



**DEPARTMENT OF THE ARMY**  
**OFFICE OF THE CHIEF OF ENGINEERS**  
**WASHINGTON, D.C. 20314-1000**

REPLY TO  
ATTENTION OF:

CECW-PE (10-1-7a)

**28 SEP 1998**

**SUBJECT: Delaware Bay Coastline, Delaware and New Jersey, Port Mahon, Delaware, Interim**

**THE SECRETARY OF THE ARMY**

1. I submit for transmission to Congress my report on the study of shore protection for ecosystem restoration and protection along the Delaware Bay shoreline at Port Mahon, Kent County, Delaware. It is accompanied by the reports of the district and division engineers. These reports are in partial response to resolutions adopted by the Committee on Public Works and Transportation of the United States House of Representatives dated 1 October 1986, and the Committee on Public Works of the United States Senate dated 30 September 1974. The House resolution requested review of existing Chief of Engineers reports concerning the tidal portion of the Delaware Bay and its tributaries to determine whether any modifications of the conclusions and recommendations contained in the previous reports are advisable at the present time. The Senate resolution requested review of existing Chief of Engineers reports and other pertinent reports concerning the Mahon River with a view to determining the advisability of improvements in the interest of navigation, recreation, fish and wildlife, environmental restoration and protection, and shoreline erosion control along the Mahon River and Delaware Bay in the vicinity of Port Mahon. This report is on the Port Mahon, Delaware, interim of the Delaware Bay Coastline, Delaware and New Jersey, study.

2. The plan developed by the reporting officers consists of three elements designed to restore the ecosystem at Port Mahon.

a. The first element consists of restoration of 19.2 acres of horseshoe crab habitat through the placement of 306,000 cubic yards (cy) of sand for approximately 4,900 feet along the shoreline with two 150-foot tapers at each end to tie into the existing land. The plan also includes construction of a 1200-foot revetment at the southern end of the proposed project to tie into the existing revetment from the termination of the beachfill to provide stability. Port Mahon is recognized by the Delaware Estuary Program as a significant breeding site for horseshoe crabs, which are highly significant from an ecological standpoint. The annual spring spawning of horseshoe crabs coincides with the migration of hundreds of thousands of shorebirds. The eggs of the crabs provide vital food and energy

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resources for these migrating shorebirds, as well as for resident shorebirds. The source of sand for initial construction and subsequent periodic nourishment of this element of the project is the Delaware River Main Channel. Periodic nourishment estimated at 150,000 cy of sand on a 7-year cycle.

b. The second element of the recommended plan consists of raising State Road 89 to +7.0 feet North American Vertical Datum (NAVD) for a distance of 7,500 feet to protect 59.1 acres of wetlands to the west of State Road 89 from excessive and damaging overwash. A total initial volume of 15,800 cy of fill material would be required to raise State Road 89. In addition, 13,600 square yards of geotextile and 3,500 cy of crushed stone would be used for the road surface. It is anticipated that the roadway and revetment would require minimal maintenance. The Delaware Department of Transportation will continue to be responsible for maintenance of State Route 89.

c. The third element in the recommended plan is the restoration of 21.4 acres of degraded marsh west of State Road 89. This calls for the reestablishment of daily tidal inundation into the wetlands and the creation of three open water ponds of 1-acre size. Removal of material to an elevation 6 inches below the mean high water line would enable replacement of the existing common reed (*Phragmites*) with smooth cordgrass (*Spartina alterniflora*), a more productive plant community. The excavation of the marsh, ponds, and ditches would generate approximately 96,000 cy of material which would be placed adjacent to the active disposal area owned by the Delaware Department of Natural Resources and Environmental Control (DNREC). This placement is estimated to result in 10 acres of upland habitat which would contribute to habitat diversity. Approximately 15,500 cy of material would be accommodated at the DNREC site.

3. As reported by the district engineer, based on October 1997 price levels, the total first cost of initial construction of the plan is estimated at \$7,563,000. Periodic nourishment costs are estimated to total \$15,328,000 over a 50-year period. Under cost sharing specified by Section 103 of the Water Resources Development Act (WRDA) of 1986, as amended, \$4,916,000 of the total first cost would be Federal and \$2,647,000 would be non-Federal. Under current policy, the Federal share of periodic nourishment is estimated at \$9,963,000, and the non-Federal share is estimated at \$5,365,000. The non-Federal sponsor would provide 35 percent of the initial construction cost, including lands, easements, rights-of-way, relocations, and disposal areas (LERRD). The DNREC would provide \$2,360,000 in cash and \$287,000 of the project first cost allocated to LERRD. Project performance monitoring for a period of 5 years is estimated at \$86,000, and the Federal share would be \$56,000, and the non-Federal share would be \$30,000. Project operation, maintenance, repair, replacement and rehabilitation (OMRR&R) costs (50 years), which are the responsibilities of the non-Federal sponsor, are estimated at \$177,000. The ultimate project cost, including initial construction, periodic nourishment, project

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performance monitoring and OMRR&R, is estimated at \$23,154,000, and under current policy would be shared \$14,935,000 Federal, and \$8,219,000 non-Federal. The recommended plan will have no adverse environmental impacts and will not adversely effect navigation in the Delaware Bay.

4. The proposed ecosystem restoration and protection project would provide 193 average annual high value habitat units at an average annual cost of \$4,338 per habitat unit. The incremental cost analysis of the ecosystem restoration and protection project is based on an October 1997 price level and the Federal interest rate of 7-3/8 percent. Incremental analysis techniques were employed to evaluate net habitat increases of the alternative restoration plans. This process provides for the greatest increase in the number of habitat units at the least cost. These non-monetary benefits justify the cost of the project. In addition to ecosystem restoration and protection and the associated non-monetary environmental quality benefits, the project would produce incidental national economic development (NED) benefits. These estimated NED benefits amount to an average annual total of \$140,000, and consists of reduction of infrastructure damages and avoidance of fuel delivery by more costly alternative means.

5. The Administration has proposed a new cost sharing policy for the periodic nourishment of shore protection projects. Cost sharing of the initial cost of construction is unchanged and will continue to be specified by Section 103 of WRDA of 1986, as amended. Under the proposed cost sharing policy, periodic nourishment will generally be 35 percent Federal and 65 percent non-Federal. Water Resources Development Act of 1986 cost sharing rules pertaining to shore ownership and public use will continue to be applied (i.e., protection of private undeveloped lands will continue to be 100 percent non-Federal). Under the Administration's proposed cost sharing policy, the cost sharing for the initial construction of the project would remain unchanged, and would be cost shared as \$4,916,000 Federal and \$2,647,000 non-Federal. The cost of periodic nourishment would be allocated \$5,365,000 Federal and \$9,963,000 non-Federal. The ultimate project cost, including initial construction and periodic nourishment is estimated at \$23,154,000, allocated \$10,337,000 Federal and \$12,817,000 non-Federal.

6. The plan developed by the reporting officers is technically and environmentally sound, justified based on the monetary and non-monetary benefits it provides, and socially acceptable. The plan conforms with essential elements of the U.S. Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies and complies with other Administration, Corps of Engineers and legislative policies and guidelines. Washington level review indicates that the proposed plan is technically sound, justified and environmentally acceptable. Also, the views of interested parties, including Federal, State, and local agencies have been considered. The non-Federal sponsor supports the ecosystem restoration and protection

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project identified by the reporting officers and supports implementation of the project consistent with cost sharing enacted by Congress in law.

7. Accordingly, I recommend that shore protection for ecosystem restoration and protection at Port Mahon, Delaware, be authorized in accordance with the reporting officers recommended plan, subject to the Administration's proposed cost sharing for shore protection projects, with such modifications as in the discretion of the Chief of Engineers may be advisable. The authorized period for the project is 50 years. My recommendation is subject to the non-Federal sponsors agreeing to comply with all applicable Federal laws and policies and other requirements, including but not limited to:

a. Provide non-Federal costs assigned to ecosystem restoration outputs, as further specified below:

(1) Enter into an agreement which provides, prior to construction, 25 percent of preconstruction engineering and design (PED) costs;

(2) Provide, during construction, any additional funds needed to cover the non-Federal share of PED costs;

(3) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Government to be necessary for the construction, operation, maintenance, repair, replacement and rehabilitation of the project;

(4) Provide or pay to the Government the cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, maintenance, repair, replacement and rehabilitation of the project;

(5) Provide, during construction, any additional costs as necessary to make its total contribution of the project's initial construction equal to 35 percent of the separable project costs allocated to ecosystem restoration and protection; and

(6) Provide during construction of each periodic nourishment 65 percent of the costs assigned to ecosystem restoration and protection;

b. For so long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, at no cost to the

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Government, in accordance with applicable Federal and State laws and any specific directions prescribed by the Government;

c. Grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project;

d. Assume responsibility for operating, maintaining, replacing, repairing, and rehabilitating (OMRR&R) the project or completed functional portions of the project in a manner compatible with the project's authorized purpose and in accordance with applicable Federal and State laws and specific directions prescribed by the Government in the OMRR&R manual and any subsequent amendments thereto;

e. Comply with Section 221 of the Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986 as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

f. Hold and save the Government free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the Government or the Government's contractors;

g. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs;

h. 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), 42 USC 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the project; except that the non-Federal sponsor shall not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government;

i. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or

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rights-of-way that the Government determines necessary for the construction, operation, or maintenance of the project;

j. 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;

k. Prevent future encroachments on project lands, easements, and rights-of-way which might interfere with the proper functioning of the project;

l. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987, and the Uniform Regulations contained in 49 CFR part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;

m. Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964 and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army";

n. Provide 35 percent of that portion of total historic preservation mitigation and data recovery costs assigned to initial construction of ecosystem restoration and protection, and 65 percent of those costs assigned to periodic nourishment that are in excess of 1 percent of the total amount authorized to be appropriated for the project;

o. Provide 35 percent of ecosystem restoration and protection project performance monitoring costs on an annual basis for a period of five years, including surveys of horseshoe crab and shorebirds usage;

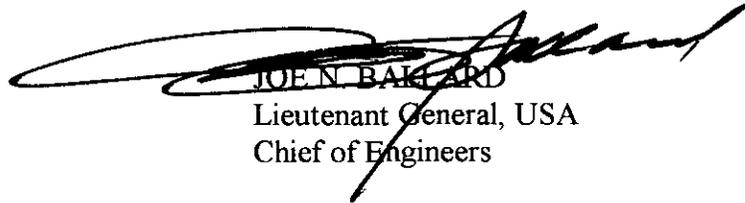
p. At least annually perform surveillance of the beach to determine losses of material from the project design section and provide the results of such surveillance to the Federal Government; and

q. Prescribe and enforce regulations to prevent obstruction of or encroachment on the Project by structures or persons that would reduce the level of ecosystem restoration and protection it affords or that would hinder operation or maintenance of the Project.

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8. The recommendation contained herein reflects 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 nor 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 the Congress, the sponsor, the State of Delaware, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.



JOE N. BAIGARD  
Lieutenant General, USA  
Chief of Engineers