



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

AUG 22 2019

DAEN

THE SECRETARY OF THE ARMY

SUBJECT: East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Reformulation, Atlantic Coast of New York

1. I submit for transmission to Congress my report on the study of hurricane and storm damage reduction for coastal communities located between East Rockaway Inlet and Rockaway Inlet and Jamaica Bay, New York. It is accompanied by the report of the District Engineer. This report is an interim response to an authorization by the House of Representatives, dated 27 September 1997, and an interim response to Public Law (PL) 113-2 (29 Jan 13), the Disaster Relief Appropriations Act of 2013. The authorizations requested that the Secretary of the Army review existing reports with a view to identify cost effective measures for storm damage reduction and reduce future flood risk in ways that will support the long-term sustainability of the coastal ecosystem and communities and reduce the economic costs and risks associated with large-scale flood and storm events. Preconstruction Engineering and Design activities for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York project will continue under the project authority cited above. The Corps of Engineers intends to undertake initial construction of the project under the authority of, and using funds provided in, PL 113-2. I am recommending that the Congress authorize periodic renourishment and any initial construction of the project that will not be completed using PL 113-2 funds.

2. The reporting officers recommend authorization of the National Economic Development Plan that consists of beach restoration with renourishment, extension of 5 existing groins, construction of 13 new groins, and a composite seawall along the Atlantic Ocean Shorefront Planning Reach; along with two separate high frequency flooding risk reduction features (HFFRRFs) within the Jamaica Bay Planning Reach designed to reduce risks for communities vulnerable to high frequency flooding events located at Cedarhurst-Lawrence and Mid-Rockaway.

a. Beach restoration will include dune and berm construction using sand obtained from an offshore beach borrow source located approximately 2 miles south of the Rockaway Peninsula and about 6 miles east of the Rockaway Inlet. The recommended plan includes a reinforced dune (composite seawall) with a structure crest elevation of +17 feet NAVD88 and dune elevation of +18 feet NAVD88, and a design berm elevation of +8 feet NAVD88 and a width of 60 feet extending approximately 35,000 linear feet (LF) from Beach 9th Street to Beach 149th Street. The bottom of dune reinforcement extends up to 15 feet below the dune crest. The composite seawall may be adapted in the future to rising sea levels by adding a layer of armor stone and extending the

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concrete cap up to the elevation of the armor stone. The final structure crest elevation after adaptation will be +20 feet NAVD88.

b. Periodic renourishment is included in project design to maintain the integrity of the design beach template over the 50 year project period of analysis. Beach fill quantity of approximately 1.6 million cubic yards (cy) is projected for the initial placement, including tolerance, overfill and advanced renourishment with a 4-year renourishment cycle over 50 years requiring approximately 1,111,000 cy per cycle, resulting in an advance berm width of 60 feet. The final dune elevation at 50 years will be +21 feet NAVD88 after adaptation.

c. Initial construction will include extension of five existing groins and construction of thirteen new groins. Dune construction cost estimates include dune crossovers, dune planting, and monitoring.

d. The HFFRRFs are to reduce the risk of frequent flooding in the Cedarhurst-Lawrence and the Mid-Rockaway areas through various methods, such as floodwalls, revetments, berms, and bulkheads. The Cedarhurst-Lawrence feature consists of approximately 1,000 LF of deep bulkhead which connects to high-ground with a 23 LF segment of medium floodwall. Project design elevations are +10 feet NAVD88. The three existing outfalls in the area will be modified to add a valve chamber that will include a sluice gate and flap valve to prevent high tides or storm surge from flooding through the drainage system. Drainage will be provided by a small ditch or drainage pipes and an approximately 40 cubic feet per second (cfs) pump station. Risk reduction measures in the Mid-Rockaway near the Edgemere, Arverne, and Hammels areas include a series of berms, bulkheads, and floodwalls ranging in elevation from +8 feet NAVD88 to +12.5 feet NAVD88, as described in the report of the District Engineer. Each area will include improvements to drainage outlets which will include valve chambers with a sluice gate and flap valve to prevent high tides or storm surge from flooding through the drainage system. Pumping stations at various locations within the subbasins will be required in the Edgemere, Arverne, and Hammels areas with a combined pumping capacity of approximately 330 cfs, 550 cfs, and 280 cfs, respectively. Natural and nature-based features (NNBF) are included in the Mid-Rockaway HFFRRF design as a cost effective erosion control measure which improves natural resiliency. The NNBF include the placement of a stone toe protection and rock sill structures off the existing shoreline to attenuate wave action and allow tidal marsh to establish between the rock sill; and the berm. In some locations, the eroded/degraded shoreline will be regraded or filled to allow for the development of low marsh. Vegetation planting and monitoring are included in the costs for the natural and nature-based features.

e. An environmental impact statement was prepared in accordance with the National Environmental Policy Act. The recommended plan has been determined to be economically justified and environmentally acceptable. Since the recommended plan would not have any significant adverse effects, no mitigation measures (beyond

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management practices and avoidance) or compensation measures would be required. The Corps of Engineers will demonstrate conformity with the New York State Implementation Plan by utilizing one of the following emissions offset options, which will be reported and coordinated with the Regional Air Team (RAT) consisting of the Corps of Engineers, the U.S. Environmental Protection Agency, the New York State Department of Environmental Conservation, and the New Jersey Department of Environmental Protection and will follow agreed upon protocols:

- Emissions reductions from the project or a non-project related source;
- Use of surplus oxides of nitrogen (NOx) emission offsets (SNEOs) generated by the New York and New Jersey Harbor Deepening Project;
- Development of a Marine Vessel Engine Repower Program which replaces older, more polluting marine engines with cleaner engines;
- Use of Cross State Air Pollution Rule (CSAPR) ozone season NOX allowances with distance ratio applied to allowances;
- Extending the construction schedule so as to not exceed NOX emissions thresholds in any given calendar year.

3. The New York State Department of Environmental Conservation (NYSDEC) is the non-federal partner for all features. Based on October 2018 (Fiscal Year 2019) price levels, the estimated total construction cost is \$961,794,000, which includes a project first cost of \$590,750,000 and 12 periodic renourishments at a total of \$371,044,000, including coastal monitoring. Periodic renourishments are planned at 4 year intervals. Cost sharing is applied in accordance with the provisions of Section 103 of the Water Resources Development Act (WRDA) of 1986, as amended; the Flood Control Act of 1965; Section 72 of the WRDA of 1974; Section 934 of the WRDA 1986; and the provisions of PL 113-2, as follows:

a. Initial construction will be completed at 100 percent federal expense. Thus the federal share of the project first cost is \$590,750,000. The NYSDEC remains responsible for providing all required lands, easements, rights-of-way, relocations, and disposal facilities (LERRD). LERRD costs are estimated at about \$42,292,000. The costs incurred by the NYSDEC to acquire LERRD from private owners after January 29, 2013 are eligible for reimbursement using federal funds.

b. Costs for periodic renourishment and adaptive management beyond initial construction will be shared 50 percent federal and 50 percent non-federal.

c. The NYSDEC would be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the project after construction, at an average annual cost currently estimated to be \$1,668,000.

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4. Based on a 2.875-percent discount rate and a 50-year period of analysis, the total equivalent average annual costs of the project are estimated to be \$34,484,000, including monitoring and OMR&R. All project costs are allocated to the authorized purpose of storm damage reduction and shoreline protection. The recommended plan has average annual benefits of \$77,672,000. The net national economic development (NED) benefits of the project are \$43,188,000 and the benefit to cost ratio (BCR) is 2.3.

5. A risk and uncertainty analysis that incorporated key economic, hydraulic and sea level change parameters was performed for the feasibility study. The project is not intended to reduce risk to loss of life during major storm events. Loss of life can only be prevented by residents and visitors following existing local evacuation plans. These residual risks have been communicated to the NYSDEC.

6. In accordance with ER 1100-2-8126 *Incorporating Sea Level Change in Civil Works Programs*, a sensitivity analysis was conducted to determine the effects that different rates of accelerated sea level rise could have on the recommended plan. The plan was formulated using an intermediate rate of approximately one foot (1.09 ft) sea level rise over 50 years from 2020 to 2070 and a sensitivity analysis considered the low/historic rate and the high rate of sea level rise, to see how the project would perform under these varying rates. The analysis found that with the addition of sea level change to the current floodplain, the floodplain for the region expands in area and depth. Regions currently in the floodplain are at risk of higher flood depths during storm events. Similarly, the floodplain will extend further inland, increasing the number of assets at risk of flooding. For the Jamaica Bay reach, floods of the 10% annual frequency are expected to double from 2018 to 2068. Adaptive management costs factored in response to sea level rise, including raising costs for the composite seawall and dune height in the future and adding additional volume of sand during periodic renourishments to compensate for sea level rise. The renourishment estimates are based upon the intermediate sea level change projections. The renourishment quantities and seawall can be further adjusted as an adaptive management measure based on monitoring results.

7. In accordance with the Corps of Engineers Circular EC 1165-2-217 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 a District Quality Control review, an Agency Technical Review, an Independent External Peer Review (IEPR) (Type 1), and a policy and legal review. The IEPR was completed by Analysis Planning and Management Institute and managed by the Logistics Management Institute. 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.

8. 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 U.S. Water Resources

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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.

9. I generally concur in the findings, conclusions, and recommendations of the reporting officers. Accordingly, I recommend that the project to reduce hurricane and storm damages for East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York, be authorized in accordance with the reporting officers' recommended plan, with such modifications as in the discretion of the Chief of Engineers may be advisable. Initial construction of the project can be carried out at 100 percent federal expense under the authority and within available funds provided under PL 113-2. Any initial construction activities beyond funds available under PL 113-2, and all renourishment activities, will require authorization by Congress. My recommendation is subject to cost sharing, financing, and other applicable requirements of federal laws and policies, including Section 103 of the Water Resources Development Act (WRDA) of 1986, as amended by Section 215 of WRDA 1999. This recommendation is subject to the non-federal sponsor agreeing to comply with all applicable federal laws and policies, including that it will:

a. Provide a minimum of 35 percent of initial project costs assigned to coastal and storm damage reduction above the costs covered by PL 113-2, 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 coastal and storm damage reduction, plus 100 percent of periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do provide public benefits, and as further defined below:

(1) Provide, during design, 35 percent of design costs allocated to coastal and storm damage reduction above the costs covered by PL 113-2 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, including suitable borrow areas, and perform or assure performance of all relocations, including utility relocations, as determined by the federal government to be necessary for the initial construction, periodic nourishment or operation and maintenance 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;

(3) Provide, during construction, any additional amounts necessary to make its total contribution equal to 35 percent of initial project costs assigned to coastal and storm damage reduction above the costs covered by PL 113-2, plus 100 percent of

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initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits;

b. Operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion 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 and state laws and regulations and any specific directions prescribed by the federal government;

c. Hold and save the United States free from all damages arising from the initial construction, periodic renourishment, operation, maintenance, repair, replacement, and rehabilitation 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 renourishment, operation, and 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;

e. Assume complete financial responsibility, as between the federal government and the non-federal sponsor for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the federal government determines to be necessary for the initial construction, periodic renourishment, operation, or maintenance of the project;

f. Agree 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, replace, and rehabilitate the project in a manner that will not cause liability to arise under CERCLA

g. Participate in and comply with applicable federal floodplain management and flood insurance programs.

h. Prevent obstructions of or encroachment 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 which might reduce the level of protection which the project affords, degrade its

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benefits, hinder operation and maintenance or future periodic renourishment, or interfere with its proper function;

i. Inform affected interests, at least yearly, of the extent of protection afforded by 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 adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

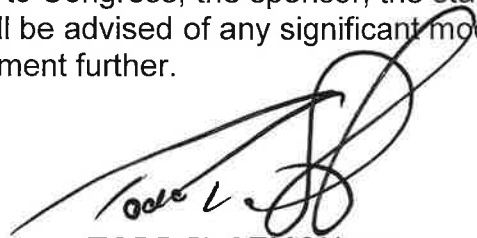
j. For so long as the project remains authorized, ensure continued conditions of public ownership and use of the shore upon which the amount of federal participation is based;

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

l. At least twice annually and after storm events, perform surveillance of the beach to determine losses of renourishment material from the project design section and provide the results of such surveillance to the federal government.

10. The recommendation contained herein reflects the information available at this time and current departmental policies governing the 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 Congress as a proposal for authorization and implementation funding. However, prior to transmittal to Congress, the sponsor, the state, interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

CRITICAL "HURRICANE SANDY" PROJECT THAT NEEDS TO BE BUILT. USACE IS PROUD TO APPROVE THIS REPORT TO BUILD CRITICAL PROTECTIVE STRUCTURES FOR ROCKAWAY AND JAMAICA BAY. SUPPLEMENTAL FUNDING AVAILABLE NOW TO START PLANNING AND DESIGN.



TODD T. SEMONITE
Lieutenant General, USA
Commanding