



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

DAEN

JUL 29 2016

SUBJECT: Southwest Coastal Louisiana

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on hurricane storm surge damage risk reduction and ecosystem restoration in three parishes in southwestern Louisiana. It is accompanied by the report of the New Orleans District Engineer and the Mississippi Valley Division Engineer. These reports are in partial response to a resolution of the U.S. House of Representatives Committee on Transportation and Infrastructure, adopted 7 December 2005, and to Section 7003 of the Water Resources Development Act (WRDA) of 2007. The resolution requested the Secretary of the Army to survey the coast of Louisiana in Cameron, Calcasieu, and Vermilion Parishes, with particular reference to the advisability of providing hurricane protection and storm damage risk reduction and related purposes, including the feasibility of constructing an armored 12-foot levee along the Gulf Intracoastal Waterway. Section 7003 of WRDA 2007 authorized a program for ecosystem restoration for the Louisiana Coastal Area to be carried out substantially in accordance with the report of the Chief of Engineers dated 31 January 2005, which recommended further study of various large scale restoration concepts. If funded, preconstruction engineering and design activities for the National Economic Development (NED) recommended plan would continue under the authority of the 7 December 2005 resolution, and would continue for the National Ecosystem Restoration (NER) recommended plan under the authority of Section 7003 of WRDA 2007.

2. The reporting officers recommend authorizing a NED plan of localized storm surge risk reduction features to reduce hurricane storm surge damage risks in Cameron, Calcasieu, and Vermilion Parishes. The NED plan reduces the risk of coastal storm damages through independent features that elevate or flood-proof structures in the 25-year floodplain predicted to occur in 2025. The NED plan includes raising approximately 3,500 residential structures in-place above the predicted 2075 1-percent chance base flood elevation; flood-proofing approximately 350 non-residential structures; and constructing earthen berms around approximately 160 warehouses. The risk evaluation and forecast, plan selection, and risk reduction design elevations are based on the projection of an intermediate rate of relative sea level rise. The raising of residential structures, the flood-proofing of non-residential structures, and the construction of localized storm surge risk reduction measures will be implemented on a voluntary participation basis. It is recommended that the NED plan be authorized for implementation over a 20-year construction period. The recommended plan has no significant adverse effects, consequently there are no compensatory mitigation requirements.

3. The reporting officers recommend authorizing a NER plan comprised of 49 features to restore coastal habitats in Cameron, Calcasieu, and Vermilion Parishes. The NER plan will provide

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benefits in two estuaries by rebuilding tidal wetlands, preventing shoreline erosion, and replanting rare native vegetation addressing land loss and ecosystem degradation. The recommended NER plan includes nine marsh restoration measures restoring a net total of 7,900 acres of brackish and saline marsh with 2,700 Average Annual Habitat Units (AAHUs); five shoreline protection measures protecting a net total of 6,135 acres of marsh with 1,738 AAHUs; and 35 chenier reforestation measures that would plant cheniers with live oak and hackberry for a net total of 1,413 acres with 538 AAHUs. Overall, the recommended NER plan would reforest, protect, and restore a net total of 15,448 acres with a total of 4,976 AAHUs. The NER plan restores and protects 260,000 acres of habitat designated as federal or state refuge in the study area. This includes protecting 84 miles of designated shoreline, 335 acres of designated critical wintering habitat for the threatened piping plover, and 72,000 acres of Wetland Conservation Area designated for an experimental population of the threatened whooping crane. This critical wintering habitat is also utilized by the rufa subspecies of the threatened red knot. The benefitted acres are located at a critical intersection of the North American flyway and support both wintering migratory water fowl and neo tropical migrant species in transit from South and Central America. The NER plan would restore very scarce marine forest habitat (oak and hackberry trees) on the coastal chenier features unique to this area of the gulf and critical to many species utilizing the flyway. The NER plan enhances overall plant productivity, which reinforces and protects critical landscape features and enhances the resilience of a geomorphic framework that support both the ecology and management of risk throughout the area. Monitoring and adaptive management of this ecosystem restoration project will be conducted for a period up to 10-years post-construction. If ecological success has not been achieved within the 10-year period, the costs for monitoring and adaptive management will be a 100% non-federal responsibility.

In addition to a construction recommendation, the reporting officers also recommend continued study of a hydrologic and salinity control structure (Cameron-Creole Spillway) and a long-range study of a Calcasieu Ship Channel salinity control structure that were identified in this study as potentially viable features but require additional analysis for construction.

Two of the nine identified marsh restoration features are partially located on United States Fish and Wildlife Service (USFWS) property (Sabine National Wildlife Refuge and Cameron Prairie National Wildlife Refuge) and are included in the recommended NER plan. These features are vitally important to help preserve the Calcasieu Lake rim and prevent vast new expanses of open water from forming should the lake rim be breached by erosional forces. The total project first costs for the measures on USFWS property are estimated at \$296,839,000 and would provide 1,492 acres and 611 AAHUs. The acquisition of some privately held lands adjacent to USFWS property would be required for implementation of each feature to be complete. A cost of approximately \$800,000 for this real estate acquisition is included in the estimates. Because USFWS is ultimately responsible for managing its refuge lands, USACE is not seeking authorization nor funding for the features located on USFWS lands. The reporting officers recommend development of an implementation plan by the State of Louisiana and USFWS for these two features. This subset of the NER plan, all features of the NER minus the two USFWS features, represents the "Corps Plan." The full NER plan, with all features including the two USFWS features, represents the "Federal Plan."

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The two USFWS features are not included in the Land, Easements, Rights-of-Way, Relocations, and Disposal Areas (LERRDs) necessary for the construction and operation, maintenance, repair, rehabilitation and replacement (OMRR&R) of the Corps Plan.

4. The Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) is the non-federal cost-sharing sponsor for all hurricane storm surge damage risk reduction and ecosystem restoration features. Based on October 2015 price levels, the total estimated project first cost of the recommended Corps Plan is \$3,094,276,000. The total cost of lands, easements, rights-of-way, relocations, and dredged or excavated material disposal areas is estimated at \$72,100,000.

a. Based on October 2015 price levels, the project first cost for the purposes of authorization and calculating the maximum cost of the project pursuant to Section 902 of WRDA 1986, as amended, for the NED plan is \$906,091,000. The total cost of lands, easements, rights-of-way, relocations, and dredged or excavated material disposal areas is estimated at \$61,970,000. In accordance with the cost sharing provisions of Section 103 of the Water Resources Development Act (WRDA) of 1986, as amended, the federal share of the project first cost of the NED plan features would be \$588,959,000 (65 percent). The non-federal share of the first costs of the NED plan would be \$317,132,000 (35 percent). CPRAB will be responsible for the OMRR&R of the project after construction, a cost currently estimated at about \$5,000 per year.

b. Based on October 2015 price levels, the project first cost for the purposes of authorization and calculating the maximum cost of the project pursuant to Section 902 of WRDA 1986, as amended, for the NER plan is \$2,188,185,000. In accordance with the cost sharing provisions of Section 103 of the WRDA 1986, as amended, the federal share of the project first cost of the ecosystem restoration features would be \$1,422,321,000 (65 percent). The non-federal share of the first costs of the ecosystem restoration features would be \$765,865,000 (35 percent). CPRAB will be responsible for the OMRR&R of the project after construction, a cost currently estimated at about \$5,958,000 per year. Post-construction monitoring and adaptive management of the ecosystem restoration project may be conducted for no more than 10-years at an estimated cost of \$62,807,000.

c. The NER plan includes a three tiered implementation sequence. (1) Tier I features may be constructed simultaneously because they would not affect the construction of any nearby Tier I NER recommended plan feature. Shoreline protection features would be constructed prior to marsh restoration features in an effort to better protect the more storm-vulnerable marsh restoration features. This approach contributes to the sustainability of the marsh restoration features. The project first cost for Tier 1 is \$850,998,000 producing 1,930 AAHU. (2) Tier II NER recommended plan features were so categorized because they utilize the same borrow or staging area, and/or construction of these features would potentially interfere with construction of a Tier I NER recommended plan feature. The project first cost for Tier II is \$561,186,000 producing 1,117 AAHU. (3) Tier III NER recommended plan features were so categorized because they would utilize the same borrow or staging area, and/or interfered with construction

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of a Tier II feature, and/or interfered with an existing mitigation project. The project first cost for Tier III is \$776,002,000 producing 1,318 AAHU.

d. Additionally, the two long range studies recommended under the NER plan are to study a hydrologic and salinity control structure (Cameron-Creole Spillway) and a long-range study of a Calcasieu Ship Channel salinity control structure estimated to cost \$6,000,000, cost shared with CPRAB at a 50/50 rate, or \$3,000,000 each.

5. Analyses are based on a 3.125-percent discount rate and a 50-year period of analysis.

a. Implementing the NED plan will reduce expected average annual flood damages by about 93 percent for structures in the projected 2025 25-year floodplain. Equivalent without-project damages are estimated at \$219,683,000 and equivalent with-project damages are estimated at \$16,129,000, resulting in equivalent annual benefits of \$203,554,000. The total average annual costs of the NED plan are estimated to be \$36,056,000 and the equivalent annual net benefits are estimated to be \$167,498,000. The NED plan benefit-cost ratio is approximately 5.6 to 1. For the entire study area with an equivalent without-project damages of \$474,998,000, the NED plan will reduce expected average annual flood damages by about 46 percent.

b. The total equivalent annual costs of the NER plan are estimated to be \$66,642,000 including OMRR&R. Implementing the NER plan will produce 4,365 average annual habitat units.

6. In accordance with USACE Sea Level Change Guidance, ER 1100-2-8162, the study evaluated potential impacts of sea level change in formulating and engineering the recommended plans. The risk reduction system and ecosystem restoration features being proposed are based on the intermediate Relative Sea Level Rise (RSLR) projection. However, the USACE will continue to monitor local conditions and determine if the intermediate scenario of RSLR is occurring. If observed conditions deviate from intermediate to high sea level forecasts during design or construction, reevaluation of the NED and NER will be required.

7. The NED plan is intended to prevent damages to structures and infrastructure; it is not intended to, nor will it, reduce the risk to loss of life during major storm events. Loss of life can only be prevented by residents and visitors following the local evacuation plans that are already in place. The proposed project would greatly reduce, but not completely eliminate future storm damages. Coastal storm damages are reduced by approximately 93 percent in the location of the recommended plan, and by approximately 46 percent across the entire study area. These residual risks have been communicated to the residents of Cameron, Calcasieu, and Vermilion Parishes.

8. In accordance with the Engineer Circular (EC 1165-2-214) 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 Agency Technical Review (ATR), a Type I Independent External Peer Review (IEPR), and USACE Headquarters policy and legal review. All concerns of the ATR have been addressed and incorporated into the final feasibility report. USACE conducted the IEPR in accordance with Section 2034 of the WRDA 2007, EC 1165-2-

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214, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004). A Section 501(c)(3) (Internal Revenue Code) non-profit science and technology organization, independent and free of conflicts of interest, established and administered the peer review panel. The IEPR panel consisted of four members with expertise in economics, civil works planning, environmental review and environmental policy, and hydrologic and hydraulic engineering. The review panel identified and documented eighteen final comments. Of these, two were identified as having medium-high significance, 10 as having medium significance, and six as having low significance. The medium-high significance comments addressed the uncertainty of Hydraulic and Hydrologic modeling in combining effects from surge and inland flooding; and potential effects of excluding or limiting impacts to the Henry Hub natural gas distribution facility, future development, Biggert-Waters flood insurance reforms, and alternative design options, on the cost/benefit analysis. All IEPR review comments have been resolved. There have been no significant changes to the plan formulation, engineering assumptions, or environmental analyses that supported the decision-making process and plan selection resulting from the resolution of comments. The final integrated report and environmental impact statement were provided for state and agency review. All comments from the above referenced reviews were addressed and incorporated into the final documents as appropriate.

9. Washington level review indicates that the project recommended by the reporting officers is technically sound, environmentally and socially acceptable, cost effective, and economically justified. The plan complies with all 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 administrative and legislative policies and guidelines. Also, the views of interested parties, including federal, state, and local agencies have been considered.

10. Federal implementation of the recommended project would be subject to the non-federal sponsor agreeing to comply with federal laws and policies, including agreeing with the following requirements prior to implementation:

a. Provide 35 percent of total hurricane storm surge risk reduction costs and 35 percent of total ecosystem restoration costs, 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, 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 improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material as determined by the federal government to be required or to be necessary for the construction, operation, and maintenance of the project, and provide relocation assistance, all in compliance with applicable provisions of the Uniform Relocation and Assistance and Real Property

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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. Pay, during construction, any additional funds necessary to make its total contribution equal to at least 35 percent of hurricane storm surge risk reduction costs and 35 percent of total ecosystem restoration costs;

b. Operate, maintain, repair, rehabilitate, and replace 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. 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 which might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function;

d. Inform affected interests, at least annually, of the extent of protection afforded by the flood risk management features; participate in and comply with applicable federal floodplain management and flood insurance programs; comply with Section 402 of the WRDA 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 flood risk management features;

e. Hold and save the United States free from all damages arising from the construction, OMRR&R of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

f. 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), 42 USC 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the federal government determines to be necessary for the construction or operation and maintenance of the project;

g. 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 necessary for the construction, OMRR&R of the project;

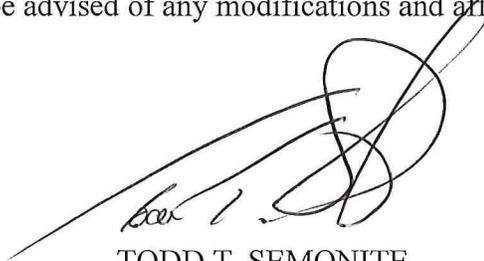
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h. Agree, as between the federal government and the non-federal sponsor, that the non-federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and

i. Not use the project or lands, easements, and rights-of-way required for the project as a wetlands bank or mitigation credit for any other project.

11. The recommendations herein reflect the information available at the time and current Department of the Army policies governing the formulation of individual projects. They do not reflect programming and budgeting priorities inherent in the formulation of 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 Congress as proposals for implementing funding. However, prior to the transmission to Congress, the state, federal agencies, and other parties will be advised of any modifications and afforded the opportunity to comment.

A handwritten signature in black ink, appearing to read "Todd T. Semonite", is written over a large, stylized circular scribble.

TODD T. SEMONITE  
Lieutenant General, USA  
Chief of Engineers