



**DEPARTMENT OF THE ARMY**  
**OFFICE OF THE CHIEF OF ENGINEERS**  
**WASHINGTON, D.C. 20314-1000**

REPLY TO  
ATTENTION OF:

28 DEC 2000

CECW-PC (10-1-7a)

SUBJECT: Dare County Beaches, North Carolina (Bodie Island Portion)

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on the study of hurricane and storm damage reduction on Bodie Island, located in Dare County on the Atlantic Coast of North Carolina. It is accompanied by the report of the district and division engineers. These reports are in partial response to a resolution by the Committee on Public Works and Transportation of the House of Representatives dated 1 August 1990. This resolution requested studies of the beaches in Dare County, North Carolina, in the interest of beach erosion control, hurricane protection, storm damage reduction, and related purposes.
2. Section 101(b)(24) of the Water Resources Development Act (WRDA) of 2000 authorized construction of a project for hurricane and storm damage reduction for Dare County beaches, North Carolina, subject to the completion of a favorable report of the Chief of Engineers not later than 31 December 2000 and subject to the conditions recommended in that final report. The authorizing language for the Dare County beaches project reflects a total first cost of \$71,674,000, with an estimated Federal cost of \$46,588,000 and an estimated non-Federal cost of \$25,086,000. The average annual cost of periodic nourishment over the 50-year life of the project is estimated at \$11,773,000, with an estimated annual Federal cost of \$5,886,000 and an estimated annual non-Federal cost of \$5,887,000. This report constitutes the final report of the Chief of Engineers required by WRDA 2000.
3. The plan developed by the district engineer consists of constructing a sand fill dune and berm project at the resort communities of Kitty Hawk, Kill Devil Hills, and Nags Head, North Carolina. The dune would have a 25-foot-wide crest at elevation +13 feet National Geodetic Vertical Datum (NGVD). The seaward face of the dune would slope 1 foot vertically, for each 10 feet horizontally, to elevation +7 feet NGVD. The design storm berm would be 50 feet wide at elevation +7 feet NGVD. However, the berm width would be 150 feet to 250 feet wide when first constructed. The design berm width would be achieved after wind and waves adjust the beach profile. The seaward face of the storm berm would slope 1 foot vertically, for each 10 feet horizontally, to closure at -27 feet NGVD. The project would be constructed in two non-contiguous segments along approximately 14.2 miles of the 20-mile-long oceanfront at Kitty Hawk, Kill Devil Hills, and Nags Head. The two project segments would be separated by about 3.1 miles of undisturbed natural beach. The north segment of the project would protect approximately 4.1 miles (21,900 feet) of shoreline in the Kitty Hawk and Kill Devil Hills areas,

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and it would include a 15,900-foot-long main fill and a 3,000-foot-long transition fill at each end of the main fill. The south segment would protect about 10.1 miles (53,340 feet) of shoreline in the Nags Head area. The south segment would include a 47,490-foot-long main fill, a 3,000-foot-long transition fill at the north end, and a 2,850-foot-long transition fill at the south end. The total length of the proposed beach-fill project would be 63,390 feet of main fill and 11,850 feet for transitions. Project implementation would include planting about 160 acres of dune grasses and constructing 46 dune walkovers. Sand fill would be obtained from two offshore borrow sites: one located about 1.5 miles east of the northern reach of the proposed project and the other located about 3 miles southeast of the southern reach. Both sites are located in State-controlled waters. Approximately 12,340,000 cubic yards (cy) of sand fill would be required for initial construction of the two proposed project segments. Of this amount, about 4,300,000 cy of sand would be required for the north segment of the project, and 8,040,000 cy would be required for the south segment. Dredging and nourishment of some portion of the proposed project would occur during each year of the 50-year period of Federal participation. On average, periodic nourishment of individual beach segments would be required at about 3-year intervals. Approximately 3,890,000 cy of sand, distributed over 3-year-long periods, would be required to nourish the various beach segments. This amount includes about 1,055,000 cy for the north segment and about 2,835,000 cy for the south segment. About 74.58 million cy of sand would be required for initial construction and periodic nourishment over a 50-year period. Compensatory environmental mitigation is not proposed.

4. Based on October 1999 price levels, the total first cost of the plan is estimated at \$71,674,000, including \$48,961,000 and \$22,713,000 for the south and north segments, respectively. Periodic beach nourishment costs are estimated as \$34,991,000, distributed over 3-year nourishment cycles: this includes \$19,668,000 and \$15,323,000 for the south and north segments, respectively. Sixteen periodic nourishments are anticipated during the 50-year period of Federal participation in project cost sharing. The total nourishment costs are estimated as \$560,689,000. The ultimate project cost, including the initial construction and cumulative periodic nourishment costs, is estimated as \$632,363,000. Based on a discount rate of 6.625 percent, and a 50-year period of economic analysis, average annual benefits are estimated as \$26,092,000 for the south segment and \$9,310,000 for the north segment, a total of \$35,402,000. Average annual costs are estimated as \$10,922,000 for the south segment and \$7,313,000 for the north segment, a total of \$18,235,000. The resulting benefit-to-cost ratios are 2.4 to 1 for the south segment, 1.3 to 1 for the north segment, and 1.9 to 1 overall. Based on information available at this time, this plan is the national economic development plan.

5. Based on the cost sharing principles specified by WRDA 1986, as amended, 65 percent of the project first costs would be Federal and 35 percent would be non-Federal; and 50 percent of the periodic nourishment costs would be Federal and 50 percent would be non-Federal. Under cost sharing specified by WRDA 1986, as amended, of the \$71,674,000 first cost, \$46,588,000 would be Federal and \$25,086,000 would be non-Federal. Of the non-Federal share, the total cash contribution required would be \$20,046,000. The balance of the non-Federal share would consist of \$5,040,000 for the estimated creditable value for lands, easements, rights-of-way,

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relocations, and suitable borrow areas (LERR). Under cost sharing specified by WRDA 1986, as amended, of the \$560,689,000 estimated for periodic nourishment, \$280,345,000 would be Federal and \$280,344,000 would be non-Federal. The ultimate project cost, which includes the initial construction and 50 years of periodic nourishment costs, is estimated to be \$632,363,000, shared \$326,932,000 Federal and \$305,431,000 non-Federal.

6. Washington level review indicates that there is a hurricane and storm damage project that is technically sound, economically justified, and environmentally and socially acceptable. However, based on information provided in the report, it is not evident that the reporting officers have developed the national economic development plan that conforms with the U.S Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Resources Implementation Studies and that complies with other administration policies and guidelines.

7. Therefore, I recommend implementation of the project subject to the following conditions and with such modification as in the discretion of the Chief of Engineers may be advisable. During preconstruction engineering and design (PED) phase, the district will undertake studies to confirm or support revision of the erosion damage relationships used in the project economic analysis as a basis for identifying the national economic development plan and the Federal interest and participation in the recommended project. The district engineer will ensure that public access to all segments of the 14.2-mile-long project is consistent with law and regulation prior to initial construction and each nourishment. Finally, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the National Marine Fisheries Service expressed concerns regarding the adequacy of the analysis of cumulative impacts; suitability of sand for beach nourishment; turbidity impacts on important fisheries; and impacts of sediment transport to Oregon Inlet. Several environmental protection advocacy organizations communicated similar concerns. The reporting officers will continue to coordinate with environmental resource agencies and environmental protection advocacy groups during the PED phase of the project to address their concerns and will conduct studies or other activities as necessary.

8. In implementing the project, the non-Federal sponsor will be required to agree to comply with all applicable Federal laws and policies and will be responsible for the following items of local cooperation:

a. Provide non-Federal costs assigned to hurricane and storm damage reduction as further specified below:

(1) Enter into an agreement that provides, prior to execution of the project cooperation agreement, 25 percent of the design costs;

(2) Provide during construction any additional amounts needed to cover the non-Federal share of design costs;

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(3) Provide all lands, easements, and rights-of-way, including suitable borrow areas, and perform or ensure performance of all relocations determined by the Federal Government to be necessary for the initial construction, periodic nourishment, operation, and maintenance of the project;

(4) Provide during construction any additional amounts necessary to make its total contribution equal to 35 percent of initial project costs assigned to hurricane and storm damage reduction plus 100 percent of initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits; and

(5) Provide during construction of each periodic nourishment, 50 percent of periodic nourishment costs assigned to hurricane and storm damage reduction and 100 percent of periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits;

b. For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

c. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspecting, completing, operating, maintaining, repairing, replacing, or rehabilitating the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall relieve the non-Federal sponsor of responsibility to meet the non-Federal sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

d. Hold and save the United States free from all damages arising from the initial construction, periodic nourishment, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors;

e. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

f. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act

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(CERCLA), Public Law 96-510, as amended, 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the initial construction, periodic nourishment, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

g. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, periodic nourishment, operation, or maintenance of the project;

h. Agree that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the project in a manner that will not cause liability to arise under CERCLA;

i. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for the initial construction, periodic nourishment, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;

j. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7 entitled, "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army," and Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), requiring non-Federal preparation and implementation of floodplain management plans;

k. Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement;

l. Participate in and comply with applicable Federal floodplain management and flood insurance programs;

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m. Prescribe and enforce regulations to prevent obstruction of or encroachment on the project that would reduce the level of protection it affords or that would hinder operation and maintenance of the project;

n. Not less than once each year, inform affected interests of the extent of protection afforded by the project;

o. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the floodplain, and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

p. For so long as the project remains authorized, the non-Federal sponsor shall ensure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based;

q. Provide and maintain necessary access roads, parking areas, and other public use facilities, open and available to all on equal terms;

r. Recognize and support the requirements of Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

s. At least twice annually and after storm events, perform surveillance of the beach to determine losses of nourishment material from the project design section and advance nourishment section and provide the results of such surveillance to the Federal Government; and

t. Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized.



ROBERT B. FLOWERS  
Lieutenant General, U.S. Army  
Chief of Engineers