

Proposed Report ¹

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SUBJECT: Morganza to the Gulf of Mexico, Louisiana

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report updating the authorized Morganza to the Gulf of Mexico, Louisiana project. This report supplements the reports of the Chief of Engineers dated 23 August 2002 and 22 July 2003 and is accompanied by the reports of the New Orleans District Commander, Mississippi Valley Division Commander and the Mississippi River Commission. This report presents the updated design and associated costs to the project as a result of applying more robust design and hydrologic and hydraulic modeling standards developed subsequent to Hurricane Katrina. These updated changes have caused the project to exceed the maximum authorized project cost limit under Section 902 of the Water Resources Development Act of (WRDA) 1986. While the project was not reformulated as part of this update, an analysis using the post-Katrina design criteria was initially performed that confirmed the authorized project alignment as the alignment that best meets the Federal objective.

2. The Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project was authorized by Section 1001 (24)(A) of the Water Resources Development Act (WRDA) of 2007 at a total cost of \$886,700,000 consistent with the reports of the Chief of Engineers dated 23 August 2002 and 22 July 2003. In addition Section 1001 (24) (B) of WRDA 2007 provides that operation, maintenance, repair, rehabilitation and replacement (OMRR&R) of the Houma Navigation Canal lock complex and the Gulf Intracoastal Waterway floodgate features of the project that provides for inland waterways transportation shall be a Federal responsibility in accordance with Section 102 of WRDA 1986 (33 U.S.C. 2212).

3. The authorized Morganza to the Gulf of Mexico, Louisiana project was designed to provide hurricane and storm damage risk reduction while maintaining navigational passage and tidal exchange. The project is located approximately 60 miles southwest of New Orleans, Louisiana and includes Terrebonne Parish and a portion of Lafourche Parish. The project recommended in the reports of the Chief of Engineers dated 23 August 2002 and 22 July 2003 was to reduce hurricane and storm damages by providing the one percent annual exceedance (1% annual exceedance probability (AEP)) probability level of risk reduction.

4. The reporting officers considered the WRDA 2007 authorized project by applying two different water surface design elevation assumptions. The first assumption retained the pre-Katrina water surface design elevations used in developing the authorized project. The second

¹ This report contains the proposed Chief of Engineers updates to the authorized project. The report is subject to change to reflect Washington level review and comments from Federal and State agencies.

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assumption applied the post-Katrina water surface design elevations to the previously authorized project. Using post-Katrina water surface design elevation calculation methodologies, the pre-Katrina water surface design elevation is equal to approximately a 3% AEP. The post-Katrina water surface design elevation is equal to a 1% AEP as used for the second assumption. Of the two, the assumption associated with the post-Katrina 1% AEP water elevation project provided the greater net benefits, had lower residual risk, and greatest adaptability to sea level rise. This 1% AEP project identified by the reporting officers provides the same target level of risk reduction as the authorized project and follows the same alignment with some refinements. The updated project also involves no change in project purpose. However, the application of the more rigorous storm modeling and more robust post-Katrina design standards has resulted in expansion of the project features authorized by WRDA 2007. Changes to the major project features are as follows:

- **Levee Length:** The total levee length has increased from 72 miles to approximately 98 miles. The reason for the increase is to reduce risk of flanking, based on the assumption of higher rates of relative sea level rise, and higher surge and waves in the future.
- **Levee/Structure Elevations:** Levee and structure elevations were increased by 6 feet to 18 feet. Most of the increase in elevation is attributable to higher predicted surge and waves and post Katrina design criteria.
- **Levee Widths:** Levee widths have increased from approximately 40 feet to 200 feet wide to approximately 282 feet to 725 feet wide. The increased widths are attributable to increases in levee heights and the post Katrina geotechnical stability factors of safety.
- **Houma Navigation Canal (HNC) lock complex and Gulf Intracoastal Waterway (GIWW) floodgate feature:** These features which cross federal navigation channels are generally the same except the HNC structure sill depth would be increased by 5 feet as part of the requested sponsor funded work item and the HNC floodgate width increased from 200 feet to 250 feet. The HNC floodgate needed to be widened given that the pre-Katrina design was no longer technically feasible with the increased project height. The GIWW floodgate near Houma was redesigned to eliminate one of the two sector gates.
- **Floodgates:** The number of floodgates on other canals and bayous increased from 9 to 19 as several bayous were not previously identified as being used for navigation and with the extension of the levee length several additional navigable bayous were crossed.
- **Environmental Control Structures:** The number of environmental control structures increased from 12 to 23 sets of concrete box culverts with sluice gates. The increase in the number of structures is attributable to more refined set of design criteria, which considered precipitation event conditions water level and velocity and box culvert design criteria.
- **Environmental Mitigation:** Impacted acres requiring mitigation increased from approximately 3,740 acres to 4,100 acres. The increase is directly related to the increase in the foot print of the levee.
- **Structures Afforded Protection:** The number of structures afforded hurricane and storm damage risk reduction increased from approximately 26,000 structures to 53,000

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structures. The increase in the number of structures afforded risk reduction is a result of post-Katrina change in 1% AEP water surface elevation.

- Hydraulic Mitigation: Costs have been included for measures to address a potential indirect impact of the construction to raise water levels outside the levees. Potential impact areas include portions of the communities of Gibson, Bayou Dularge, Dulac, and all of Cocodrie and Isle de Jean Charles. In addition, measures and associated costs have been included to offset potential induced stages on the existing Larose to Golden Meadows project.

5. Based on October 2012 price levels, the estimated first cost of the updated project is \$10,265,000,000, with the Federal and non-Federal shares estimated at \$6,672,000, 000 and \$3,592,000,000, respectively. The Coastal Protection and Restoration Authority of Louisiana in coordination with the Terrebonne Levee and Conservation District has expressed intent to be the non-Federal cost sharing sponsor for the project. Upon completion of construction, the non-Federal sponsor would be responsible for the OMRR&R of the project, a cost currently estimated at \$7,400,000 per year. In accordance with Section 1001 (24) (B) of WRDA 2007 the OMRR&R for the GIWW floodgates and the Houma Navigation Canal Lock, estimated at \$1,700,000 per year, is a Federal responsibility.

6. Based on a 3.75-percent discount rate, October 2012 price levels and a 50-year period of analysis, the total equivalent average annual costs of the updated project, including OMRR&R, are estimated to be \$716,000,000. The equivalent average annual benefits are estimated to be \$1,023,000,000. The net average annual benefits would be \$307,000,000. The benefit-to-cost ratio is 1.4 to 1.

7. While the estimated project costs in the district's report are the best available and compliant with current post-Katrina design criteria, the U.S. Army Corps of Engineers Risk Management Center and the New Orleans District jointly evaluated the proposed Morganza to the Gulf project to assess whether the post-Katrina design criteria, specifically in the areas of global stability and overtopping and structural superiority, could be site adapted to reduce project cost without significantly increasing risk. Based on the results of this effort, site adaptations of the criteria were identified for consideration during the next phase of implementation, preconstruction, engineering and design.

8. I concur that the reporting officers have updated the plan identified within the previous reports of the Chief of Engineers and find that the updated plan is economically justified, environmentally acceptable and engineeringly sound. Post-Katrina engineering design criteria and standards for gulf coast communities were applied to reduce the potential of loss of life and property from coastal storms. These engineering practices were developed using the findings of the *Interagency Performance Evaluation Task Force* including key lessons learned from Hurricane Katrina and their implications for future hurricane preparedness and planning for south Louisiana. Project modifications were also found necessary to address developments after the project was authorized, including community resettlement patterns after Katrina, to

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incorporate improved water control elements and navigation features, and to update other outmoded aspects of the authorized project to more effectively provide the utility of function originally intended by Congress. Accordingly, I submit for transmission to Congress my report updating the authorized Morganza to the Gulf of Mexico, Louisiana project with the required modifications and changes necessary for engineering and construction reasons to produce the degree and extent of coastal storm damage reduction improvements intended by Congress.

9. This report reflects the information available at this time. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program or the perspective of higher review levels within the executive branch. Consequently, this supplemental report may be modified before it is transmitted to the Congress. However, prior to transmittal to Congress, the sponsor, the State, interested Federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

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Chief of Engineers