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DAEN

SUBJECT: St. Tammany Parish, Louisiana Coastal Storm and Flood Risk Management

THE SECRETARY OF THE ARMY

10 1. I submit for transmission to Congress my report on coastal storm and flood risk
11 management in St. Tammany Parish, Louisiana. It is accompanied by the report of the
12 New Orleans District Commander. This study is a final response to the authorization in
13 Subtitle B, Section 1201(14) of the Water Infrastructure Improvement Act of 2016 (P.L.
14 114-322), otherwise referred to as WRDA 2016. The authorization provided that the
15 Secretary of the Army is authorized to conduct a feasibility study for flood damage
16 reduction, as identified in the reports titled "Report to Congress on Future Water
17 Resources Development" submitted to Congress on January 29, 2015, and January 29,
18 2016, respectively, pursuant to section 7001 of the Water Resources Reform and
19 Development Act of 2014 (33 U.S.C. 2282d). Preconstruction engineering and design
20 (PED) activities will continue under the study authority cited above.

21

22 2. The reporting officers recommend authorizing structural and nonstructural features
23 each as separable elements to reduce the risk of damages from coastal storms, riverine,
24 and rainfall flooding to residential and commercial structures, public infrastructure and
25 critical facilities. The structural features of the Recommended Plan consist of a levee and
26 floodwall system (with related features) for coastal storm risk management. The structural
27 features are inseparable from one another and must be implemented together to form the
28 comprehensive structural risk management system. The nonstructural features of the
29 Recommended Plan are separable from the structural features and can be implemented
30 independently. The nonstructural features (i.e., the residential structure elevations and
31 the nonresidential dry floodproofing) are also separable elements that can be
32 implemented independent of the nonstructural features.

33

34 3. The reporting officers recommend authorizing a coastal storm risk management system
35 of features that will reduce the risk of flooding to lives, property, and infrastructure. The
36 Recommended Plan for structural features is the National Economic Development (NED)
37 Plan and the plan that reasonably maximizes net NED benefits consistent with protecting
38 the Nation's environment.

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- 1 a. Structural Features: A fifteen (15) mile long earthen levee and a three and a half
2 (3.5) mile long floodwall system totaling eighteen and a half (18.5) miles in length,
3 together with eight (8) pump stations, thirteen (13) sluice gates/lift gates, eighteen
4 (18) vehicular gates, one (1) pedestrian floodgate, one (1) railroad gate, six (6)
5 road ramps, and the raising of the I-10 road surface;
6

7 The structural features of the Recommended Plan would have adverse effects to the
8 environment, requiring mitigation. The following are the habitat losses that would result
9 with the implementation of the Recommended Plan:

- 10 • Loss of 48 Average Annual Habitat Units (AAHUs) of fresh and intermediate marsh
11 wetland habitat in the Mississippi Alluvial Plain, Deltaic Coastal Marshes and
12 Barrier Islands ecoregion within Louisiana.
- 13 • Loss of 67 AAHUs (9.7 red-cockaded woodpecker AAHU; 57 pine warbler AAHU)
14 of Pine Savanna habitat in the Lake Pontchartrain Watershed.
- 15
- 16 • Loss of 9 AAHUs (7 red-cockaded woodpecker AAHU; 2 pine warbler AAHU) of
17 Pine Savanna habitat on refuge land within Big Branch Marsh National Wildlife
18 Refuge (BBMNWR) or on other USFWS Lands within the Lake Pontchartrain
19 Watershed.
20

21 The Recommended Plan includes a compensatory mitigation plan inclusive of associated
22 monitoring and adaptive management. The environmental impacts will be mitigated by a
23 combination of pine savanna mitigation bank credit purchases; fresh and intermediate
24 marsh to be constructed by the United States Army Corps of Engineers (USACE); and
25 pine savanna to be constructed by USACE on Big Branch Marsh National Wildlife Refuge.
26 The total costs of mitigation for the Recommended Plan is \$39,973,512, which is included
27 in the estimated total project first cost.
28

29 4. The State of Louisiana, acting by and through, the Coastal Protection and Restoration
30 Authority Board of Louisiana is the non-federal cost sharing sponsor for all features of the
31 project. As a shared responsibility, the Recommended Plan is inclusive of the non-federal
32 sponsor's additional floodplain management responsibilities and emergency response
33 actions in conjunction with state and Federal Emergency Management Agency (FEMA)
34 related programs to mitigate the Plan's residual risk, including potential life loss and
35 damages to critical infrastructure. Based on October 2023 price levels (FY24), the
36 estimated total project first cost for the structural levee and floodwall system is
37 \$2,881,740,000. The total project first cost includes the value of lands, easements, rights-
38 of-way, relocations, and disposal areas (LERRD). Total LERRD (including Facility/Utility
39 Relocations, except for the Interstate 10 elevation) costs are estimated to be
40 \$85,792,000. Cost sharing is applied in accordance with the provisions of Section 103 of
41 the Water Resources Development Act (WRDA) of 1986 (33 U.S.C. § 2213) as follows:
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1 a. The federal share of the project first cost for initial construction of the structural
2 features is estimated at \$1,817,366,200 and the non-federal share, which includes the
3 cost of LERRD, is estimated at \$1,064,373,800, which equates to 65 percent federal and
4 35 percent non-federal. The non-federal sponsor is responsible for Facility/Utility
5 Relocations, included the elevation of a segment of Interstate 10, the costs for which are
6 accounted for in the non-federal share of the project cost.

7
8 b. The additional annual cost of operation, maintenance, repair, replacement, and
9 rehabilitation (OMRR&R) for the Recommended Plan is estimated to be \$7,753,000.
10 OMRR&R activities include routine maintenance, periodic inspection, monitoring,
11 machinery and gate replacements, and minor and major repairs. The non-federal sponsor
12 will be responsible for 100 percent of the cost of project OMRR&R except the raised
13 portion of Interstate 10 (I-10).

14
15 5. Based on a 2.5 percent discount rate and a 50-year period of analysis, the equivalent
16 average annual benefits for the structural levee and floodwall system are estimated at
17 \$159,036,000 and equivalent average annual costs are estimated at \$115,196,000, with
18 equivalent average annual net benefits of \$43,840 and a benefit-to-cost ratio (BCR) of
19 1.4 to 1.

20
21 6. The structural features of the Recommended Plan reasonably maximize the National
22 Economic Development benefits and also provides Regional Economic Development,
23 Other Social Effects, and Environmental Quality benefits. The implementation of the
24 Recommended Plan is expected to create a long-term increase in economic productivity
25 by providing more reliable coastal storm and flood management. Increased reliability
26 could create a long-term economic benefit to existing businesses that rely on reduced
27 flooding for production. Construction will also generate secondary economic activity often
28 called multiplier effects. The implementation of the Recommended Plan would also help
29 preserve community cohesion should a significant flood event occur and risks from future
30 floods and loss of life would be greatly reduced in the areas at high risk for structure and
31 property damages. The Recommended Plan is also expected to indirectly reduce
32 roadway flooding and impacts to smaller roadways and benefit overall evacuation.

33 7. The Recommended Plan aligns with the current Administration's prioritization of
34 environmental justice contained in the Justice40 Initiative included in Executive Order
35 14008, "Tackling the Climate Crisis at Home and Abroad" (2021); Executive Order 13390,
36 "Protecting Public Health and the Environment and Restoring Science to Tackle the
37 Climate Crisis (2021)"; and Executive Order 12898, "Federal Actions to Address
38 Environmental Justice in Minority Populations and Low-Income Populations" (1994).
39 Forty-six percent (46%) of the NED benefits provided by the structural portion of the
40 Recommended Plan will accrue to disadvantaged communities.

41
42 8. The reporting officers recommend authorizing a nonstructural plan that will reduce the
43 risk of flooding to lives, property, and infrastructure. The Recommended Plan for

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1 nonstructural features is the National Economic Development (NED) Plan and the plan
2 that reasonably maximizes net NED benefits consistent with protecting the Nation's
3 environment. The nonstructural plan includes both elevations and dry floodproofing of
4 structures. The nonstructural features of the Recommended Plan are separable from the
5 structural features and can be implemented independently. The nonstructural features
6 (i.e., the residential structure elevations and the nonresidential dry floodproofing) are also
7 separable elements that can be implemented independently of one another.

8 a. Elevation of 5,583 preliminarily eligible residential structures to a height no
9 greater than 13 feet above grade. Elevation includes the entire structure or the
10 habitable area of a structure to allow floodwaters to flow and recede underneath;

11 b. Dry floodproofing of 827 non-residential structures to make walls, doors, and
12 other openings impermeable to water penetration up to three (3) feet above grade.
13 The National Flood Insurance Program (NFIP), Technical Bulletin #3 (January
14 2021), published by the Federal Emergency Management Agency (FEMA) and the
15 Department of Homeland Security, explains the NFIP floodplain management
16 requirements for the design and certification of dry floodproofing. The term "dry
17 floodproofing" means a combination of measures that make a building and
18 attendant utilities and equipment watertight and substantially impermeable to
19 floodwater, with structural components having the capacity to resist flood loads.
20 ASCE 24, *Flood Resistant Design and Construction*" represents the standard of
21 practice for the design of buildings and structures in flood hazard areas, including
22 the design of dry floodproofed buildings.

23 The elevation of residential structures and the dry floodproofing of non-residential
24 structures will be implemented on a voluntary participation basis. It is recommended that
25 the nonstructural plan be authorized for a 12-year implementation schedule based on the
26 assumption that five separate contractors would each floodproof and/or elevate 100
27 structures concurrently, thereby totaling approximately 500 structures to be floodproofed
28 and/or elevated within a given year.

29 The nonstructural features of the Recommended Plan do not have adverse effects to the
30 environment, and do not require compensatory mitigation.

31
32 9. The State of Louisiana, acting by and through, the Coastal Protection and Restoration
33 Authority Board of Louisiana is the non-federal cost sharing sponsor for all features of the
34 project. As a shared responsibility, the Recommended Plan is inclusive of the non-federal
35 sponsor's additional floodplain management responsibilities and emergency response
36 actions in conjunction with state and Federal Emergency Management Agency (FEMA)
37 related programs to mitigate the Plan's residual risk, including potential life loss and
38 damages to critical infrastructure. Based on October 2023 price levels (FY24), the
39 estimated total project first cost for the nonstructural features is \$3,012,488,000. The total
40 nonstructural project first cost includes the value of lands, easements, rights-of-way,
41 relocations, and disposal areas (LERRD). Total LERRD (including Facility/Utility
42 Relocations) costs are estimated to be \$187,903,000. Cost sharing is applied in

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1 accordance with the provisions of Section 103 of the Water Resources Development Act
2 (WRDA) of 1986 (33 U.S.C. § 2213) as follows:

3
4 a. The federal share of the project first cost for initial construction is estimated at
5 \$1,835,980,250 and the non-federal share, which includes the cost of LERRD, is
6 estimated at \$1,176,507,750, which equates to 65 percent federal and 35 percent non-
7 federal.

8
9 b. For the nonstructural features, the non-federal cost sharing sponsor will be
10 required to obtain subordinations and releases for all rights required for project
11 implementation, including the temporary ROW easements. In addition, a non-standard
12 estate in the form of a permanent easement for restrictions and access (permanent
13 easement), will be submitted in accordance with USACE regulations with a request for
14 approval. It is anticipated that such an easement will be imposed in, on, over, and across
15 the land on which the residential structure(s) has been or will be elevated in connection
16 with this project. The easement will perpetually prohibit the grantors, heirs, successors,
17 assigns, and all others from: (1) using any portion of the ground level of the elevated
18 structure for human habitation; (2) constructing or placing any enclosure or permanent
19 obstruction that would impair the flow of water on the ground level of the elevated
20 structure; and (3) engaging in other uses of the elevated structure or the land that would
21 impair, contravene, or interfere with the integrity of the elevated structure. There would
22 be a reservation of rights and privileges in favor of the grantors, heirs, successors, and
23 assigns to use the land in such a manner so as not to interfere with, or abridge, the rights,
24 easement, prohibitions, and restrictions contained in the easement. The easement would
25 also include a right of ingress and egress over and across the land by the Coastal
26 Protection and Restoration Authority Board of Louisiana, its representatives, agents,
27 contractors, and assigns, for the purpose of inspecting and monitoring the elevated
28 residential structures and land in order to enforce the rights and prohibitions contained in
29 the easement. A similar nonstandard estate (permanent easement) to that described
30 above, may also be required for manufactured, modular and mobile homes that are to be
31 elevated as part of the Nonstructural Plan.

32
33 c. There are no OMRR&R obligations for the completed nonstructural work other than
34 the performance of monitoring and periodic inspections.

35
36 10. Based on a 2.5 percent discount rate and a 50-year period of analysis, the equivalent
37 average annual benefits for the nonstructural are estimated at \$213,455,000 and
38 equivalent average annual costs are estimated at \$111,964,000, with equivalent average
39 annual net benefits of \$101,491,000 and a benefit-to-cost ratio (BCR) of 1.9 to 1.

40
41 11. The nonstructural features of the Recommended Plan reasonably maximize the
42 National Economic Development benefits and also provides Regional Economic
43 Development, Other Social Effects, and Environmental Quality benefits. The
44 implementation of the Recommended Plan is expected to create a long-term increase in
45 economic productivity by providing more reliable coastal storm and flood management.

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1 Increased reliability could create a long-term economic benefit to existing businesses that
2 rely on reduced flooding for production. Construction will also generate secondary
3 economic activity often called multiplier effects. The implementation of the Recommended
4 Plan would also help preserve community cohesion should a significant flood event occur
5 and risks from future floods and loss of life would be greatly reduced in the areas at high
6 risk for structure and property damages. The nonstructural component of the
7 Recommended Plan is the least Environmental Quality impacts of any alternative
8 considered.

9 12. The Recommended Plan aligns with the current Administration's prioritization of
10 environmental justice contained in the Justice40 Initiative included in Executive Order
11 14008, "Tackling the Climate Crisis at Home and Abroad" (2021); Executive Order 13390,
12 "Protecting Public Health and the Environment and Restoring Science to Tackle the
13 Climate Crisis (2021)"; and Executive Order 12898, "Federal Actions to Address
14 Environmental Justice in Minority Populations and Low-Income Populations" (1994). Four
15 percent (4%) of the benefits provided by the nonstructural plan accrue to disadvantaged
16 communities.

17
18 13. The study report fully describes flood risk and coastal storm risk to structures and life
19 safety associated with coastal storms and other flood events. The Recommended Plan
20 would reduce, but not eliminate future damages and residual risk would remain. The
21 Recommended Plan reduces equivalent annual damages by approximately seventy
22 percent (70%) for the structures included in the study area relative to the without project
23 conditions.

24
25 The residual risk, along with the potential consequences, has been communicated to the
26 non-federal sponsor and will become a requirement of any communication and
27 evacuation plan. The Recommended Plan is not intended to, nor will it, reduce the risk
28 to loss of life during major storm events. The only certain method to prevent loss of life
29 is by residents and visitors following existing local evacuation plans and leaving the study
30 area prior to major storm events.

31
32 14. Implementation strategies for the risk management system would be a shared
33 responsibility conducted in coordination with the non-federal sponsor, to cost effectively
34 reduce risk from coastal storms and other flood events. The implementation strategy for
35 the NED plan would reduce the risk through a series of risk reduction increments that
36 either could be implemented simultaneously, where the entire project is implemented in
37 an expedited manner or implemented sequentially, where measures are implemented on
38 a rolling incremental basis. The Recommended Plan includes a risk informed strategy
39 that utilizes best practices to reduce risk to the most vulnerable areas and critical
40 infrastructure first with the most cost-effective measures.

41
42 The various implementation strategies to identify efficient risk reduction increments that
43 were considered for the nonstructural features of the NED plan, include:
44

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1 • clustering based on low-income or environmental justice communities and public
2 structures that function as critical infrastructure for public safety and storm response and
3 recovery;

4 • clustering construction for individual structures that would rank efficiency first;

5 • clustering based on willing property owners that exhibit the highest risk for flood
6 damages; and
7

8 • clustering based on first-come, first-served approach which would help ensure that
9 resources would be used effectively by focusing on properties that have owner support
10 for the flood proofing measures.
11

12
13
14 15. The study evaluated potential impacts of sea level change in formulating and
15 engineering the Recommended Plan. To address this uncertainty, project performance
16 was assessed at the intermediate rate of sea level rise as it offered the best balance
17 between equally likely scenarios (i.e., the historic rate of sea level rise continuing
18 indefinitely and the high rate including accelerated rates of change caused by warming
19 temperatures and accelerated ice melt). In recognition of the uncertainty presented by
20 sea level rise, adaptation capacity has been incorporated into the final feasibility-level
21 design to maximize the overall usefulness of the system over the life of the project by
22 including redundancy and robustness in the design, so they are adaptable to future
23 conditions including the high rate of sea level rise. Local conditions will be monitored to
24 determine if the intermediate scenario of sea level change is reasonably representative
25 of observed conditions. If observed conditions significantly exceeding the intermediate
26 projection are identified during design or construction, revaluation of the NED Plan will be
27 required. The non-federal cost sharing sponsor will continue monitoring for sea level
28 changes once the project is turned over for OMRR&R.
29

30 16. All compliance with required applicable environmental laws and regulations has been
31 completed.
32

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

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1 and incorporated into the final report documents where appropriate. All comments from
2 these reviews have been addressed and incorporated into the final documents.

3
4 18. The following are the actions that will be deferred to PED and the potential risks
5 associated with the deferral of these actions. The potential risks of deferring these actions
6 are an increase in the total project costs and an extended implementation schedule.

7
8 a. The performance of additional hydraulic and hydrologic modeling, performance of
9 field surveys (centerline profile, topographic, bathymetric, etc.), and the
10 acquisition of additional geotechnical data (borings), may result in localized
11 project design and feature changes that may in turn result in increases in
12 material quantities leading to increased construction costs.

13
14 b. A detailed review of the adequacy of interior drainage conveyances to handle
15 landside runoff from the levee and floodwall system will be conducted which may
16 result in design and cost changes.

17
18 c. The cost per square foot for residential structure elevation and dry flood proofing
19 measures will be further investigated and implementation costs may increase. In
20 addition, the nonstructural implementation methods and related issues (e.g., use
21 of nonstandard estates) may change if new USACE nonstructural implementation
22 guidance is issued, which in turn, may significantly alter the means, methods,
23 costs, schedule, and level of structure owner participation.

24
25 d. An updated cost analysis will be performed but changes in design; quantities of
26 material; costs for labor and material; fluctuations in inflation, market conditions,
27 and productivity, among other factors, can materially impact the total project cost
28 and the construction schedule.

29
30 e. A full system risk/life safety risk assessment will be performed during PED to
31 support Risk Informed Design and ultimately NFIP Accreditation. In an effort to
32 develop a consistent way to recommend projects that warrant funding based on
33 risk to life safety, USACE developed the Life Safety Risk Indicator (LSRI) tool,
34 which provides a relative representation of the life risk (average annual life loss)
35 that would be reduced if a given structural or non-structural flood damage reduction
36 project was constructed. The LSRI builds off of and replaces the Life Safety Hazard
37 Index (LSHI) tool by incorporating not just consequence information, but also
38 likelihood of the consequences. The results of which show an LSRI value of 6.682
39 which means that if this project was not built, the area protected by this measure
40 would experience an average annual life loss of 6.682 people per year.
41 Additionally, the cost per statistical life saved (CSSL) for St. Tammany is
42 \$10,623,109 annually.

43
44 f. The feasibility level hydrologic modeling indicated “negligible” increase in water
45 surface elevation inside and outside of the levee alignment resulting in no concrete

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1 evidence that the construction of the levee will induce flood damages (to structures
2 and vehicles). If during the PED phase, further modeling results show actual
3 induced flood damages that would give rise to a possible taking or would require
4 the acquisition of flowage easements, a legal takings opinion would be prepared
5 and the REP would be updated to show any additional real estate requirements
6 (i.e., flowage easement).

7
8 19. USACE decision documents recognize cost risk and uncertainty surrounding
9 implementation. All cost estimates will carry degree of uncertainty. The estimated total
10 for the combined structural and nonstructural features of the Recommended Plan is
11 \$5,894,229,000, at a Class 3 level of technical information and design reflecting
12 approximately a ten percent (10%) of project definition. The cost contingencies reflect an
13 eighty percent (80%) confidence level in estimated total project first cost and are intended
14 to cover cost and schedule increase due to the identified project risks and their probability
15 of occurrence. An eighty percent (80%) percent confidence level carries some degree of
16 uncertainty. Even a 100 percent confidence level carries some degree of uncertainty.
17 Changes to assumptions or the basis of design can result in additional risks not currently
18 identified. Contingencies were developed utilizing the CSRA, and the computed
19 contingency for the overall project is 46%, with a 51% computed contingency for the
20 structural portion and a 43% computed contingency for the nonstructural portion. When
21 considering the fully funded costs, the structural portion (West and South Slidell Levee
22 and Floodwall System) represents roughly 51% of the total fully funded project cost and
23 the nonstructural portion that represents roughly 49% of the total fully funded project cost.
24

25 Given that there is limited underlying field data and that the hydraulics has been advanced
26 to a high percentage of completion, the cost estimate for the structural component of the
27 Recommended Plan meets the minimum requirements for a Class 3 cost estimate. The
28 contingency derived from the cost schedule risk analysis (CSRA) is outside the upper
29 limit of the typical range of 20%-50%, but major elements of scope have been captured,
30 with uncertainty remaining around scale and magnitude of foundations for project
31 elements. The total project first cost is within a similar order of magnitude of other recently
32 approved USACE coastal storm and flood risk management projects. Therefore, while
33 there is uncertainty that will need to be addressed through field investigations and
34 additional design during the Preconstruction Engineering and Design phase, the project
35 cost estimates meet the USACE minimum standard for Class 3.
36

37 For the Recommended Plan project first costs, the currently known major uncertainty
38 drivers are the following:
39

- 40 a. Limited geotechnical data and borings may result in further refinements of design
41 elements, changes in the structure number, configuration, and size/capacity and
42 levee footprints/cross-sections and pile foundation depths. In addition, there is risk
43 of increase in the cost and duration utility/facility relocations.
44

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- 1 b. Further refinements of hydraulics and hydrology modeling in the future may result
- 2 in quantity and construction feature changes.
- 3
- 4 c. Inflation estimates may be lower than actual inflation.
- 5
- 6 d. There may be a variation in major material costs and bid assumptions.
- 7
- 8 e. Any changes to assumptions on productivity, construction sequencing due to
- 9 funding allocations and future market conditions can affect overall project cost.
- 10
- 11 f. Limited survey data may result in quantity changes for levee construction
- 12 materials.
- 13
- 14 g. Further investigations into the price per square foot costs for residential structure
- 15 elevation and dry floodproofing could result in significant cost increases.

16

17 Notwithstanding the foregoing uncertainties that will need to be addressed, the project

18 cost estimates meet the minimum standard for a Class 3 level of technical information

19 and design. As the project moves into the next phases, USACE will focus risk

20 management and mitigation on the primary cost and other significant risk drivers to the

21 extent within USACE control. However, there still exists the potential for other

22 unanticipated and uncontrollable changes in environmental or economic conditions that

23 could further increase the total project first cost beyond the current estimate and/or

24 necessitate changes in the project's design.

25 **Structural (West and South Slidell Levee)** The structural portion consists of an

26 approximately 18.5-mile levee and floodwall system surrounding the City of Slidell.

27 Designs underpinning this cost estimate are based upon limited existing field data; no

28 additional field investigations were taken for this study. Design computations informed by

29 engineering judgment, lessons-learned from recent similar projects, and the hydraulic

30 elevations/stages resulting from the modeling performed. Key assumptions for the

31 structural portion are described below.

32

33 (1) Topography/bathymetry used for hydraulic modeling and geotechnical analysis is

34 limited to existing LiDAR datasets. The data utilized is a mosaic terrain dataset (NGOM),

35 prepared for the Gulf Coast that is supplemented by bathymetry to cover areas under

36 water and other data subsets to provide more definition where needed. All terrain data is

37 pre-2018. Aerial imagery is from Louisiana NAIP (2021). The bathymetry utilized for

38 AdCIRC modeling represented the most current bathymetric grid.

39

40 (2) No subsurface investigations were performed for this study. Existing data, which was

41 limited and largely concentrated on the eastern half of the proposed alignment, was used.

42 The limited existing data required extrapolation and resulted in soil strength assumptions

43 with high degrees of uncertainty. The available data was largely concentrated at the

44 eastern end of the alignment, consisted of 3-inch borings (not the 5-inch typically utilized

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1 by the New Orleans District for detailed design), and did not necessarily provide coverage
2 directly on the project alignment, instead being “near” the project alignment in the region
3 between the railroad tracks at the western end and the Kings Point East Levee at the
4 eastern end. Essentially, the western end of the project from the railroad to the western
5 terminus (approximately 9 miles) utilized a single boring near the railroad tracks near the
6 center of the overall 18.5 mile project alignment. The middle third of the project had
7 nearby existing data and some on the alignment (approximately 5 miles), and the eastern
8 end of the project to its eastern terminus had limited to no existing borings (approximately
9 4 miles). The PDT applied best judgment based on the knowledge of the geomorphology
10 of the area and developed what is expected to be conservative assumptions for soil
11 parameters.

12

13 (3) No additional alignment survey, topographic survey, bathymetric survey, or detailed
14 utility surveys were performed levee with the PDT relying only on the available existing
15 data described above.

16

17 (4) From the hydraulic design perspective, AdCIRC modeling using the latest grid and 2D
18 HEC-RAS modeling were performed to support pump station, drainage structure, and
19 navigation structure sizing. However, no detailed review of adequacy of interior drainage
20 conveyances to handle land side runoff from the levee system were performed.

21

22 (5) The PDT utilized conservative design approaches based on recent experiences on
23 the West Shore Lake Pontchartrain (WSLP) project, to include wider levee sections,
24 deeper pile tips for structures, etc. Design calculations were performed to size major
25 elements utilizing the limited field data available and the hydraulic model results. Given
26 that this is the study phase, a minimum number of typical sections were developed for
27 each feature type (e.g., a limited number of typical floodwall sections based on relative
28 height were used) to support cost estimate development. Given the lack of geotechnical
29 data, there are residual uncertainties that pose risks for cost growth and schedule growth
30 for the West and South Slidell Levee component during PED and Construction. While the
31 hydraulic analysis is well advanced, there still remains a residual risk of configuration and
32 size/capacity changes associated with hydraulic design refinements during PED. There
33 is certainly residual risk of levee footprints/cross-sections increasing in size and pile
34 foundation depths increasing during PED. There is risk of utility/facility relocations
35 creating schedule and cost growth during PED.

36

37 Given that there is some underlying field data, and that the hydraulics has been advanced
38 to a high percentage of completion, the design maturity for the West and South Slidell
39 Levee reflects the minimum required to support a Class 3 designation. The contingency
40 for the West and South Slidell Levee derived from the CSRA does fall just outside the
41 upper limit of the typical range defined in ER 1110-2-1302 (20%-50%), but major
42 elements of scope have been captured, with uncertainty remaining around scale and
43 magnitude of foundations for project elements. In comparison to an analog project
44 (WSLP, which also primarily consisted of an 18.5-mile levee system constructed in similar

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1 conditions) the overall fully funded cost for the West and South Slidell Levee is within a
2 similar order of magnitude.

3
4 **Nonstructural** The Nonstructural measure of the Recommended Plan consists of the
5 elevation of residences and dry floodproofing businesses. Although no specific design
6 computations were performed, the home sizes were pulled from a structural inventory and
7 quotes were obtained from local shoring contractors and local governments executing
8 grant programs. Similarly, the dry floodproofing cost was obtained through vendor quotes.
9 The project cost estimate assumes 100% participation by all homeowners in the
10 inventory, so the overall total project cost has inherent conservatism. The estimate also
11 utilizes the best available information and judgment by the cost estimating community
12 across the enterprise with respect to Preliminary Engineering and Design percentage and
13 Supervision and Administration percentage, given that there is not a strong history of
14 execution of such a program by USACE. It should be noted, however, that there was a
15 wide range of price per square foot for home raising presented by local contractors, which
16 could result in some potential cost growth. Another unknown that could impact the
17 ultimate cost is the frequency and magnitude of appropriations to execute the program.
18 Incremental funding or a prolonged overall execution timeline could also result in cost
19 growth. Based upon the methodology used, the Nonstructural estimate fits within the
20 definition of a Class 3 estimate. The CSRA-derived contingency is 43%, which fits within
21 the range of typical contingencies for a Class 3.

22
23 20. In full consideration of the risks as documented in the preceding paragraphs in this
24 report, I concur in the findings, conclusions, and recommendation of the reporting officers.
25 Accordingly, I recommend that coastal storm and flood risk management improvements
26 for St. Tammany Parish, Louisiana be authorized in accordance with the reporting
27 officers' Recommended Plan for structural and nonstructural features at an estimated cost
28 of **\$5,894,229,000** for initial construction, with such modifications as in the discretion of
29 the Chief of Engineers may be advisable. **The federal implementation of the coastal**
30 **storm risk management structural features includes, but is not limited to, the**
31 **following items of local cooperation** to be undertaken by the non-federal sponsor in
32 accordance with applicable federal laws, regulations, and policies:

33 a. Provide 35 percent of construction costs, as further specified below:

34
35 1. Provide, during design, 35 percent of design costs in accordance with
36 the terms of a design agreement entered into prior to commencement of design work for
37 the project;

38
39 2. Provide all lands, easements, rights-of-way, and placement areas and
40 perform all relocations determined by the federal government to be required for the
41 project;

42
43 3. Provide, during construction, any additional contribution necessary to
44 make its total contribution equal to at least 35 percent of construction costs;

45

DAEN

SUBJECT: St. Tammany Parish, Louisiana Flood Risk and Coastal Storm Risk Management

1 b. Prevent obstructions or encroachments on the project (including prescribing
2 and enforcing regulations to prevent such obstructions or encroachments) that might
3 reduce the level of coastal storm risk reduction the project affords, hinder operation and
4 maintenance of the project, or interfere with the project's proper function;
5

6 c. Inform affected interests, at least yearly, of the extent of risk reduction afforded
7 by the project; participate in and comply with applicable federal floodplain management
8 and flood insurance programs; prepare a floodplain management plan for the project to
9 be implemented not later than one year after completion of construction of the project;
10 and publicize floodplain information in the area concerned and provide this information to
11 zoning and other regulatory agencies for their use in adopting regulations, or taking other
12 actions, to prevent unwise future development and to ensure compatibility with the
13 project;
14

15 d. Operate, maintain, repair, rehabilitate, and replace the project or functional
16 portion thereof at no cost to the federal government, in a manner compatible with the
17 project's authorized purposes and in accordance with applicable federal laws and
18 regulations and any specific directions prescribed by the federal government;
19

20 e. Give the federal government a right to enter, at reasonable times and in a
21 reasonable manner, upon property that the non-federal sponsor owns or controls for
22 access to the project to inspect the project, and, if necessary, to undertake work
23 necessary to the proper functioning of the project for its authorized purpose;
24

25 f. Hold and save the federal government free from all damages arising from
26 design, construction, operation, maintenance, repair, rehabilitation, and replacement of
27 the project, except for damages due to the fault or negligence of the federal government
28 or its contractors;
29

30 g. Perform, or ensure performance of, any investigations for hazardous, toxic, and
31 radioactive wastes (HTRW) that are determined necessary to identify the existence and
32 extent of any HTRW regulated under the Comprehensive Environmental Response,
33 Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, and any other
34 applicable law, that may exist in, on, or under real property interests that the federal
35 government determines to be necessary for construction, operation and maintenance of
36 the project;
37

38 h. Agree, as between the federal government and the non-federal sponsor, to be
39 solely responsible for the performance and costs of cleanup and response of any HTRW
40 regulated under applicable law that are located in, on, or under real property interests
41 required for construction, operation, and maintenance of the project, including the costs
42 of any studies and investigations necessary to determine an appropriate response to the
43 contamination, without reimbursement or credit by the federal government;
44

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SUBJECT: St. Tammany Parish, Louisiana Flood Risk and Coastal Storm Risk Management

1 i. Agree, as between the federal government and the non-federal sponsor, that
2 the non-federal sponsor shall be considered the owner and operator of the project for the
3 purpose of CERCLA liability or other applicable law, and to the maximum extent
4 practicable shall carry out its responsibilities in a manner that will not cause HTRW liability
5 to arise under applicable law; and
6

7 j. Comply with the applicable provisions of the Uniform Relocation Assistance and
8 Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42
9 U.S.C. 4630 and 4655) and the Uniform Regulations contained in 49 C.F.R Part 24, in
10 acquiring real property interests necessary for construction, operation, and maintenance
11 of the project including those necessary for relocations, and placement area
12 improvements; and inform all affected persons of applicable benefits, policies, and
13 procedures in connection with said act.
14

15 **k. The federal implementation of the project for the nonstructural features for**
16 **flood risk management includes, but is not limited to, the following required items**
17 **of local cooperation** to be undertaken by the non-federal sponsor in accordance with
18 applicable federal laws, regulations, and policies:

19 a. Provide 35 percent of construction costs, as further specified below:
20

21 1. Provide, during design, 35 percent of design costs in accordance with the terms
22 of a design agreement entered into prior to commencement of design work for the project;
23

24 2. Provide all lands, easements, rights-of-way, and placement areas and perform
25 all relocations determined by the federal government to be required for the project;
26

27 3. Provide, during construction, any additional contribution necessary to make its
28 total contribution equal to at least 35 percent of construction costs;
29

30 b. Prevent obstructions or encroachments on the project (including prescribing and
31 enforcing regulations to prevent such obstructions or encroachments) that might
32 reduce the level of flood risk reduction the project affords, hinder operation and
33 maintenance of the project, or interfere with the project's proper function;
34

35 c. Inform affected interests, at least yearly, of the extent of risk reduction afforded by
36 the flood risk management features; participate in and comply with applicable federal
37 floodplain management and flood insurance programs; prepare a floodplain management
38 plan for the project to be implemented not later than one year after completion of
39 construction of the project; and publicize floodplain information in the area concerned and
40 provide this information to zoning and other regulatory agencies for their use in adopting
41 regulations, or taking other actions, to prevent unwise future development and to ensure
42 compatibility with the project;
43

DAEN

SUBJECT: St. Tammany Parish, Louisiana Flood Risk and Coastal Storm Risk Management

1 d. Operate, maintain, repair, rehabilitate, and replace the project or functional portion
2 thereof at no cost to the federal government, in a manner compatible with the project's
3 authorized purposes and in accordance with applicable federal laws and regulations and
4 any specific directions prescribed by the federal government;
5

6 e. Give the federal government a right to enter, at reasonable times and in a
7 reasonable manner, upon property that the non-federal sponsor owns or controls for
8 access to the project to inspect the project, and, if necessary, to undertake work
9 necessary to the proper functioning of the project for its authorized purpose;
10

11 f. Hold and save the federal government free from all damages arising from design,
12 construction, operation, maintenance, repair, rehabilitation, and replacement of the
13 project, except for damages due to the fault or negligence of the federal government or
14 its contractors;
15

16 g. Perform, or ensure performance of, any investigations for hazardous, toxic, and
17 radioactive wastes (HTRW) that are determined necessary to identify the existence and
18 extent of any HTRW regulated under the Comprehensive Environmental Response,
19 Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, and any other
20 applicable law, that may exist in, on, or under real property interests that the federal
21 government determines to be necessary for construction, operation, and maintenance of
22 the project;
23

24 h. Agree, as between the federal government and the non-federal sponsor, to be
25 solely responsible for the performance and costs of cleanup and response of any HTRW
26 regulated under applicable law that are located in, on, or under real property interests
27 required for construction, operation, and maintenance of the project, including the costs
28 of any studies and investigations necessary to determine an appropriate response to the
29 contamination, without reimbursement or credit by the federal government;
30

31 i. Agree, as between the federal government and the non-federal sponsor, that the
32 non-federal sponsor shall be considered the owner and operator of the project for the
33 purpose of CERCLA liability or other applicable law, and to the maximum extent
34 practicable shall carry out its responsibilities in a manner that will not cause HTRW liability
35 to arise under applicable law; and
36

37 j. Comply with the applicable provisions of the Uniform Relocation Assistance and
38 Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42
39 U.S.C. 4630 and 4655) and the Uniform Regulations contained in 49 C.F.R Part 24, in
40 acquiring real property interests necessary for construction, operation, and maintenance
41 of the project including those necessary for relocations, and placement area
42 improvements; and inform all affected persons of applicable benefits, policies, and
43 procedures in connection with said act.
44

DAEN

SUBJECT: St. Tammany Parish, Louisiana Flood Risk and Coastal Storm Risk Management

1 21. The recommendation contained herein reflects the information available at this time
2 and current departmental policies governing formulation of individual projects. It does not
3 reflect program and budgeting priorities inherent in the formulation of a national civil works
4 construction program or the perspective of higher review levels within the Executive
5 Branch. Consequently, the recommendation may be modified before it is transmitted to
6 Congress as a proposal for authorization and implementation funding. However, prior to
7 transmittal to Congress, the non-federal sponsor, interested federal agencies, and other
8 parties will be advised of any significant modifications and will be afforded an opportunity
9 to comment further.

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SCOTT A SPELLMON
Lieutenant General, USA
Chief of Engineers