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DAEN

30 July 2024

SUBJECT: Puerto Rico, 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 Puerto Rico Coastal Study. It is accompanied by the report of the Jacksonville District. This study is an interim response to the authorization in Section 204 of the Flood Control Act of 1970, Public Law 91-611. It authorizes the Secretary of the Army, acting through the Chief of Engineers, to prepare plans for the development, utilization and conservation of water and related land resources of drainage basins and coastal areas in the Commonwealth of Puerto Rico. Preconstruction engineering and design (PED) activities will continue under the authority cited above.
2. The reporting officers recommend authorizing a risk management system of features that will reduce the risk of damages from coastal storms to residential and commercial structures, public infrastructure, and critical facilities. The Recommended Plan consists of two separable elements – Ocean Park and Rincón. Both plans deviate from the National Economic Development (NED) plan. Policy exceptions were approved by the Assistant Secretary of the Army, Civil Works (ASA(CW)) for Ocean Park (February 2, 2024) and for Rincón (May 8, 2023). Due to the nature of these very different study areas, in terms of geographical distances, different problems, and coastal dynamics, a Recommended Plan is proposed for each planning area as a separable element. The overall estimated total project first cost for the Recommended Plan is \$252,300,000 (\$112,582,000 for Ocean Park and \$139,718,000 for Rincón). The Federal share is \$97,154,000 and the non-Federal share is \$155,147,000. The overall project has been determined to be justified based on comprehensive benefits including both national and regional economic development benefits, other social benefits, and environmental benefits. The Recommended Plan includes the following system of structural, non-structural, and natural and nature-based features by separable element:
  - a. Ocean Park within the municipality of San Juan – The Recommended Plan for the Ocean Park planning reach includes the construction of two floodwalls, the first with a length of approximately 1,600 feet in the Barbosa Park area and the second floodwall approximately 1,200 feet long in the vicinity of Las Mariás skate park, both with an elevation of 7 feet (Puerto Rico Vertical Datum of 2002), to reduce coastal flooding in the San Juan metropolitan area as a result of hurricanes and coastal storm impacts. This plan is designed to maintain existing community recreation access and the ocean viewshed while providing coastal flooding risk reduction.

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b. Rincón located on the western coast of the Commonwealth – The Recommended Plan for the Rincón planning reach is a non-structural plan that includes acquisition of 71 vulnerable parcels along approximately 1.1 miles of shoreline. The recommendation incorporates coastal retreat using nature-based and non-structural measures to proactively restore the natural coastal environment by removing coastal structures that are projected to be destroyed by future erosion and coastal storms. This alternative was chosen after consideration of other strategies such as sand placement or shoreline hardening. Both methods were determined to be either environmentally infeasible due to offshore coral reef impacts or beyond current permissible Coastal Zone Management Act regulatory practices of the Commonwealth of Puerto Rico.

3. The Puerto Rico Department of Natural and Environmental Resources (DNER) is the non-federal cost sharing sponsor for both separable elements of the Recommended Plan. The success of this project is a shared Federal and non-federal responsibility. As a shared project responsibility, the Recommended Plan is dependent on the non-federal sponsor executing existing coastal and floodplain management responsibilities and emergency response actions through the Commonwealth's emergency response agencies and other Federal Emergency Management Agency related programs. The non-federal sponsor's role in coastal and floodplain management is critical to community resilience, residual risk mitigation, including potential life loss and damages to critical infrastructure. In conjunction with the Rincón non-structural coastal retreat plan, the U.S. Army Corps of Engineers (USACE) and the non-federal sponsor will develop an acquisition strategy as part of PED prior to project implementation. The acquisition strategy will also outline a coastal resiliency plan for Rincon, which will include details such as the roles and responsibilities for the re-delineation of the maritime terrestrial zone following project implementation. As part of the whole-of-government approach to managing coastal hazards, the coastal resiliency plan, a component of the acquisition strategy, will address coastal erosion and associated residual risk that may occur earlier in the future without project condition or while the project is being implemented.

a. Based on October 1, 2023 (FY24) price levels, the estimated total project first cost for the Ocean Park element is \$112,582,000. The total project first cost includes the value of lands, easements, rights-of-way, relocations (LERR), and dredged material placement area improvements, estimated to be \$39,404,000, where the full amount would be credited to the non-federal sponsor. The federal share of the project first cost for initial construction for Ocean Park is estimated at \$73,179,000 and the non-federal share, which includes the cost of LERR and dredged material placement area improvements, is estimated at \$39,404,000 which equates to 65 percent federal and 35 percent non-federal. The additional annual cost of operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) for the Recommended Plan in the Ocean Park reach is estimated to be \$135,000 per year. OMRR&R activities include yearly inspections and small repairs on the floodwalls and associated infrastructure. The non-federal sponsor will be responsible for 100 percent of the cost of project OMRR&R.

Based on a 2.75 percent discount rate and a 50-year period of analysis, the equivalent average annual benefits in Ocean Park are estimated at \$2,390,000 and equivalent average annual costs are estimated at \$4,414,000, with equivalent average annual net benefits of negative \$2,024,000 and a benefit-to-cost ratio (BCR) of 0.5 without recreation and 0.6 with recreation. All project costs are allocated to the authorized purpose of coastal storm risk management.

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The Recommended Plan in Ocean Park is a total benefits plan. Nearly 40 percent of the benefits would be gained by the most socially vulnerable including residents of the Residencial Luis Llorens Torres community, which is a historical, economically disadvantaged community and meets thresholds for environmental justice. The acquisition of parcels west of Barbosa Park is proposed to mitigate for the adverse effects of floodgates and associated flood risk management levee easements that would be required to maintain access to those properties. The restoration of this area will result in land restored to natural beach for increased recreation in the amount of approximately \$146,000 in average annual benefits and as well as improved habitat (approximately an increase of 0.3 average annual habitat units). Business disruption due to coastal flooding and life safety would be reduced. Additional analysis will be performed during PED to further evaluate if any induced flooding results in a taking of private property that will require compensation or if design changes to prevent induced flooding may eliminate the need for residential and vacant land acquisition of parcels to the west of the Barbosa Park area.

b. Based on October 1, 2023 (FY24) price levels, the estimated total project first cost for the Rincón reach is \$139,718,000. The federal share of the project first cost for initial project implementation for Rincón is estimated at \$24,887,000 and the non-federal share, which includes the cost of LERR and dredged material placement area improvements, is estimated at \$114,831,000, which equates to 18 percent federal and 82 percent non-federal. After crediting, the adjusted amount for the non-federal sponsor's 35 percent share would be \$48,901,000. The remaining cost in excess the 35 percent would be eligible for reimbursement. 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). The additional annual cost of OMRR&R for the Recommended Plan in the Rincón reach is estimated to be \$5,000 per year, which would include at minimum, annual inspections and documentation of project area observations to evaluate project performance.

Based on a 2.75 percent discount rate and a 50-year period of analysis, the equivalent average annual NED benefits in Rincón are estimated at \$649,000 and equivalent average annual costs are estimated at \$5,353,000, with equivalent average annual net benefits of negative \$4,704,000 and a BCR of 0.1 without recreation and 0.2 with recreation. All project costs are allocated to the authorized purpose of coastal storm risk management.

The Recommended Plan in Rincón is a total benefits plan that incorporates “managed retreat.” Managed retreat involves the purposeful and coordinated movement of people, infrastructure, and buildings away from risks. This plan will afford homeowners with structures most at risk to erosion an opportunity to relocate in a coordinated effort before structural failure of homes occurs in a piecemeal fashion. Most notably, this plan sustains community cohesion by allowing the community of Stella to thrive rather than submit to decline with the renewal of a beach, removal of abandoned damaged structures which contribute to erosion and lead to blight conditions, and removal of structures under direct threat of severe storms. During PED, analyses will be performed to further evaluate existing conditions prior to construction and potential risks during construction that could impact project costs and intended benefits. Additionally, monitoring and analysis will be performed after project implementation, as outlined in Appendix I (Adaptation Management Plan) of the Puerto Rico Coastal Study Final Integrated Feasibility

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Report and Environmental Assessment, to further evaluate if any accelerated erosion would impact nearby properties, potentially requiring additional acquisition or design changes to reduce the erosion impacts.

The recommended plan is consistent with Puerto Rico government actions in response to the Governor's Executive Order 2023-009 "*Executive Order of the Governor of Puerto Rico...Declaring an Emergency as a result of the effects of coastal erosion on the island and implementing prevention, mitigation, adaptation, and resiliency measures; and other related matters* (Administrative Bulletin Number OE-2023-009)", as the newly established shoreline will function as a buffer, allowing time and space for government entities to manage the shoreline and increase coastal resiliency into the future. The sandy shoreline would be naturally restored and would support the tourism-based regional economy into the future by maintaining \$3,372,000 in average annual benefits of local tourism spending. The plan does not require mitigation but would instead re-establish approximately 4 average annual habitat units for shoreline species within the acquisition footprint (eventually creating 17 acres of beach habitat). This proposed project implementation would positively affect the town of Stella, which is identified as a historical economically disadvantaged community and meets thresholds for environmental justice.

4. The Recommended Plan for the Ocean Park and Rincón elements is in alignment with the current administration's "Justice40 Initiative," as well as the Comprehensive Documentation of Benefits in Decision Documents (ASA(CW)). The plan also is in response to and aligns with the intent towards resilience as outlined in Puerto Rico's Administrative Bulletin Number OE-2023-009.

5. Risk and uncertainty is incorporated into the recommendation with a preliminary adaptation plan that includes annual monitoring of site conditions to support implementation and adaptation triggers. In Ocean Park and Rincón, there is increasing residual risk under the high sea level change scenario that could impact plan performance. To mitigate this risk, if projections are that the high sea level conditions are likely, under future project conditions, DNER should consider initiating a study with the U.S. Army Corps of Engineers (USACE) to re-evaluate new solutions, which may be more effective than adaptation of the recommended plan features.

a. In Ocean Park, there is residual risk of sea levels exceeding the intermediate sea level change (SLC) scenario used for plan formulation. To mitigate this risk, it is recommended that DNER and the municipality of San Juan actively monitor sea level change and follow recommendations in Appendix I, Adaptive Management Plan, if certain triggers are met. In addition, if sea levels significantly exceed the intermediate SLC scenario, it is recommended that reaches 4 through 6 (Cano Martin Pena, Los Corozos and San Jose Lagoon, Torrecilla Lagoon investigated as part of this project) be re-evaluated under a separate study in order to adequately address both storm surge and precipitation (compound flooding) holistically, using the same study authority that is used for this study.

In Ocean Park, to adapt to the high SLC scenario, a future response plan will likely include a study to re-evaluate solutions rather than proposing any specific adaptable measures. Under the high SLC scenario there would be an increase in ocean-front and back-bay flooding pathways

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(per modeling) in combination with the study area's topography and extensive shoreline armoring alternatives. Under the high SLC scenario, the increase in flood pathways would extend throughout the San Juan study area and include flooding from the coastal and back-bay regions. Specific adaptable measures to the recommended plan would likely require elevation and extension of the structures laterally to encompass the entire study area and potentially areas outside of the study area. The future re-evaluation study would likely indicate that a reassessment of coastal flood risk problems be accomplished. The non-federal sponsor should establish a shoreline monitoring program, in concert with the outlined thresholds as described in Appendix I, Adaptive Management Plan, to provide the data necessary to actively manage the coastal area.

b. In Rincón, the recommended plan is non-structural and does not prevent future erosion. Consequently, after project implementation, there will be residual risk of erosion that could impact the next line of shorefront structures, municipal facilities, and roads that support emergency evacuation routes. "Coastal retreat" through acquisition in Rincón has the potential to be continuous. The project as formulated restores the coastline to a more natural state and it is anticipated that the coastline will stabilize. However, the Recommended Plan includes the non-federal sponsor continuing to manage the risk of future erosion through required monitoring and through existing floodplain management plans, regulatory program, and other community coastal resilience actions. These non-Federal actions would all work in concert with the outlined thresholds as described in Appendix I, Adaptive Management Plan, to determine when reevaluation for adaptation needs to take place. There is uncertainty as to what year all benefits would be achieved in Rincón, as benefits accrue after acquisition and relocations are completed. Other factors contributing to the uncertainty of the effectiveness of the project are potential increases in storm intensity and frequency. Estimated benefits could take longer to achieve than 2029, as originally assumed, and costs may change as buyout timelines shift or extend.

6. Implementation strategies for construction are a shared responsibility conducted in coordination with the non-federal sponsor providing an acquisition strategy in advance of construction.

a. In Ocean Park, both floodwalls in Barbosa Park and Skate Park must be constructed to effectively reduce coastal flooding risk for the entire area and to avoid increasing the risk of induced flooding that could occur if only one floodwall is in place. The current recommended plan proposes fee acquisition by the non-federal sponsor of approximately 8 parcels in addition to a road, one of which is necessary for construction of the floodwall and the other 7 which have been identified for acquisition to mitigate for the adverse effects of floodgates and associated flood protection levee easements that would be required to maintain access to those properties. The current Recommended Plan also requires the standard Temporary Work Area Easement and the standard Restrictive Easement. If a non-standard estate is required to support the project, the estate will be drafted and forwarded to Headquarters Real Estate for approval prior to use.

b. In Rincón, the current Recommended Plan requires approximately 71 parcels for fee acquisition by the non-federal sponsor, which could change based on more detailed surveys in PED. In addition to fee acquisition, the current project plan also requires the standard Restrictive

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Easement and the standard Temporary Work Area Easement. All acquisitions will be necessary to achieve all total benefits most effectively.

7. The Recommended Plan for Ocean Park and Rincón was formulated using the intermediate sea level change curve. However, modeling indicates there would be a significant increase in damages from erosion as well as waves and inundation if sea level were to significantly outpace that scenario. If monitoring indicates that this has occurred, initiation of the Adaptive Management strategies in Appendix I, Adaptive Management Plan, should be employed. In some cases, a new study may be recommended to reformulate additional measures to address hazards associated with elevated sea levels.

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

9. 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.

10. Delayed acquisition timelines in Rincón could increase costs resulting from continued erosion and increased implementation challenges. These risks have been accounted for in the risk-based cost contingency.

11. 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 level cost is estimated to be at \$252,300,000 (\$112,582,000 for Ocean Park and \$139,718,000 for Rincón). This project carries a degree of uncertainty such that if the main risk drivers described below are realized, the first cost for the Recommended Plan could increase to approximately \$265,428,000 (\$122,802,000 for Ocean Park and \$142,626,000 for Rincón). The Recommended Plan has construction and non-construction components. These components range from 10 to 70 percent in design maturity. The overall Recommended Plan is at 20 percent design maturity. 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 3 estimate. The total project first cost, which includes a contingency value of \$64,325,000, is approximately 35 percent of the estimated base project cost of \$187,976,000. 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

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the Recommended Plan's project first costs, the currently known major uncertainty drivers of the risk-based contingency are the following: (1) ability of the non-federal sponsor to provide their share of funds and obtain all required real estate interests in a timely fashion as reflected in the project schedule. Additionally, the acquisition of properties is highly dependent on comparable home market/inventory for families that qualify for relocation assistance benefits; (2) differing site conditions during construction; (3) utility relocation requirements; (4) availability of local labor and equipment; (5) bidding climate; and (6) changes to assumptions on productivity, construction sequencing due to funding allocations and future market conditions that can affect overall project cost. Uncertainty related to limited survey and geotechnical data is mitigated by conservative assumptions related to the design and construction of the floodwalls. Uncertainty related to the hydraulic design is low. 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.

12. 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 the Ocean Park and Rincón element in Puerto Rico, be authorized in accordance with the reporting officers' Recommended Plan at an estimated cost of \$112,582,000 and \$139,718,000, respectively, for initial construction, 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 risk management is subject to the non-federal sponsor agreeing to perform, in accordance with applicable Federal laws, regulations, and policies, the required items of local cooperation for the project, including but not limited to the following:

a. Provide 35 percent of construction costs allocated by the Federal government to coastal storm risk management; 100 percent of construction costs allocated by the Federal government to beach improvements with exclusively private benefits; 100 percent of construction costs 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 allocated by the Federal government to the prevention of losses of undeveloped private lands, 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;

(3) Provide, during construction, any additional contribution necessary to make its

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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. 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 public use of, and access to, such shores by all on equal terms in a manner 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 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;



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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 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 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.

13. 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 non-federal sponsor, interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.



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