



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

CECW-SAD

MAY 23 2012

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Brevard County Florida, Hurricane and Storm Damage Reduction Project, Mid-Reach Segment, Final Integrated General Reevaluation Report and Supplemental Environmental Impact Statement

1. Purpose: To provide for your review and approval the Final Integrated General Reevaluation Report and Supplemental Environmental Impact Statement for Brevard County Florida, Hurricane and Storm Damage Reduction Project, Mid-Reach Segment, included as enclosure. Section 3045 of the Water Resources Development Act (WRDA) 2007, Public Law (PL) 110-114, authorized construction of the Mid-Reach segment, subject to a determination by the Secretary, following completion of the General Reevaluation Report (GRR), that the shore protection is feasible. This report constitutes the final report in response to this legislation.

2. Recommendation: That the Assistant Secretary of the Army for Civil Works (ASA(CW)) approve the Brevard County, Florida, plan to reduce coastal storm damages by construction of beach fill and dune with vegetation using beach-compatible sand from offshore borrow sources. The beach fill and dune would extend the 7.8 miles of the Mid-Reach Segment of Brevard County from monument R-119 to R-75.4.

3. Background:

a. In order to evaluate the problems and alternative solutions within the Mid-Reach segment it was divided into six reaches. The recommended design consists of dune fill and a 10-foot extension of the mean high water line plus advanced nourishment to maintain that design fill volume in Reaches 1, 4 and 5; dune fill and a 20-foot extension of the mean high water line plus advanced nourishment to maintain that design fill volume in Reaches 2 and 3; and a dune fill consisting of advanced nourishment in Reach 6. The approximate volume of sand to be placed during initial construction, as calculated from a 2005 survey, includes an initial design fill of 445,000 cubic yards plus an advanced nourishment fill of 210,000 cubic yards for a total of 655,000 cubic yards. The project's design baseline as defined for all economic benefit and damage calculations and plan formulation steps, is the mean high water line from the year 2005. Mean high water in the project area is defined as elevation +2.0 feet NGVD 29.

(1) The plan includes rehabilitation of the Poseidon Dredged Material Management Area (DMMA) at Port Canaveral to facilitate stockpiling of sand, dredging material at six year intervals from Canaveral Shoals with placement and storage in the Poseidon DMMA, hauling sand by dump truck to the Mid-Reach for placement on the beach at approximately three year intervals, and construction of nearshore reefs required for environmental mitigation.

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(2) This plan is the Locally Preferred Plan (LPP). Because the National Economic Development (NED) plan and the LPP are very similar in construction technique, fill volume, and environmental impact, the Jacksonville District supports construction of the LPP. The Jacksonville District requested and was given a waiver per a memorandum from the ASA(CW) dated 7 December 2009. The differences between the NED plan and the LPP plan are that in Reach 3 the LPP plan is for a 20-foot extension of the mean high water line versus a 30-foot extension in the NED plan; and in Reach 4 the LPP plan is for a 10-foot extension of the mean high water line versus dune fill in the NED plan. The actions in Reaches 1, 2, 5 and 6 are the same in the LPP and NED plans.

b. Section 101(b)(7) of WRDA 1996, PL 104-303, authorized construction of the Brevard County, Florida, project for storm damage reduction and shoreline protection subject to completion of a final report of the Chief of Engineers, which was completed 23 December 1996 (enclosure). The 23 December 1996 Chief's Report also served as a final response to a resolution passed by the Committee on Public Works and Transportation of the U.S. House of Representatives adopted 23 September 1982. That resolution requested review of the 3 June 1968 Report of the Chief of Engineers on Brevard County, Florida (House Document No. 352, 90th Congress, 2nd Session) to determine the advisability of modifying the existing project, with particular reference to the advisability of providing beach erosion control works in the area from the southern border of Patrick Air Force Base southerly to the northern border of the town of Indialantic. It also directed that consideration be given to the economic and recreational benefits of beach restoration as well as the technical requirements for implementation of restoration projects, and extending the period of federal participation in the cost of periodic nourishment of the authorized beach erosion control project. Section 418 of WRDA 2000, PL 106-541, directed the Secretary to prepare a GRR on the project for shoreline protection, Brevard County, Florida, authorized by section 101(b)(7) of WRDA 1996, to determine, if the project were modified to direct the Secretary to incorporate in the project any or all of the 7.1-mile reach of the project that was deleted from the south reach of the project, as described in paragraph (5) of the Report of the Chief of Engineers dated 23 December 1996, whether the project as modified would be technically sound, environmentally acceptable, and economically justified. Section 3045 of WRDA 2007 authorized construction of the Mid-Reach Segment, subject to a determination by the Secretary, following completion of the GRR, that the shore protection is feasible.

4. Discussion:

a. Brevard County, Florida is the non-federal cost-sharing sponsor for all features. Based on an October 2011 price level, the estimated project first cost of the plan is \$32,474,000 with \$17,536,000 federal share and \$14,938,000 non-federal share. The total nourishment cost, including periodic nourishment every three years over 50 years of federal participation, is \$165,064,000 with the federal share of the total nourishment cost of \$76,141,000 and the non-

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federal share \$88,923,000. In accordance with the cost sharing provisions of Section 103 of WRDA 1986, as amended by Section 202 of WRDA 1996, and again amended by Section 215 of WRDA 1999, the federal share of the project first costs is 54% and the federal share of the periodic nourishments is 44.2%. These percentages are based on the maximum level of federal participation and the federal interest dictated by public access and parking. Based on a 4-percent discount rate for FY12 and a 50-year period of analysis, the total equivalent average annual costs of the project are estimated to be \$4,182,000, including engineering monitoring, and operations, maintenance, repairs, rehabilitation and replacement (OMRR&R). All project costs are allocated to the authorized purpose of coastal storm damage reduction. The selected plan has primary outputs based on hurricane and storm damage reduction. The equivalent average annual benefits are estimated to be \$13,473,000, which include incidental recreation benefits of \$1,044,000. The net average annual benefits are approximately \$9,291,000.

b. The cost of lands, easements, rights-of-way, relocations, and dredged or excavated material disposal areas (LERRD) is estimated at \$87,000 for initial construction, as well as for each periodic nourishment, all of which is eligible for LERRD credit. The project first cost includes \$7,172,000 for environmental mitigation and \$786,000 for engineering monitoring. Brevard County would be responsible for the OMRR&R of the project after construction, a cost currently estimated at about \$134,000 per year.

c. The benefit-to-cost ratio for the LPP is 3.2.

d. The study was designed to work in tandem with adjacent federal (Brevard County Federal Shore Protection Project, Canaveral Harbor Federal Navigation Project, and Patrick Air Force Base) and non-federal projects to help protect the project area. A statistical, risk based model was used to formulate and evaluate the project. The recommended plan is designed to offset erosion from a 5-year to 75-year storm depending on the shoreline locations. However, the risk to structures from flooding, or wave damage other than loss of material was not included in the modeling and thus is unknown.

e. In accordance with the Corps Engineering Circular (EC) 1165-2-211 on sea level change, the study performed a sensitivity analysis of three Sea Level Rise (SLR) rates, including the shoreline recession and volume lost due to the SLR rates. If the higher rates of SLR are observed, the effect on the project would be either higher volumes of sand required for periodic nourishments or an increase in the frequency of periodic nourishments. Therefore the recommended alternative, construction of beach fill and dune with vegetation, is adaptable across all SLR scenarios.

In accordance with the Corps EC 1165-2-209 on review of decision documents, all technical, engineering and scientific work underwent an open, dynamic and vigorous review process to ensure technical quality. This included an independent Agency Technical Review and an

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Independent External Peer Review (IEPR). Overall the reviews have resulted in the improvement of the technical quality of the report including the enhanced communication of risk and uncertainty. Specifically, IEPR comments resulted in improvements to technical soundness and economic justification of the project as documented within the report. The IEPR comments also captured the public and agency concerns with environmental tradeoffs between rock and sand systems, which resulted in enhancements to the discussion of tradeoffs and effects in the document.

f. The documentation of review findings and a draft transmittal letter to the Office of Management and Budget are provided as enclosures.

5. Conclusion: I have reviewed the Final Integrated General Reevaluation Report and Supplemental Environmental Impact Statement. Based on this review, I find the proposed plan is technically and environmentally sound, justified based on the monetary and non-monetary benefits it provides, and is socially acceptable. The proposed project complies with applicable U.S. Army Corps of Engineers planning procedures and regulations. Also, the views of interested parties, including federal, state, and local agencies, have been considered.

FOR THE COMMANDER:



STEVEN L. STOCKTON, P.E.
Director of Civil Works

Encl

23 Dec 96

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THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on hurricane and storm damage reduction for Brevard County, Florida. It is accompanied by the report of the district and division engineers. This report is being submitted in final response to a resolution passed by the Committee on Public Works and Transportation of the U.S. House of Representatives adopted 23 September 1982. This resolution requested review of the report of the Chief of Engineers on Brevard County, Florida (House Document No. 352, 90th Congress, 2nd Session) to determine the advisability of modifying the existing project, with particular reference to the advisability of providing beach erosion control works in the area from the southern border of Patrick Air Force Base southerly to the northern border of the town of Indialantic, with consideration given to the economic and recreational benefits of beach restoration as well as the technical requirements for implementation of restoration projects, and extending the period of Federal participation in the cost of periodic nourishment of the authorized beach erosion control project.

2. Section 101(b)(7) of the Water Resources Development Act of 1996 (WRDA 1996), Public Law 104-303, authorized construction of the Brevard County, Florida, project for storm damage reduction and shoreline protection subject to completion of a final report of the Chief of Engineers on or before 31 December 1996, and subject to the conditions recommended in that final report. This report constitutes the final report of the Chief of Engineers in response to this legislation.

3. The plan authorized by section 101(b)(7) provides for beach fill placement along two separable project elements or shoreline reaches. The north reach is bounded by the south jetty of Canaveral Harbor to the north and Patrick Air Force Base to the south and the project consists of placing beach fill along 9.4 miles of shoreline with a 1,500-foot transition section at the southern limit of the reach. The design berm elevation is +10.0 feet mean low water (MLW). Construction of the north reach requires placement of approximately 1,984,000 cubic yards (cy) of initial beach fill and 516,000 cy of advanced nourishment material for a total of 2,500,000 cy. The primary borrow source would be Canaveral Shoals which is located between 2 to 3 miles offshore of the tip of Cape Canaveral. The estimated total construction cost for the north reach plan would be approximately \$18,126,000, including \$17,892,000 for initial construction and \$234,000 for project monitoring. Nourishment would be provided at

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6-year intervals over the 50-year life of the project with an associated cost of each future nourishment of \$4,895,000. The benefit-cost ratio of the authorized plan for the north reach of the project is 1.9 to 1.

4. The south reach of the authorized project is bounded by Patrick Air Force to the north and Spessard Holland Park to the south. The project for the south reach consists of placing beach fill along 10.5 miles of shoreline with 1,500-foot transition sections at the northern and southern limits of the reach. Like the north reach, the design berm elevation is +10.0 feet MLW. This portion of the project would require placement of approximately 3,404,000 cy of initial beach fill and 948,000 cy of advanced nourishment material for a total of 4,352,000 cy. The primary borrow source for construction of the south reach would also be Canaveral Shoals. The estimated cost of the beach fill placement would be approximately \$53,210,000, including \$52,907,000 for initial placement and \$303,000 for project monitoring. Nourishment of the south reach would be provided at 6-year intervals over the 50-year life of the project with an associated cost of each future nourishment of \$12,369,000. The authorized plan for the south reach plan would result in burial of nearshore coquina rock outcrops. Environmental mitigation costs, totaling \$5,284,000, have been included in the south reach plan costs for construction and placement of artificial reef modules. Therefore, the total cost of the authorized plan for the south reach is \$58,494,000. The benefit-cost ratio of the authorized plan for the south reach of the project is 2.2 to 1.

5. The project authorized by Section 101(b)(7) of WRDA 1996 has been modified in the district and division engineer's reports. Due to the adverse environmental impacts to 32 acres of nearshore coquina rock outcrops and the need for extensive and costly mitigation, the current recommended plan no longer includes a 7.1 mile reach of shoreline for beach fill placement in the south reach. The district engineer's final plan, like the authorized plan, consists of two separable project elements or shoreline reaches. The district engineer's final plan for the north reach is the same as authorized in Section 101(b)(7) of WRDA 1996. The north reach element of the project consists of beach fill along 9.4 miles of shoreline with a 1,500-foot transition section at the southern limit of the reach. The design berm elevation is +10.0 feet MLW with design template slopes of 1 vertical (V) to 15 horizontal (H) seaward to the location of MLW thence 1 V to 50 H out to the existing ocean bottom. Construction would require placement of approximately 1,984,000 cy of initial beach fill and 516,000 cy of advanced nourishment material for a total of 2,500,000 cy. The primary borrow source would be the Canaveral Shoals and nourishment would be provided at 6-year intervals over the 5-year life of the project.

6. The district engineer's plan for the south reach element of the project consists of beach fill along 3.4 miles of shoreline with a 1,000-foot transition section at the northern limit and a 1,500-foot transition at the southern limit of the reach. The south reach is bounded by the Florida Department of Environmental Protection monument R-119 to the north and Spessard Holland Park to the south. The design berm elevation of +10.0 feet MLW with design template

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slopes of 1 V to 15 H seaward to the location of MLW, thence 1 V to 50 H out to the existing ocean bottom. Construction would require placement of approximately 1,044,000 cy of initial beach fill and 601,000 cy of advanced nourishment material for a total of 1,645,000 cy. The primary borrow source for this reach would also be the Canaveral Shoals. Nourishment would be provided at 6-year intervals over the 50-year life of the project.

7. The plan developed by the reporting officers incorporates combined placement techniques to provide a protective beach while avoiding impacts to nearshore hardgrounds. The project would be designed and constructed in a manner that minimizes environmental impacts. Such actions as instituting dredging windows to avoid impacts to sea turtle nesting seasons and establishment of buffer areas around cultural resources sites located within the Canaveral Shoals borrow site would be undertaken. All available and practicable means and measures have been incorporated into the plan to ensure that the project is environmentally sound.

8. Based on September 1996 price levels, the total first cost of the final plan developed by the reporting officers is estimated at \$40,620,000. Under cost sharing specified by the WRDA 1986, based on shoreline ownership and public access, cost sharing for initial construction of the north reach is currently estimated at about 53.1 percent Federal, estimated at \$9,625,000, and about 46.9 percent non-Federal, estimated at \$8,501,000. The cost sharing for the south reach is currently estimated at about 52.7 percent Federal, estimated at \$11,854,000, and about 47.3 percent non-Federal, estimated at \$10,640,000. Of the total non-Federal share for both reaches, the total cash contribution required would be about \$18,816,000. The balance of the non-Federal share of first cost would consist of \$325,000 for the estimated creditable cost for lands, easements, right-of-way, relocations, and suitable borrow and dredged or excavated material disposal areas. Periodic nourishment would be shared as continuing construction. The total cost of renourishment is estimated at about \$94,241,000, allocated \$49,803,000 Federal and \$44,438,000 non-Federal, at September 1996 price levels. Costs associated with periodic performance monitoring activities, currently estimated at \$3,917,000 over the 50-year economic life of the project, as identified in the operations and maintenance manual developed by the district engineer, will be borne by the non-Federal sponsor.

9. The ultimate project cost, including initial construction, periodic nourishment and monitoring is estimated at about \$138,778,000, allocated \$71,282,000 Federal and \$67,496,000 non-Federal. Based on a discount rate of 7.625 percent and a 50-year period of economic analysis, average annual costs, which include periodic nourishment, monitoring and maintenance, are estimated at about \$2,278,000 for the north reach and about \$2,997,000 for the south reach. Average annual benefits for the north reach are estimated at \$3,132,000 for storm damage reduction and \$984,000 for recreation. Average annual benefits for the south reach are \$3,179,000 for storm damage reduction and \$122,000 for recreation. Net benefits are estimated at \$1,838,000 for the north reach and \$304,000 for the south reach. The resulting ratios of benefits-to-costs are 1.8 for the north reach and 1.1 for the south reach.

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10. The authorizing language for the Brevard County shore protection project reflects a total cost of \$76,620,000, with an estimated Federal cost of \$36,006,000, and an estimated non-Federal cost of \$40,614,000, and an estimated average annual cost of \$2,341,000 for periodic nourishment over the 50-year life of the project. These costs reflect an earlier plan described in the draft feasibility report which included protection of 10.5 miles of shoreline in the south reach and environmental mitigation features which are not in the final feasibility report or this report. The earlier plan was reduced in scope during preparation of the final feasibility report to eliminate adverse environmental effects to nearshore coquina rock outcrops located along 7.1 miles of shoreline in the south reach. Project costs were reduced to reflect the deletion of this reach from the plan.

11. I generally concur in the findings of the reporting officers. The project plan developed is technically sound, economically justified, and socially and environmentally acceptable. The project 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 and legislative policies and guidelines on project development. However, based on current budget priorities, projects like Brevard County, would receive a low budget priority, and it is unlikely that funding for this project will be included in future budget requests.

12. However, in light of the authorization provided by Section 101(b)(7) of WRDA 1996, should the project receive construction appropriations for Federal implementation, it would be implemented subject to the cost sharing, financing, and other applicable requirements for hurricane and storm damage reduction projects established by WRDA 1986, as amended, and would be implemented with such modifications as the Chief of Engineers deems advisable within his discretionary authority. Federal implementation would also be subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies, and that it shall be responsible for the following items of local cooperation.

a. Provide 35 percent of total project costs assigned to hurricane and storm damage reduction plus 100 percent of total project costs assigned to protecting undeveloped private lands and other privately owned shores which do not provide public benefits, and as further specified below:

(1) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the initial construction, periodic nourishment, operation, and maintenance of the project.

(2) Provide all improvements required on lands, easements, and rights-of-way to enable the proper disposal of dredged or excavated material associated with the initial construction, periodic nourishment, operation, and maintenance of the project. Such

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improvements may include, but are not necessarily limited to, retaining dikes, wasteweirs, bulkheads, embankments, monitoring features, stilling basins, and dewatering pumps and pipes.

(3) Provide, during construction, any additional amounts as are necessary to make its total contribution equal to 35 percent of total project costs assigned to hurricane and storm damage reduction plus 100 percent of total project costs assigned to protecting undeveloped private lands and other privately owned shores which do not provide public benefits.

b. For so long as the project remains authorized, operate, maintain, monitor, 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 purpose and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government.

c. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspection, and, if necessary, after failure to perform by the non-Federal sponsor, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall operate to relieve the non-Federal sponsor of responsibility to meet the non-Federal sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance.

d. Hold and save the United States free from all damages arising from the initial construction, periodic nourishment, 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 United States or its contractors.

e. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20.

f. 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 nourishment, operation, and maintenance of the

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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.

g. 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 nourishment, operation, or maintenance of the project.

h. As between the Federal Government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability. 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.

i. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the initial construction, periodic nourishment, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

j. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), 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."

k. Provide 35 percent of that portion of total historic preservation mitigation and data recovery costs attributable to hurricane and storm damage reduction that are in excess of 1 percent of the total amount authorized to be appropriated for hurricane and storm damage reduction.

l. Provide 100 percent of that portion of total historic preservation mitigation and data recovery costs attributable to protecting undeveloped private lands and other privately owned shores which do not provide public benefits that are in excess of 1 percent of the total amount authorized to be appropriated for protecting undeveloped private lands and other privately owned shores which do not provide public benefits.

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m. Participate in and comply with applicable Federal floodplain management and flood insurance programs in accordance with Section 402 of Public Law 99-662, as amended.

n. Within one year after the date of signing a project cooperation agreement, prepare a floodplain management plan designed to reduce the impact of future flood events in the project area. The plan shall be prepared in accordance with guidelines developed by the Secretary of the Army and must be implemented not later than 1 year after completion of construction of the project.

o. Prescribe and enforce regulations to prevent obstruction of or encroachment on the project that would reduce the level of protection it affords or that would hinder operation and maintenance of the project.

p. Not less than once each year, inform affected interests of the extent of protection afforded by the project.

q. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the floodplain, and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project.

r. For so long as the project remains authorized, the non-Federal sponsor shall ensure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based.

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

/s/

JOE N. BALLARD
Lieutenant General, USA
Chief of Engineers