



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
CHIEF OF ENGINEERS  
2600 ARMY PENTAGON  
WASHINGTON, DC 20310-2600

DAEN

23 DEC 2014

THE SECRETARY OF THE ARMY

SUBJECT: Bogue Banks, Carteret County, North Carolina, Integrated Feasibility Report and Environmental Impact Statement for Coastal Storm Damage Reduction

1. I submit for transmission to Congress my report on hurricane and storm damage reduction at Bogue Banks, Carteret County, North Carolina. It is accompanied by the report of the district and division engineers. This report is an interim response to a resolution adopted on 23 July 1998 by the Committee on Transportation and Infrastructure of the United States House of Representatives. The resolution requested the Secretary of the Army to review the report of the Chief of Engineers dated 27 November 1984 on Bogue Banks and Bogue Inlet, North Carolina, and other pertinent reports to determine whether any modifications of the recommendations contained therein are advisable at the present time in the interest of shore protection and related purposes. Pre-construction engineering and design activities for the project will continue under the above cited authority.

2. The reporting officers recommend authorization of the National Economic Development (NED) Plan to reduce coastal storm damages by constructing a beach fill berm and limited dunes along the shoreline of Bogue Banks, a barrier island in Carteret County, North Carolina. The recommended plan for coastal storm damage reduction includes construction of approximately 22.7 miles of main beach fill berm, approximately 50-foot wide, with a consistent profile across the entire length, along with dune expansion of approximately 5.9 miles of the project shoreline. The main beach fill would be bordered at either end by tapered transition berms approximately 1,000-feet in length. The amount of dune expansion would vary from elevation fifteen to twenty feet North American Vertical Datum 1988 (NAVD 88) and dune width varying from ten to ninety-five feet.

3. Carteret County, North Carolina is the non-federal cost sharing sponsor for all features. Based on October 2014 (Fiscal Year 2015) price levels, the estimated total nourishment cost is \$266,783,000, which includes the project first cost of initial construction of \$37,327,000 and a total of 16 periodic nourishments at a total cost of \$229,456,000. Periodic nourishments are planned at 3-year intervals. In accordance with the cost share provisions in Section 103 of the Water Resources Development Act

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(WRDA) of 1986, as amended (33 U.S.C. 2213), the federal and non-federal share are as follows:

a. The federal share of the project first cost is estimated to be \$24,263,000 and the non-federal share is estimated to be \$13,064,000, which equates to 65% federal and 35% non-federal. The non-federal share includes the value of lands, easements, rights-of-way, relocations, and dredged or excavated material disposal areas (LERRD) estimated to be \$4,361,000.

b. The federal share of each periodic nourishment is estimated to be \$7,170,500 and the non-federal share is estimated to be \$7,170,500, which equates to 50% federal and 50% non-federal.

c. Operations and maintenance costs are a 100% non-federal responsibility. Carteret County, North Carolina would be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project, a cost currently estimated at about \$75,000 per year.

4. The cost share for both the initial construction and periodic nourishment is based on the project meeting current policy requirements for parking and access. Currently, the entire project length does not have the required parking and access. The sponsor has committed to providing all required parking and access prior to entering into a project partnership agreement, or the cost share will be re-evaluated and adjusted as warranted.

5. Based on a 3.375 percent discount rate and a 50-year period of analysis, the total equivalent average annual costs of the project are estimated to be \$6,037,000, including monitoring and OMRR&R. Monitoring consists of semiannual beach profile surveys, aerial photography, and an annual beach fill monitoring report, as well as annual seabeach amaranth monitoring for five years following initial construction. All project costs are allocated to the authorized purpose of hurricane and storm damage reduction. The recommended plan has total annual benefits of \$14,978,000, including average annual coastal storm damage benefits of \$11,715,000 and average annual recreation benefits of approximately \$3,263,000. Annual net benefits of the project would amount to approximately \$8,941,000. The benefit to cost ratio is approximately 2.48 to 1. Additionally, by protecting about 138 acres of beach habitat, the project would have additional benefits to a variety of species, including threatened and endangered species, using the coastal beach as habitat for all or some of their life cycle. These threatened and endangered species include the piping plover shorebird and loggerhead, green, and leatherback turtles.

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6. Risk and uncertainty has been explicitly factored into the economic analysis of this project. The certified statistical risk based model, Beach-*fx*, was used in this study to formulate and evaluate the project in a life-cycle approach. Beach-*fx* integrates the engineering and economic analyses and incorporates uncertainty in both physical parameters and environmental forcing, which enables quantification of risk with respect to project evolution and economic costs and benefits of project implementation. The project is intended to address erosion and prevent damages to structures and contents; it is not intended to, nor will it, reduce the risk to loss of life during major storm events. Loss of life can only be prevented by residents and visitors following the local evacuation plans that are already in place. These residual risks have been communicated to the residents of Bogue Banks.

7. In accordance with the Corps Engineering Circular (EC 1165-2-212) on sea level change, the study performed a sensitivity analysis to evaluate the effects that different rates of sea level change could have on the recommended plan. The plan was formulated using a historical or low rate of sea level change of 0.0084 feet/year. The sensitivity analyses also utilized additional accelerated rates, which includes what the EC defines as intermediate and high rates of 0.0145 feet/year and 0.0341 feet/year, respectively. The analysis found that the influence of current sea level change on the project is relatively low as compared to other factors causing erosion (waves, currents, winds and storms). Adaptive management will be used including monitoring and adding additional volume of sand during renourishments to compensate for any significant accelerated sea level rise beyond the current observed rate should it become necessary.

8. In accordance with EC 1165-2-214 on review of decision documents, all technical, engineering and scientific work underwent an open, dynamic and rigorous review process to ensure technical quality. This included District Quality Control (DQC) review, Agency Technical Review (ATR), Major Subordinate Command (MSC) review, Independent External Peer Review (IEPR), Public Review, and a Corps Headquarters policy and legal review. All concerns of the ATR have been addressed and incorporated into the final report. All comments from the above referenced reviews have been addressed and incorporated into the final documents. Overall, the reviews resulted in improvements to the technical quality of the report.

9. Washington level review indicates that the project recommended by the reporting officers is technically sound, environmentally and socially acceptable, and economically justified. The plan complies with all essential elements of the 1983 U.S. Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Land Related Resources Implementation studies and complies with other

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administrative and legislative policies and guidelines. Also, the views of interested parties, including federal, state and local agencies have been considered.

10. I concur in the findings, conclusions, and recommendations of the reporting officers. Accordingly, I recommend that the plan to reduce hurricane and storm damages for Bogue Banks, North Carolina be authorized in accordance with the reporting officers' recommended plan at an estimated total nourishment cost of \$266,783,000, which includes the project first cost of initial construction of \$37,327,000 and a total of 16 periodic nourishments at a total cost of \$229,456,000, with such modifications as in the discretion of the Chief of Engineers may be advisable. My recommendation is subject to cost sharing, financing and other applicable requirements of federal laws and policies, including Section 103 of WRDA of 1986, as amended (33 U.S.C. 2213). These requirements include, but are not limited to, the following items of local cooperation from the non-federal sponsor:

a. Provide 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 50 percent of periodic nourishment costs assigned to hurricane and storm damage reduction plus 100 percent of periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits and as further specified below:

(1) Provide, during design, 35 percent of design costs assigned to hurricane and storm damage reduction plus 100 percent of design costs assigned to protecting undeveloped private lands and other private shores that do not provide public benefits;

(2) Provide all lands, easements, and rights-of-way, and perform or ensure the performance of any relocations determined by the federal government to be necessary for the initial construction, periodic nourishment, and OMRR&R of the project;

(3) Pay, during initial construction and periodic nourishment, any additional amounts as are necessary to meet its total contribution as set out in paragraph a; and

b. Operate, maintain, repair, rehabilitate, and replace the project or functional portions of the project, including any mitigation features, 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;

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c. Hold and save the United States free from all damages arising from the initial construction, periodic nourishment, and OMRR&R of the project, except for damages due to the fault or negligence of the United States or its contractors;

d. 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 (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, and OMRR&R of the project;

e. Assume, as between the federal government and the non-federal sponsor, 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 necessary for the initial construction, periodic nourishment, and OMRR&R of the project;

f. Agree that, as between the federal government and the non-federal sponsor, 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, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA;

g. Inform affected parties, at least yearly, of the extent of the protection provided by the project; participate in and comply with applicable federal floodplain management and flood insurance programs; comply with Section 402 of the WRDA of 1986, as amended (33 U.S.C. 701b-12); and 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;

h. Prevent obstructions of or encroachment on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) which might reduce the level of protection it affords, hinder OMRR&R or future periodic nourishment, or interfere with its proper function, such as any new developments on project lands or the addition of facilities which would degrade the benefits of the project; and

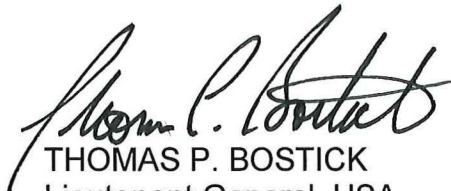
i. Ensure continued conditions of public ownership, access, and use of the shore upon which the amount of federal participation is based; and provide, keep, and

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maintain the recreation features and access roads, parking areas, and other associated public use facilities open and available to all on equal terms.

11. The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. These recommendations do not reflect program and budgeting priorities inherent in the formulation of national civil works construction program nor the perspective of higher review levels within the executive branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the non-federal sponsor, the state, interested federal agencies and other parties will be advised of any modifications and will be afforded an opportunity to comment further.



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Lieutenant General, USA  
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