



**DEPARTMENT OF THE ARMY
CHIEF OF ENGINEERS
2600 ARMY PENTAGON
WASHINGTON, DC 20310-2600**

DAEN

SUBJECT: Memphis Metropolitan Stormwater – North DeSoto County Feasibility Study, DeSoto County, Mississippi, Flood Risk Management and Ecosystem Restoration

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on flood risk management (FRM) and aquatic ecosystem restoration (AER) recommendations for the Memphis Metropolitan Stormwater – North DeSoto County Feasibility Study, DeSoto County, Mississippi. It is accompanied by the report of the Memphis District and Mississippi Valley Division U.S. Army Corps of Engineers. This study is an interim response to the authorization pursuant to the United States House of Representatives Committee on Transportation and Infrastructure resolution on March 7, 1996, regarding the Memphis Metro Area. The authorization directs that:

“ The Secretary of the Army review the report of the Chief of Engineers on the Wolf River and Tributaries, Tennessee and Mississippi, published as House Document Numbered 76, Eighty-fifth Congress, and other pertinent reports, to determine whether any modifications of the recommendations contained therein are advisable at this time, with particular reference to the need for improvements for flood control, environmental restoration, water quality, and related purposes associated with storm water runoff and management in the metropolitan Memphis, Tennessee area and tributary basins including Shelby, Tipton, and Fayette Counties, Tennessee, and DeSoto and Marshall Counties, Mississippi. This area includes the Hatchie River, Loosahatchie River, Wolf River, Nonconnah Creek, Horn Lake Creek, and Coldwater River Basins. The review shall evaluate the effectiveness of existing Federal and non-Federal improvements, and determine the need for additional improvements to prevent flooding from storm water, to restore environmental resources, and to improve the quality of water entering the Mississippi River and its tributaries.”

Preconstruction engineering and design activities will continue under current authorities.

2. The reporting officers recommend authorizing an FRM Plan and an AER plan, with each as separable elements that produce both economic and environmental benefits which are separately identifiable. The FRM plan is a risk management system of features that will reduce the risk of flooding to lives, property, and residential and commercial infrastructure. The AER plan will address habitat degradation resulting from chronic channel incision, loss of bottomland hardwood forests, and loss of fish passage connectivity.

3. The reporting officers recommend authorizing a flood risk management system of features that will reduce the risk of flooding to lives, property, and infrastructure. The flood risk management

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recommended plan for federal participation is not the National Economic Development (NED) Plan as it includes a non-economically justified increment. A NED Policy Exception was approved by the Assistant Secretary of the Army for Civil Works on July 21, 2023 that allows the plan to include a non-economically justified increment based on other social effects (OSE). The Federally Recommended Plan for flood risk management includes the following system of structural and nonstructural features:

a. 3,000 linear foot levee and floodwall located on the southeast side of Highway 51 and Goodman Road, in an area known locally as Bullfrog Corner. The NED plan would consist only of this feature.

b. Dry floodproofing of 21 commercial and 14 residential (apartment complex) structures. The dry floodproofing, while not incrementally justified based on NED benefits, provides risk reduction to structures in an economically disadvantaged and historically underserved community located on the eastern side of Highway 51 and Goodman Road in Horn Lake, Mississippi.

4. The DeSoto County Board of Supervisors is the non-federal cost sharing sponsor for the recommended FRM plan. As a shared responsibility, the FRM Recommended Plan is inclusive of the non-federal sponsor's additional floodplain management responsibilities and emergency response actions in conjunction with state and Federal Emergency Management Agency (FEMA) related programs to mitigate the plan's residual risk including potential life loss and damages to critical infrastructure. Based on October 2022 price levels, the estimated project first cost for the FRM Recommended Plan is \$25,785,000. The project first cost for the FRM Recommended Plan includes the value of lands, easements, rights-of-way, relocations, and dredged material placement area improvements (LERRD). LERRD costs for the FRM Recommended Plan are estimated to be \$2,404,000. Cost sharing is applied in accordance with the provisions of Section 103 of the Water Resources Development Act (WRDA) of 1986 (33 U.S.C. § 2213), as follows:

a. The federal share of the project first cost initial construction for the FRM Recommended Plan is estimated at \$16,761,000 and the non-federal share, which includes the cost of LERRD, is estimated at \$9,024,000 which equates to 65 percent federal and 35 percent non-federal.

b. The additional annual cost of operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) for the FRM Recommended Plan is estimated to be \$26,000 per year. Components of the FRM recommended plan are designed to be passively operated. Maintenance activities for the levee include mowing levee annually and slide repair every 10 years. This accounts for costs to repair after flood events as well. The non-federal sponsor will be responsible for 100 percent of the cost of project OMRR&R.

5. Based on a 2.5 percent discount rate and a 50-year period of analysis, the equivalent average annual benefits are estimated at \$2.43 million and equivalent average annual costs are estimated at \$1.06 million, with equivalent average annual net benefits of \$1.49 million and a benefit to

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cost ratio (BCR) of 2.6. Project Costs for the FRM Recommended Plan are allocated to the authorized purpose of Flood Risk Management.

6. While dry floodproofing of 14 residential apartment structures and 21 commercial structures is not economically justified based on NED benefits, these measures provide other social effects that justify Federal participation in implementation as they will serve to reduce flood risk to an economically disadvantaged community that would otherwise not receive flood risk reduction under the NED plan. These measures would also provide additional positive social and economic benefits to residents of the community by potentially allowing for a faster resumption of services and return to work soon after a flood event. The FRM Recommended Plan meets current Administration priorities to deliver environmental justice by investing in and supporting sustainable and resilient communities that have been historically underserved.

7. Implementing the FRM plan reduces expected annual damages by approximately 52 percent relative to the without project conditions. Roadway flooding remains an area of concern in the Horn Lake Creek watershed and no alternatives were identified that would completely eliminate flooding on Goodman Road or Highway 51, north of Goodman Road, during less frequent events. It is anticipated that road closures would be required at the 0.01 annual exceedance probability event.

8. The recommended AER plan is the National Ecosystem Restoration (NER) plan. The Recommended Plan for aquatic ecosystem restoration includes the following features:

a. a comprehensive system of 74 bank stabilizing grade control structures (GCS) paired with lateral stone toe protection, and riser pipes.

b. 327 acres of riparian restoration along Camp, Cane, Hurricane, Johnson, Lick, Mussacuna, Nolehoe, Nonconnah, Red Banks, and Short Fork Creeks. This feature is considered nonstructural and nonmechanical.

9. The DeSoto County Board of Supervisors is the non-federal cost sharing sponsor for the NER Plan. Based on October 2022 price levels, the estimated project first cost for the NER Plan is \$40,152,000. The project first cost for the NER Plan includes the value of lands, easements, rights-of-way, relocations, and dredged material placement area improvements (LERRD). LERRD costs for the NER Plan are estimated to be \$7,850,000. Cost sharing is applied in accordance with the provisions of Section 103 of the Water Resources Development Act (WRDA) of 1986 (33 U.S.C. § 2213), as follows:

a. The federal share of the project first cost for initial construction for the NER Plan is estimated at \$26,100,000 and the non-federal share is estimated at \$14,052,000, which equates to 65 percent federal and 35 percent non-federal. The non-federal sponsor will receive credit for the value of LERRs, included in the estimate, toward the non-federal share.

b. The additional annual cost of operation, maintenance, repair, replacement, and

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rehabilitation (OMRR&R) for the NER Plan is estimated to be \$274,000. Components of the NER plan are designed to be passively operated. OMRR&R activities include maintenance of grade control structures and stone toe protection, including clearing access and replacing up to 10 percent of the stone every 10 years. This accounts for costs to repair after flood events as well. The non-federal sponsor will be responsible for 100 percent of the cost of project OMRR&R.

c. The estimated project first cost includes total monitoring costs of \$160,000 and total adaptive management costs of \$585,000. Cost shared monitoring will occur for up to 10 years beginning upon completion of each functional portion of the project.

10. Based on a 2.5 percent discount rate and a 50-year period of analysis, the equivalent average annual costs of the NER plan are estimated at \$1.65 million. The NER plan is estimated to provide 314 average annual habitat units (AAHUs). The average annual cost per AAHU for the restoration is approximately \$5,000 with an average annual cost per acre restored of approximately \$3,000.

11. The proposed actions would improve ecological resources in degraded streams throughout DeSoto County including: Nonconnah Creek, Johnson Creek, Lick Creek, Mussacuna Creek, Nolehoe Creek, Red Banks Creek and Short Fork Creek. Nonconnah Creek, flows into the Mississippi River Basin, while the other six streams flow into the Coldwater River Watershed and eventually into Arkabutla Lake/Reservoir. Degradation in these streams leads to severe erosion resulting in excessive sedimentation in the Mississippi River and Arkabutla Lake. Stabilizing and restoring riparian habitat on these streams, not only restores and protects critical habitats but also reduces sediment loading in these waterbodies thereby preventing ecosystem degradation associated with excess sedimentation. The NER plan would reforest approximately 327 acres of riparian buffers with native vegetation and stabilize and restore approximately 28 miles (approximately 187 acres) of in-stream habitat within the Mississippi Valley Loess Plain (MVLPL) ecoregion, arresting stream bed degradation and allow for the improvement of foraging, cover, and reproductive habitats for native fish, wildlife, and birds in the area.

The NER plan would also reconnect approximately 83 stream miles in DeSoto County by; providing riparian corridors that could connect streams to larger forested blocks and wetlands; reconnecting isolated stands of habitat to allow movement and dispersal of species throughout the project area. The design of the grade control structures would improve fish passage in the streams.

The NER plan would protect or provide habitat that would benefit endemic and/or species in need of conservation, including the Yazoo darter and Yazoo shiner, Southern red-bellied dace, and Piebald madtom (the madtom is currently petitioned for listing under the ESA); and the endangered northern long-eared bat. Additionally, reforestation of acreage within the Mississippi Flyway is beneficial to neo-tropical migratory birds and would promote forage and resting habitat. The Mississippi Flyway is a bird migration route from central Canada following the Mississippi, Missouri, and Lower Ohio River corridors south to the region surrounding the Gulf

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of Mexico, is used by approximately 40 and 60 percent of all U.S. waterfowl and bird species, respectively, for migratory purposes.

12. All compliance with required applicable environmental laws and regulations has been completed.

13. In accordance with USACE policy on the review of decision documents, all technical, engineering, and scientific work underwent an open, dynamic, and rigorous review process. The comprehensive review process included District Quality Control Review, Agency Technical Review, and Headquarters Policy and Legal Compliance review to confirm the planning analyses, alternative design and safety, and the quality of decisions. Washington-level review indicates that the plan recommended by the reporting officers complies with all essential elements of the U.S. Water Resources Council's Economic and Environmental Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies, as well as other administrative and legislative policies and guidelines. The views of interested parties, including federal, state, and local agencies, were considered and all comments from public reviews have been addressed and incorporated into the final report documents where appropriate.

14. USACE decision documents recognize cost risk and uncertainty surrounding implementation. All cost estimates will carry a degree of uncertainty. The estimated total project first cost for the combined FRM and AER features of the Recommended Plan is estimated at \$65,937,000 to \$XXX (this should be the 100% confidence level cost) at the 80 and 100 percent confidence level, respectively. Based on the design maturity and available technical information, this is reflective of a Class 2 level estimate. The total project first cost includes a contingency value of \$16,471,000, which is approximately 33.3 percent of the estimated base project cost of \$49,467,000. The cost contingencies reflect an 80 percent confidence level in estimated total project first cost and are intended to cover cost and schedule increase due to the identified project risks and their probability of occurrence. Even a 100 percent confidence level carries some degree of uncertainty. Changes to assumptions or the basis of design can result in additional risks not currently identified. For the Recommended Plan project first costs, the currently known major uncertainty drivers are the following: 1) nonstructural dry floodproofing is based on parametric costs, 2) estimate assumes no issues with finding qualified contractors associated with the nonstructural floodproofing efforts, 3) The owners of the 35 structures identified for dry floodproofing would receive a net benefit from the dry floodproofing. The increase in the value of the property or net benefit after being dry floodproofed is expected to exceed the cost of the estate needed to obtain the rights to conduct the dry floodproofing measures, therefore USACE would request structure owners to waive their rights to compensation for those. As the project moves into the next phases, USACE will focus risk management and mitigation on the primary cost and other significant risk drivers to the extent within USACE control. However, there still exists the potential for other unanticipated and uncontrollable changes in environmental or economic conditions that could further increase the total project first cost beyond the current estimate and/or necessitate changes in the project's design.

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15. In full consideration of the risks as documented in the preceding paragraphs in this report, I concur in the findings, conclusions, and recommendation of the reporting officers. Accordingly, I recommend that flood risk management and aquatic ecosystem restoration improvements for DeSoto County, Mississippi be authorized in accordance with the reporting officers' Recommended Plan at an estimated cost of \$65,937,000 for initial construction, with such modifications as in the discretion of the Chief of Engineers may be advisable. Federal implementation of the project for flood risk management and aquatic ecosystem restoration includes, but is not limited to, the following items of local cooperation to be undertaken by the non-federal sponsor in accordance with applicable federal laws, regulations, and policies:

a. Provide a minimum of 35 percent, up to a maximum of 50 percent, of construction costs allocated to structural flood risk management; 35 percent of construction costs allocated to nonstructural, natural, or nature-based flood risk management, and 35 percent of construction costs allocated to ecosystem restoration, 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. Pay, during construction, a contribution of funds equal to 5 percent of construction costs allocated to structural flood risk management;

3. Provide all lands, easements, rights-of-way, and placement areas and perform all relocations determined by the Federal government to be required for the project;

4. Provide, during construction, any additional contribution necessary to make its total contribution equal to at least 35 percent of construction costs;

b. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) that might reduce the level of flood risk reduction the project affords, reduce the outputs produced by the aquatic ecosystem restoration features project, hinder operation and maintenance of the project, or interfere with the project's proper function;

c. Inform affected interests, at least yearly, of the extent of risk reduction afforded by the flood risk management features; participate in and comply with applicable Federal floodplain management and flood insurance programs; prepare a floodplain management plan for the project to be implemented not later than one year after completion of construction of the project; 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 the project;

d. Ensure that the project or lands, easements, and rights-of-way required for the project shall not be used as a wetlands bank or mitigation credit for any other project;

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e. Operate, maintain, repair, rehabilitate, and replace the project or functional portion thereof 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;

f. 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 work necessary to the proper functioning of the project for its authorized purpose;

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

h. Perform, or ensure performance of, any investigations for hazardous toxic, and radioactive wastes (HTRW) that are determined necessary to identify the existence and extent of any HTRW regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9601-§9675, and any other applicable law, that may exist in, on, or under real property interests that the Federal Government determines to be necessary for construction, operation, and maintenance of the project;

i. Agree, as between the Federal Government and the non-federal sponsor, to be solely responsible for the performance and costs of cleanup and response of any HTRW regulated under applicable law that are located in, on, or under real property interests required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination, without reimbursement or credit by the Federal Government;

j. Agree, as between the Federal Government and the non-federal sponsor, that the non-federal sponsor shall be considered the owner and operator of the project for the purpose of CERCLA liability or other applicable law, and to the maximum extent practicable shall carry out its responsibilities in a manner that will not cause HTRW liability to arise under applicable law; and

k. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. §4630 and §4655) and the Uniform Regulations contained in 49 C.F.R. Part 24, in acquiring real property interests necessary for construction, operation, and maintenance of the project including those necessary for relocations, and placement area improvements; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

16. The recommendation contained herein reflects the 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

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construction program or 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 Congress, the non-federal sponsor, interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

SCOTT A. SPELLMON
Lieutenant General, USA
Chief of Engineers

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