



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

August 26, 2024

DAEN

SUBJECT: Miami-Dade Back Bay, Miami-Dade County, Florida, Coastal Storm Risk Management

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on coastal storm risk management recommendations for the Miami-Dade County, Florida. It is accompanied by the report of the Norfolk District engineer. This study is an interim response to the authorization in Public Law 84-71, enacted June 15, 1955. The authorization provided that the Secretary of the Army examine and survey the eastern and southern seaboard of the United States with respect to hurricanes, with particular reference to areas where severe damages have occurred. Preconstruction engineering and design (PED) activities will continue under the study authority.

2. The reporting officers recommend authorizing nonstructural features that will manage the risk of damages from coastal storms to residential and non-residential buildings as well as critical facilities in a subset of vulnerable disadvantaged and Environmental Justice communities. The Recommended Plan is not the National Economic Development (NED) Plan; an NED Policy Exception was approved by the Assistant Secretary of the Army (Civil Works) on June 24, 2024 based on maximization of public benefits including benefits to social cohesion and reduction of life loss in Environmental Justice communities. The Recommended Plan includes the following nonstructural measures in the Cities of Aventura, Miami, Miami Beach, and North Miami; Villages of Bal Harbour, El Portal, and Indian Creek; Towns of Bay Harbor Islands, Cutler Bay, and Surfside; and Unincorporated Miami-Dade County:

- a. Elevations of up to 2,052 residential buildings to approximately the 0.5% annual exceedance probability (AEP).
- b. Floodproofing of up to 403 nonresidential commercial buildings to four feet above ground.
- c. Floodproofing of up to 27 Critical Infrastructure (CI) facilities to four feet above ground.

All nonstructural features would be offered to property owners on a voluntary basis. These features are considered separable elements that can be implemented in part or in whole.

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3. Miami-Dade County is the non-federal cost sharing sponsor (NFS) for all features of the project. In addition to the Recommended Plan, this study acknowledges and relies upon the NFS's additional floodplain management responsibilities and emergency response actions in conjunction with state and Federal Emergency Management Agency (FEMA) related programs to mitigate the plan's residual risk including potential life loss and damages to critical infrastructure. Based on October 2023 price levels, the estimated total project first cost is \$2,660,000,000. The total project first cost includes the cost for lands, easements, rights-of-way, and relocations (LERR) estimated to be \$147,000,000. The elevation and floodproofing measures would be offered to owners of buildings that have been determined to be eligible and have voluntarily consented to grant a restrictive easement or covenant that will run with the land and prevent re-development of the elevated space. The easement or restrictive covenant will be acquired only over the portion of the property occupied by the building and not over the entirety of the property. Owners must sign a Participation Agreement and grant a right to entry for construction, staging, and storage. The NFS would be required to provide temporary relocation assistance benefits to tenants occupying eligible buildings in accordance with the Uniform Relocation Act (URA). Due to the condensed urban setting of the project area and the general nature of properties being small with limited space to maneuver, there may be a need to acquire temporary easements from third-party landowners for work, staging or access purposes to help facilitate a structure elevation. The extent of any requirement to obtain temporary easements from third-party landowners will be determined during PED. Any temporary easement acquired from a third-party landowner would require payment of the market value of the easement to the landowner. Cost sharing is applied in accordance with the provisions of Section 103 of the Water Resources Development Act (WRDA) of 1986 (33 U.S.C. § 2213), as follows:

a. The federal share of the project first cost for initial construction is estimated at \$1,729,000,000 and the non-federal share, which includes the cost of LERR is estimated at \$931,000,000, which equates to 65 percent federal and 35 percent non-federal.

b. The additional annual cost of operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) for the Recommended Plan is estimated to be approximately \$3,800,000, which is based on a 100 percent participation rate. OMRR&R activities for floodproofing include annual testing and inspection of dry floodproofing methods in place. OMRR&R activities for elevating buildings include primarily administrative activities and periodic monitoring and reporting of the project through curb-side assessments to ensure buildings that participated are not violating any restrictions. The NFS will be responsible for 100 percent of the cost of project OMRR&R.

4. Based on a 2.75 percent discount rate and a 50-year period of analysis, the equivalent average annual benefits are estimated at \$62,000,000 and equivalent average annual costs are estimated at \$121,000,000, with equivalent average annual

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net benefits of -\$59,000,000 and a benefit-to-cost ratio (BCR) of 0.5, assuming the USACE High future sea level change scenario. The estimated project costs and benefits assume a 100 percent participation rate. All project costs are allocated to the authorized purpose of coastal storm risk management.

5. Additional benefits being provided by the Recommended Plan include improvements to human health, safety, and community resilience. Managing coastal storm risks to CI improves emergency response following a storm event and potentially decreases the risk of life loss both during and after a storm event. Managing coastal storm risks to residential and nonresidential buildings manages risk of damage to buildings and contents and therefore, provides an opportunity for citizens and businesses to recover more quickly following an event. The Recommended Plan provides a future condition that most likely represents less stress and anxiety on the occupant and/or owner knowing after evacuating and returning post-storm that their building and contents could be potentially less damaged and more livable. Even during non-storm events, populations are more likely to have a better peace of mind knowing emergency response would be available and houses would experience reduced risks.

6. The Recommended Plan aligns with the Administration's priorities of climate and racial equity. The study area and Recommended Plan focuses on environmental justice communities at risk for coastal storm flooding and sea level rise.

7. In addition to the recommended nonstructural plan, the reporting officers also recommend authorization of a nature-based solutions (NBS) pilot program and a nonstructural programmatic study authority, as follows:

a. \$180,000,000 to implement a system of NBS, which are engineered features designed to act in concert with natural processes to provide risk management in coastal areas. Historically, incorporating NBS for managing coastal storm risk has been a challenge because of the difficulty in quantifying the coastal storm risk management benefits and limited space for large-scale implementation. The NBS Pilot Program seeks to provide a framework for identifying, evaluating, implementing, and monitoring a diverse set of NBS pilot demonstration projects within Miami-Dade County to inform the methodology for quantitative evaluation of economic, environmental, and social benefits. Site-specific pilot demonstration projects would be identified and evaluated in the future, in coordination with Miami-Dade County, municipalities, and other stakeholders. In accordance with the provisions of Section 103 of the Water Resources Development Act (WRDA) of 1986 (33 U.S.C. § 2213) the federal share of the NBS Pilot Program would be \$117,000,000 and the non-federal share, which includes the cost of any LERR and dredged material placement improvements, would be \$63,000,000, which equates to 65 percent federal and 35 percent non-federal. LERR and dredged material placement improvements and OMRR&R required for the pilot program have not yet been determined. However, Miami-Dade County would be responsible for providing

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any needed LERR and dredged material placement improvements for the program as well as be responsible for 100% of the cost of any required OMRR&R.

b. \$6,000,000 for programmatic comprehensive urban nonstructural studies to innovate, formulate, and assess nonstructural measures for structures with which the Corps currently has limited experience studying and implementing solutions – specifically, complex critical infrastructure facilities such as hospitals and large (more than four units) multi-family residential housing structures. These nonstructural studies would also include the potential to carry out limited conceptual tests in areas within Miami-Dade County. The recommended programmatic nonstructural study authority would be cost shared 50 percent federal and 50 percent non-federal, corresponding to a \$3,000,000 federal share and \$3,000,000 non-federal share, in accordance with Section 105 of the WRDA of 1986 (33 U.S.C. § 2215).

c. Future Congressional authorization would be required to implement pilot and demonstration nonstructural projects and monitor their success. Currently, it is anticipated that such a program could be implemented with approximately \$200,000,000 in authorized appropriations. The cost-share requirements for the future implementation costs would be in accordance with Section 103 of the WRDA of 1986, as amended (33 U.S.C. §2213). Miami-Dade County would be responsible for providing any needed LERR for the projects as well as be responsible for 100% of the cost of any require OMRR&R.

8. The study report fully describes coastal storm risk to structures and life safety associated with coastal storms within the focused study area. The Recommended Plan is associated with the 0.5% AEP in the year 2089 (approximately 50 years after completion of project construction) after applying the USACE High sea level change scenario; however, due to varying ground and hydrologic elevation data throughout the focused study area and due to height limitations of floodproofing and elevation of buildings, the level of performance ranges from the 2% to the 0.1% AEP on a building-by-building basis. The Recommended Plan would reduce, but not eliminate future damages and residual risk would remain. 2,482 of the 4,875 buildings within the focused study area are included in the Recommended Plan which reduces expected annual damages by approximately 35% in the entirety of the focused study area. The remaining buildings in the focused study area that are not included in the Recommended Plan are recommended for study in future feasibility reports. The residual risk, along with the potential consequences, has been communicated to the NFS. The Recommended Plan will potentially reduce the risk to loss of life during major storm events if people are unable or unwilling to evacuate. However, the only certain method to prevent loss of life is by residents and visitors following existing local evacuation plans and leaving the project area prior to significant storm events.

9. Remaining residual risk in Miami-Dade County will be addressed in a future feasibility study that would target a Chief's Report's in 2028. These studies will continue to evaluate coastal storm risk within the study area and may include nonstructural and

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minor structural measures and NBS. In addition to these studies, a separate and more comprehensive feasibility study would be necessary to evaluate more complex structural measure systems with consideration of large storm surge barriers in support of a multiple lines of defense approach.

10. The study evaluated potential impacts of sea level change in formulating and engineering the Recommended Plan. Project performance and economic benefits were assessed under the USACE High sea level change scenario as it offered the best balance between equally likely SLC scenarios and accounts for other water resources challenges experienced by Miami-Dade County, such as groundwater intrusion, that exacerbate the impacts of sea level change. To address uncertainty, a sensitivity analysis was also performed on the Recommended Plan under the Low and Intermediate sea level change scenarios.

11. All compliance with required applicable environmental laws and regulations has been completed.

12. In accordance with USACE policy on the 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, and Headquarters Policy and Legal Compliance review to confirm the planning analyses, alternative design and safety, and the quality of decisions. Washington-level review indicates that the plan recommended by the reporting officers complies with all essential elements of the U.S. Water Resources Council's Economic and Environmental Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation 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 public reviews have been addressed and incorporated into the final report documents where appropriate.

13. USACE decision documents recognize cost risk and uncertainty surrounding implementation. All cost estimates will carry a degree of uncertainty. The estimated total project first cost for the Recommended Plan at the 80 percent confidence interval is estimated at \$2,660,000,000. This project carries a degree of uncertainty such that if the main drivers described below are realized, the first cost for the Recommended Plan could increase to approximately \$2,840,000,000. The recommended plan has various construction and non-construction components. These components are up to 10 percent in project definition. The overall recommended plan is at 10 percent design. Based on the recommended project design of the construction components and scope definition of the non-construction components, the total project cost is designated as a Class 4 estimate. Current USACE Engineering Policy requires a higher design maturity level that would support at least a Class 3 estimate. The reduced level of design maturity and cost estimate may result in increased risk for future design changes and cost increase. The total project first cost includes a contingency value of \$900,000,000,

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which is approximately 52 percent of the estimated base project cost of \$1,760,000,000. The cost contingencies are intended to cover cost and schedule increases due to the identified project risks and their probability of occurrence. Changes to assumptions or the basis of design can result in additional risks not currently identified. For the Recommended Plan project first costs, the currently known major uncertainty drivers are the following 1) limited geotechnical data and borings for individual structures may result in unanticipated design needs or refinements, 2) further refinements of hydraulics and hydrology modeling in the future may result in varying levels of performance and optimized AEP design level; 3) survey data was not collected for individual structures, however, general site visits were conducted in residential areas and at critical infrastructure facilities, 4) variation in major material costs and bid assumptions; 5) ability of the NFS to provide their share of funds and obtain all required real estate interests in a timely fashion as reflected in the project schedule; and 6) any changes to assumptions on productivity and/or contractor availability, construction sequencing due to funding allocations, and future market conditions can affect overall project cost. As the project moves into the next phases, USACE will focus risk management and mitigation on the primary cost and other significant risk drivers to the extent within USACE control. However, there still exists the potential for other unanticipated and uncontrollable changes in environmental or economic conditions that could further increase the total project first cost beyond the current estimate and/or necessitate changes in the project's design.

14. In full consideration of the risks as documented in the preceding paragraphs in this report, I concur in the findings, conclusions, and recommendation of the reporting officers. Accordingly, I recommend that coastal storm risk management improvements for Miami-Dade County, be authorized in accordance with the reporting officers' Recommended Plan at an estimated cost of \$2,660,000,000 for initial construction, with such modifications as in the discretion of the Chief of Engineers may be advisable. Additionally, I recommend authorization of an NBS pilot program for \$180,000,000 and a nonstructural programmatic study authority for \$6,000,000. Federal implementation of the project for coastal storm risk management includes, but is not limited to, the following items of local cooperation to be undertaken by the NFS in accordance with applicable federal laws, regulations, and policies:

a. Provide 35 percent of construction costs, as further specified below:

1. 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;

2. Provide all lands, easements, rights-of-way, and placement areas and perform all relocations determined by the Federal government to be required for the project;

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3. Provide, during construction, any additional contribution necessary to make its total contribution equal to at least 35 percent of construction costs;

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

f. 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;

g. 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;

h. 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;

i. Agree, as between the Federal government and the NFS, to be solely responsible for the performance and costs of cleanup and response of any HTRW

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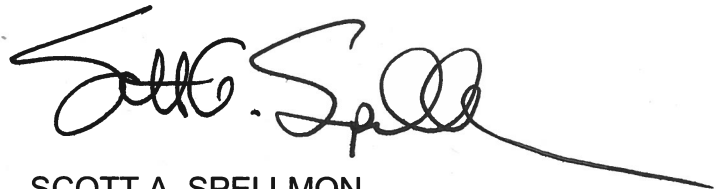
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regulated under applicable law that are located in, on, or under real property interests required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination, without reimbursement or credit by the Federal government;

j. Agree, as between the Federal government and the NFS, that the NFS 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

k. 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 C.F.R 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.

15. The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program or the perspective of higher review levels within the Executive Branch. Consequently, the recommendation may be modified before it is transmitted to the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to Congress, the NFS, interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

A handwritten signature in black ink, appearing to read "Scott A. Spellmon". The signature is fluid and cursive, with a long horizontal line extending to the right from the end of the name.

SCOTT A. SPELLMON  
Lieutenant General, USA  
Chief of Engineers