



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

AUG 13 2020

DAEN

SUBJECT: Rio Guayanilla Flood Risk Management, Guayanilla, Commonwealth of Puerto Rico

THE SECRETARY OF THE ARMY

1. I submit, for transmission to Congress, my report on the study of flood risk management along the Rio Guayanilla at Guayanilla, Puerto Rico. It is accompanied by the report of the Chicago District Commander. The study is being conducted as an interim response to the authority provided by Section 722 of the Water Resources Development Act (WRDA) of 1986 (Public Law (P.L.) 99-662) which directed the Secretary to conduct a feasibility study on providing flood protection in the Guayanilla River Basin, Puerto Rico. Preconstruction engineering and design activities will continue under the study authority cited above.

2. The reporting officers recommend authorizing the National Economic Development Plan to reduce flood risks to the community in and near Guayanilla, Puerto Rico. The principal features of the plan include:

a. Construction of an engineered diversion channel, 9,000 feet long with a bottom width of 100 feet and 2:1 side slopes. The engineered channel will extend from a new diversion structure, constructed across the existing river approximately 2,000 feet downstream of PR-127. The diversion structure will direct the majority of flood waters to the trapezoidal diversion channel while maintaining a bank-full flow to the Rio Guayanilla. The diversion structure will maintain riverine connectivity for sediment transport and fish passage. A levee will be built on the eastern side of the diversion channel. The riverside slope of the levee will be lined with riprap to prevent erosion. The diversion channel and existing channel will be reconnected with an additional diversion structure upstream of an existing non-federal project.

b. A combination of levees and floodwalls will be installed upstream of the diversion channel on the east side of the river channel at designated locations. The levees will be constructed from local limestone that will be excavated from an abandoned quarry in the project area. A 2,750-foot long earthen levee will also be constructed to reduce flood risk for the El Faro community from overbank riverine flooding.

c. Improvement of conveyance under PR-2 and PR-127 and removal of flow impediments. Compensatory wetland mitigation of six acres of forested wetland and salt flat to address impacts associated with the El Faro Levee, is also included in the recommended plan. Conservation measures for two special status species will be

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implemented during quarrying of levee materials to minimize potential impacts to less than significant.

d. Relocation of three local roads that will be impacted by project features. A road at the northern part of the project will be moved north of PR-2 and two roads that intersect the diversion channel will be replaced with a bridge over the channel and connecting roadway that follows the southern edge of the diversion channel as it curves to the east.

e. A flood warning system/response plan.

3. The Department of Natural & Environmental Resources of Puerto Rico (DNER) is the non-federal cost-sharing sponsor for all features. Based on October 2019 price levels, the estimated total first cost of the recommended plan is \$154,341,000. In accordance with the cost sharing provisions of Section 103 of WRDA 1986, as amended, the non-federal sponsor must contribute a minimum of 35 percent of construction costs, up to a maximum of 50 percent of construction costs, with a minimum 5% cash contribution. The remaining portion of the non-federal share can be provided in lands, easements, rights-of-way, relocations and dredged or excavated material disposal areas; in-kind contributions; cash; or a combination. The estimated share of costs is adjusted based on Section 1156 of WRDA 1986, as amended (33 USC 2310), which provides a waiver for a portion of non-federal cost sharing for Puerto Rico, Territories, and Indian Tribes. As a result, the non-federal share would be reduced \$484,000 and the federal and non-federal shares of construction costs would be \$100,806,000 and \$53,535,000, respectively. The non-federal costs include the value of lands, easements, rights-of-way, relocations and dredged or excavated material disposal areas estimated at \$25,815,000. The DNER would be responsible for operation, maintenance, repair, replacement and rehabilitation (OMRR&R) of the project at approximately \$39,000 per year.

4. Based on a 2.75 percent discount rate and a 50-year period of analysis, the total equivalent average annual costs of the project are estimated at \$6,071,000, including OMRR&R. All project costs are allocated to the authorized purpose of flood risk management. The recommended plan is estimated to be about 98 percent reliable in reducing flood risk to the most densely developed portions of the city of Guayanilla, Puerto Rico from a flood which has a one percent chance of occurrence in any year. The recommended plan would reduce average annual flood damages by approximately \$19,265,000, or 97 percent, and would leave average annual residual damages estimated at \$579,000. Net average annual benefits are estimated at \$13,951,000, with a benefit to cost ratio of approximately 3.3 to 1.

5. Guayanilla, Puerto Rico is located in the active floodplain of the Rio Guayanilla with the natural river channel bisecting the community. Heavy rainfall combined with very steep slopes in the upper catchment can produce high peak discharges in a relatively

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short period of time. This discharge can be in the magnitude of 30,000-40,000 cubic-feet-per-second. The 0.01 Annual Exceedance Probability (100-year) flood event can inundate over 8 square kilometers of land within the study area. The study report fully describes these flood risks associated with the Rio Guayanilla and describes the residual risk. The residual risks have been communicated to the non-federal sponsor and they understand and agree with the analyses. Residual flood risk would be addressed through wise floodplain management measures including the flood warning system that is part of the recommended plan. Additional analyses related to system reliability and tolerable risk will be conducted during the Pre-Construction, Engineering and Design Phase. The recommended plan has been designed to avoid or minimize environmental impacts while maximizing future safety and economic benefits to the community. The study team organized and participated in stakeholder meetings and public workshops throughout the process and worked with local groups to achieve a balance of project goals and public concerns.

6. In accordance with the U.S. Army Corps of Engineers guidance on the 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 review, two iterations of independent Agency Technical Review, and a headquarters policy and legal review of the draft and final reports. All comments from the above referenced reviews have been addressed and incorporated into the final documents. A safety assurance review (Type II Independent External Peer Review) will be conducted during the Preconstruction Engineering and Design Phase.

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

8. I concur with the findings, conclusions, and recommendations of the reporting officers. My recommendation is subject to cost sharing and other applicable requirements of federal laws and policies. Federal implementation of the recommended plan would be subject to the non-federal sponsor agreeing to comply with applicable federal laws and policies, including but not limited to agreeing to:

a. Provide a minimum of 35 percent, up to a maximum of 50 percent of total project costs, subject to a reduction per Section 1156 of WRDA 1986, as amended, as further specified below:

(1) Provide 35 percent of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work;

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(2) Provide, during construction, a cash contribution of funds equal to 5 percent of total project costs;

(3) Provide all lands, easements and rights-of-way, including those required for relocations, the borrowing of material and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all modifications required on lands, easements and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Federal Government to be required or to be necessary for the construction and OMRR&R of the project, all in compliance with applicable provisions of the Uniform Relocation and Assistance and Real Property Acquisition Policies act of 1970, as amended (42 U.S.C. 4601-4655) and the regulations contained in 49 C.F.R. Part 24; and

(4) Provide, during construction, any additional funds necessary to make its total contribution equal to at least 35 percent of total project costs, subject to a reduction per Section 1156 of WRDA 1986, as amended;

b. Operate, maintain, repair, rehabilitate, and replace the project, or functional portions 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 laws and regulations and any specific directions prescribed by the Federal Government;

c. Inform affected interests, at least annually, of the extent of protection afforded by the project; participate in and comply with applicable federal floodplain management and flood insurance programs; comply with Section 402 of the Water Resources Development Act 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 adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

d. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of way or the addition of facilities that may reduce the level of protection the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

e. 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 any work necessary to the functioning of the project for its authorized purpose.

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

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g. Perform, or ensure performance of, 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 construction, operation, or 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;

h. Assume, as between the Federal Government and the non-federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, or maintenance of the project, and;

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

9. 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 a 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 Commonwealth of Puerto Rico, interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

THE CHIEF'S REPORT AHEAD
OF SCHEDULE
A FLOOD RISK MANAGEMENT PLAN
FOR THE RIO GUAYANILLA. THE
97% REDUCTION IN FLOOD DAMAGES
AND SIGNIFICANT LIFE LOSS
BENEFITS FOR THE
COMMUNITY OF
GUAYANILLA,
FOR DECADES TO
COME.


TODD T. SEMONITE
Lieutenant General, USA
Chief of Engineers