



**DEPARTMENT OF THE ARMY**  
CHIEF OF ENGINEERS  
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WASHINGTON, D.C. 20310-2600

OCT 26 2021

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SUBJECT: Folly Beach, South Carolina Coastal Storm Risk Management

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on coastal storm risk management for Folly Beach, South Carolina. It is accompanied by the report of the Wilmington District Commander. This report was generated under the authority of Section 216 of the Flood Control Act of 1970, Public Law 91-611 (33 U.S.C. § 549a). Section 216 authorizes the Chief of Engineers to review the operation of projects constructed by the U.S. Army Corps of Engineers (USACE) when found advisable due to significantly changed physical or economic conditions, and to recommend to Congress on the advisability of modifying the structures or their operations, and for improving the quality of the environment in the overall public interest. The existing federal project, the Folly Beach Shore Protection Project, was authorized by Section 501 of the Water Resources Development Act of 1986 (WRDA 1986), Public Law 99-662, as amended, and modified by the Energy and Water Development Appropriations Act of 1992, Public Law 102-104. Pre-construction engineering and design (PED), if funded, would continue under the study authority cited above.

2. The reporting officers recommend authorizing a plan that will reduce the potential damage caused by coastal storms and improve safety and coastal resiliency of the Folly Beach area in and immediately adjacent to the City of Folly Beach, South Carolina. The recommended plan is the National Economic Development (NED) plan combined with measures for the mitigation of erosion attributable to the federal navigation jetties at Charleston Harbor. The recommended plan includes construction of an approximately 5.85-mile (30,890 linear-foot) main dune and berm combination beach fill.

a. The southwest portion of the project includes a 35-foot-wide berm from reaches 1 to 17 for approximately 19,170 feet, which includes the 2,200-foot County Park portion in reach 1 and the approximately 16,970-foot portion that has a 35-foot-wide berm and a dune in reaches 2 through 17.

b. The northeast portion includes a 50-foot-wide berm plus dune from reaches 18 to 26 for 9,720 feet, plus a 2,000-foot portion which includes the County-administered Lighthouse Inlet Heritage Preserve with only the 50-foot-wide berm and no dune.

c. The berm is at elevation 8.0 feet North American Vertical Datum 88 (NAVD88). The plan includes constructing a new dune or raising the existing dune to a uniform elevation of 15 feet NAVD88 with a minimum top width of five feet. Neither the County Park nor the Lighthouse Inlet Heritage Preserve portions of the plan include a dune. The

DAEN

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beach fill includes a 750-foot tapered transition at the ends of the project and a 500-foot transition between the 35-foot and 50-foot-wide berm reaches.

3. The City of Folly Beach is the non-federal cost-sharing sponsor for all features of the project. Based on October 2021 (Fiscal Year 2022) price levels, the estimated total nourishment cost is \$241,735,000, which includes the project first cost of initial construction of \$50,544,000 and three periodic nourishments at total cost of \$191,191,000. Section 103 of WRDA 1986 (33 U.S.C. § 2213), as amended, establishes, in general, the cost sharing for the project, with adjustments in the cost allocation as provided by Section 101(c) of WRDA 1986 (33 U.S.C. § 2211(c)) to the extent the measures are for the prevention of erosion or shoaling damages attributable to the federal navigation project at Charleston Harbor, as follows:

a. The initial construction cost for shore protection features allocated to coastal storm risk management is shared 65 percent federal and 35 percent non-federal, with costs allocated to mitigation attributed to the federal navigation project 100 percent federally funded based on the cost sharing for the Charleston Harbor project necessitating the need for mitigation. The federal share of the project first cost is estimated to be \$45,490,000 and the non-federal share is estimated to be \$5,054,000, which includes the costs of land, easements, rights-of-way, relocations, and dredged or excavated material disposal areas (LERRD) currently estimated to be \$10,000.

b. Following initial construction, three additional nourishment cycles are expected throughout the 50-year period of federal participation averaging about \$63,730,300 per nourishment. The cost for periodic nourishment will be shared at a rate of 50 percent federal and 50 percent non-federal, with costs allocated to mitigation attributed to the Charleston Harbor project 100 percent federally funded. The federal share of the re-nourishment cost is estimated to be \$164,424,000 and the non-federal share is estimated to be \$26,767,000. In addition, nourishment activities include monitoring costs estimated to average \$25,000 per year over the 50-year period for a total of \$1,250,000.

c. The non-federal sponsor would be responsible for the annual operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project after construction, an average annual cost estimated to be \$101,000.

4. Based on a 2.25 percent discount rate and a 50-year period of analysis, the average annual equivalent costs of the project are estimated to be \$5,584,000. The equivalent average annual benefits for the project prior to inclusion of recreation benefits are estimated to be \$4,723,000 with net average annual benefits of -\$861,000, which results in a benefit to cost ration (BCR) of approximately 0.85 to 1. With the inclusion of \$48,177,000 in incidental recreation benefits, the total benefits are estimated to be \$52,899,000 with net average annual benefits of \$47,315,000, which results in a BCR of approximately 9.5 to 1. All project costs are allocated to the authorized purpose of coastal storm risk management.

DAEN

SUBJECT: Folly Beach, South Carolina Coastal Storm Risk Management

5. The recommended plan would greatly reduce, but not eliminate, future coastal damages to residential and commercial property and transportation infrastructure in the coastal flood plain. It would also reduce risks to evacuation of residents and visitors, and to essential services. Residual risk would remain. The recommended plan reduces expected annual damages by approximately 83 percent relative to the without project conditions. The residual risk, along with the potential consequences, has been communicated to the non-federal sponsor and will become a requirement of any communication and evacuation plan. The recommended plan is not intended to, nor will it, reduce the risk to loss of life during major storm events. The only certain method to prevent loss of life is by residents and visitors following existing local evacuation plans and leaving the area prior to significant storm events.

6. Risk and uncertainty were factored into the economic analysis by using statistical risk-based models. The model "Beach-fx", was used to formulate and evaluate the suite of alternatives within the Folly Beach and island-focused study area. The Beach fx model computes stage-damage curves and equivalent annual damages (with and without-project) based on water surface profiles by event probability, and asset (structure and content) inventory and damage relationship functions. Uncertainty or error distributions associated with estimating the depth-damage functions, structure values, content value ratios, other value ratios and first flood stage are used to develop the total aggregated stage damage-uncertainty functions by damage categories for the damage reaches. The project is intended to address coastal storm damage and manage and reduce damages to structures and adjacent transportation infrastructure, as well as providing enhanced risk reduction to evacuation and essential services.

7. In accordance with Engineer Regulation 1100-2-8126, Incorporating Sea Level Change in Civil Works Programs, the study's analysis evaluated the effects of different rates of sea-level change on different alternatives under with- and without-project conditions. The selection of the recommended plan considered how the uncertainty across all future sea-level change scenarios (i.e., low, intermediate, and high) affects risk levels and plan performance through either a robust design or adaptive capacity. Based on analysis of historical data and trends, it was determined that the intermediate rate of sea-level rise offered the "most-likely" future scenario so that the recommended plan best balances potential under-performance and over-performance of the plan.

8. In accordance with USACE policy on review of decision documents, all technical, engineering, and scientific work underwent an open, dynamic, and rigorous review process. The comprehensive review process included district quality control review, agency technical review, public review, and a headquarters policy and legal review to confirm the planning analyses, alternative design and safety, and the quality of decisions. Independent external peer review was not required. Washington level review indicates that the plan recommended by the reporting officers 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

DAEN

SUBJECT: Folly Beach, South Carolina Coastal Storm Risk Management

Studies, as well as other administrative and legislative policies and guidelines. The views of interested parties, including federal, state, and local agencies, were considered and all comments from the above referenced reviews have been addressed and incorporated into the final report documents where appropriate.

9. I concur with the findings, conclusions, and recommendations of the reporting officers. Accordingly, I recommend that the plan to reduce coastal storm damages to Folly Beach be authorized in accordance with the reporting officers' recommended plan at an estimated project first cost of \$241,735,000 with such modifications as in the discretion of the Chief of Engineers may be advisable. My recommendation is subject to cost-sharing and other applicable requirements of federal laws, regulations, and policies. Federal implementation of the project for coastal storm risk management includes, but is not limited to, the following required items of local cooperation to be undertaken by the non-federal sponsor in accordance with applicable federal regulations, laws, and policies:

a. Provide 35 percent of construction costs for initial construction of the project and 50 percent of construction costs for periodic nourishment allocated by the Federal Government to coastal storm risk management; 100 percent of construction costs for initial construction and periodic nourishment allocated by the Federal Government to beach improvements with exclusively private benefits; 100 percent of construction costs for initial construction and periodic nourishment allocated by the Federal Government to improvements and other work located within the Coastal Barrier Resources System that the Federal Government has determined are ineligible for federal financial participation; and 100 percent of construction costs for initial construction and periodic nourishment allocated by the Federal Government to the prevention of losses of undeveloped private lands, as further specified below:

i. Provide, during design, 35 percent of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project; and

ii. Provide all real property interests, including placement area improvements, and perform all relocations determined by the Federal Government to be required for the project.

b. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) that might reduce the level of coastal storm risk reduction the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

c. Inform affected interests, at least yearly, of the extent of risk reduction afforded by the project; participate in and comply with applicable federal floodplain management and flood insurance programs; prepare a floodplain management plan for the project to be implemented not later than one year after completion of construction of the project;

DAEN

SUBJECT: Folly Beach, South Carolina Coastal Storm Risk Management

and publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with the project;

d. Operate, maintain, repair, rehabilitate, and replace the project or functional portion thereof at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable federal laws and regulations and any specific directions prescribed by the Federal Government;

e. At least annually and after storm events, at no cost to the Federal Government, perform surveillance of the project to determine losses of material and provide results of such surveillance to the Federal Government;

f. For shores, other than federal shores, protected using federal funds, ensure the continued public use of such shores compatible with the authorized purpose of the project;

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

h. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-federal sponsor owns or controls for access to the project to inspect the project, and, if necessary, to undertake work necessary to the proper functioning of the project for its authorized purpose;

i. Hold and save the Federal Government free from all damages arising from design, construction, operation, maintenance, repair, rehabilitation, and replacement of the project, except for damages due to the fault or negligence of the Federal Government or its contractors;

j. Perform, or ensure performance of, any investigations for hazardous, toxic, and radioactive wastes (HTRW) that are determined necessary to identify the existence and extent of any HTRW regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, and any other applicable law, that may exist in, on, or under real property interests that the Federal Government determines to be necessary for construction, operation and maintenance of the project;

k. Agree, as between the Federal Government and the non-federal sponsor, to be solely responsible for the performance and costs of cleanup and response of any HTRW regulated under applicable law that are located in, on, or under real property interests required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate

DAEN

SUBJECT: Folly Beach, South Carolina Coastal Storm Risk Management

response to the contamination, without reimbursement or credit by the Federal Government;

l. Agree, as between the Federal Government and the non-federal sponsor, that the non-federal sponsor shall be considered the owner and operator of the project for the purpose of CERCLA liability or other applicable law, and to the maximum extent practicable shall carry out its responsibilities in a manner that will not cause HTRW liability to arise under applicable law; and

m. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. 4630 and 4655) and the Uniform Regulations contained in 49 CFR Part 24, in acquiring real property interests necessary for construction, operation, and maintenance of the project including those necessary for relocations, and placement area improvements; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

10. 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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