach 4 - Southampton to Beach Hampton
Reach 5 - Beach Hampton to Montauk Point

The currently authorized project, which is being reformulated, provides for storm protection and storm induced erosion control along the five reaches by means of widening the beaches along the developed areas, raising the dunes by artificial placement of suitable sand, grass planting on the dunes, and construction of interior drainage structures at Mecox Bay, Sagaponack Lake, and Georgica Pond. The project authorizes construction of 50 groins subject to determination of their actual need, based on experience.

Figure 1
Storm Damage Reduction Reformulation Study
Fire Island Inlet to Montauk Point
Project Area Location



Construction History

Following the original project authorization in 1960, a series of design memoranda were planned to be prepared for the entire project along the south shore from Fire Island Inlet to Montauk Point. All planning for Reach 2 was completed in October 1963 in accordance with General Design Memorandum (GDM) No. 1, Moriches to Shinnecock Reach. This GDM recommended improvements for the Moriches to Shinnecock Reach and recommended inclusion of 13 of the 23 groins authorized for construction in this reach. The Chief of Engineers concurred with the State of New York's request to initially construct 11 groins in Reach 2 and 2 groins in Reach 4, with beach fill to be added as necessary. Construction of 11 groins in Reach 2 was initiated in January, 1965 and completed in September, 1966. Construction of 2 groins in Reach 4 was also completed in September, 1965. In February 1969, Supplement No. 1 to GDM No.1 (Moriches to Shinnecock Reach) was prepared which recommended the construction of 4 more groins and placement of dune and beach fill in the section of beach west of the 11 groin field. These 4 additional groins and hydraulic sandfill in Reach 2 were completed by 1970.

Since the congressionally authorized project was developed prior to the enactment of the NEPA regulations, the District was required to prepare an Environmental Impact Statement (EIS) for the entire project area once the regulations took effect. In accordance with NEPA requirements, the New York District of the Corps prepared a Draft Environmental Impact Statement (DEIS) on the project, dated March 12, 1975. The final EIS was submitted to the United States Environmental Protection Agency (USEPA) on January 28, 1978. The Department of the Interior, supported by the Department of Commerce and the USEPA, referred the final EIS to the Council for Environmental Quality (CEQ) as unacceptable, because the agencies felt the EIS did not adequately address all alternatives and their impacts. On June 6, 1978, the CEQ requested that the Corps reformulate the project. In November, 1978, the Chief of Engineers advised concerned environmental agencies of the Corps' intention to develop a plan of corrective measures for the critical area at Westhampton in Reach 2 of the project area. The CEQ decision on the EIS allowed for construction of interim measures for critical areas along the barrier islands provided they could be reversed depending on the outcome of the reformulation effort.

In November, 1978, concerned Federal agencies agreed to a basis for proceeding with the development of Supplement No. 2 to GDM No. 1, independent of the overall Fire Island Inlet to Montauk reformulation effort due to critical erosion in the Westhampton area. Supplement No. 2 to GDM No. 1 (Moriches to Shinnecock Reach), dated July, 1980, noted the severe erosion which had occurred during storms in January and February of 1978. The plan provided for beach fill and dune construction in the area west of the 15-groin field to mitigate erosion and provide storm surge protection, and for beach fill and dune construction in the existing groin field. GDM Supplement No. 2 was approved on November 5, 1980.

In 1980, the barrier island was breached 2,600 feet eastward of the from the east jetty at Moriches Inlet. Public Law emergency authority was invoked to repair the breach which was completed in 1981.

Due to lack of local government support related to periodic re-nourishment cost-sharing issues, planning for construction for the completion of the Moriches to Shinnecock reach was suspended. Since Reach 2 has always been considered the most vulnerable section within the project area, all work regarding the reformulation effort was suspended due to lack of support for this most critical area of the project. The periodic renourishment cost sharing issue was resolved following the enactment of the Water Resources Development Act of 1986, Section 502. This provided for 70% Federal funding to be applied to periodic nourishment of continuing construction at Westhampton, for a period of 20 years following the Act. Upon this resolution, the State was willing to participate in a plan for Reach 2 and coordination between the State and the New York District resumed for Reach 2 and the reformulation effort.

In September, 1989, New York State proposed a plan which became known as the State's preferred interim plan for Westhampton. This interim plan was a variation of Supplement No. 2 to GDM No. 1 but provided for a lesser level of protection. In July, 1991, the Corps issued a Public Notice of a conceptual preferred interim plan for Westhampton prepared by the State. USEPA responded to the public notice and agreed to endorse the plan following the preparation of an environmental assessment and reinstate the reformulation of the overall project.

Meanwhile, the Northeaster of December, 1992, caused two significant breaches in the area of Pikes Beach. In response to this, the Corps utilized approximately 60,000 cubic yards of material dredged from the Intracoastal Waterway and placed it within the western most breach (Pikes Inlet breach). The placement of this material was completed in January, 1993. Construction of the closure of the eastern most breach (Little Pikes Inlet), utilizing material obtained from an offshore borrow area, was completed in November, 1993.

In December, 1992, the District was directed to initiate baseline data collection, including review of previous reports, on the uncompleted portion of Westhampton. As the baseline data was collected, the District also prepared a reformulation project management plan which provided the guidelines for the reformulation. The plan was approved by the Headquarters of the U.S. Army Corps of Engineers (HQUSACE) in July, 1993. Through local government support, the Acting Assistant Secretary of the Army also requested the New York District to evaluate the possibility of developing interim projects under the reformulation effort. Specific areas being considered for interim actions include: Fire Island Inlet to Moriches Inlet (Fire Island Interim Project); Moriches Inlet to Shinnecock Inlet (Westhampton Interim Project); Moriches Inlet (Modification to navigation dredging, and disposal operations); the area west of Shinnecock Inlet; and the Breach Contingency Plan for Barrier Islands - Fire Island Inlet to Southampton.

These interim projects are generally short-term solutions based on the concept that a more long-term solution would be implemented sometime after the interim projects are completed. The interim projects would be designed to provide erosion control for 30 years as required by the N.Y. Environmental Conservation Law, Article 34, the Coastal Erosion Hazard Areas Act. All interim projects have been and shall be coordinated with the Federal, State and interested agencies to obtain conceptual approval early in the study and the design phase.

Project Objective

The Corps will be conducting a reformulation of the shore protection and storm damage reduction project for the south shore of Long Island, New York, from Fire Island Inlet to Montauk Point, and the back bay areas. Along the length of the shoreline from Fire Island Inlet to Montauk Point, the width and the height of the beaches has been continually diminishing, thereby reducing the level of protection to the barrier islands and mainland areas. The loss of beaches has also proved to be a threat to the ecology of the bay areas that are contained within the project area. Breaches in the barrier islands resulting from the storm activity from the period of 1991 through 1993 have also reduced the level of protection and posed substantial threats.

The currently authorized project provides for storm protection and storm induced erosion control along the five reaches by means of widening the beaches along the developed areas, raising the dunes by artificial placement of suitable sand, grass planting on the dunes, and construction of interior drainage structures at Mecox Bay, Sagaponack Lake, and Georgica Pond. The project also authorizes construction of 50 groins subject to determination of their actual need, based on experience.

The reformulation study will evaluate a wide range of alternatives, to be coordinated with Federal, State and local government agencies, to ensure all alternatives are explored. A general list of possible alternatives under consideration in the initial plan of formulation are provided below:

- No Action
- Buy-out Plan
- Revetments
- Revetments with Beach Restoration
- Breakwaters
- Breakwaters with Beach Restoration
- Seawalls
- Seawalls with Beach Restoration
- Beach Restoration
- Groins

- Groins with Beach Restoration
- Inlet Management Plans/Sand Bypassing
- Removal or Modification of Existing Structures (i.e. groins, jetties)
- Land Use Regulations

These alternatives, in conjunction with other applicable alternatives, will be evaluated individually and in combination, to optimize the scale of design and level of protection to be provided by the reformulated project. This evaluation and optimization will be conducted utilizing state-of-the-art modeling of coastal processes. The planning process will be conducted in full compliance with NEPA.

APPENDIX B

INTERAGENCY MAILING LIST

Draft Interagency / Public Mailing List
Environmental Scoping Document
Atlantic Coast of Long Island
Fire Island Inlet to Montauk Point, New York

Internal Review

Army Corps of Engineers

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Department of State

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DISTRICT-SUFFOLK COUNTY

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23-24 Argyle Square
Babylon, NY 11702
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STATE ASSEMBLY MEMBERS

Sheldon Silver
Speaker of the Assembly
Room 932 LOB
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(518) 455-3791

Thomas Reynolds
Assembly Minority Leader
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Albany, NY 12248
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DISTRICT-SUFFOLK COUNTY

Fred Thiele
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Other State

Ms. Mary E. Sampson
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New York State Clearinghouse
Division of the Budget
State Capitol
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New York, NY 10036
(212) 803-3100

Director
Tri-State Regional Planning Commission
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Mr. Ed Matthews, General Park Manager
Long Island State Park Headquarters
Belmont Lake State Park
P.O. Box 247
Babylon, NY 11702

Mr. Alan Bauder
Division of Land Utilization
New York Office of General Services
Empire State Plaza
Tower Building, 26th Floor
Albany, NY 12242

Randall S. Davies, Associate Planner
NYS, State Emergency Management Office
Public Security Building
Harriman Campus
Albany, NY 12226-5000

Brian Culhane, Senior Research Analyst
State Office Building
Veterans Highway
Hauppauge, NY 11788

Local

Long Island Regional Planning Board

Dr. Lee E. Koppelman, Director
Long Island Regional Planning Board
220 Rabro Drive
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(516) 853-5189

Dewitt Davies, Environmental Analyst
Suffolk County Planning Department
220 Rabro Drive
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Suffolk County Elected Officials

COUNTY EXECUTIVE

Robert J. Gaffney
888 Veterans Memorial Highway
Hauppauge, NY 11788-0099
(516) 853-4000

COUNTY LEGISLATORS

Brian Foley
27 Havens Ave.
Patchogue, NY 11772
(516) 854-1400

Steve Levy
22-30 Railroad Ave.
Sayville, NY 11782
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Deputy Presiding Officer
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Islip Terrace, NY 11752
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Tom Finlay
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Bayshore, NY 11706
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Angie Carpenter
4 Udall Rd.
West Islip, NY 11795
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David Bishop
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Lindennhurst, NY11757
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Suffolk County Offices and Appointed Officials

Robert Cimino, County Attorney
Department of Law
North County Complex-Building 158
Veterans Memorial Highway
Hauppauge, NY 11788
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Department of Civil Service
Alan Schneider, Personnel Officer
220 Rabro Dr.
Hauppaugue, NY 11787
(516) 853-5500

Department of Communications
Tim Ryan, Director
P.O. Box 6100
888 Veteran's Memorial Highway
Hauppaugue, NY 11788
(516) 853-4005

Community Development
Joseph Sanseverino, Director
220 Rabro Dr.
P.O. Box 6100
Hauppaugue, NY 11788
(516) 853-5700

Citizens Affairs
Charles Gardner, Director
County Center-Building 340
Veteran's Memorial Highway
Hauppaugue, NY 11788
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Deputy County Executives
P.O. Box 6100
888 Veteran's Memorial Highway
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Department of Economic Development
Tom Junor, Commissioner
220 Rabro Dr.
P.O. Box 6100
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Department of Fire Rescue and
Emergency Services
David Fischler, Commissioner
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Yaphank, NY 11980-0127
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Department of Health Services
Dr. Mary Hibberd, Commissioner
220 Rabro Dr.
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Environmental Engineering
Division of Environmental Health Services
Suffolk County Offices and Institutions
15 Horseblock Road
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Department of Labor
Michael Falcone, Commissioner
North Country Complex-Building 17
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Suffolk County Department of Parks
Michael Frank, Commissioner
P.O. Box 144
Montauk Highway
West Sayville, NY 11796
(516) 854-4949

Mr. W. Charles Bender
Suffolk County Parks Superintendent
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West Sayville, NY 11796

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Stephen M. Jones, Director
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Public Administration
Anthony Mastroianni
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Stephen G. Hayduk P.E., Commissioner
335 Yaphank Ave.
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Suffolk County Department of Public Works
335 Yaphank Ave.
Yaphank, NY 11980

Department of Social Services
John Wingate, Commissioner
3085 Verterans Memorial Highway
Ronkonkoma, NY 11779
(516) 854-9700

Suffolk County Soil and Water Conservation District Office
Mr. Tom McMahon, District Manager
Riverhead County Center, Rm. E16
300 Center Drive
Riverhead, NY 11901
(516) 727-2315

Suffolk County Water Authority
Michael Logrande, Chairman
4060 Sunrise Hwy.
Oakdale, NY 11769
(516) 589-5200

Suffolk County Town Officials

BABYLON:
Richard H. Schaffer, Jr. , Supervisor
Town Hall
200 East Sunrise Hwy.
North Lindenhurst, NY 11757
(516) 957-3000

BROOKHAVEN:
Felix Grucci, Jr. , Supervisor
Town Hall
205 South Ocean Ave.
Patchogue, NY 11772
(516) 654-7822

EAST HAMPTON:
Catherine Lester, Supervisor
Town Hall
159 Pantigo Rd.
East Hampton, NY 11937
(516) 324-4140

ISLIP:
Pete McGowan, Supervisor
Town Hall
655 Main St.
Islip, NY 11751
(516) 224-5691

Town of Islip
Town Clerk
Town Hall
655 Main St.
Islip, NY 11751

SOUTHAMPTON:
Vincent J. Cannuscio, Supervisor
Town Hall
116 Hampton Rd.
Southampton, NY 11968
(516) 283-6000

Incorporated Villages in Suffolk County

Mayor E. Donald Conroy
153 West Main St.
Babylon, NY 11702
(516) 669-1500

Mayor Frank C. Trotta
29 Bellport Lane
Bellport, NY 11713
(516) 286-0327

Mayor Robert L. Cox
40 Seneca Dr.
Brightwaters, NY 11718
(516) 665-1280

Village Clerk
Village of Brightwaters
40 Seneca Drive
Brightwaters, NY 11718

Mayor Paul F. Rickenbach, Jr.
1 Cedar St.
East Hampton, NY 11937
(516) 324-4150

Mayor Frederick Kienle
430 S. Wellwood Ave.
Lindenhurst, NY 11757
(516) 957-7500

Mayor Mike Youchah
P.O. Box 457
Ocean Beach, NY 11770
(516) 853-5940

Mayor Franklin S. Leavandosky
14 Baker St.
Patchogue, NY 11772
(516) 475-4300

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P.O. Box 926
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Mayor Martin Berger
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Business Office
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103 Broadway
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23 Main St.
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Mayor John F. Petit
P.O. Box 991
Westhampton Beach, NY 11978
(516) 288-1654

Mayor Gary Vegliante
Village of Westhampton Dunes
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Other Local

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Town of Islip Engineering and Building
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Islip, NY 11751
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Natural Resources Conservation Service
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Riverhead, NY 11901
(516) 727-2315

Nassau County Department of Recreation and Parks
Eisenhower Park
Hempstead Turnpike
East Meadow, NY 11554

Mr Thomas Doheny
Town of Hempstead
Department of Conservation and Waterways
Lido Boulevard
Point Lookout, NY 11569

Ms. Sheryl Weichbrodt
Town of Babylon, DEC
281 Phelps Lane
N. Babylon, NY 11703

Dr. Robert M. Cerrato
Endeavour Hall
Marine Sciences Research Center
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Dr. Daniel Conley
Dana Hall
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Mr. William Wise, Director
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