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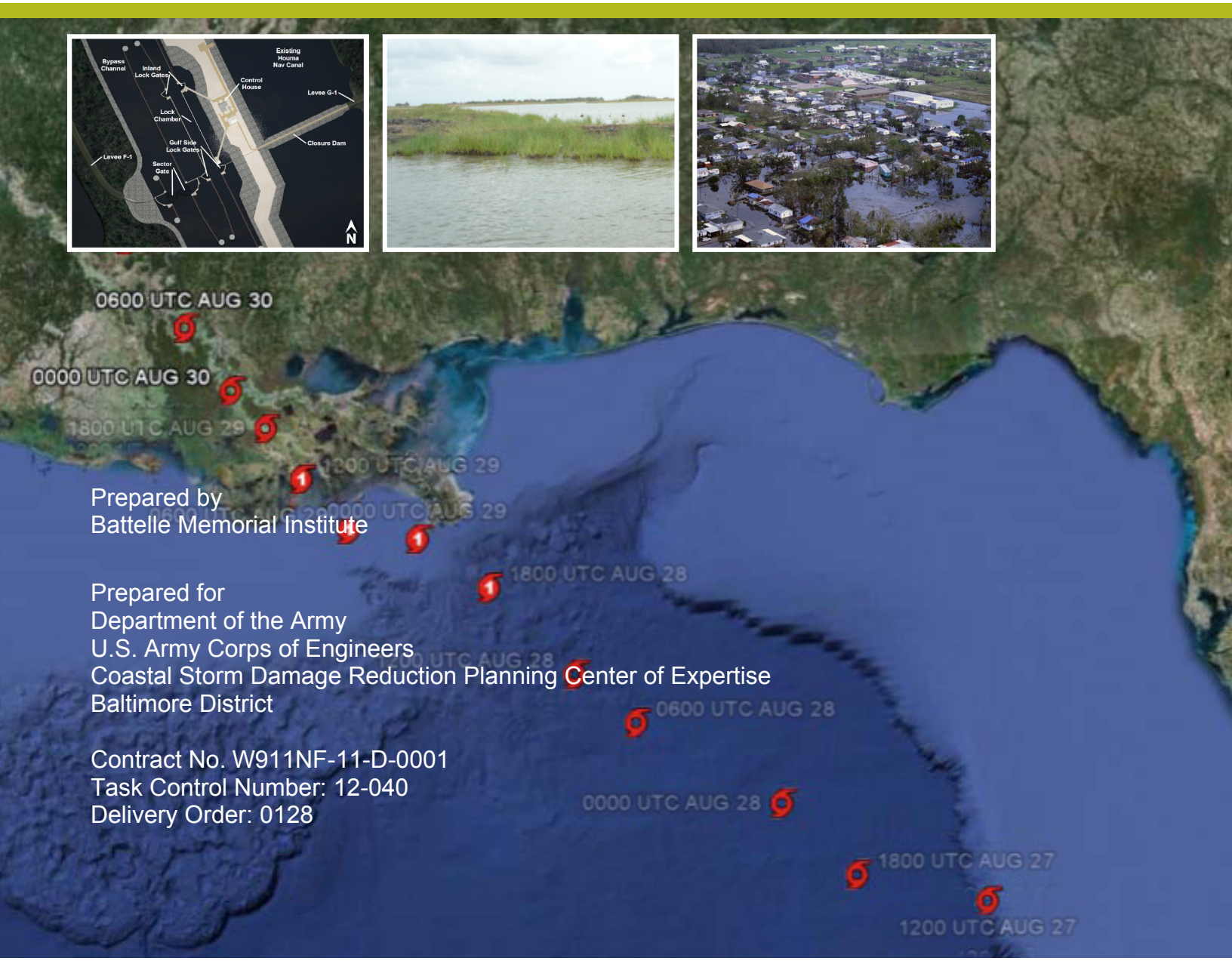
Final Independent External Peer Review Report for the Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Post Authorization Change Decision Document



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Coastal Storm Damage Reduction Planning Center of Expertise
Baltimore District

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Final Independent External Peer Review Report for the Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Post Authorization Change Decision Document

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EXECUTIVE SUMMARY

Project Background and Purpose

The Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project (hereinafter: Morganza to the Gulf project) feasibility study was completed in March 2002. The project was authorized for construction in the Water Resources Development Act (WRDA) of 2007. Authorization was based on 2002 and 2003 Chief of Engineers Reports, which was prepared prior to development and implementation of post-Katrina design criteria. In the interest of public safety, the U.S. Army Corps of Engineers (USACE) is required to incorporate lessons learned from Hurricanes Katrina and Rita into the designs for the Morganza to the Gulf project. A reconnaissance-level revised project cost estimate prepared in 2008 determined that the cost to incorporate post-Katrina design criteria into the Morganza to the Gulf project would exceed the WRDA of 1986, Section 902 limit. As a result, USACE New Orleans District must prepare a Post Authorization Change (PAC) decision document to present a new project cost for reauthorization. In addition, a revised Programmatic Environmental Impact Statement (PEIS) must accompany the USACE decision document, including constructible features that were not presented in the original PEIS prepared in 2002.

The Morganza to the Gulf project's purpose is hurricane and storm damage risk reduction for people and property within portions of Terrebonne and Lafourche Parishes, Louisiana, as well as fragile marsh in the vicinity of Houma, Louisiana. The scope of the Morganza to the Gulf project includes the following features: 98 miles of earthen levee; 22 navigable structures (including the Houma Navigation Canal [HNC] Lock Complex); 21 environmental control structures; fronting protection for four existing pump stations; and six roadway gates. The structural features are integrated into the levee alignment to provide flood protection, drainage, environmental benefits, and navigational passage. The Morganza to the Gulf project sponsor is the Coastal Protection and Restoration Authority of Louisiana.

The Congressionally mandated WRDA Section 902 limit requires reauthorization by Congress when construction costs are estimated to exceed the authorized project cost by 20 percent (WRDA, 1986). Due to post-Katrina design criteria changes, including new 1-percent-annual-chance storm water surface elevations and new borrow standards, the Morganza to the Gulf project will exceed this 20-percent cost increase. Therefore, the Morganza to the Gulf project requires reauthorization from Congress to start construction. The PAC report was developed to serve as the basis for reauthorization. The PAC report includes feasibility-level designs incorporating the post-Karina design criteria, new project costs, and updated economic benefits.

The PAC will lead to a signed Chief of Engineers' Report and anticipated Congressional reauthorization.

Independent External Peer Review Process

USACE is conducting an Independent External Peer Review (IEPR) of the Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Post Authorization Change Decision Document (hereinafter: Morganza to the Gulf PAC). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012a and 2012b). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the Morganza to the Gulf PAC. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012a and 2012b), and OMB (2004). This final report describes the IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

Based on the technical content of the Morganza to the Gulf PAC and the overall scope of the Morganza to the Gulf project, Battelle identified candidates for the Panel in the following key technical areas: Civil Works planning, economics, wetland ecology/biology, fisheries biology, coastal engineering, civil/construction engineering, and geotechnical/structural engineering. Seven panel members were selected from among the Louisiana Water Resources Council (LWRC) Primary Panel, LWRC Candidate Pool, and other sources such as Battelle's Peer Reviewer Database. USACE was given the list of seven selected candidate panel members; Battelle selected the final panel members.

The Panel conducted its review of the Morganza to the Gulf PAC documents in June 2012. During the Panel's review, Battelle was informed that USACE Headquarters had requested changes to the economics analysis, requiring that the documents be revised followed by an IEPR of the revisions to be conducted by the same Panel. Battelle also was informed that the IEPR of the revised documents would include additional economics-related charge questions provided by Headquarters. Because the Panel had essentially completed its review of the original documents and the economics revisions requested by Headquarters would take several months to complete, Battelle and USACE decided to allow the Panel to complete its review (hereinafter, Review 1) and prepare Final Panel Comments to document the issues identified during Review 1.

In January 2013, USACE provided the revised documents to Battelle and the Panel, accompanied by a list of the changes that had been made. This list allowed the Panel to focus its review of the revised documents (hereinafter, Review 2) only on those parts of the documents that had changed. This Final IEPR Report includes activities conducted during both Reviews 1 and 2.

During Review 1, the Panel received electronic versions of 1,599 pages of review documents from the Morganza to the Gulf project, including the PAC, along with a charge that solicited

comments on specific sections of the documents to be reviewed. During Review 2, revised versions of several of the documents (including the revised PAC and Economics Appendix), the list of changes made, and the additional charge questions requested by USACE Headquarters were provided electronically (approximately 667 pages). In addition, 173 pages of public comments were also provided. Review 2 focused solely on the changes made, the revised Economics Appendix, and the public comments; the Panel did not review portions of the documents that were unchanged from Review 1. USACE prepared the charge questions for both Reviews 1 and 2, which were included in Appendix D of the draft and final Work Plans and in Appendices D and F of the revised final Work Plan.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off teleconference prior to the start of each review to provide the Panel with (1) an overview of the project (Review 1) and a briefing on the changes to the project documents (Review 2), and (2) an opportunity to ask questions of USACE. Other than these teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced more than 300 individual comments in response to the 68 charge questions during Review 1. For Review 2, three additional charge questions were provided, and the economics and civil/construction engineering panel members were directed to respond to the charge questions. Both panel members responded to each of the questions.

During each review period, each IEPR panel member was given all of the Morganza to the Gulf PAC documents provided by USACE. However, because of the number of documents and the varying disciplines, the panel members focused their reviews on those documents applicable to their technical area. For example, for Review 2, only the economics and civil/construction engineering panel members reviewed the revised Economics Appendix. At the completion of each review, Battelle merged the Panel's responses to the charge questions and supplied the merged responses to the Panel so that each panel member could review all of the issues that were identified by the Panel.

At the end of Review 1, the panel members met via teleconference with Battelle to review key technical comments, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments to be provided to USACE. However, at the end of Review 2, the economics expert and civil/construction engineer who both reviewed the revised Economics Appendix stated via e-mail that they each independently identified similar concerns in their responses. Furthermore, the other panel members had no comments or questions that needed clarification or discussion. Therefore, Battelle determined that a teleconference was not necessary at the end of Review 2.

For each review, Final Panel Comments were prepared. After Review 1, 21 draft Final Panel Comments were prepared and supplied via e-mail to USACE. During Review 2, the Panel was asked to re-examine the 21 draft Final Panel Comments against the revised documents that were supplied and determine whether the comments were still applicable based on the revised documents. Of the original 21 Final Panel Comments, four (4) were eliminated because the revised documents addressed the issues presented, 11 were revised based on the revised documents, and six (6) were unchanged. One new Final Panel Comment was developed based on the economics and civil/construction engineering panel members' review of the revised

Economics Appendix. In the end, 18 Final Panel Comments were identified and presented. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Of the 18 Final Panel Comments remaining at the end of Review 2, 13 were identified as having medium significance, and five (5) had low significance.

Results of the Independent External Peer Review

The panel members agreed among one another on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012a and 2012b; p. D-4) in the Morganza to the Gulf project review documents. Table ES-1 lists the Final Panel Comments statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel's findings.

Environmental – While the Morganza to the Gulf project is enormous and complex, the National Environmental Policy Act (NEPA) requirements were only partially satisfied. The cumulative effects analysis does not thoroughly consider reasonably foreseeable future actions unrelated to the project. The Panel believes that minimal and (in some instances) imprecise data were used for the analyses, which resulted in a variety of uncertainties associated with the TABS modeling and wetlands data and resulting modeling assumptions. The Panel is concerned that the direct, indirect, and cumulative impacts on fisheries and other ecological resources (and resulting mitigation actions) may not be comprehensive given the limited data available. In addition, given the length of time since the decision documents were originally developed and the number of changes that have been made, these changes may not be accurately represented in the analyses (e.g., HET, TABS modeling) that support the EIS. The Panel was also concerned with the lack of detail on future multi-purpose lock operations of the Houma Navigation Canal (HNC) (including whether environmental restoration will be a future purpose) and on how the HNC might affect the ecosystem, especially salinity regimes.

Economics and Plan Formulation – The plan formulation process thoroughly followed and documented the six-step planning process and, in most cases, the economic analyses are appropriate and consistent with current practices. However, the Panel remains concerned about the sparseness of data for several of the analyses, which affects the Panel's ability to assess the adequacy and acceptability of the economic analyses. Overall, there appears to be a reliance on undocumented data sources, particularly for some critical elements of the damage calculations, for which the input data sources were not provided. The content-to-structure value ratio (CSVR) discussion does not include information on the representativeness of the samples used to develop the CSVRs. The sources and impacts of residual risk have not been thoroughly described, and a communication plan for at-risk populations has not been included. Finally, the report does not include data or other information on why rainfall-related flooding in the interior project area was considered a low risk.

Table ES-1. Overview of 18 Final Panel Comments Identified by the Morganza to the Gulf PAC IEPR Panel

No.	Final Panel Comments
Significance – Medium	
1	The effectiveness of the Morganza to the Gulf project design and construction is uncertain given the limited amount of site data.
2	A borrow availability assessment (BAA) has not been conducted; therefore, the likelihood of project success and the potential impacts (environmental, cost, schedule) of the project cannot be fully assessed.
3	Environmental effects of operations of the Houma Navigation Canal (HNC) lock and environmental gates are not fully documented.
4	There are uncertainties in the TABS modeling caused by limited data available for testing, unresolved model-to-data discrepancies, and a lack of relative sea level rise (RSLR) simulations.
5	The accuracy of wetland impacts and mitigation requirements is constrained by the lack of site-specific wetlands data and an over-reliance on generic modeling assumptions.
6	Risk and uncertainty information associated with the base, project, and Multiple Lines of Defense Strategy (MLODS) conditions in the various coastal models (e.g., ADCIRC, STWAVE) has not been included in the Post Authorization Change (PAC) document.
7	The Post Authorization Change (PAC) document may not accurately capture the risks and uncertainties associated with potential loss of life because of evacuation behavior assumptions.
8	The cumulative effects analysis does not thoroughly consider reasonably foreseeable future actions unrelated to the project.
9	The indirect effects analysis does not thoroughly consider the potential impacts of the constructible features on ecological resources.
10	Degradation of the road system from construction of the levees and an associated mitigation plan have not been considered in the project schedule and impact analysis.
11	The impacts on fishery resources are uncertain because qualitative baseline fish data and seasonally averaged salinity results were used.
12	Residual risk has not been thoroughly described, the associated communication plan for the affected population is not presented, and no adaptive management plan is included.
13	The description of the content-to-structure value ratios (CSVRs) is missing some important information on the representativeness and demographics of the sample of property owners selected and the specific locations and representativeness of the residential and commercial units used to develop the ratios.

Table ES-1. Overview of 18 Final Panel Comments Identified by the Morganza to the Gulf PAC IEPR Panel (Continued)

No.	Final Panel Comments
	Significance – Low
14	Rainfall-related damages to the interior project area have not been presented for each alternative and therefore cannot be evaluated.
15	The modeling documentation for the Post Authorization Change (PAC) document does not explain why the Dokka Real Time Kinematic (RTK) data are considered to be more accurate than the light detection and ranging (LIDAR) measurements prior to adjustment.
16	The accuracy of the estimated highway and street flood monetary damages is uncertain because the basis of the estimate has not been described.
17	The Post Authorization Change (PAC) document does not consider public access to, and recreational use of, the levees.
18	The Post Authorization Change (PAC) document does not discuss the desired final level of redundancy, resiliency, and robustness of the interfaces between structures, materials, or members.

Engineering – For a feasibility-level study, the engineering analyses used were generally acceptable given the size, complexity, and tight schedule of the project. However, the limited subsurface explorations that were completed have resulted in significant uncertainties about the geotechnical site conditions, which could affect cost and schedule. There was also a lack of documentation on model uncertainty, verification, and validation, especially for the hurricane surge analysis (ADCIRC). The Panel also believed that the full impacts and success of the project cannot be fully ascertained without a borrow availability assessment (BAA) and a mitigation plan for the construction-related degradation of the local road system.

Public Comment Review

The Panel reviewed the technical comments provided by various agencies, stakeholders, and members of the public. Comments expressing general support or opposition and comments related to policy compliance were not reviewed by the Panel. These public comments are outside the directed focus of the Panel's charge, and therefore were not noted by the Panel.

The Panel identified several public concerns that deserve further investigation and documentation in the Morganza to the Gulf project documents. These public concerns are described in Appendix B, Final Panel Comment on the Morganza to the Gulf Public Comments. However, the Panel recommends that the public comments should be directly examined regarding the details of each concern. Topics include, but are not limited to, changes in Federal insurance, borrow costs, buy-out plans, and identified benefits. Additional concerns noted by the public parallel some of the Panel's concerns addressed in its Final Panel Comments (see Appendix A); the Panel did not repeat these concerns in Appendix B.

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LIST OF ACRONYMS

AEP	Annual Exceedance Probability
ATR	Agency Technical Review
BA	Biological Assessment
BAA	Borrow Availability Assessment
COI	Conflict of Interest
CSU	Colorado State University
CSVR	Content-to-Structure Value Ratio
CWRB	Civil Works Review Board
DEA	Draft Engineering Appendix
DrChecks	Design Review and Checking System
EC	Engineer Circular
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
FEMA	Federal Emergency Management Agency
HNC	Houma Navigation Canal
HSDRRS	Hurricane and Storm Damage Risk Reduction System
HSI	Habitat Suitability Index
IEPR	Independent External Peer Review
LACPR	Louisiana Coastal Protection and Restoration
LACPRA	Louisiana Coastal Protection and Restoration Authority
LCA	Louisiana Coastal Area
LIDAR	Light Detection and Ranging
LWRC	Louisiana Water Resources Council
MLODS	Multiple Lines of Defense Strategy
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
NWI	National Wetlands Inventory
O&M	Operation and Maintenance

OEO	Outside Eligible Organization
OMB	Office of Management and Budget
OSE	Other Social Effects
PAC	Post Authorization Change
PDT	Project Delivery Team
PEIS	Programmatic Environmental Impact Statement
RSLR	Relative Sea Level Rise
RTK	Real Time Kinematic
SAM	Standard Assessment Methodology
SAR	Safety Assurance Review
TLCD	Terrebonne Levee and Conservation District
TSP	Tentatively Selected Plan
UF	University of Florida
USACE	United States Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WRDA	Water Resources Development Act
WVA	Wetland Value Assessment

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1. INTRODUCTION

The Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project (hereinafter: Morganza to the Gulf project) feasibility study was completed in March 2002. The project was authorized for construction in the Water Resources Development Act (WRDA) of 2007. Authorization was based on 2002 and 2003 Chief of Engineers Reports, which was prepared prior to development and implementation of post-Katrina design criteria. In the interest of public safety, the U.S. Army Corps of Engineers (USACE) is required to incorporate lessons learned from Hurricanes Katrina and Rita into the designs for the Morganza to the Gulf project. A reconnaissance-level revised project cost estimate prepared in 2008 determined that the cost to incorporate post-Katrina design criteria into the Morganza to the Gulf project would exceed the WRDA of 1986, Section 902 limit. As a result, USACE New Orleans District must prepare a Post Authorization Change (PAC) decision document to present a new project cost for reauthorization. In addition, a revised Programmatic Environmental Impact Statement (PEIS) must accompany the USACE decision document, including constructible features that were not presented in the original PEIS prepared in 2002.

The Morganza to the Gulf project's purpose is hurricane and storm damage risk reduction for people and property within portions of Terrebonne and Lafourche Parishes, Louisiana, as well as fragile marsh in the vicinity of Houma, Louisiana. The scope of the Morganza to the Gulf project includes the following features: 98 miles of earthen levee; 22 navigable structures (including the Houma Navigation Canal [HNC] Lock Complex); 21 environmental control structures; fronting protection for four existing pump stations; and six roadway gates. The structural features are integrated into the levee alignment to provide flood protection, drainage, environmental benefits, and navigational passage. The Morganza to the Gulf project sponsor is the Coastal Protection and Restoration Authority of Louisiana.

The Congressionally mandated WRDA Section 902 limit requires reauthorization by Congress when construction costs are estimated to exceed the authorized project cost by 20 percent (WRDA, 1986). Due to post-Katrina design criteria changes, including new 1-percent-annual-chance storm water surface elevations and new borrow standards, the Morganza to the Gulf project will exceed this 20-percent cost increase. Therefore, the Morganza to the Gulf project requires reauthorization from Congress to start construction. The PAC report was developed to serve as the basis for reauthorization. The PAC report includes feasibility-level designs incorporating the post-Karina design criteria, new project costs, and updated economic benefits. The PAC will lead to a signed Chief of Engineers' Report and anticipated Congressional reauthorization.

The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Post Authorization Change Decision Document (hereinafter: Morganza to the Gulf PAC) in accordance with procedures described in the Department of the Army, USACE Engineer Circular *Civil Works Review, Change 1* (EC 1165-2-209, Change 1) (USACE, 2012a), *Civil Works Review* (EC 1165-2-214) (USACE, 2012b), and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review*

(OMB, 2004). Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

A seven-member IEPR Panel (the Panel) conducted its review of the Morganza to the Gulf PAC documents in June 2012. During the Panel's review, Battelle was informed that USACE Headquarters had requested changes to the economics analysis, requiring that the documents be revised followed by an IEPR of the revisions to be conducted by the same Panel. Battelle also was informed that the IEPR of the revised documents would include additional economics-related charge questions provided by Headquarters. Because the Panel had essentially completed its review of the original documents and the economics revisions requested by Headquarters would take several months to complete, Battelle and USACE decided to allow the Panel to complete its review (hereinafter, Review 1) and prepare Final Panel Comments to document the issues identified during Review 1.

In January 2013, USACE provided the revised documents to Battelle and the Panel, accompanied by a list of the changes that had been made. This list allowed the Panel to focus its review of the revised documents (hereinafter, Review 2) only on those parts of the documents that had changed.

This final report details the IEPR process for both Review 1 and Review 2, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the environmental, economic, and engineering analyses contained in the Morganza to the Gulf PAC. The full text of the Final Panel Comments remaining after Review 2 is presented in Appendix A.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012a and 2012b).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the economic, engineering, and environmental analysis of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Morganza to the Gulf PAC was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC Nos. 1165-2-209, Change 1 and 1165-2-214) under Section 501(c)(3) of the U.S. Internal Revenue Code. Battelle has been conducting IEPRs for USACE since 2005.

3. METHODS

This section describes the method followed in selecting the members for the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described by USACE (2012a and 2012b) and OMB (2004) guidance. Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

After receiving the notice to proceed (NTP), Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan and the revised final Work Plan.

Table 1 is based on receipt of pre-award funding from the USACE Contracting Officer's Representative and the Army Research Office's Contracting Officer to begin initial work on the project (i.e., pre-award funding received on May 1, 2012). The Review 1 documents were provided by USACE on June 1, 2012, while the Review 2 documents were received on December 27, 2012, and February 22, 2013 (public comments).

Battelle entered 19 Final Panel Comments (18 Final Panel Comments from the Morganza to the Gulf PAC IEPR, plus 1 Final Panel Comment from the Public Comment Review) developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE could review and respond to them. USACE provided responses (Evaluator Responses) to the Final Panel Comments, and the Panel responded (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses to the Final Panel Comments were documented in DrChecks. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

Table 1. Morganza to the Gulf PAC IEPR Schedule

Task	Action	Due Dates	
		Original Award (Review 1)	Modification 3 (Review 2)
1	**Pre-award Funding Authorization**	5/1/2012	NA
	Notice to Proceed (NTP)	6/7/2012	1/9/2013
	Review documents received	6/1/2012	12/27/2012; 2/22/2013
	*Battelle submits draft Work Plan	5/10/2012	1/22/2013
	USACE provides comments on draft Work Plan	5/18/2012	1/23/2013
	Teleconference (if necessary)	5/20/2012	NA
	*Battelle submits final Work Plan	5/25/2012	1/24/2013
2	Battelle requests input from USACE on the COI questionnaire	5/8/2012	NA
	USACE provides comments on COI questionnaire	5/10/2012	NA
	*Battelle submits list of selected panel members	5/15/2012	NA
	USACE confirms the panel members have no COI	5/17/2012	NA
	Battelle completes subcontracts for panel members	5/30/2012	1/22/2013
3	Battelle convenes kick-off meeting with USACE	5/8/2012	1/18/2013
	Battelle convenes kick-off meeting with panel members	6/1/2012	1/23/2013
	USACE/Battelle convenes kick-off meeting with panel members	6/1/2012	1/23/2013
	Battelle sends second round of review documents to Panel	6/12/2012	1/23/2013
	Battelle convenes mid-review teleconference with USACE and panel members	6/19/2012	NA
3.1	Civil Works Review Board (CWRB)	May 3, 2013	
4	Panel members complete their individual reviews	6/26/2012	1/31/2013
	Battelle convenes panel review teleconference	7/2/2012	NA
	Panel members provide finalized Final Panel Comments to Battelle	7/17/2012	2/5/2013
	Battelle provides public comments to Panel for review	NA	2/25/2013
	Battelle enters one Final Panel Comment related to the Public Comment Reviews into DrChecks	NA	3/4/2013
5	*Battelle submits Final IEPR Report to USACE	3/5/2013	
6	Battelle inputs Final Panel Comments to DrChecks; Battelle provides Post-Final Panel Comment Response Process template to USACE	2/6/2013	
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses and clarifying questions to Battelle	2/13/2013	

Table1. Morganza to the Gulf PAC IEPR Schedule (Continued)

Task	Action	Due Dates	
		Original Award (Review 1)	Modification 3 (Review 2)
6	Battelle convenes teleconference between the Panel and USACE to discuss Final Panel Comments, draft responses, and clarifying questions	2/22/2013	
	USACE inputs final PDT Evaluator Responses in DrChecks	2/26/2013	
	Battelle inputs the Panel's BackCheck Responses in DrChecks	3/5/2013	
	*Battelle submits pdf printout of DrChecks project file	3/5/2013	
	Contract End	9/13/2013	

3.2 Identification and Selection of IEPR Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: (1) Civil Works planning, (2) economics, (3) wetland ecology/biology, (4) civil/construction engineering, (5) coastal engineering, (6) geotechnical/structural engineering, and (7) fisheries biology. These areas correspond to the technical content of the Morganza to the Gulf PAC documents and overall scope of the Morganza to the Gulf project.

The first four technical areas of expertise listed above are among those previously identified by Battelle as Primary Panel Members for the Louisiana Water Resources Council (LWRC, as defined in the WRDA of 2007, Section 7009) (WRDA, 2007). To identify panel members for the Morganza to the Gulf PAC IEPR, Battelle consulted with the LWRC Primary Panel Members and confirmed that their expertise and schedules made them suitable to serve on the IEPR Panel.

To fill the coastal engineering and geotechnical/structural engineering roles, Battelle inquired with appropriate experts in the LWRC Candidate Pool[1]. One geotechnical/structural engineering pool member was available and qualified to serve on the IEPR Panel; however, none of the coastal engineering candidates with suitable expertise in the Pool was available or qualified for this review. Therefore, Battelle reviewed experts in Battelle's Peer Reviewer Database (which contains 1,600 experts), sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches to fill the coastal engineering position.

The last technical area of expertise required, fisheries biology, was not among those previously specified for the LWRC Primary Panel or the LWRC Candidate Pool. Because this additional area of expertise was required to address technical aspects of the Morganza to the Gulf IEPR, using the resources listed above, Battelle identified and recruited a fisheries biologist to serve on the IEPR Panel.

[1] The LWRC Candidate Pool was a group of additional panel members previously identified as potential backup panel members to the LWRC Primary Panel Members.

Battelle selected the final panel members according to the selection criteria described in the project Work Plan. The final Panel consisted of seven expert reviewers: four experts from the LWRC Primary Panel, one expert from the LWRC Candidate Pool, and two experts from outside the LWRC Candidate Pool. Information about the candidate panel members, including brief biographical information, highest level of education attained, and years of experience, was provided to USACE for feedback.

The candidates were screened for the following potential exclusion criteria or COIs.[2]

- Previous and/or current involvement by you or your firm[3] in any part of the Morganza to the Gulf Hurricane Protection Project including the Post-Authorization Change Decision Document and the Environmental Impact Statement (EIS).
- Previous and/or current involvement by you or your firm[3] in any work *related to* the Morganza to the Gulf Hurricane Protection Project, including any contractual involvement with the Terrebonne Levee and Conservation District (TLCD) and the Louisiana Coastal Protection and Restoration Authority (LACPRA).
- Previous and/or current involvement by you or your firm[3] in any work on the Hurricane and Storm Damage Risk Reduction System (HSDRRS).
- Previous and/or current involvement by you or your firm[3] in the conceptual or actual design, construction, or operation and maintenance (O&M) of the Morganza to the Gulf Hurricane Protection Project or related projects.
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Previous and/or current involvement with paid or unpaid expert testimony related to the Morganza to the Gulf Project or HSDRRS in general.
- Current or previous employment or affiliation with members of the cooperating agencies, including the Louisiana Department of Transportation and Development, the LACPRA, TLCD **and** currently working on Morganza to the Gulf Project-related projects (for pay or *pro bono*).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Terrebonne Basin, LaFourche Parish, or Terrebonne Parish.
- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and

[2] Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "….when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

[3] Note: Includes any joint ventures in which the panel member's firm is involved.

position/role. Please highlight and discuss in greater detail any projects that are *specifically* with or in support of the New Orleans District.

- Previous or current involvement with the development or testing of models that will be used for or in support of the Morganza to the Gulf project, including ADCIRC, HEC-FDA, @Risk, IMPLAN, WVA Model, WAM, and STWAVE.
- Current firm[3] involvement with other USACE projects, *specifically* those projects/contracts that are with the New Orleans District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the New Orleans District. Please explain.
- ***Any*** previous employment by the USACE as a direct employee or contractor (either as an individual or through your firm[3]) within the last 10 years, *notably* if those projects/contracts are with the New Orleans District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning hurricane protection projects, and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in Morganza to the Gulf Hurricane Protection Project-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm[3] revenues within the last 3 years came from USACE contracts.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to Morganza to the Gulf Hurricane Protection Project, including the draft EIS.
- Participation in prior Federal studies relevant to this project.
- Previous and/or current participation in prior non-Federal studies relevant to this project.
- Is there any past, present or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe:

These COI questions were intended to serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Three of the seven final reviewers are affiliated with consulting companies; the other four are independent consultants who are also affiliated with universities. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given

the list of candidate panel members, but Battelle selected the final panel members. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning their review and within a day of their subcontracts being finalized, all members of the Panel attended a kick-off meeting, via teleconference, that was planned and facilitated by Battelle to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel.

3.3 Preparation of the Charge and Conduct of the IEPR

Charge questions were provided by USACE for both reviews and were included in the draft (Review 1), final (Review 1), and revised final (Review 1 and 2) Work Plans. USACE submitted a list of 68 charge questions/discussion points for Review 1 and a list of 3 charge questions for Review 2. In both cases, the final charge included general guidance for the Panel on the conduct of the peer review (the Review 1 charge is provided in Appendix C, and the Review 2 charge is provided in Appendix D of this report).

Battelle planned and facilitated kick-off meetings via teleconference during which USACE presented project details to the Panel prior to both reviews. Before each meeting, the IEPR Panel received an electronic version of the final charge as well as the Morganza to the Gulf project documents and reference materials listed below. The documents and files listed below were provided to all panel members as review, reference, or supporting information documents. Each panel member focused on reviewing those documents relevant to his or her technical area of expertise. In addition, during Review 2, USACE provided additional documents at the request of panel members. These additional documents were provided to Battelle and then disseminated to the Panel as supplemental information only and were not part of the official review. A list of these additional documents requested by the Panel is also provided below.

Documents Reviewed

Review 1

- Draft Post Authorization Change Decision Document (three files Executive Summary, Main Report, Project Maps; 131 pages)
- Revised Programmatic Environmental Impact Statement Morganza to the Gulf of Mexico, Louisiana - June 2012 (471 pages)
- Morganza to the Gulf of Mexico, Louisiana Draft PAC, Draft Engineering Appendix (two files appendix and plates; 415 pages)
- Morganza, Louisiana , to the Gulf of Mexico Post Authorization Change Report Economics Appendix (included RED and OSE Appendices; 155 pages)
- Real Estate Plan, Morganza to the Gulf of Mexico, Louisiana (80 pages)
- Public comments (as of June 11, 2012) (347 pages)

Review 2

- Draft Post Authorization Change Report Morganza to the Gulf of Mexico, Louisiana - January 2013 (two files main report and attachments 1-3 ; total 131 pages)

- Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix - January 2013 (369 pages)
- Morganza to the Gulf of Mexico, Louisiana Post-Authorization Change Report Economics Appendix - January 2013 (154 pages)
- Morganza Summary Report - January 2013 (13 pages)
- Public Comments (173 pages)

Supporting Information

Review 1

- Morganza Mississippi River and Tributaries to the Gulf of Mexico Hurricane Protection Feasibility Report and Appendices, March 2002 (1,106 pages)
- Annex 2 Soils Report with Barrier Alignment Soil Sample Lab Testing (two files; 6,564 pages)
- Annex 4 Relocations (282 pages)
- Annex 6 Design and Construction Schedule (5 pages)
- Hydraulic Appendices A-O (2,321 pages)
- Structural Appendix (Appendix X; 12 files; 14,590 pages)

Additional Documents Requested by Panel

Review 2

- Development of Depth-Emergency Cost and Infrastructure Damage Relationships for Selected South Louisiana Parishes, March 2012
- Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios in Support of the Lower Atchafalaya Reevaluation and Morganza to the Gulf, Louisiana Feasibility Studies
- Morganza to the Gulf Draft Revised Programmatic Environmental Impact Statement, January 2013

Reference Documents

- USACE guidance Civil Works Review, Change 1(EC 1165-2-209, Change 1) dated 31 January 2012 (Review 1 Only)
- USACE guidance Civil Works Review, (EC 1165-2-214) dated 15 December 2012 (Review 2 Only)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

About halfway through Review 1 of the Morganza to the Gulf PAC documents, a teleconference was held with USACE, the Panel, and Battelle so that USACE could answer any clarifying questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 15 panel member questions to USACE. USACE was able to provide responses to all of the questions during the teleconference. Additional information requested during the teleconference was provided by USACE within a few days.

3.4 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle for each review. At the end of Review 1, the Panel produced 300 individual comments in response to 68 charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle distilled the 300 comments into a preliminary list of 28 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table. At the end of Review 2, the Panel's comments were also consolidated and reviewed by Battelle.

3.5 IEPR Panel Teleconference

During Review 1, Battelle facilitated a 5-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance with the Panel.

The Panel also discussed responses to five specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were ultimately determined not to be conflicting. Each comment was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

At the end of the Review 1 discussion, the Panel had identified 21 comments and discussion points that should be brought forward as Final Panel Comments.

At the end of Review 2, the entire Panel reviewed the merged comments from Review 2. The economics expert and civil/construction engineer who both reviewed the revised Economics Appendix determined via e-mail that they were in agreement on all issues identified during the review. In addition, all panel members were in agreement regarding the changes to the original 21 Final Panel Comments identified in Review 1. Therefore, a teleconference to discuss their findings was not conducted.

One new comment was brought forward by the economics and civil/construction engineer panel members as a Final Panel Comment as a result of the review of the Economics Appendix.

3.6 Preparation of Final Panel Comments

Following the Review 1 teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Morganza to the Gulf PAC:

- Lead Responsibility: For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- Directive to the Lead: Each lead was encouraged to communicate directly with other panel members as needed, to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
  1. Comment Statement (succinct summary statement of concern)
  2. Basis for Comment (details regarding the concern)
  3. Significance (high, medium, low; see description below)
  4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
  1. High: Describes a fundamental problem with the project that could affect the recommendation, success, or justification of the project. Comments rated as high indicate that the Panel analyzed or assessed the methods, models, and/or analyses and determined that there is a “showstopper” issue.
  2. Medium: Affects the completeness of the report in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium indicate that the Panel does not have sufficient information to analyze or assess the methods, models, or analyses.
  3. Low: Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information (tables, figures, equations, discussions) that was mislabeled or incorrect or data or report sections that were not clearly described or presented.
- Guidance for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment

(e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

At the end of this process, 21 Final Panel Comments were prepared by the Panel and submitted to Battelle. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. These 21 Final Panel Comments were supplied to USACE via e-mail as "draft" comments on August 22, 2012. Based on discussions with the USACE PCX, these comments were not entered into DrChecks but were instead held in abeyance pending completion of Review 2.

During Review 2, the Panel was asked to re-examine the 21 draft Final Panel Comments against the revised documents. As a result, four (4) of the 21 original Final Panel Comments were eliminated because the Panel determined that they had been addressed by the revised documents. Of the remaining 17, 11 were revised based on the review of the revised documents, and 6 were unchanged. However, one new Final Panel Comment was prepared based on the review of the revised Economics Appendix. In the end, 18 Final Panel Comments for the Morganza to the Gulf PAC IEPR were entered into DrChecks. Of those, 13 were identified as having medium significance, and 5 had low significance. The 18 Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified from the LWRC Primary Panel and LWRC Candidate Pool, and from a search of Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), searches of websites of universities or other compiled expert sites, and referrals. Battelle prepared a list of candidate panel members (who were screened for availability, technical background, and COIs), and provided the list to USACE for feedback. Battelle selected the final panel members.

An overview of the credentials of the seven panel members and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 2. Morganza to the Gulf PAC IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Casavant	Loomis	Crouch	Ellis	Espey	Vita	Rose
Civil Works Planner							
Minimum 10 years of demonstrated experience in public works planning	x						
Direct experience working for or with USACE	x						
Very familiar with USACE plan formulation process, procedures, and standards	x						
Familiar with USACE hurricane and coastal storm damage risk reduction projects, as well as riverine flood risk management projects	x						
Minimum 5 years of experience directly dealing with the USACE six-step planning process as described in ER 1105-2-100	x						
Experience identifying and evaluating impacts to environmental resources from structural flood risk management and hurricane and coastal storm damage risk reduction projects	x						
Economics							
Minimum 10 years of experience directly related to water resource economic evaluation or review		x					
Direct experience working for or with USACE		x					
Familiar with the USACE planning process, guidance, and economic evaluation techniques		x					
Familiar with the USACE hurricane and coastal storm damage risk reduction analysis and economic benefit calculations, including use of standard USACE computer programs, including HEC-FDA		x					
Experience with the National Economic Development (NED) analysis procedures, particularly as they relate to hurricane and coastal storm damage risk reduction		x					
Minimum Master's Degree in economics		x					

Table 2. Morganza to the Gulf PAC IEPR Panel: Technical Criteria and Areas of Expertise (Cont'd)

Technical Criterion	Casavant	Loomis	Crouch	Ellis	Espey	Vita	Rose
Wetland Ecology/Biology							
Minimum 10 years of experience directly related to water resource environmental evaluation or review and National Environmental Policy Act (NEPA) compliance			x				
Extensive experience working with coastal and estuarine ecosystems			x				
Familiar with USACE calculation and application of environmental impacts and benefits			x				
Experience in the Gulf of Mexico region			x				
Minimum Master's Degree in related field			x				
Civil/Construction Engineer							
Minimum 10 years of experience in civil or construction engineering				x			
Demonstrated experience in performing cost engineering/construction management for all phases of flood risk management and hurricane and coastal storm damage risk reduction projects				x			
Familiar with and have demonstrated experience related to levee design and construction				x			
Experience related to pumping station design as well as water control structures, such as sluice gates, sector gates, tidal exchange structures, and locks				x			
Capable of addressing the USACE Safety Assurance Review (SAR) aspects of all projects				x			
Registered professional engineer				x			
Coastal Engineer							
Minimum of 10 years of experience in coastal and hydraulic engineering or a professor from academia with extensive background in coastal processes and hydraulic theory and practice					x		
Familiar with USACE application of risk and uncertainty analyses in hurricane and coastal storm damage risk reduction projects					x		
Familiar with standard USACE coastal hydrologic/ hydraulic computer models, including ADH and TABS, as well as familiarity with the ADCIRC storm surge simulation model					x		
Registered professional engineer					x		
Minimum Master's degree in engineering					x		

Table 2. Morganza to the Gulf PAC IEPR Panel: Technical Criteria and Areas of Expertise (Cont'd)

Technical Criterion	Casavant	Loomis	Crouch	Ellis	Espey	Vita	Rose
Geotechnical/Structural Engineer							
Minimum 10 years of experience in civil or construction engineering						x	
Familiar with geotechnical practices associated with flood risk management and hurricane and coastal storm damage risk reduction projects in southeastern Louisiana, including levees, T-wall structure, closure structures, sluice gates, sector gates, tidal exchange structures, locks, and pumping station design and construction						x	
Capable of addressing the USACE SAR aspects of all projects						x	
Registered professional engineer						x	
Fisheries Biology							
Minimum 10 years of experience directly related to water resource environmental evaluation or review and NEPA compliance							WA
Extensive experience working with coastal and estuarine fisheries							x
Familiar with USACE calculation and application of environmental impacts and benefits							WA
Experience in the Gulf of Mexico coastal region							x

WA – Waiver accepted.

Kenneth Casavant, Ph.D.

Role: This panel member was chosen primarily for his Civil Works planning experience and expertise.
Affiliation: Independent Contractor/Washington State University

Dr. Casavant is currently a professor and agricultural economist at the School of Economic Sciences at Washington State University, is Director of the Freight Policy Transportation Institute (FPTI), and has served as an adjunct professor at North Dakota State's Upper Great Plains Transportation Institute since 2002. He earned his Ph.D. in economics from Washington State University in 1971 and has 46 years of experience as an economist, with expertise in transportation economics and planning. He has served as an economic consultant detailing the tradeoffs necessary on several public works projects, most recently on studies of the deep draft national and international maritime industry. Dr. Casavant also has over 10 years of experience in plan formulation, evaluation and comparison of alternative plans for numerous ecosystem restoration projects, navigation studies, and feasibility studies, including his technical reviews of the Lower Columbia River Channel Deepening Project, the Upper Mississippi and Illinois Navigation Study, the Barataria Basin Barrier Shoreline Restoration Study, and the Mississippi River Gulf Outlet Ecosystem Restoration Plan. Many of these projects involved the assessment and sensitivity analyses of coastal storm damage and flood risk management. He is familiar with USACE standards, procedures, and the Institute for Water Resources-Planning Suite methodologies, with a focus on ecological output per dollar of relevant expenditure for alternative project formulations. He also has experience evaluating the usage and output of HEC-FDA models. Risk analysis and risk models are critical to many of his projects, including ecosystem restoration projects that included a methodological review of flood risk management. His dam construction and public works development and evaluation projects have included benefit/cost analysis where a major benefit has been flood risk reduction. His expertise on the needs and policy alternatives for agricultural and system transportation, ranging from development of intelligent transportation systems' applications to logistical designs for port physical distribution systems, and competitive impacts from investments in infrastructure and regulatory changes has been sought out by public and private organizations, state governments, railroad/truck/marine firms, and legal institutions. He is a member of numerous professional associations, including the Transportation Research Board - National Research Council, the International Agricultural Economics Association, and the Logistics and Physical Distribution Association.

John Loomis, Ph.D.

Role: This panel member was chosen primarily for his economics experience and expertise.
Affiliation: Independent Contractor/Colorado State University

Dr. Loomis is currently a professor of economics in the Department of Agricultural and Resource Economics at Colorado State University (CSU), and has been performing economic evaluations of water resources for over 20 years. He earned his Ph.D. in economics from CSU in 1983, has taught courses in economics at University of California-Davis and CSU for a total of 23 years, and has over 30 years of experience. Dr. Loomis has performed economic evaluations for numerous water resource projects such as hydroelectric relicensing, irrigation water and tradeoffs with instream flows and waterfowl, endangered fish recovery, and reservoir

management. Dr. Loomis has direct experience working with USACE, including conducting training courses in conjunction with USACE's Waterways Experimental Station. He has evaluated water resource management at several USACE reservoirs in California and Tennessee, participated in the Lower Snake River Feasibility Study on dam removal for the USACE Walla Walla District, and conducted studies on the value of salmon fisheries used in the agency environmental impact statement. Though his work with the USACE Waterways Experiment Station and other federal agencies, he is very familiar with the U.S. Water Resources Council Principles and Guidelines for conducting benefit-cost analysis for National Economic Development (NED) that USACE utilizes to conduct economic analyses. He was a panel member for the Surf City and North Topsail Beach IEPR, in which hurricane and coastal storm damage reduction was the main part of the NED analysis; this also involved reviewing HEC-FDA output. He is familiar with flood risk management analysis and benefit calculations on damage avoided and property values. Dr. Loomis's extensive work on EISs has provided him with a strong understanding of the USACE planning process. He is well versed in economic evaluation techniques, including discounting, present value calculations, and plan evaluation. He has experience with standard economic computer models based on multiple regression (e.g., Hedonic Property Models of damages to property from floods, hurricanes, and other natural and man-made effects) or spreadsheet analysis (e.g., Excel-based economic analysis models). He is familiar with flood damage avoidance analyses and USACE's HEC models and their use of 50-year and 100-year flood events probabilities, damages associated with them, and ways to reduce damages. Additionally, Dr. Loomis has authored three books that include chapters on economic evaluation techniques and has published numerous economic studies utilizing the Travel Cost Method and Contingent Valuation Methods for valuation of NED benefits from recreational fishing, hunting, and wildlife viewing.

Kay Crouch, M.S.

Role: This panel member was chosen primarily for her wetland ecology/biology experience and NEPA expertise.
Affiliation: Crouch Environmental Services, Inc.

Ms. Crouch is currently the president of Crouch Environmental Services, Inc., a company specializing in National Environmental Policy Act (NEPA) analysis, environmental site assessment, wetland permitting, and wetlands mitigation for projects with high public and interagency interests. She earned her M.S. in biology/ecology in 1978 from Steven F. Austin State University, and has received additional academic training in the NEPA process from the Duke University Nichols School of Environmental and Earth Sciences (2004 to 2006). Ms. Crouch has over 34 years of nationwide experience in conducting environmental site assessments and NEPA impact assessments for complex multi-objective public works projects with competing tradeoffs. She has performed numerous environmental evaluations throughout the coastal ecosystems of Louisiana and Texas in support of Federal Energy Regulatory Commission filings and NEPA documentation. In the mid-1990s, Crouch Environmental Services Inc. designed and constructed the Baytown Nature Center, Texas, a large coastal marsh creation project for which the company received the 1998 Award of Excellence from the National Association of Landscape Architects. For the first 10 years of her consulting career, Ms. Crouch worked predominantly in Louisiana performing NEPA analyses for oil and gas pipelines crossing the Louisiana Coastal Zone. Ms. Crouch is familiar with USACE calculations and application of

environmental impacts and benefits. She routinely performs cumulative effects analyses on high-visibility public works projects as part of her extensive NEPA practice. She has substantial experience working with USACE that includes environmental analyses and flood damage reduction projects. Specific NEPA projects she has worked on are the EIS for the Bayport Container Terminal and public involvement for the Sabine Neches Waterway and Clear Creek Flood Damage Reduction Project. Recently, Ms. Crouch planned, organized, and executed a public outreach plan for the Addicks and Barker Dam Safety Program (Houston, Texas). This effort was declared a "Best Practice" by USACE, for which Ms. Crouch and her staff received a written commendation from the Commander of the Galveston District. She has served as an environmental expert in previous IEPRs of USACE projects. Ms. Crouch is a member of the Society of Wetland Scientists and founder and president of fundmyresearch.org. She is the Vice-chair of HeartGift Houston (www.heartgift.com).

Ralph Ellis, Ph.D., P.E.

Role: This panel member was chosen primarily for his civil/construction engineering experience and expertise.
Affiliation: Independent Contractor/University of Florida

Dr. Ellis is an Associate Professor in the Department of Civil Engineering at the University of Florida (UF) specializing in the areas of engineering management, construction engineering, and the legal aspects of construction. He earned a Ph.D. in civil engineering from UF in 1989 and is a licensed professional engineer in Florida. Dr. Ellis has over 35 years of construction engineering and management experience and has worked on large-scale civil engineering projects both regionally and internationally. Prior to joining UF, he was president of the Hammer Corporation construction firm and Director of Projects for the FMI Hammer Joint Venture, where he was responsible for estimating and delivering all construction projects, including numerous projects for USACE, the U.S. Navy, and the Panama Canal Company. Many of these projects were located in South Florida and Central America and involved the construction of large-scale earthworks, some directly associated with flood control projects. He is familiar with all aspects required for the construction of pump station structures, which typically required setting up complex dewatering operations. Dr. Ellis is familiar with construction practices commonly required for Everglades Restoration projects in South Florida, as well as those utilized on Gulf Coast projects. Through his background and project experience, Dr. Ellis has an understanding of the USACE Safety Assurance Review (SAR) design and analysis processes with regard to civil structures such as those constructed for flood control purposes. He is familiar with incorporating environmental protection planning into project operations and has been teaching earthwork construction methods and environmental protection planning to engineering students for over 20 years. Dr. Ellis has authored over 55 construction-related research publications and has performed over 48 research projects focusing on construction management and construction technical issues. He has served as a construction cost engineering expert for previous IEPRs of USACE projects.

Bill Espey, Ph.D., P.E.

Role: This panel member was chosen primarily for his coastal engineering experience and expertise.
Affiliation: Espey Consultants, Inc.

Dr. Espey is the president of Espey Consultants, Inc. He earned his Ph.D. in civil engineering from the University of Texas at Austin in 1965. He is a registered professional engineer in Texas, Louisiana, New Mexico, and Oklahoma and has over 50 years of experience in hydrologic and hydraulic engineering. His teaching/research and consulting experience focus mainly on the fields of water resources and oceanography and includes expertise on flood frequency, urban hydrology, hydraulics, sedimentation, drainage, flood control, and coastal engineering.
Dr. Espey's experience includes numerous projects involving coastal and inland water systems and lakes, and the associated hydrologic modeling. Dr. Espey has experience with engineering analyses related to flood damage reduction in urbanized areas of the Gulf Coast, including his work on the Lowland Flooding and Sediment Transport Study for the Willacy and Hidalgo Drainage Districts, Texas; the Sienna Plantation Drainage/Flood Protection Improvements in Fort Bend County, Texas; the Armand Bayou Channel Improvements in Harris County, Texas; and Master Stormwater Drainage/Flood Control Plan/Studies for the cities of Rosenberg and Pasadena, Texas. Dr. Espey was elected as Chair of the Galveston Bay Basin and Bay Expert Science Team (BBEST) to develop flow regimes necessary for the maintenance of a sound ecological environment for the Trinity and San Jacinto River basins and the Galveston Bay ecosystem. His familiarity with USACE application of risk and uncertainty analyses in hurricane and coastal storm damage risk reduction projects includes his work on several IEPRs (including the Clear Creek Flood Control Project, the White Oak Bayou Flood Control Project, and the Lake Borgne Closure structure). Dr. Espey is familiar with standard USACE hydrologic and hydraulic computer models such as ADH, TABS, and ADCIRC, having used ADCIRC on the Texas Coastal Hurricane Surge Project. His familiarity with ADH and TABS includes serving on a Hurricane Katrina External Review Panel. Other models with which he is experienced include HEC-HMS, HEC-RAS, HEC-FDA, STWAVE, and WAM. He is a member of the American Society of Civil Engineers, the National Society of Professional Engineers, the Texas Society of Professional Engineers, and the American Council of Consulting Engineers.

Chuck Vita, Ph.D., P.E., G.E.

Role: This panel member was chosen primarily for his geotechnical and structural engineering experience and expertise.
Affiliation: Exponent, Inc.

Dr. Vita is currently a Senior Managing Engineer at Exponent, Inc. with 40 years of professional geotechnical engineering experience. He earned a Ph.D. in civil engineering from the University of Washington in 1985; is a registered Professional Engineer in Alaska, California, and Washington; and is a registered Geotechnical Engineer in California. Dr. Vita is familiar with geotechnical practices associated with levee, closure structure, and pumping station design and construction, specifically related to flood risk management/storm damage reduction related projects in southeastern Louisiana. Dr. Vita has provided independent expert reviews on the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS) Design Guidelines and provided detailed geotechnical review for the New Orleans East Levee

Improvement Program. After Hurricane Katrina, Dr. Vita provided geotechnical engineering support to the Federal Emergency Management Agency on levee stability issues in the greater New Orleans area. He was also a principal engineer on the project team developing and implementing California's 350-mile Urban Levee Geotechnical Evaluation Program and, as a principal author for the program-wide Guidance Document for Geotechnical Analyses, conducted numerous analyses and reviews for affected levees. Dr. Vita is familiar with construction industry practices used in flood control/coastal storm damage reduction along the Gulf of Mexico coast, including knowledge of the New Orleans HSDRRS. Dr. Vita has addressed SAR aspects of the ongoing HSDRRS Design Elevation Report. Dr. Vita is a technical leader in the analysis and evaluation of uncertainty, risk, and reliability of complex infrastructure systems. As part of California's Urban Levee Geotechnical Evaluation Program, he developed a probabilistic formulation of under-seepage analysis for risk and uncertainty considerations. He also initiated development of a geotechnical analysis of levee-system slope stability as part of risk and uncertainty considerations of length effects in levee system reliability. He investigated the use of statistical analysis to characterize the probability of undiscovered geologic and geotechnical details affecting levee stability. He also reviewed and commented on Draft Engineer Technical Letter 1110-2-570 Certification of Levee Systems for the National Flood Insurance Program with a focus on geotechnical risk and uncertainty considerations.

Ken Rose, Ph.D.

Role: This panel member was chosen primarily for his fisheries biology expertise.
Affiliation: Independent Contractor/Louisiana State University

Dr. Rose is a professor in the Oceanography and Coastal Science Department at Louisiana State University and was recently named the E.L. Abraham Distinguished Professor in Louisiana Environmental Studies. He earned his Ph.D. in fisheries from the University of Washington in 1985 and has 25 years of experience in fish biology, ecology, and population dynamics, including extensive experience researching estuarine and coastal fisheries. His research interests include developing and applying mathematical simulation models to better understand and forecast the effects of natural and anthropogenic factors on aquatic populations and communities, and using models in resource management and risk assessment. He has published over 75 papers on fish ecology and management, and he teaches the graduate-level course "Population Dynamics Modeling." In terms of his Gulf of Mexico experience, he has applied the Habitat Evaluation Procedure and Habitat Suitability Indices to coastal Louisiana planning, was a participant in a workshop on Developing Conceptual Ecological Models for Coastal Louisiana, served as a panel review member for proposals to the Coastal Impact Assistance Program in 2006, and was a member of the Technical Support Team of the Louisiana Coastal Area (LCA) Science and Technology Program in 2005. Dr. Rose was an external peer reviewer for model certification of USACE's EnviroFish model and the Standard Assessment Methodology (SAM) and SAM Electronic Calculation Template for the Sacramento River Bank Protection Project. He is a Fellow at the American Association for the Advancement of Science and currently serves as an editor for the Canadian Journal of Fisheries and Aquatic Sciences, San Francisco Estuary and Watershed Science, The Open Fish Journal, and Fisheries Research.

5. SUMMARY OF FINAL PANEL COMMENTS

The panel members agreed among one another on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012a and 2012b; p. D-4) in the Morganza to the Gulf project review documents. Table 3 lists the Final Panel Comments statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel's findings.

Environmental – While the Morganza to the Gulf project is enormous and complex, the National Environmental Policy Act (NEPA) requirements were only partially satisfied. The cumulative effects analysis does not thoroughly consider reasonably foreseeable future actions unrelated to the project. The Panel believes that minimal and (in some instances) imprecise data were used for the analyses, which resulted in a variety of uncertainties associated with the TABS modeling and wetlands data and resulting modeling assumptions. The Panel is concerned that the direct, indirect, and cumulative impacts on fisheries and other ecological resources (and resulting mitigation actions) may not be comprehensive given the limited data available. In addition, given the length of time since the decision documents were originally developed and the number of changes that have been made, these changes may not be accurately represented in the analyses (e.g., HET, TABS modeling) that support the EIS. The Panel was also concerned with the lack of detail on future multi-purpose lock operations of the Houma Navigation Canal (HNC) (including whether environmental restoration will be a future purpose) and on how the HNC might affect the ecosystem, especially salinity regimes.

Economics and Plan Formulation– The plan formulation process thoroughly followed and documented the six-step planning process and, in most cases, the economic analyses are appropriate and consistent with current practices. However, the Panel remains concerned about the sparseness of data for several of the analyses, which affects the Panel's ability to assess the adequacy and acceptability of the economic analyses. Overall, there appears to be a reliance on undocumented data sources, particularly for some critical elements of the damage calculations, for which the input data sources were not provided. The content-to-structure value ratio (CSVR) discussion does not include information on the representativeness of the samples used to develop the CSVRs. The sources and impacts of residual risk have not been thoroughly described, and a communication plan for at-risk populations has not been included. Finally, the report does not include data or other information on why rainfall-related flooding in the interior project area was considered a low risk.

Engineering – For a feasibility-level study, the engineering analyses used were generally acceptable given the size, complexity, and tight schedule of the project. However, the limited subsurface explorations that were completed have resulted in significant uncertainties about the geotechnical site conditions, which could affect cost and schedule. There was also a lack of documentation on model uncertainty, verification, and validation, especially for the hurricane surge analysis (ADCIRC). The Panel also believed that the full impacts and success of the project cannot be fully ascertained without a borrow availability assessment (BAA) and a mitigation plan for the construction-related degradation of the local road system.

Table 3. Overview of 18 Final Panel Comments Identified by the Morganza to the Gulf PAC IEPR Panel

No.	Final Panel Comments
	Significance – Medium
1	The effectiveness of the Morganza to the Gulf project design and construction is uncertain given the limited amount of site data.
2	A borrow availability assessment (BAA) has not been conducted; therefore, the likelihood of project success and the potential impacts (environmental, cost, schedule) of the project cannot be fully assessed.
3	Environmental effects of operations of the Houma Navigation Canal (HNC) lock and environmental gates are not fully documented.
4	There are uncertainties in the TABS modeling caused by limited data available for testing, unresolved model-to-data discrepancies, and a lack of relative sea level rise (RSLR) simulations.
5	The accuracy of wetland impacts and mitigation requirements is constrained by the lack of site-specific wetlands data and an over-reliance on generic modeling assumptions.
6	Risk and uncertainty information associated with the base, project, and Multiple Lines of Defense Strategy (MLODS) conditions in the various coastal models (e.g., ADCIRC, STWAVE) has not been included in the Post Authorization Change (PAC) document.
7	The Post Authorization Change (PAC) document may not accurately capture the risks and uncertainties associated with potential loss of life because of evacuation behavior assumptions.
8	The cumulative effects analysis does not thoroughly consider reasonably foreseeable future actions unrelated to the project.
9	The indirect effects analysis does not thoroughly consider the potential impacts of the constructible features on ecological resources.
10	Degradation of the road system from construction of the levees and an associated mitigation plan have not been considered in the project schedule and impact analysis.
11	The impacts on fishery resources are uncertain because qualitative baseline fish data and seasonally averaged salinity results were used.
12	Residual risk has not been thoroughly described, the associated communication plan for the affected population is not presented, and no adaptive management plan is included.
13	The description of the content-to-structure value ratios (CSVRs) is missing some important information on the representativeness and demographics of the sample of property owners selected and the specific locations and representativeness of the residential and commercial units used to develop the ratios.

Table 3. Overview of 18 Final Panel Comments Identified by the Morganza to the Gulf PAC IEPR Panel (Continued)

No.	Final Panel Comments
	Significance – Low
14	Rainfall-related damages to the interior project area have not been presented for each alternative and therefore cannot be evaluated.
15	The modeling documentation for the Post Authorization Change (PAC) document does not explain why the Dokka Real Time Kinematic (RTK) data are considered to be more accurate than the light detection and ranging (LIDAR) measurements prior to adjustment.
16	The accuracy of the estimated highway and street flood monetary damages is uncertain because the basis of the estimate has not been described.
17	The Post Authorization Change (PAC) document does not consider public access to, and recreational use of, the levees.
18	The Post Authorization Change (PAC) document does not discuss the desired final level of redundancy, resiliency, and robustness of the interfaces between structures, materials, or members.

Public Comment Review

The Panel reviewed the technical comments provided by various agencies, stakeholders, and members of the public. Comments expressing general support or opposition and comments related to policy compliance were not reviewed by the Panel. These public comments are outside the directed focus of the Panel's charge, and therefore were not noted by the Panel.

The Panel identified several public concerns that deserve further investigation and documentation in the Morganza to the Gulf project documents. These public concerns are described in Appendix B, Final Panel Comment on the Morganza to the Gulf Public Comments. However, the Panel recommends that the public comments should be directly examined regarding the details of each concern. Topics include, but are not limited to, changes in Federal insurance, borrow costs, buy-out plans, and identified benefits. Additional concerns noted by the public parallel some of the Panel's concerns addressed in its Final Panel Comments (see Appendix A); the Panel did not repeat these concerns in Appendix B.

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APPENDIX A

Final Panel Comments

on the

Morganza to the Gulf PAC

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Final Panel Comment 1

The effectiveness of the Morganza to the Gulf project design and construction is uncertain given the limited amount of site data.

Basis for Comment

The geotechnical conditions associated with the very weak, highly compressible, and variable soils along the project alignment will have a major impact on the cost and schedule of the project design and construction. The Panel is concerned that, given the soil conditions, the geotechnical uncertainty created by the limited data (Post Authorization Change [PAC] Report, p. 98; Draft Engineering Appendix [DEA], pp. 238, 239) is under-represented in the cost contingencies and risk evaluations. A significant but as yet unquantified portion of the project will have conditions more problematic than assumed or expected, which could increase costs and schedules, and potentially make the project more costly than currently envisioned.

The limited geotechnical data create uncertainty partly because only one-third of the subsurface explorations required for project construction have been completed (PAC, p. 98; DEA, p. 239), and many of the structures lack site-specific data. According to the DEA (pp. 238, 239), final analysis and design will require an additional 400 deep borings, 400 borrow borings, and 600 cone penetrometers. Therefore, using only the currently available data restricts the accuracy of the project estimates, including cost and schedule risks.

In addition to geotechnical uncertainty, the Panel did not find a thorough and clear explanation in the PAC or supporting documents of how the geotechnical analysis and design properties (e.g., strength lines, consolidation parameters) and geometries (geotechnical analysis reaches and soil profiles) were determined and justified from the limited available field and laboratory data. The Panel recognizes that the available field and laboratory data have to be analyzed, interpreted, and considered for variability, then extrapolated beyond boring and sample testing locations to the project alignment, including structures. However, neither the PAC nor DEA contained illustrative or explanatory figures of soil profiles and cross-sections of relevant soil conditions used in the analyses and affecting the project. Assumed conditions were not clearly defined or quantified, and there was no suitable plan (e.g., based on a geotechnical observational-method adaptive management approach) to address the situation if actual conditions were more adverse than assumed or expected. Therefore, the Panel could not evaluate the degree of conservatism or potential risks associated with assumed conditions.

The Panel believes that the currently assumed geotechnical conditions are subject to significant change and variation during project design and construction. Geotechnical conditions more adverse than currently assumed could mean that project construction cost and schedule risks have been underestimated, given that:

- Geotechnical behavior of both levees and structures could be governed by geologic details that are difficult to detect or not currently included in the analyses (e.g., thin or adversely oriented, very weak soil layers or zones).

- Borrow sources and available volumes are not well-defined.
- Levee protection heights are substantially higher than typical hurricane protection levees in southeast Louisiana (DEA, p. 240).
- Construction of multi-lift levees and structures will be complex and challenging in terms of (a) borrow suitability and availability, and (b) embankment stability and settlement, particularly in areas of marsh sediments and open water (PAC, p.56).
- Foundation settlement predictions were based on limited consolidation data and were not intended to be precise or conservative. In addition, the predictions did not include canals or channels, which are expected to experience higher-than-average settlement due to the greater heights of fill and the soft canal bottoms (DEA, p. 245).
- The many canal and channel crossings were not specifically addressed in the current design, where it was assumed that the cost to cross bodies of water will not change the overall cost of each reach (DEA, p. 240).

The Panel believes there is significant potential for adverse geotechnical conditions, including settlements, and greater required borrow volumes than expected, which could increase risk and uncertainty in the cost and schedule estimates. Overall, the Panel could not determine whether the project cost contingencies and risks are appropriate given the geotechnical uncertainties.

Significance – Medium

The current level of geotechnical uncertainty due to limited data could cause the project cost, including contingencies and risks, to be significantly underestimated.

Recommendations for Resolution

1. Add discussion in the PAC clearly stating why USACE believes the risk and cost contingency associated with the current level of geotechnical information is considered acceptable for the purpose of the PAC. The following recommendations should be included in the PAC or, if not included in the PAC, identified in the PAC as being part of future project preconstruction engineering and design.

2. Conduct additional geotechnical exploration and testing, as identified in the PAC.

3. Add documentation and explanation of geotechnical characterization for analysis and design for the levee reaches and individual structures. The geotechnical characterization should describe the principles, hypotheses, and assumptions used to interpret the site- or reach-specific geotechnical field and laboratory data to develop the geotechnical properties used for analysis and design, reach by reach, and structure by structure. For example, the 5,143 pages of soil index and engineering test data results reported in the supplemental documents file ('14_soil_lab_testing_ results_optimized.pdf') should be first clearly summarized, analyzed, interpreted, and discussed to define levee reaches and formulate their analysis and design properties before being directly input to the geotechnical analyses, as presented in the supplemental document file

'annex_2_soils_reduced.pdf.'

4. Clearly define assumed or expected conditions and their basis.
5. Develop a comprehensive plan to monitor field conditions and address conditions more adverse than assumed or expected (e.g., using geotechnical engineering observational methods (Peck, 1969), a particular form of adaptive management).
6. Add illustrative or explanatory figures of soil profiles and cross-sections of relevant soil conditions used in analyses or otherwise affecting the project. Include appropriately generalized figures to help reader understanding.
7. Implement technically appropriate and representative full-scale test sections for levee construction where side-borrow material is excavated and dried to see how long drying would take and prove out the construction methodology.
8. Conduct further exploration and characterization of borrow sources to reduce uncertainty associated with borrow quality and quantity.

Literature Cited

Peck, R.B. (1969). Advantages and limitations of the observational method in applied soil mechanics, Geotechnique, 19(1): 171–187.

Final Panel Comment 2

A borrow availability assessment (BAA) has not been conducted; therefore, the likelihood of project success and the potential impacts (environmental, cost, schedule) of the project cannot be fully assessed.

Basis for Comment

Borrow material is the critical material component of the project. Earthen levees are to be constructed with approximately 100 million cubic yards of haul-in borrow material. Sources for borrow materials have been assumed to be available within 30 miles of the project site. However, a comprehensive BAA, including a geotechnical analysis of the borrow sites to confirm material suitability, was not performed. Without this information, the project design cannot be completed. The transport of borrow materials from greater-than-assumed distances would significantly impact project cost and schedule. Additionally, specific locations and borrow pit configurations are needed to determine the environmental impact of mining borrow materials. The availability of sufficient borrow materials is a firm requirement for project implementation. Borrow availability and locations should be confirmed during design.

Significance – Medium

The availability and location of suitable borrow materials is needed to complete the project design and construction planning.

Recommendations for Resolution

1. Develop, in the design phase, a comprehensive BAA including geotechnical testing at borrow sites to confirm material suitability. Consider possible demands of other concurrent projects in the development of the BAA.

2. Given the selected borrow locations, analyze possible environmental, cost, and schedule impacts of the required mining and transport operations.

Final Panel Comment 3

Environmental effects of operations of the Houma Navigation Canal (HNC) lock and environmental gates are not fully documented.

Basis for Comment

HNC lock operations, along with other system elements, are generally described in the Post Authorization Change (PAC) document, the revised PAC document, and the original Programmatic Environmental Impact Statement (PEIS). Additional details on lock and environmental gate operations were included in the revised PAC. However, a complete analysis of potential environmental effects was not fully described in the revised PAC or other review documents. The Panel notes that the revised PEIS may include this additional information. However, the revised PEIS was not included in the documents supplied for review, and limited time was available to review the revised documents; therefore, its contents were not taken into consideration.

Section 10.1.7 of the revised PAC document restates that the environmental effects of HNC lock operation are primarily discussed in the Louisiana Coastal Area (LCA) report and further states the following (p. 99):

> "For the multipurpose operation to occur, the LCA project would need an [Operations and Maintenance Repair Replacement & Requirements] plan that considers operation of the lock beyond the current authorization of the Morganza to the Gulf project. A detailed multipurpose OMRR&R plan including these environmental purposes has not yet been developed."

At this time, the Panel is not sure whether there is a multipurpose plan for the operation of the HNC lock.

Placement and operations of the environmental gates requires re-examination and further discussion. The rationale for their locations is not clear, and the TABS modeling showed that their planned locations and operation would have little effect on seasonally averaged salinity. This suggests that the gates, as planned, may not have maximum effect.

The HNC Lock Complex would be operated as part of the Morganza to the Gulf project for flood damage reduction and for preventing salt water intrusion, but it has also been put forward as part of Louisiana's planned coastal restoration. The PEIS states (p. 3-13):

> "A supplemental [National Environmental Policy Act] document would be needed under the LCA program once a detailed operation plan is developed."

The Panel is concerned about the lack of clarity of future multipurpose lock operations and is also concerned that leaving substantive coordination as a future activity may have unanticipated impacts relating to predicted salinity regimes. Coastal ecosystem

restoration endeavors intended to replace lost estuarine and freshwater habitat may be adversely affected or delayed.

Significance – Medium

Documentation of the HNC lock operations, along with other elements of the full system, is not thorough enough to fully assess the effects of the lock operations on natural resources.

Recommendations for Resolution

1. Discuss operations of the entire HNC lock system more fully.
2. Clarify whether there is still a “multipurpose” for HNC lock system operations.
3. Describe in the PEIS the monitoring and adaptive management plan, if any, that will be used to make adjustments in future lock and full system operations.
4. Analyze, predict, and describe the potential effects of lock and system operations on ecological resources within the levee system under a variety of anticipated conditions.
5. Discuss required future analyses and required coordination in more detail.

Final Panel Comment 4

There are uncertainties in the TABS modeling caused by limited data available for testing, unresolved model-to-data discrepancies, and a lack of relative sea level rise (RSLR) simulations.

Basis for Comment

The TABS modeling is a scientifically sound approach for assessing project impacts on hydrodynamics and salinity. In the Programmatic Environmental Impact Statement (PEIS), much of the subsequent determination of direct impacts on wetlands and fish is based on predicted changes in seasonally averaged salinity values under the without- and with- project conditions. The basic logic was that because hydrodynamics and seasonally averaged salinity values were similar under without- and with-project conditions, the direct impacts would be small. Thus, the analysis of direct impacts depends heavily on the accuracy, robustness, and proper interpretation of the TABS modeling.

Uncertainties in the TABS modeling arise from (1) the use of only 1 year of data for testing, (2) several model-to-data discrepancies in the skill assessment, and (3) a lack of simulations under RSLR:

1. The TABS modeling uses only 1 year of data for model testing (2004). This leads to uncertainty because there is no comparison of general and representative 2004 conditions relative to weather patterns and hydrology of other years.
2. In many cases, the model-to-data comparisons for 2004 results show reasonably good agreement, but some of the model-to-data comparisons involving variability in salinity and discharge show major discrepancies. These discrepancies suggest some lack of fit in the TABS model (Appendix L, Validation of the Morganza to the Gulf of Mexico TABS-MDS
   Numerical Model). This is especially apparent in the comparisons of discharge, which are presented in Appendix M to capture any impacts on water circulation. Some examples (in Appendix L) of poor model-to-data fits include Figure 48 for water elevation, Figure 61 for discharge, and Figure 77 for salinity. Some differences are expected given the complexity of the system being modeled (i.e., perfect fit is not achievable), but the lack of model-to-data agreement should be considered more in the interpretation of project impacts.
3. Further uncertainty arises because the TABS modeling does not include any RSLR scenarios. There appear to be plans to perform RSLR simulations (Post Authorization Change [PAC] document, p. 181), but no results were available for the Panel. Inclusion of RSLR in the TABS modeling is important because it can result in larger predicted changes in hydrodynamics and salinity than predicted under the 2004 conditions.

The uncertainties with the TABS modeling are not conveyed in the PEIS and the PAC and can lead to underestimation of project impacts on hydrodynamics and salinity. Changes to hydrodynamics and salinity predictions could affect the subsequent assessment of project alternative impacts on wetlands and fisheries that are based on

the TABS modeling. This is a particular concern for the constructible elements for which no further National Environmental Policy Act (NEPA) documentation will be required.

Significance – Medium

Because uncertainties with the TABS modeling are not presented in the documentation, project impacts on hydrodynamics and salinity, as well as subsequent impacts on wetlands and fisheries, cannot be fully determined.

Recommendations for Resolution

1. Present the generality of hydrological conditions during 2004 relative to other years in the discussion.

2. Undertake additional TABS model validation using additional periods of record (representing a range of environmental conditions and including RSLR scenarios) and report it in the documents.

3. Include uncertainty measures with model results and better communication of that uncertainty in the PEIS and PAC.

Final Panel Comment 5

The accuracy of wetland impacts and mitigation requirements is constrained by the lack of site-specific wetlands data and an over-reliance on generic modeling assumptions.

Basis for Comment

The Tentatively Selected Plan (TSP) affects approximately 30 miles of wetlands. The Wetland Value Assessment (WVA) was used to quantify direct impacts of the TSP on wetlands.

While the WVA is a well-used and acceptable method, the credibility of a specific analysis depends on the quality of the input parameter values in the implementation. Wetlands data used in the Morganza to the Gulf planning process, including modeling efforts, relies on National Wetlands Inventory (NWI) maps to determine locations and sizes of wetlands. The NWI maps are known to be inaccurate (Forgette and Shuey, 1997; Graves, 1991; Hinson et al., 1994; Nichols, 1994; USACE, 1987; Zygo, 1999). To improve their accuracy, NWI maps require field verification, and initial NWI map creation efforts typically left this step out of map production.

Some impact analyses use the specific acres of impacted areas (based on rights-of-way of the levees), with almost all other model inputs set to non-site-specific values. The six variables in the Habitat Suitability Index (HSI) rarely vary from location to location (polygon to polygon), with impacts largely dependent on the assumed areal footprint (zone of influence) of the levees. When the HSI variables do vary, they are based on "best professional judgment," with the caveat that the tight schedule did not allow for collection of field data (U.S. Fish and Wildlife Service [USFWS] Coordination Report, p. 13).

The TABS modeling is used to determine that changes in salinity would have small impacts on wetlands. Determining the magnitude of wetland direct impacts is not fully supported by the use of the TABS modeling because of modeling limitations, and because other direct impacts related to water level fluctuations, hydroperiod, pooling, and finer-scale variability in salinity are not quantified.

The documentation does not make clear to what extent these uncertainties were mitigated by adding a buffer to wetland loss calculations.

Possible indirect and cumulative effects on wetlands may have been underestimated. Indirect effects are concluded to be small based on the qualitative examination of hydrodynamic modeling results. Cumulative effects are qualitatively evaluated by considering them with other projects and restoration efforts and stating that the net effects of all activities would be beneficial to the wetlands in the area.

Significance – Medium

The use of NWI information, the lack of site-specific information, and the assessment's over-reliance on generic modeling assumptions may have resulted in an underestimation of wetland impacts, mitigation requirements, and costs. This is of

particular importance to the constructible elements.

Recommendations for Resolution

1. Field-verify the NWI information that serves as the basis for determining wetlands affected by the TSP.
2. Adjust mitigation requirements based on wetland field observations and analysis of other potential effects (salinity).
3. Adjust the cost analysis based on wetland field observations, mitigation requirements, and additional analyses.
4. Broaden the scope of the effects analysis (direct, indirect, and cumulative) beyond the project footprint and seasonally averaged salinities.

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Forgette, T.A., and J.A. Shuey (1997). A Comparison of Wetland Mapping Using SPOT Satellite Imagery and National Wetland Inventory Data for a Watershed in North Michigan. Northern Forested Wetlands; Ecology and Management. pp. 61-70.

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Zygo, Lisa M. (1999). “Wetland Distribution in the Big Thicket National Preserve.” Thesis. Baylor University Libraries. Waco, Texas. August.

Final Panel Comment 6

Risk and uncertainty information associated with the base, project, and Multiple Lines of Defense Strategy (MLODS) conditions in the various coastal models (e.g., ADCIRC, STWAVE) has not been included in the Post Authorization Change (PAC) document.

Basis for Comment

Because ADCIRC and STWAVE modeling are used to predict base and future project design water surface conditions, the quantification of the associated risk and uncertainty is fundamental to the evaluation of various project alternatives. Adequate evaluation of the uncertainty is essential to the interpretation of the modeling results with respect to projected changes because of environmental conditions and project alternatives. Validation of the ADCIRC and STWAVE modeling is essential to the quantification of the uncertainty and the associated risks of the models predictions presented in the PAC, Appendix A (pp. 22-26). This can be accomplished through the review of additional hurricanes, including Katrina, Ike, and Gustav, for model validation.

Significance – Medium

The report's understanding, completeness, and technical quality are affected because some models have not been validated.

Recommendations for Resolution

1. Provide additional validation of the ADCIRC and STWAVE results with respect to field measurements of other selected hurricanes in the project area.

2. Compare base conditions (1%) surge elevations with published Federal Emergency Management Agency (FEMA) Digital Flood Insurance Rate Maps map results for the project area.

Final Panel Comment 7

The Post Authorization Change (PAC) document may not accurately capture the risks and uncertainties associated with potential loss of life because of evacuation behavior assumptions.

Basis for Comment

Given the U.S. Army Corps of Engineers (USACE) statement that the Tentatively Selected Plan (TSP) would keep the area dry and without structural damage in all but extreme events, the assertion that the evacuation order compliance rate would be unchanged from that of pre-project flooding events is undocumented. The Panel believes it is possible that there may be lower evacuation compliance, and hence greater risk to life with the project, than has been calculated.

Page 101 of the revised PAC document states that the effectiveness of the evacuation response is not expected to change whether the project is implemented or not and that the current evacuation compliance is 80-95%. No data or justification are provided for why current compliance rates would be the same with the project in place. It is not clear if this expectation is based on evidence from other similar projects or if there is some other basis for this assumption.

Page 102 of the revised PAC document indicates that if the project is in place, the system of levees and floodgates would keep the structures within the levee system from being damaged by storm surge. Yet in the next sentence on the same page, the PAC document states that, with extremely rare events (500-year flood or 0.2%), the area would still flood.

If the public is told that there will be no flood damages with the project (with the exception of extremely rare events, the determination of which is difficult to make at evacuation time), the Panel questions whether people would continue to evacuate at the same rate as they have in the past. The Panel believes that if the project is built, a lower percentage of people may evacuate than have historically evacuated pre-project, when flooding was common. If evacuation compliance is lower under the project, the potential loss of life may be higher than is currently described in the PAC document.

Significance – Medium

Without justification for or documentation of why the evacuation compliance rate would remain the same, there is uncertainty regarding the project's goal of preventing loss of life.

Recommendations for Resolution

1. Provide documentation and empirical justification for the assertion that the evacuation compliance percentage with the project would be the same as is currently the case without the project.

2. If the statement cannot be empirically justified, acknowledge in the PAC document that it is uncertain whether the evacuation compliance rate will be the same, and that

it is possible that the percentage of the population evacuating could be lower than is currently the case. Hence, it is possible that loss of life would not drop as much as would be expected with the project.

Final Panel Comment 8

The cumulative effects analysis does not thoroughly consider reasonably foreseeable future actions unrelated to the project.

Basis for Comment

Cumulative effects are defined by Code of Federal Regulations Title 40 Part 1508.7 as:

> "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions."

Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.[1]

The primary purpose of the cumulative effects analysis in the National Environmental Policy Act (NEPA) process is to ensure that federal decisions consider the full range of consequences – not only the project proposal, but also all connected and similar actions that could contribute to cumulative effects. The Panel has the following specific comments relating to the cumulative effects analysis:

- Additional economic growth is projected as a potential positive consequence of Tentatively Selected Plan (TSP) implementation. Potential impacts associated with additional population and economic sector growth within the levee protection zone are mentioned (PAC, p. 94), but not thoroughly discussed. Additional pressure on highway systems, sewer and water capacity, and potentially greater flood damage losses and greater risks to human life as a result of expected growth are examples of cumulative socioeconomic effects that have not been thoroughly discussed.
- The analysis and description of cumulative effects does not adequately address the effects of other large projects planned in the region when combined with the potential effects of the TSP. Other large projects may compete for borrow materials or mitigation sites, and competing needs may affect assumptions used in models (e.g., TABS analysis) deployed in evaluating the TSP. Other large projects may have synergistic beneficial effects when combined with the TSP or may have negative effects on the TSP. An example of a negative effect would be competing for labor and equipment (e.g., BP Gulf oil spill restoration efforts).
- A particular concern is the constructible elements and their coordination with planned coastal restoration actions in the project area described in the Louisiana 2012 Coastal Master Plan. In the absence of clearly articulated integrated protection and restoration planning for the major constructible elements that purport to serve both purposes, project impacts may not be minimized and restoration options may be lost or hindered.
- Cumulative effects of unrelated private actions, including actions that may adversely affect the TSP, are not described. These may include, but are not

limited to, private development (residential, commercial, and industrial) and oil, gas, and other energy activities. For example, activities requiring the creation of new canals within surrounding wetlands (including the planned mitigation sites) may have adverse effects on the project.

Cumulative effects described for wetlands losses and fish and aquatic resources are not specific, with focus placed on wetlands mitigation and small predicted changes in seasonally averaged salinity based on the TABS modeling. A more thorough cumulative effects analysis for these resources would strengthen the Programmatic Environmental Impact Statement (PEIS), considering all reasonable unrelated foreseeable future scenarios (including climate change).

Significance – Medium

The discussion of cumulative effects in the PEIS does not provide the detail required to comply with NEPA requirements.

Recommendations for Resolution

1. Include in the PEIS a comprehensive inventory of reasonably foreseeable future actions (based on known future projects, planned and proposed projects, and past/predicted development patterns) that may be undertaken in the project area.

2. Fully describe in the PEIS reasonably foreseeable future activities that are anticipated to occur in the project area (e.g., other federal projects, development, infrastructure expansion, BP Gulf restoration efforts, oil and gas exploration and production, pipeline system expansion and maintenance, and other similar activities). Forecast the cumulative effects, both adverse and positive, that the TSP may have on those activities as well as the potential effects that those activities may have on the federal investment in the TSP (both levee construction and mitigation). In particular, give greater attention to both positive and negative socioeconomic and ecological effects, including potential effects of climate change.

3. Fully describe related flood damage reduction and restoration/mitigation projects anticipated to be performed under other authorities. Their adverse and positive effects should be described in combination with those anticipated for the TSP.

4. Describe any anticipated measures to mitigate adverse cumulative effects, including those that may be adverse to the federal project

[1] The terms “impacts” and “effects” are used interchangeably in NEPA practice.

Final Panel Comment 9

The indirect effects analysis does not thoroughly consider the potential impacts of the constructible features on ecological resources.

Basis for Comment

Potential indirect effects of the project on wetlands, fisheries, and listed species are properly identified and defined, but analyses and discussion of the indirect effects are too limited.

Wetlands impacts depend on the accuracy of the Wetland Value Assessment (WVA), and fisheries impacts rest on the accuracy, robustness, and proper interpretation of the TABS salinity modeling. Because the hydrodynamics (e.g., water elevations) and seasonally averaged salinity values were determined to be similar in the without- and with-project conditions, the indirect impacts were deemed to be small. The evaluation of indirect effects thus rests on the TABS-simulated differences in hydrodynamics and seasonally averaged salinities for 2004. In addition to relying on limited use of TABS modeling, the analyses of indirect effects are also limited by the absence of site-specific data.

While seasonal salinity is important, the health of wetlands and impacts on fish and fish habitat also depend on the degree and frequency of flooding (hydroperiod), fluctuations in water depth and salinity, and sufficient water exchange patterns. Indirect effects cannot be determined to be small based on qualitative examination of hydrodynamics and simply on the similarity of seasonal averages in salinity. The TABS modeling (Appendix M) presented time series comparisons of salinity (not averaged), water elevations, and water discharge as measures of water circulation changes. These results are not used or are not discussed in enough detail in the assessments of direct and indirect effects.

The potential for indirect effects on threatened and endangered species is also incomplete. The Biological Assessment (BA) is qualitative, relying on information that needs to be updated in some cases, and providing little supporting information. For example, a 1995 paper is cited as the basis of opinion that sea turtles would not be found in the project area. More recent information on sea turtle populations and distributions should be considered. The BA states that the eastern brown pelican is found in the project area, but then Appendix A states without explanation that no adverse impacts are expected. There are similar unresolved issues with the discussion of bald eagles.

More detailed and more recent information is needed to increase confidence in the BA results. Supplemental National Environmental Policy Act (NEPA) and Endangered Species Act documentation, and further coordination with the U.S. Fish and Wildlife Service (USFWS), will be needed as plans become refined and more detailed. These issues can be dealt with as the project proceeds, but to conclude there will be no impacts (including indirect effects) on threatened and endangered species is premature.

Significance – Medium

The Panel has insufficient information to evaluate the determination that the project will have small indirect impacts on approximately 30 miles of wetlands and related ecological resources.

Recommendations for Resolution

1. Expand the interpretation of the TABS results beyond seasonally averaged salinities to include finer-scale (less than seasonal) variation in salinity, and more quantitative evaluation of model predictions of water elevations and water discharge.

2. Strengthen the wetlands loss analysis using more site-specific parameter values in the WVA and further consider indirect effects arising from water level fluctuations and other hydroperiod-related changes.

3. Increase the rigor of the indirect effects analysis on fish by using more quantitative habitat and density information. These data should be considered in the context of life stage and individual species sensitivity to changes in salinity, water levels, and access.

4. Update information on listed species and consider presenting it in a format that clearly gives the available information along with the assessment of potential direct and indirect effects on each species.

Final Panel Comment 10

Degradation of the road system from construction of the levees and an associated mitigation plan have not been considered in the project schedule and impact analysis.

Basis for Comment

This project will require the transport of roughly 100 million cubic yards of borrow material. This material will be transported by commercial dump trucks. Given the typical capacity of a truck at 20 tons, a large number of truck trips will be required during each of the levee lift construction phases. The specific haul routes are not known; however, it appears likely that much of the transport will occur on local roads, which because of their structural design are the least able to resist the effects of heavy truck loading.

The expected moderate to severe degradation to the local road system is acknowledged in the Programmatic Environmental Impact Statement (PEIS). However, the impacts of road system degradation on the project implementation have not been considered. As a consequence of the heavy truck traffic, local haul routes will require reconstruction earlier and more frequently than currently planned. It should be noted that the damage to the road system would include the roadway, culverts, bridges, and other crossings.

Roadway reconstruction may be necessary during active levee construction operations. Haul routes may have to be temporarily closed to accommodate roadway maintenance and/or reconstruction, which would impact levee construction operations.

Significance – Medium

The success of the project is dependent upon the capacity of the local road system to support the required transport of borrow materials.

Recommendations for Resolution

1. Develop, in the design phase, a comprehensive project plan for the optimum transport of borrow materials. Include an analysis of the possible impacts: road system degradation, congestion (level of service reductions), and traffic safety.

2. Prior to construction operations, coordinate the planned project schedule, including haul routes and expected truck-trip volumes, with local roadway authorities with regard to traffic operations, expected route maintenance, and reconstruction activities.

3. Consider the development of alternative strategies, in the design phase, to reduce the transport burden on the local road system. The following are offered as examples of options that may be considered:
   - Using temporary haul routes within the levee right-of-way
   - Reducing wheel loads by restricting on-road haul trucks to five-axle configurations
   - Selectively using other material transportation methods, as practicable

Final Panel Comment 11

The impacts on fishery resources are uncertain because qualitative baseline fish data and seasonally averaged salinity results were used.

Basis for Comment

The potential direct and indirect effects of the project on fish and fish habitat are identified, but specific analyses required to quantify impacts are incomplete. Impact assessment is limited to TABS predictions of seasonally averaged salinity values and a qualitative description of fish species in the area and their habitat requirements. The qualitative nature of these determinations leads to high uncertainty about the magnitude of the potential direct and indirect impacts on fish and fish habitat.

TABS modeling presents time series results of salinity, water elevations, and water discharge. However, only the seasonally averaged salinity results are used to assess fish impacts. Other potential impacts, such as organism exchange and hydroperiod, are identified in the Programmatic Environmental Impact Statement (PEIS), and potential effects on access are noted (PEIS, Table 6-3), but the TABS results (or any other analyses) related to these direct and indirect effects are not discussed in any detail in the PEIS.

The fish analyses consist primarily of species lists (with some information on relative abundance) and salinity ranges of the species. The descriptions of the benthos and plankton are generic.

The fish species checklist for the affected area is reasonable, but using a species list to determine potential effects lacks sufficient rigor. The PEIS refers to the Louisiana Coastal Area (LCA) Ecosystem Restoration Study as the source of the fish information. Insufficient information is included in the PEIS to support the conclusion that there would be no direct or indirect impacts based on small changes in seasonally averaged salinities under the 2004 conditions. This is of particular importance for the constructible elements, which do not require further impact analyses.

The description of fish-related habitat and essential fish habitat (EFH) in the affected area is appropriately taken from other agencies and sources. However, the analysis lacks a connection relating the EFH information to the specifics of the project area. For example, there is no assessment or discussion of how much of the project area falls under the categories of EFH. While what is presented is accurate, it is insufficient to support the conclusion that there would be small direct and indirect impacts on fish habitat and EFH. Analyses of water level fluctuations, altered access, and other hydroperiod-related impacts to fish and their habitat are not thorough.

Information is progressively summarized in the documents (appendices to the PEIS and Post Authorization Change [PAC]), but the uncertainties are not sufficiently communicated. The summary does not note the limitations of the analyses. The main report draws conclusions from the analyses without clearly stating that some of the conclusions are based on professional judgment because of limited information. The report is unclear that the analyses performed include intrinsic uncertainties due to time

constraints and that conclusions are, in some cases, based on general, qualitative information and judgment.

Significance – Medium

Due to the report's reliance on qualitative fish data and limited salinity analyses, the Panel is unable to confirm that the direct and indirect effects on fish and fish habitats would be small, especially with regard to the constructible elements that would not require further National Environmental Policy Act (NEPA) documentation.

Recommendations for Resolution

1. Expand the determination of direct and indirect effects on fish and fish habitat, including EFH, beyond seasonally averaged salinities, particularly for the constructible elements.

2. Use the Louisiana Department of Wildlife and Fisheries data more extensively and include more details in the PEIS.

3. Thoroughly discuss and summarize uncertainties and limitations of the analyses.

4. Re-evaluate the potential effects on fisheries resources based on a more thorough examination and discussion of the TABS modeling for constructible elements.

5. Expand and update literature citations for the fish, benthos, and plankton.

Final Panel Comment 12

Residual risk has not been thoroughly described, the associated communication plan for the affected population is not presented, and no adaptive management plan is included.

Basis for Comment

Residual risk takes many forms, ranging from the remaining risk to inhabitants within the project area if they occupy riskier (low-lying) areas and expect that the project will protect them from all hurricane damage, to the need for adaptive management as the project implementation proceeds in unknown directions.

Residual risk is briefly described in the Post Authorization Change (PAC) document; however, not much detail is provided, except regarding the expected number of people who will not evacuate (p. 94). Page 95 describes the residual risk of the Tentatively Selected Plan (TSP) design of the 1% annual exceedance probability (AEP) of a one-in-500-year event (or 0.2% chance of occurrence) versus the 3% AEP. The cost risk is briefly described on pp. 96-97, and there is a separate "Cost and Schedule Risk Analysis Report." A more complete and broader analysis of residual risk is needed.

The project work has a high probability of achieving the desired results, but there must be a dynamic implementation process, one that changes with new information, new hurricanes, or new institutional relationships. An adaptive management plan would help minimize the impact of residual risk-causing changes.

Wetland mitigation requirements may also change during detailed design. In general, it is not possible to assess direct, indirect, and cumulative effects with the preliminary information provided. This comment pertains to all resources that may be affected. Additional National Environmental Policy Act (NEPA) documentation will be required to handle such risk.

An adequate plan for communicating residual risk to those in danger and to future planners is not presented. There is some very general discussion on what has been done, but the Panel found no specific plan in the review documents

Significance – Medium

The completeness of the PAC and supportive documents would be improved if information on residual risk, a risk communication plan, and an adaptive management plan for updating the residual risk were provided.

Recommendations for Resolution

1. Incorporate a fuller discussion of residual risk-its sources, its impacts, and how to adapt to it-in the documents.

2. Develop and describe in the project documents a specific communication plan to increase awareness of individuals in areas of risk.

3. Develop and describe in the project documents an adaptive management plan that can respond to updated sources of risk as project implementation continues.

Final Panel Comment 13

The description of the content-to-structure value ratios (CSVRs) is missing some important information on the representativeness and demographics of the sample of property owners selected and the specific locations and representativeness of the residential and commercial units used to develop the ratios.

Basis for Comment

Pages 16-17 of the revised Post Authorization Change (PAC) Economics Appendix indicate that on-site interviews were conducted with 10 owners of residential structures in each of three residential categories. Page 17 indicates that interviews were conducted with 10 owners of non-residential structures in each of eight categories.

There is no information provided in this document or in the Depth Damage Report for Morganza to the Gulf (USACE, 2012c) as to how these owners of residential and non-residential structures were selected. Without this information, the Panel cannot determine whether: (a) the owners of the residential and non-residential properties are representative of the type of owners in the study area with respect to demographics; and (b) the structures selected are representative of the category of structures in the study area.

Significance – Medium

The estimated CSVRs, and hence associated damage estimates with and without the Tentatively Selected Plan (TSP), may not be accurate if the sampled residential and non-residential property owners are not representative of the study area.

Recommendations for Resolution

1. Provide documentation of process that was used to select the 10 residential property owners and the 10 non-residential property owners.

2. Provide an assessment of how well (1) the selected residential and non-residential property owners represent the population of these two groups of property owners and (2) the structures owned by the selected property owners represent the types of structures in the study area.

Literature Cited

USACE. (2012c). Development of Depth-Emergency Cost and Infrastructure Damage Relationships for Selected South Louisiana Parishes. March.

Final Panel Comment 14

Rainfall-related damages to the interior project area have not been presented for each alternative and therefore cannot be evaluated.

Basis for Comment

A potential unintended consequence of this project would be interior flooding from storm-related heavy rainfall events. This potential risk is dismissed by the U.S. Army Corps of Engineers (USACE) based on UNET model analysis, environmental control structures and in sizing the levees. However, UNET model results are not presented in the review documents for evaluation by the Panel, nor is there a discussion of how the environmental control structures would reduce rainfall-related interior flooding.

Page 20 of the revised Post Authorization Change (PAC) states that:

> "Rainfall is not part of the [Hydrologic Engineering Center-Flood Damage Reduction Analysis] because the hurricane and storm damage reduction levees would not reduce rainfall damages."

The Panel is concerned that, during storm surge events when the gates are closed, large amounts of rain may result in increased interior flooding and that rainfall damages with and without the project are not discussed. The PAC further states that the UNET model indicates that no interior drainage improvements are necessary given that Lake Boudreaux acts as a large storage area behind the levee (p. 20). However, the UNET results are not provided in the review documents for the Panel to verify this claim. The Panel also notes that U.S. Fish and Wildlife Service (USFWS) comments on the prior PAC indicate that pooling of water behind the levees could be an important environmental issue.

Significance – Low

The absence of rainfall damage documentation affects the technical credibility and completeness of the report.

Recommendations for Resolution

1. Include the UNET model results showing that no interior drainage improvements are necessary.
2. Discuss how the environmental control structures can be operated to reduce rainfall-related damages.
3. Indicate whether interior rainfall damages in the project area vary during the construction and operation of the Tentatively Selected Plan (TSP), especially during storm surge events.
4. Indicate if there is any pooling of water behind the levees and what, if any, consequences this may have on natural resources, properties, and infrastructure.

Final Panel Comment 15

The modeling documentation for the Post Authorization Change (PAC) document does not explain why the Dokka Real Time Kinematic (RTK) data are considered to be more accurate than the light detection and ranging (LIDAR) measurements prior to adjustment.

Basis for Comment

The basis for the ADCIRC meshes applied in the project is the s115v6f2007 mesh that was developed for the Louisiana Coastal Protection and Restoration (LACPR) project (Appendix A, p. 8). Before the existing LACPR grid was applied, modifications to the bathymetry/topography and levee heights in the Morganza region were made as follows.

There are known vertical datum issues with the LIDAR data used to create the original s115v6f 2007 ADCIRC mesh. Therefore, as part of this project, a considerable effort to quantify and correct these errors was made by comparing LIDAR measurements to land survey data taken by Roy Dokka using RTK satellite navigation techniques. Specifically, the PAC document states:

> "It is assumed that the Dokka data is more accurate [than the LIDAR data] due to the RTK method used to obtain the data."

The datum of the base Federal Emergency Management Agency (FEMA) LIDAR (2004.65 epochs) measurements is a critical issue with respect to the design of the Morganza project. Datum is essential to the establishment of the elevation data used in the ADCIRC and STWAVE modeling. The variability of the adjustments within the different parishes with respect to the 2,004.65 epochs can affect the resulting modeling design water elevations. The FEMA LIDAR (2004.65 epochs) grid system, the Dokka data, and the averaging/correction procedure used to adjust the FEMA LIDAR (2004.65 epochs) data are discussed in Appendix A (pp. 8-11). Similar projects have included additional independent ground truth data to verify the datum used for ADCIRC, TABS, or other modeling tools.

Additional field verification of the datum would improve the quantification of the uncertainty associated with the base elevation data used in the ADCIRC and STWAVE modeling, and therefore the resulting design surge elevations.

Significance – Low

Additional information on the datum adjustment used for the ADCIRC modeling would strengthen the quality of the documentation of the report.

Recommendation for Resolution

1. Information provided by the U.S. Army Corps of Engineers (USACE) (June 26, 2012)[a] in response to the Panel's questions should be included in the final USACE documents to improve the understanding and quality of the documents.

   [a] "If there was an adjustment based on the [Louisiana State University Virtual

Reference Station] surveys of roads and levees, then the motivation for that action would have been to convert the FEMA LIDAR data to 2004.65 epochs in the project area (Terrebonne Parish). Louisiana State University ran an uncalibrated survey and had no metadata, survey report, or other supporting documentation for their survey. There was an effort to independently verify their survey and measure its accuracy relative to the 2004.65 epoch and potentially perform an adjustment to use in ADCIRC modeling. The conclusion was that in lower Terrebonne parish, the accuracy of the data was within the tolerance of the survey equipment used and the ADCIRC model, so no adjustment was suggested. (Other areas like East Jefferson and St. Charles were more suspect.) In effect, we were also implying that the data could be considered congruent with 2004.65 specifically in this region."

Final Panel Comment 16

The accuracy of the estimated highway and street flood monetary damages is uncertain because the basis of the estimate has not been described.

Basis for Comment

The estimated monetary damages for flooded highways and streets that could be avoided under the project are included in the Total Equivalent Annual Benefits of the project, but are based on just one estimate by a person whose qualifications are not well documented in the Economics Appendix. The basis of this estimate needs additional documentation to instill confidence in this category of benefits.

The Economics Appendix (p. 37 of the revision) states that one interview was conducted to estimate damages avoided to highways and streets versus the cost of repairing each mile of roadway. Tables 47 and 48 in the revised Economics Appendix indicate that Total Equivalent Annual Benefits of reducing damages to highways and streets is $17 million to $23 million. Debris removal costs have a similar magnitude of Total Equivalent Annual Benefits as highways and streets (see Tables 47 and 48 in the Economics Appendix), but these costs are based on four estimates. Given the magnitude of the highway and street Total Equivalent Annual Benefits, the Panel believes that more than one estimate should have been obtained. There is no documentation (beyond the word “expert” on p. 30) to indicate the qualifications of the individual who gave this one estimate. Applying @Risk program and generating distributions based on one expert’s estimation of minimum, maximum, and most likely damages does not compensate for the fact that the highway and street flood damages avoided is based on just one estimate.

Significance – Low

The technical credibility of the report and the accuracy of the highway and street damage estimates would be improved if the qualifications of the individual providing the estimate were documented and if more than one estimate was obtained.

Recommendations for Resolution

1. Describe in the Economics Appendix the qualifications of the expert who provided the estimate of highway and street damages versus cost of repair.

2. Obtain three additional estimates of highway and street cost of repairs, including from the State of Louisiana and from parish highway departments so that these benefit estimates are as credible as those for debris removal.

Final Panel Comment 17

The Post Authorization Change (PAC) document does not consider public access to, and recreational use of, the levees.

Basis for Comment

Although the revised Programmatic Environmental Impact Statement (PEIS) discusses public access to the levees, there is no discussion in the PAC. The levees represent a potential recreational opportunity for non-boaters in a project area with few public parks, and where recreation access to the project area is currently by boat only. The Other Social Effects (OSE) analysis (Economics Appendix, p. 6) lists very few public parks in the project area for non-boating recreation, which suggests that such parks are scarce in the project area. The revised PEIS (p. 5-52) indicates that many of the predominant recreational activities in the study area are accessible only by boat (p. 5-52) and that the project levees will be beneficial to recreation by providing new recreational opportunities (e.g., development of walking trails along the levees) (p. 6-45). The Panel could not find any discussion regarding public access to levees in the PAC or OSE of the Economics Appendix.

Significance – Low

The completeness of the PAC and the Economics Appendix (especially the OSE) would be improved if a discussion of the publicly accessible sections of the levee or levee segments was included in the PAC.

Recommendations for Resolution

1. Add a brief discussion in the PAC of the U.S. Army Corps of Engineers' (USACE's) intent to allow public access to the project levees.

2. Add a full discussion in the OSE of the miles of levees and likely levee segments that would be open for public access.

3. Add a list in the OSE of the public recreation activities that would be permitted (e.g., walking, biking, etc).

Final Panel Comment 18

The Post Authorization Change (PAC) document does not discuss the desired final level of redundancy, resiliency, and robustness of the interfaces between structures, materials, or members.

Basis for Comment

The Panel understands that redundancy, resiliency, and robustness are major performance issues and the ultimate design intent for the Morganza to the Gulf project. However, the Panel did not see, in either the PAC or the Draft Engineering Appendix (DEA), an explanation or discussion of the desired final level of redundancy, resiliency, and robustness of the interfaces between structures, materials, or members.

Significance – Low

The technical quality of the PAC document would be increased by including an appropriate discussion of redundancy, resiliency, and robustness and an explanation of how these concepts and design intents affect the alternatives, including the Tentatively Selected Plan (TSP).

Recommendation for Resolution

1. Provide a discussion in the PAC or DEA, at an appropriate level of detail, of the desired or expected final level of redundancy, resiliency, and robustness of the interfaces between structures, materials, or members expected or intended for the alternatives, including the TSP.

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APPENDIX B

Final Panel Comment on the

Morganza to the Gulf Public Comments

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Public Comment Review Summary

Several concerns noted in the Public Comments on the Morganza to the Gulf Project Authorization Change (PAC) Decision Document and Revised Programmatic Environmental Impact Statement (RPEIS) should be further analyzed and documented.

Basis for Comment:

During review of the Public Comments, the Panel found that the following issues raised by agencies, stakeholders, and members of the public deserve further investigation and documentation within the Morganza to the Gulf PAC and RPEIS. The Panel has summarized below the most significant technical concerns identified by the Public. The Panel notes, however, that the Public Comments should be directly examined regarding the details of each concern. To assist USACE in locating where these concerns were noted, the Panel has provided, in parentheses, those submissions that identified each concern.

M2G Public and NGO Letters.pdf (p. 40) – Gulf Restoration Network

> **2) Lack of consideration of updates to the DFIRM and Biggert-Waters Reform Act of 2012**
> Although the population projections for the project area are projected to rise overall, the analysis of population growth within the basin does not distinguish between the areas more proximal to the Mississippi River, which are growing in population, and the distal areas, where people are leaving (RPEIS, 5-44). This pattern reflects a general trend across the coast.
>
> Parishes along the coast have recently seen or will see in the future, large changes to federal flood insurance rates. Across Louisiana coastal communities, flood insurance rates are the major talk of the day, and will likely influence the current intra-basin migration up the bayou.
>
> *We question any population analysis that ignores the changes in federal insurance, as well as the existing intra-basin trend of population growth. We request an economic benefits analysis that includes these geographic details.*

M2G Public and NGO Letters.pdf (p. 62) - Louisiana Audubon Council Letter, Incomplete Report on Borrow Locations

> "Borrow costs are by far the largest component of this project. Borrow material for first lift levees is primarily obtained adjacent to the levees. Constructible feature borrow sites have been identified; however, for future lifts, it is assumed that borrow material will come from yet to be identified government-furnished borrow areas. The current status of unknown supply locations may be a concern to project reviewers/approvers." (USACE, 2013d, p. 1-9)

Location of borrow sites. "not all borrow sources have been identified" USACE (2013a, p. ix). The report states that borrow sites for only 3 out of 21 levee segments have been identified. Which habitat types will be directly impacted by the location of the unnamed borrow sites?

M2G Non-Federal Sponsor Comments.pdf (p. 1) – Draft PAC Report and PEIS Comments, Comments of Importance, PAC Report

1. ***Page vii:*** Further discussions are warranted in the future on the scope of the "preliminary buyout plan", including proposed concepts/alternatives, and how future sea level rise/landloss factors are utilized in determining impacts, if any.
7. As currently understood, benefits have not been calculated for eastern side of Bayou Lafourche. The exclusion of these benefits results in a reduced benefits to cost ratio.

M2G Non-Federal Sponsor Comments.pdf (p. 7) – Email from R. Dupre

- **Analysis Years (Sec 2.1 – pg.17) –** The 50 Year “life” of the Federal MTG system would be between 2035-2085. The soonest time we could expect a completed 1% AEP system is 2035, however we should be able to have some benefits of a closed system by 2024. Does the “closed system: mean that the entire 98 miles of levee has to have a first lift? Has the Corps included benefits of a partially closed system such as connecting some of the existing ridges. For example, it seems that having a partially closed system between Bayou Dularge and Bayou Lafourche (Reaches E-L) would provide some benefit to the project area.

Additional concerns noted by the public parallel the Panel’s concerns identified during the Independent External Peer Review (IEPR) of the Morganza to the Gulf PAC documents. Because these concerns were documented in Final Panel Comments, the Panel did not repeat the concerns in this summary.

Significance – Medium:

Clarification to address concerns raised throughout the Public Comments would make the document more complete.

Recommendation for Resolution:

1. Conduct additional investigations, provide documentation, and carry out further consultation on the issues noted above as suggested.

APPENDIX C

Final Charge to the Independent External Peer Review Panel as Submitted to USACE on May 25, 2012

on the

Morganza to the Gulf PAC (Review 1)

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Charge Questions and Guidance to the Peer Reviewers for the Independent External Peer Review of the Morganza to the Gulf PAC (Review 1)

BACKGROUND

The Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project feasibility study was completed in March 2002. The project was authorized for construction in the Water Resources Development Act (WRDA) of 2007, based on Chief of Engineers Reports dated 2002 and 2003, prior to development and implementation of post-Katrina design criteria. In the interest of public safety, the U.S. Army Corps of Engineers (USACE) is required to incorporate lessons learned from Hurricanes Katrina and Rita into the designs for Morganza to the Gulf. A reconnaissance-level revised project cost estimate prepared in 2008 determined that the cost to incorporate post-Katrina design criteria into the Morganza project will exceed the WRDA 1986, Section 902 limit. As a result, USACE, New Orleans District must prepare a post authorization change (PAC) decision document to present a new project cost for reauthorization. In addition, a revised programmatic environmental impact statement (PEIS) will accompany the USACE decision document, which would include constructible features that were not presented in the original PEIS prepared in 2002.

The project area is located in coastal Louisiana approximately 60 miles southwest of New Orleans. The project area includes portions of Terrebonne and Lafourche Parishes. The area is bounded on the west by Bayou Black in Gibson and on the east by Bayou Lafourche with the east and west boundaries forming an apex at Thibodaux, Louisiana. The southern boundary is the Gulf of Mexico.

The project purpose is hurricane and storm damage risk reduction for people and property within portions of Terrebonne and Lafourche Parishes, Louisiana, as well as fragile marsh in the vicinity of Houma, Louisiana. The area has been affected by an extreme deterioration of coastal marshes as a result of saltwater intrusion, land subsidence and the lack of sediment deposits from the Mississippi River and its tributaries. This deterioration has led to increased hurricane and storm surge inundation. The area is also significantly affected by tides emanating from the Gulf of Mexico. The scope of the project includes the following features: 77 miles of earthen levee; 22 Navigable Structures (including the Houma Navigation Canal Lock Complex); 21 Environmental Control Structures; Fronting Protection for four existing Pump Stations; and six Roadway Gates. The structural features are integrated into the levee alignment to provide flood protection, drainage, environmental benefits, and navigational passage. The project sponsor is the Coastal Protection and Restoration Authority of Louisiana.

Federal projects aimed at managing the nation's water resources typically receive congressional authorization through WRDA. Historically, Congress has considered WRDA legislation approximately every other year. The Morganza to Gulf chief's report was signed in August 2002 and supplemented in July 2003, but Congress did not pass any WRDA legislation until 2007. Thus, the Morganza to the Gulf Hurricane Protection Project was not authorized for construction until WRDA 2007.

In the interim, Hurricanes Katrina and Rita devastated the Gulf Coast. Congress responded by passing a series of emergency supplemental appropriations bills to fund short-term repairs and long-term enhancements of the hurricane protection system in southern Louisiana. Funding was provided only for previously authorized projects. The Morganza to the Gulf Hurricane Protection Project, though an integral part of the Hurricane and Storm Damage Risk Reduction System (HSDRRS), did not receive emergency funding because it had not yet been authorized when the funding bills passed.

Post-Katrina hurricane protection projects are being planned and built according to new design criteria to provide a stronger, more robust system of protection than existed before Katrina. As this project was planned five years before Katrina, its design does not meet the Corps' new standards for 100-year level protection. The project's design must now be revised and will result in a substantially higher cost, increased direct and indirect impacts, and the need to complete a report for Congress explaining these changes.

The Congressionally-mandated WRDA, Section 902 limit (WRDA, 1986) requires reauthorization by Congress when construction costs are estimated to exceed the authorized project cost by 20-percent. Due to Post-Katrina design criteria changes, including new 1-percent-annual-chance storm water surface elevations, and new borrow standards, the Morganza to the Gulf Hurricane Protection Project will exceed this 20-percent cost increase. The Morganza to the Gulf Hurricane Protection Project requires reauthorization from Congress to start construction. A PAC report is being developed that will serve as the basis for reauthorization. The PAC report will include feasibility-level designs incorporating the post-Karina design criteria, new project costs and updated economic benefits. The PAC will lead to a signed Chief of Engineers' Report in December 2012, with anticipated Congressional reauthorization as early as 2013.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Post Authorization Change Decision Document (hereinafter: Morganza to the Gulf IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010, and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-209; p. D-4) for the Morganza to the Gulf documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR

panel members) with extensive experience in Civil Works planning, economics, wetland ecology/biology, civil/construction engineering, coastal engineering, geotechnical/structural engineering, and fisheries biology issues relevant to the project. They will also have experience applying their subject matter expertise to coastal storm damage reduction.

The Panel will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-209, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review.

Documents for Review
The following documents are to be reviewed by designated discipline:

Title	Approx. No. of Pages	Required Disciplines
Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Draft Post Authorization Change Decision Document	150	All disciplines
Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Environmental Impact Statement	250	All disciplines
Main Engineering Appendix	150	Civil/construction engineering; coastal engineering/geotechnical structural engineering
Hydrology, Hydraulics, and Water Quality – Main Report	250	Coastal engineering/geotechnical structural engineering; wetland biology/ecology; fisheries ecology
1-percent and 3-percent AEP Civil Plates	90	Civil/construction engineering; coastal engineering/geotechnical structural engineering
Economics Appendix	65	Civil Works planning; economics; civil/construction engineering

RED Appendix	20	Civil Works planning; economics; civil/construction engineering
OSE Appendix	25	Civil Works planning; economics
1-Percent AEP REP	60	Civil Works planning; civil/construction engineering; coastal engineering/geotechnical structural engineering
Public comments (as of June 11, 2012)	50	All disciplines
TOTAL PAGES OF REVIEW DOCUMENTS	1,110	

Supporting Information

- Appendix A - JPM-OS, ADCIRC and STWAVE Modeling – 775 pp
- Appendix B - Future Condition SLR Case Two Sensitivity Analysis – 30 pp
- Appendix C - ERDC Statistical Results – 150 pp
- Appendix D - Frequency and Fragility Curves – 50 pp
- Appendix E - Hindcast Plots – 20 pp
- Appendix F - Design plots for levees, structures, and wave loads – 225 pp
- Appendix G - Evaluation of Authorized 1% Designs In Light of New Design Criteria – 25 pp
- Appendix H - MTOG - Environmental Flow Control Structures Study – 175 pp
- Appendix I - ADH Floodgate Evaluation Study – 5 pp
- Appendix J - TABS – MD Floodgate Evaluation Study for GIWW and Vicinity – 55 pp
- Appendix K - Rip Rap Design for Navigation and Environmental Structures – 35 pp
- Appendix L - Validation of the Morganza to the Gulf of Mexico TABS-MDS Numerical Model – 150 pp
- Appendix M - Comparison of Plan Alternatives for the MTOG Levee System – 370 pp
- Appendix N - MTOG Hurricane Projects Interior Drainage Study – 75 pp
- Appendix O - Review of Hydraulic Engineering Analysis and Design – 210 pp
- Soils Appendices – 6,575 pp
- Structures Appendices – 13,825 pp
- Relocation Appendix – 285 pp
- Cost Appendices – 110 pp
- Schedule – 5 pp
- HSDRRS Quality Management Plan – 130 pp

Documents for Reference

- USACE guidance Civil Works Review, (EC 1165-2-209) dated January 31, 2010
- CECW-CP Memorandum dated March 31, 2007
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review released December 16, 2004.

SCHEDULE

This final schedule is based on the May 15, 2012 receipt of the final review documents. The schedule will be revised upon receipt of final review documents.

Task	Action	Days to Complete Action	Due Date
Conduct Peer Review	Battelle sends review documents to Panel	Within 1 day of Panel being under subcontract or submission of final Work Plan, whichever is later	5/31/2012
	Battelle convenes kickoff meeting with Panel	Within 2 days of Panel being under subcontract or submission of final Work Plan, whichever is later	6/1/2012
	USACE/Battelle convenes kickoff meeting with Panel	Within 2 days of Panel being under subcontract or submission of final Work Plan, whichever is later	6/1/2012
	Battelle convenes mid-review teleconference for Panel to ask clarifying questions of USACE	At the halfway point of Panel review	
	Battelle sends second round of review documents to Panel	Within 1 day of review documents being available	6/12/2012
	Panel members complete their individual reviews	Within 10 days of second round of review documents being available	6/26/2012
Prepare Final Panel Comments and Final IEPR Report	Battelle provides Panel merged individual comments and talking points for Panel Review Teleconference	Within 3 days of panel members completing their review	6/29/2012
	Battelle convenes Panel Review Teleconference	Within 4 days of panel members completing their review	7/2/2012
	Final Panel Comments finalized	Within 5 days of receipt of draft Final Panel Comments	7/17/2012
	Battelle provides Final IEPR Report to Panel for review	Within 2 days Final Panel Comments being finalized	7/19/2012
	Panel provides comments on Final IEPR Report	Within 2 days of receipt of Final IEPR Report	7/23/2012
	*Battelle submits Final IEPR Report to USACE	Within 14 days of panel members providing draft Final Panel Comments to Battelle	7/24/2012

Task	Action	Days to Complete Action	Due Date
Comment/ Response Process	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	Within 1 day of submittal of Final IEPR Report	7/25/2012
	USACE provides draft PDT Evaluator Responses to Battelle	Within 5 days of receipt of Final IEPR Report	7/31/2012
	Battelle provides the Panel the draft PDT Evaluator Responses	Within 1 days of receipt of draft PDT Evaluator Responses	8/1/2012
	Panel members provide Battelle with draft comments on draft PDT Evaluator Responses (i.e., draft BackCheck Responses)	Within 5 days of receipt of draft PDT Evaluator Responses from Battelle	8/8/2012
	Battelle convenes teleconference with Panel to discuss draft BackCheck Responses	Within 1 day of receipt of draft BackCheck Responses	8/9/2012
	Battelle convenes teleconference with Panel and USACE to discuss Final Panel Comments and draft responses	Within 1 day of receipt of draft BackCheck Response	8/9/2012
	USACE inputs final PDT Evaluator Responses in DrChecks	Within 2 days of Final Panel Teleconference	8/13/2012
	Battelle provides PDT Evaluator Responses to Panel	Within 0 days of final PDT Evaluator Responses being available	8/13/2012
	Panel members provide Battelle with final BackCheck Responses	Within 2 days of receipt of final PDT Evaluator Responses	8/15/2012
	Battelle inputs the Panel's BackCheck Responses in DrChecks	Within 1 day of Panel providing final BackChecks	8/16/2012
	*Battelle submits pdf printout of DrChecks project file	Within 1 day of DrChecks closeout	8/17/2012
Civil Works Review Board			9/27/2012

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Morganza to the Gulf IEPR documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or Appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the Morganza to the Gulf IEPR documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance: the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-209; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please

do not comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Independent Technical Review.
2. Please contact the Battelle Project Manager (Lynn McLeod, mcleod@battelle.org) or Program Manager (Karen Johnson-Young (johnson-youngk@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Lynn McLeod, mcleod@battelle.org, no later than June 26, 2012, 10 pm ET.

Independent External Peer Review

MISSISSIPPI RIVER AND TRIBUTARIES, MORGANZA TO THE GULF OF MEXICO HURRICANE PROTECTION PROJECT, LOUISIANA – POST AUTHORIZATION CHANGE DECISION DOCUMENT

Charge Questions (Review 1)

General Questions

1. To what extent has it been shown that the project is technically sound?
2. Are the assumptions that underlie the engineering, and environmental analyses sound?
3. Are the engineering, and environmental methods, models and analyses used adequate and acceptable?
4. Were all models used in the analyses used in an appropriate manner with assumptions appropriately documented and explained?
5. Were risk and uncertainty sufficiently considered?

General Safety Assurance Review Questions

6. Have the two (2) alternatives been adequately described for this project?
7. Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?
8. Are the quality and quantity of the surveys, investigations, and engineering sufficient to assess expected risk reduction?
9. Have the hazards that affect the structures, including subsidence, been adequately documented and described?
10. Is there sufficient information presented to identify, explain, and comment on the assumptions that underlie the engineering analyses?
11. Are there any additional analyses or information available or readily obtainable that would affect decisions regarding the structures?
12. Does the physical data and observed data provide adequate information to characterize the structures and their performance?
13. Have all characteristics, conditions, and scenarios leading to potential failure, along with the potential impacts and consequences, been clearly identified and described? Have all

pertinent factors, including but not necessarily limited to population-at-risk been considered?

14. Does the analysis adequately address the uncertainty given the consequences associated with the potential loss of life for this type of project

15. Has anything significant been overlooked in the development of the assessment of the project or the two (2) alternatives?

Specific Charge Questions

DRAFT POST-AUTHORIZATION CHANGE DECISION DOCUMENT

Problems and Opportunities

16. Are the problems and opportunities adequately and correctly defined?

17. Do the identified problems and opportunities reflect a systems approach, addressing a geographic area large enough to ensure that plans address the cause and effect relationships among affected resources and activities that are pertinent to achieving the study objectives?

Environmental Resources

18. Was the discussion of environmental and natural resources sufficient to characterize current baseline conditions and to allow for evaluation of forecasted conditions (with and without proposed conditions)?

19. Were the analyses of the existing environmental and natural resources within the study area sufficient to support the estimation of impacts for the two alternatives?

Alternatives

20. Are the two alternative plans clearly described?

21. Were the assumptions made for use in developing the future with project conditions for the two alternatives reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent and/or adequately justified where different?

22. Are the changes between the without and with project conditions adequately described for the two alternative?

23. Have comparative impacts been clearly and adequately described for the two alternatives?

24. Are future Operation, Maintenance, Repair, Replacement, and Rehabilitation efforts adequately described and are the estimated cost of those efforts reasonable for the two alternatives?

25. Are there any unmitigated environmental impacts not identified and if so could they impact project designs?

26. Are residual risks adequately described and is there a sufficient plan for communicating the residual risk to affected populations?

27. Please comment on the likelihood that the proposed work will achieve the expected outputs.

Recommended Plan

28. Please comment on the likelihood of the recommended plan will achieve the expected outputs.

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

Objectives of Actions

29. Have the public concerns been identified and adequately described?

30. Are the specific objectives adequately described?

31. In your opinion, are there any other issues, resources, or concerns that have not been identified and/or addressed?

32. Have the impacts to existing infrastructure, such as utilities, been adequately addressed?

Affected Environment

33. Is the description of the climate in the study area sufficiently detailed and accurate?

34. Is the description of the geomorphic and physiographic setting of the proposed project area accurate and comprehensive?

35. Is the description of wetland resources in the project area complete and accurate?

36. Is the description of aquatic resources in the project area complete and accurate?

37. Is the description of the historical and existing fishery resources in the study area complete and accurate?

38. Is the description of Essential Fish Habitat in the study area complete and accurate?

39. Is the description of threatened and endangered species resources in the study area complete and accurate?

40. Is the description of the historical and existing recreational resources in the study area complete and accurate?

41. Is the description of the cultural resources in the study area complete and accurate?

42. Is the description of the historical and existing socioeconomic resources in the study area complete and accurate? Were specific socioeconomic issues not addressed?

Environmental Consequences

43. Have impacts to significant resources been adequately and clearly described?

44. To what extent have the potential impacts of the alternatives on significant resources been addressed and supported?

45. Are the scope and detail of the potential adverse effects that may arise as a result of project implementation sufficiently described and supported?

46. Have impacts from borrow areas, levees, structures and construction access areas been adequately and clearly described?

Cumulative Impacts

47. Are cumulative impacts adequately described and discussed? If not, please explain.

Mitigation

48. Are mitigation measures adequately described and discussed? If not, please explain.

Public Involvement

49. Based on your experience with similar projects and using the public comments and other public involvement documentation available to date, has adequate public, stakeholder, and agency involvement occurred to determine all issues of interest and to ensure that the issues have been adequately addressed to the satisfaction of those interested parties? Should additional public outreach and coordination activities be conducted?

Mitigation and Wetlands

50. Was the process used to select the recommended mitigation sites implemented in a reasonable manner given the project constraints?

51. Are the assumptions used to determine mitigation credit for the proposed project adequate?

52. Are the assumptions used for the Wetland Value Assessment Methodology for the proposed project adequate?

Section 404(b)(1) Evaluation

53. Have the short-term and long-term impacts associated with the discharge of dredged and fill material been adequately and clearly described?

MAIN ENGINEERING APPENDIX

Project Design Data

54. Are project design features clearly and adequately described and discussed? If not, please explain.

55. Have the design and engineering considerations presented been clearly outlined?

56. Are any additional design assumptions necessary to validate the preliminary design of the primary project components?

57. To what extent have significant project construction costs been adequately identified and described?

58. Are the assumptions used to determine the cost of operations and maintenance for the proposed project adequately documented and explained?

Hydrology, Hydraulics, and Water Quality

59. Has the role of background erosion and sea level rise been adequately considered in the model analysis?

60. Has the role of subsidence been adequately considered in the model analysis?

ECONOMICS/REGIONAL ECONOMIC DEVELOPMENT APPENDIX

61. To what extent are the input parameters, methods, models and analyses used in the study methodology as documented in the Economics Appendix appropriate and consistent with current best management practices?

62. Were the methods to calculate structure and content values adequately described?

63. Was the methodology to assess storm damages, and storm damage reduction adequately described?

Real Estate Plan

64. Comment on the extent to which assumptions and data sources used in the economics analyses are clearly identified and the assumptions are justified and reasonable.

65. Does the Real Estate appendix adequately address all real estate interests (public and private)?

OTHER SOCIAL EFFECTS APPENDIX

66. Comment on the adequacy and comprehensiveness of the other social effects analysis?

PUBLIC COMMENTS

67. Based on the primary themes presented as part of the public comments submitted to date, have the primary concerns been adequately and satisfactorily addressed?

FINAL OVERVIEW QUESTION

68. What is the most important concern you have with the document or its appendices that was not covered in your answers to the questions above?

APPENDIX D

Final Charge to the Independent External Peer Review Panel as Submitted to USACE on January 24, 2013

on the

Morganza to the Gulf PAC (Review 2)

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Charge Questions and Guidance to the Peer Reviewers for the Independent External Peer Review of the Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Post Authorization Change Decision Document (Review 2)

BACKGROUND

The Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project feasibility study was completed in March 2002. The project was authorized for construction in the Water Resources Development Act (WRDA) of 2007, based on Chief of Engineers Reports dated 2002 and 2003, prior to development and implementation of post-Katrina design criteria. In the interest of public safety, the U.S. Army Corps of Engineers (USACE) is required to incorporate lessons learned from Hurricanes Katrina and Rita into the designs for Morganza to the Gulf. A reconnaissance-level revised project cost estimate prepared in 2008 determined that the cost to incorporate post-Katrina design criteria into the Morganza project will exceed the WRDA 1986, Section 902 limit. As a result, USACE, New Orleans District must prepare a post authorization change (PAC) decision document to present a new project cost for reauthorization. In addition, a revised programmatic environmental impact statement (PEIS) will accompany the USACE decision document, which would include constructible features that were not presented in the original PEIS prepared in 2002.

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OBJECTIVES

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DOCUMENTS PROVIDED

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Documents for Review

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Title	Approx. No. of Pages	Required Disciplines
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Main Engineering Appendix	369	Civil/construction engineering; coastal engineering/geotechnical structural engineering
Economics Appendix	154	Civil Works planning; economics
Morganza Summary Report	13	All disciplines
Public comments	173	All disciplines

Documents for Reference

- USACE guidance Civil Works Review Policy (EC 1165-2-214) dated December 15, 2012
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review released December 16, 2004.

SCHEDULE

This draft schedule is based on a kickoff of Review 2 of January 23, 2013.

Task	Action	Due Dates Modification 3 (Review 2)
3	Battelle convenes kickoff meeting with panel members	1/23/2013
	USACE/Battelle convenes kickoff meeting with panel members	1/23/2013
	Battelle sends second round of review documents to Panel	1/23/2013
3.1	Civil Works Review Board (CWRB)	TBD
4	Panel members complete their individual reviews	1/31/2013
	Battelle convenes panel review teleconference	TBD
	Panel members provide finalized Final Panel Comments to Battelle	2/5/2013
	Battelle provides public comments to Panel for review	2/25/2013
	Battelle enters public comment reviews of Final Panel Comments into DrChecks	3/4/2013
5	*Battelle submits Final IEPR Report to USACE	3/5/2013
6	Battelle inputs Final Panel Comments to DrChecks; Battelle provides Post-Final Panel Comment Response Process template to USACE	2/6/2013
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses and clarifying questions to Battelle	2/13/2013
	Teleconference between Battelle, Panel, and USACE to discuss Final Panel Comments, draft responses, and clarifying questions	2/21/2013
	USACE inputs final PDT Evaluator Responses in DrChecks	2/26/2013
	Battelle inputs the Panel's BackCheck Responses in DrChecks	3/5/2013
	*Battelle submits pdf printout of DrChecks project file	3/5/2013
	Contract End	9/13/2013

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Morganza to the Gulf IEPR documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or Appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the Morganza to the Gulf IEPR documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance: the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-209; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.

2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.

3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.

4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.

5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.

6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable

7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

5. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Independent Technical Review.
6. Please contact the Battelle Project Manager (Lynn McLeod, mcleod@battelle.org) or Program Manager (Karen Johnson-Young (johnson-youngk@battelle.org) for requests or additional information.
7. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.
8. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Corey Wisneski, wisneskic@battelle.org, no later than January 31, 2013, 10 pm ET.

Independent External Peer Review of the Mississippi River and Tributaries, Morganza to the Gulf of Mexico Hurricane Protection Project, Louisiana – Post Authorization Change Decision Document

Review 2 Charge Questions

ECONOMICS/REGIONAL ECONOMIC DEVELOPMENT APPENDIX

1. Were the methods used by the expert elicitation panel to develop the depth-damage relationships appropriate and were the generated results applicable to the study area?

2. Were the methods used to develop the content-to-structure value ratios (CSVRs) appropriate and were the generated results applicable to the study area?

3. Has the report adequately addressed the issue of repetitive flood damages and the subsequent extent of rebuild/repair by property owners as it relates to annualized damage estimation?