Final Independent External Peer Review Report Integrated Draft Feasibility Study and Environmental Impact Statement, Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi

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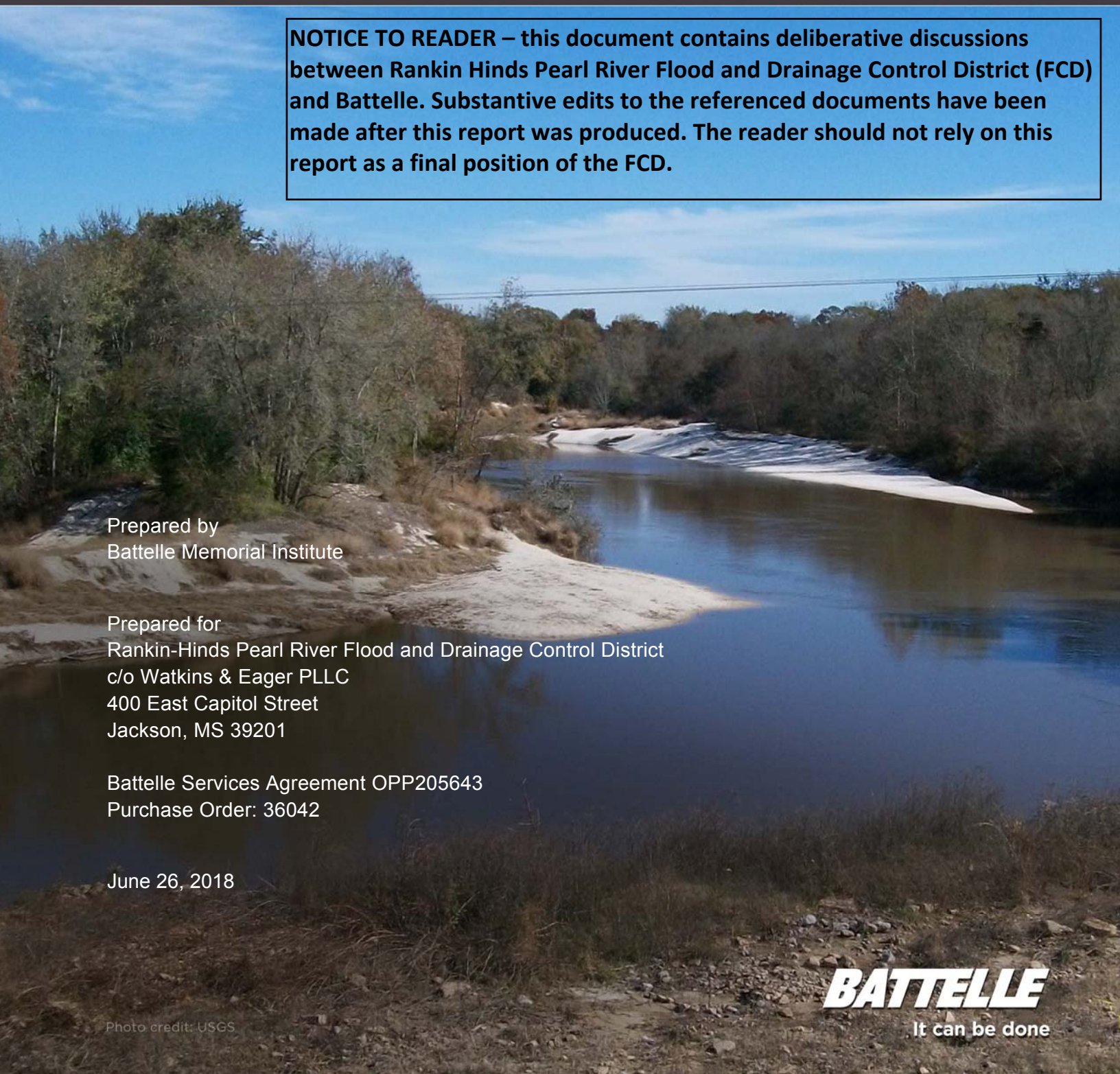

Prepared by
Battelle Memorial Institute

Prepared for
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Battelle Services Agreement OPP205643
Purchase Order: 36042

June 26, 2018

Photo credit: USGS

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It can be done

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The Integrated Draft Feasibility Study and Environmental Impact Statement (FS/EIS), Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi, was prepared pursuant to Congressional authorization originally enacted in 1986 and most recently reconfirmed in 2016. The Water Infrastructure Improvements for the Nation Act (the WIIN Act), now codified as Public Law 114-322, continues the long-standing Congressional authorization for the project (Section 1322(b)(4)(A)). This newest project authorization instructs the Secretary to "expedite a review and decision on recommendations" made for the project by continuing and modifying the language found in Section 3104 of the Water Resources Development Act (WRDA) of 2007. Section 3104 in turn modifies the Pearl River Basin project originally authorized by Section 401(e)(3) of WRDA 1986 by allowing the Assistant Secretary of the Army for Civil Works (ASACW) to construct a project generally in accordance with the plan described in the Pearl River Watershed, Mississippi, Feasibility Study Main Report, Preliminary Draft, dated February 2007, and to determine the appropriate plan based upon the requirements set out in Section 3104. Section 3104 provides that the ASACW may construct the National Economic Development (NED) plan, the Locally Preferred Plan (LPP), or some combination thereof subject to a determination by the ASACW that the LPP provides the same level of flood protection as the NED plan and that the LPP is environmentally acceptable and technically feasible. Further, Section 3104 provides that the non-Federal interests may carry out the project under Section 211 of WRDA 1996, as amended.

Section 211 of WRDA 1996 provides authority for non-Federal sponsors to prepare FS/EISs and to design and construct Federally authorized flood risk management projects without Federal funding. The U.S. Army Corps of Engineers (USACE) may provide technical assistance to the non-Federal sponsor during the FS/EIS.

The Rankin-Hinds Pearl River Flood and Drainage Control District (the Flood Control District) is a political subdivision of the State of Mississippi created in 1962 pursuant to the Urban Flood and Drainage Control Law, Miss. Code Ann. § 51-35-301, et seq. Its responsibilities include construction of flood and drainage control improvements for the protection of property in the Jackson metropolitan area. Its Board of Directors consists of the mayors representing four municipalities (Flowood, Jackson, Pearl, and Richland) and representatives of the two counties (Hinds and Rankin) in which the district's boundaries lie, along with a representative from the state appointed by the Governor of Mississippi.

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Effective July 19, 2012, the Flood Control District and USACE entered into a Memorandum of Agreement to undertake and complete a Section 211 Feasibility Report to identify the Federal interest in the Pearl River Watershed, Mississippi, Project, in accordance with the Economic and Environmental Principles and Guidelines for Water and Related Land Resources, March 10, 1983, and the Planning Guidance Notebook, Engineer Regulation (ER) 1105-2-100 (USACE, 2000). The Section 211 Feasibility Report for the Pearl River Basin, titled the Integrated Draft Feasibility Study and Environmental Impact Statement, Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi (Draft FS/EIS), will serve as the decision document for review by the Secretary of the Army. The Draft FS/EIS is being undertaken in accordance with the National Environmental Policy Act of 1969 (NEPA) and USACE regulations for implementing NEPA.

The Pearl River Watershed is located in the south-central portion of Mississippi and in a small part of southeastern Louisiana. The river drains an area of 8,760 square miles consisting of all, or parts, of 23 counties in Mississippi and parts of three Louisiana parishes. The primary study area comprises the Pearl River Watershed between River Mile (RM) 280.0, located south of Richland, Mississippi, and RM 301.77, located at the dam of Ross Barnett Reservoir.

Municipalities within the study area include Flowood, Jackson, Pearl, and Richland. The study area includes parts of Hinds and Rankin counties. Major tributaries of the Pearl River within the study area include Caney, Eubanks, Hanging Moss, Hog, Lynch, Prairie Branch, Purple, Richland, and Town Creeks. The study area is primarily affected by headwater flooding caused by unusually heavy and intense rainfall over the upper Pearl River Watershed. Although the study area is located primarily within the boundaries described, additional areas downstream were included to address any potential downstream impacts of the proposed project alternatives.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The Flood Control District, under the authority granted by Section 211 of the WRDA of 1996, is conducting an Independent External Peer Review (IEPR) of the Integrated Draft FR/EIS, Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi (hereinafter: Rankin-Hinds IEPR). 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 per guidance described in USACE (2018). Battelle has experience in establishing and administering peer review panels and was engaged to coordinate this IEPR. The IEPR was external to the Flood Control District and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2018) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: Civil Works planning/economics, environmental scientist/NEPA, hydrology and hydraulic (H&H) engineering, and civil/geotechnical engineering. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. The Flood Control District was given the list of all the final candidates to independently confirm that they had no COIs, and Battelle made the final selection of the four-person Panel from this list.

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The Panel received electronic versions of the decision documents (2,447 pages in total), along with charge questions that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018) and OMB (2004), Battelle, in coordination with the Flood Control District, prepared the charge questions, which were included in the draft and final Work Plans.

The Flood Control District Project Team briefed the Panel and Battelle during a kick-off meeting held via teleconference at the start of the review to provide the Panel an opportunity to ask questions of the Flood Control District and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and the Flood Control District during the peer review process.

IEPR panel members reviewed the decision documents individually and produced individual comments in response to the charge questions. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to the Flood Control District. 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/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, 23 Final Panel Comments were identified and documented. Of these, five were identified as having high significance, two had medium/high significance, four had medium significance, four had medium/low significance, and eight had low significance.

Results of the Independent External Peer Review

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2018) in the Rankin-Hinds IEPR review documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel's findings.

Based on the Panel's review, the report is well-written and concise, which provided for an easy understanding of the history of the project and the development and selection of the alternatives. However, the Panel identified several elements of the project where additional analyses are warranted and places where clarification of project findings and objectives need to be documented or revised.

Plan Formulation/Economics: Three of the four most significant issues identified by the Panel are focused on plan formulation. The first issue is whether the final alternative plans demonstrate that the Tentatively Selected Plan (TSP) (which is Alternative C) is the NED plan. For a flood risk management study, identification of the NED plan requires formulation and evaluation of alternatives that offer different degrees of net benefits, such that determination of the alternative that offers the greatest net benefits is feasible. Currently, only Alternative C has positive net NED benefits. There are no other alternatives with positive net benefits. Without a range of alternatives that result in varying levels of positive net benefits, it is not possible to verify that Alternative C (the TSP) provides the greatest net NED benefits. The Panel recommends that the project team formulate and evaluate additional alternative plans designed to result in benefits that are lower than and greater than Alternative C, to verify that Alternative C does, in fact, provide the greatest net NED benefits.

The second major concern is focused on the structural and nonstructural management measures and how they are combined and presented within the report. The initial array of alternatives includes very few combinations of management measure types. As a result, it is not possible to evaluate benefit and cost

tradeoffs between the extent of levees/floodwalls and pumps and that of channel improvements. It is possible that if nonstructural management measures (after screening) were included in one or more of the initial array of alternatives, benefits and costs might have been beneficially impacted. The Panel suggests that tradeoffs between management measures be evaluated (e.g., evaluate increased channelization vs. reduced levees/floodwalls and pumps) to ensure that the alternatives perform efficiently.

The third major plan formulation issue is that the inclusion of an impractical alternative (Alternative A, the Buyout Plan) in the final array of alternative plans precludes an efficient evaluation of the alternatives that best meet the planning objectives. Because of the detailed and time-consuming evaluation required of the final alternative plans, inclusion of an impractical alternative such as Alternative A prevents consideration of another, practical plan. In order to identify the TSP, alternatives must be identified that provide fewer and greater net NED benefits than the TSP. The Panel recommends that the Buyout Plan be screened out and replaced with another, promising alternative from the initial array of alternatives.

Engineering: The Panel had one primary concern with the engineering analysis and several other lower-level issues. Overall, panel members found the main report concise; however, the lack of detail in the conceptual engineering design affects the evaluation of potential impacts and the cost estimates. For example, Appendix C (Engineering) provides limited engineering documentation to evaluate the possible impacts and costs of Alternatives B and C. The discussions refer to the previous levee and lake plans, the details of which are not presented. Additionally, Section 2.5.2.3 of the Draft FS/EIS, Pearl River Tributaries and Interior Drainage, refers to engineering analyses of interior drainage which resulted in the addition of several new pump stations for Alternative B but not for Alternative C. The models, assumptions, and results of these analyses are not provided in the report. Since pump station costs are a significant component of Alternative B, this issue could affect the selection of the most cost-effective alternative. The lack of detail in the engineering analysis may be exacerbating uncertainty to the extent that the selection of the TSP could be affected. The Panel recommends providing conceptual levee plans and cross-sections showing the extent of the proposed improvements, approximate grades, and location of key features. Additional details in Appendix C (Engineering) regarding interior drainage engineering analyses should also be provided.

The Panel is concerned that the economic feasibility of the TSP is uncertain due to the lack of connection between the modeling results, engineering analysis, design drawings, and cost estimates. For example, the results of the H&H analysis include the modeled water surface and top-of-levee elevations along the project area for Existing Conditions and With-Project. It is not clear, however, if the top-of-levee elevations shown in the figures for Alternatives B and C correspond to the proposed levee work. Additionally, the Interior Analysis section of the H&H analysis discusses the modeling conducted to determine interior drainage needs, including pumping requirements, but there is no explicit connection with the typical plan view and typical cross section, nor with the quantities and cost estimates subsequently presented in the Cost Engineering section.

Another prominent issue is related to the Hydrologic Engineering Center-River Analysis System (HEC-RAS) calibration of Existing Conditions against the 2007 Pearl River Watershed Feasibility Study results. There appears to be contradictory information within the tables and text, raising questions about the applicability of the results and the potential impact on the determination of benefits for the with-project alternatives. If the calibration had been performed against the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) results, the water surface elevations modeled for Existing Conditions would be lower, and potentially the benefits would be smaller because the flood level reduction attributable to the with-project alternatives would be consequently smaller. The Panel suggests that the

rationale for calibrating the hydraulic model for Existing Conditions against the 2007 Pearl River Watershed Feasibility Study instead of the FEMA FIS results be described in the report.

The Panel noted that the potential construction means and methods associated with excavation and placement of a large quantity of soil are not addressed. As a result, the lack of detail associated with construction makes it difficult to evaluate air quality, water quality, noise impacts, and cost implications. The Panel suggests that (1) further discussion and evaluation of the impacts be included in the report (including a discussion of the possible mix of equipment for various alternatives, methods, and approximate durations) and (2) the assumption that unit costs in the cost estimates are consistent with the proposed range of means and methods be confirmed.

Environmental/NEPA: The Panel found that the discussion regarding wetland delineation and the Habitat Evaluation Procedures (HEPs) was detailed and comprehensive; however, panel members did have several concerns regarding the environmental analysis. The HEP analysis in the Draft FS/EIS does not clearly state whether proposed mitigation techniques are consistent with the current TSP, and, if so, how successful the opportunities for in-kind mitigation would be. Potential adverse impacts to obligate and facultative riverine guilds due to project construction may not be successfully mitigated if the mitigation techniques are not consistent with the TSP. The Panel recommends clarifying whether the mitigation for aquatic resources under the current TSP will provide suitable habitat for riverine fish species and will include in-kind mitigation for loss of obligate riverine fish habitat.

The Panel also found that the Draft FS/EIS identifies three hazardous, toxic, and radioactive waste (HTRW) sites that present issues of concern. While the existence of these sites has been identified, the potential costs for site remediation may be significantly understated in the cost estimates and risk analysis, potentially affecting the selection of the TSP. The Panel recommends that additional site characterizations be conducted and that a detailed evaluation of possible remedial measures/costs, including contaminated soil/landfill waste disposal and groundwater remediation, be provided.

The Panel found that the discussion of climate change acknowledges the significant uncertainty of climate change forecasts but does not evaluate potential impacts under the no action plan or the alternatives. Without an assessment of potential climate change impacts, it is not possible to evaluate how project benefits might be impacted. The Panel recommends a qualitative analysis that considers both past (observed) impacts and potential future (projected) impacts to relevant hydrologic inputs based on applicable USACE guidance. The analysis should explain how the performance of the no action plan and the alternatives might be impacted.

The Panel noted that the Draft FS/EIS is not consistent in explaining the applicability of the listed environmental laws and compliance requirements to the TSP. Applicable Federal statutes and executive orders are listed in Section 6.0. In some cases, the Draft FS/EIS explains how a requirement relates to the TSP (for example, Federal Aviation Administration Hazardous Wildlife Attractants On or Near Airports). In most cases, however, no explanation is provided to demonstrate TSP compliance with these environmental laws. The Panel suggests that the Draft FS/EIS explain how compliance with each executive order/compliance requirement has been or will be achieved.

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Table ES-1. Overview of 23 Final Panel Comments Identified by the Rankin-Hinds IEPR Panel

No.	Final Panel Comment
Significance – High	
1	The final alternative plans do not definitively demonstrate that the TSP is the NED plan.
2	The report does not provide a rationale for how structural and nonstructural management measures were combined to form the initial array of alternative plans.
3	Alternative A, the Buyout Plan, is impractical, and its inclusion in the final array of alternative plans precludes an efficient evaluation of the alternatives that best meet the planning objectives.
4	The lack of detail in the conceptual engineering design affects the evaluation of potential impacts and the cost estimates.
5	The three HTRW sites identified in the Draft FS/EIS are not sufficiently characterized to determine the adverse impacts on the Pearl River and on the overall project cost.
Significance – Medium/High	
6	There is minimal explicit connection between the modeling results, the dimensioning of the structures, and the associated cost estimates for the alternatives evaluated, including the TSP.
7	The HEC-RAS calibration of Existing Conditions against the 2007 Pearl River Watershed Feasibility Study results does not appear to be consistent with the decision to use the FEMA discharge estimates for this study.
Significance – Medium	
8	The impacts of construction involving 25 million cubic yards of excavation are not addressed.
9	The Draft FS/EIS does not clearly state whether the mitigation techniques presented are consistent with the current TSP or explain how mitigation would be implemented.
10	The evaluation of the project is focused on the area where flood risk reduction will be provided, but impacts on the river morphology can occur farther downstream, impacting costs under the TSP.
11	It is not clear whether stormwater ponded behind the levees/floodwalls under Alternative B will induce flooding.

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Significance – Medium/Low	
12	The discussion of climate change addresses the significant uncertainty of climate change forecasts but does not evaluate potential impacts under the no action plan or the alternatives.
13	The location and type of the hydraulic model's downstream boundary condition could be affecting the model results.
14	The process for screening nonstructural management measures is not clearly described, was applied inconsistently, and does not comply with USACE guidance.
15	The description of Alternative A, the Buyout Plan, is not complete.
16	The Draft FS/EIS does not fully describe the direct impacts of the TSP on the ringed sawback (map) turtle, a Federally listed species.
Significance – Low	
17	Section 6.0 of the Draft FS/EIS is not consistent in explaining the applicability of the listed environmental laws and compliance requirements to the TSP.
18	The data and conclusions presented in Appendix E (Environmental Justice) are not provided in the text of the Draft FS/EIS.
19	It is unclear why the planning objectives are limited to reducing flood impacts only for transportation routes with more than 10,000 Average Daily Traffic (ADT) counts.
20	The basis for the designs flows is not fully described in Appendix C of the Draft FS/EIS.
21	There is no discussion of energy requirements and conservation potential of various alternatives and mitigation measures, as specified in Council on Environmental Quality (CEQ) regulations.
22	The direct adverse impacts to aquatic resources are not clearly defined in the Draft FS/EIS.
23	It is unclear whether the cost estimates for Alternative C consider the future use of the filled land or account for unspecified (but anticipated) costs associated with fill placement requirements.

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LIST OF ACRONYMS

ADT	Average Daily Traffic
ASACW	Assistant Secretary of the Army for Civil Works
CEQ	Council on Environmental Quality
COI	Conflict of Interest
EA	Environmental Assessment
EC	Engineer Circular
ECB	Engineering and Construction Bulletin
EIS	Environmental Impact Statement
EO	Executive Order
EP	Engineer Pamphlet
EQ	Environmental Quality
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FS	Feasibility Study
GRR	General Reevaluation Report
H&H	Hydrology and Hydraulic
HEA	Habitat Equivalency Analysis
HEC-FDA	Hydrologic Engineering Center-Flood Damage Reduction Analysis
HEC-RAS	Hydrologic Engineering Center-River Analysis System
HEP	Habitat Evaluation Procedure
HTRW	Hazardous, Toxic, and Radioactive Waste
IEPR	Independent External Peer Review
LPP	Locally Preferred Plan
MDAH	Mississippi Department of Archives and History
MDWFP	Mississippi Department of Wildlife, Fisheries, & Parks
NED	National Economic Development

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NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NRDA	Natural Resource Damage Assessment
O&M	Operation and Maintenance
OMB	Office of Management and Budget
P&G	Principles and Guidelines
PB	Planning Bulletin
RM	River Mile
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
TSP	Tentatively Selected Plan
WIIN Act	Water Infrastructure Improvements for the Nation Act
WRDA	Water Resources Development Act
WWTP	Wastewater Treatment Plant

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1. INTRODUCTION

The Integrated Draft Feasibility Study and Environmental Impact Statement (FS/EIS), Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi, was prepared pursuant to Congressional authorization originally enacted in 1986 and most recently reconfirmed in 2016. The Water Infrastructure Improvements for the Nation Act (the WIIN Act), now codified as Public Law 114-322, continues the long-standing Congressional authorization for the project (Section 1322(b)(4)(A)). This newest project authorization instructs the Secretary to "expedite a review and decision on recommendations" made for the project by continuing and modifying the language found in Section 3104 of the Water Resources Development Act (WRDA) of 2007. Section 3104 in turn modifies the Pearl River Basin project originally authorized by Section 401(e)(3) of WRDA 1986 by allowing the Assistant Secretary of the Army for Civil Works (ASACW) to construct a project generally in accordance with the plan described in the Pearl River Watershed, Mississippi, Feasibility Study Main Report, Preliminary Draft, dated February 2007, and to determine the appropriate plan based upon the requirements set out in Section 3104. Section 3104 provides that the ASACW may construct the National Economic Development (NED) plan, the Locally Preferred Plan (LPP), or some combination thereof subject to a determination by the ASACW that the LPP provides the same level of flood protection as the NED plan and that the LPP is environmentally acceptable and technically feasible. Further, Section 3104 provides that the non-Federal interests may carry out the project under Section 211 of WRDA 1996, as amended.

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Effective July 19, 2012, the Flood Control District and USACE entered into a Memorandum of Agreement to undertake and complete a Section 211 Feasibility Report to identify the Federal interest in the Pearl River Watershed, Mississippi, Project, in accordance with the Economic and Environmental Principles and Guidelines for Water and Related Land Resources, March 10, 1983, and the Planning Guidance Notebook, Engineer Regulation (ER) 1105-2-100 (USACE, 2000). The Section 211 Feasibility Report for the Pearl River Basin, titled the Integrated Draft Feasibility Study and Environmental Impact Statement, Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi (Draft FS/EIS), will serve as the decision document for review by the Secretary of the Army. The Draft FS/EIS is being undertaken in accordance with the National Environmental Policy Act of 1969 (NEPA) and USACE regulations for implementing NEPA.

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Municipalities within the study area include Flowood, Jackson, Pearl, and Richland. The study area includes parts of Hinds and Rankin counties. Major tributaries of the Pearl River within the study area include Caney, Eubanks, Hanging Moss, Hog, Lynch, Prairie Branch, Purple, Richland, and Town Creeks. The study area is primarily affected by headwater flooding caused by unusually heavy and intense rainfall over the upper Pearl River Watershed. Although the study area is located primarily within the boundaries described, additional areas downstream were included to address any potential downstream impacts of the proposed project alternatives.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Integrated Draft FS/EIS, Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi (hereinafter: Rankin-Hinds IEPR) in accordance with procedures described in the USACE, Engineer Circular (EC) *Review Policy for Civil Works* (EC 1165-2-217) (USACE, 2018) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). 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).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the Rankin-Hinds IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the schedule followed in executing the IEPR. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to the Flood Control District in the final Work Plan according to the schedule listed in Table A-1.

2. PURPOSE OF THE IEPR

To ensure that documents USACE relies upon to make decisions 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, as described in USACE (2018). This process is also required to be implemented to project documents prepared under authorization of Section 203 of the WRDA.

In general, the purpose of peer review is to strengthen the quality and credibility of the Flood Control District-developed decision documents for flood control projects in support of the USACE Civil Works program. IEPR provides an independent assessment of the engineering, economic, environmental, and plan formulation analyses 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 Rankin-Hinds IEPR was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (as defined by EC 1165-2-217). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE, EPA,

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state and local agencies, and industrial clients. Prior to contracting for the Rankin-Hinds IEPR, Battelle completed an internal organizational COI screening to ensure we were free of COIs before conducting the IEPR.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. The IEPR was completed in accordance with established milestones and deliverables identified as part of the final Work Plan; the due dates are based on the award/effective date, the receipt of review documents, and the receipt of additional information requested during the mid-review call. The schedule was modified throughout the project based on these milestones.

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: Civil Works planning/economics, environmental scientist/NEPA, hydrology and hydraulic (H&H) engineering, and civil/geotechnical engineering. The Panel reviewed the Rankin-Hinds documents and produced 23 Final Panel Comments in response to 27 charge questions provided by the Flood Control District for the review. Additionally, the charge included two overview questions and one public comment question added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)
3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)
4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-217), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and the Flood Control District during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

This section presents the results of the IEPR. A summary of the Panel's findings and the full text of the Final Panel Comments are provided.

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2018) in the Rankin-Hinds IEPR review documents. The following summarizes the Panel's findings.

Based on the Panel's review, the report is well-written and concise, which provided for an easy understanding of the history of the project and the development and selection of the alternatives. However, the Panel identified several elements of the project where additional analyses are warranted and places where clarification of project findings and objectives need to be documented or revised.

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Plan Formulation/Economics: Three of the four most significant issues identified by the Panel are focused on plan formulation. The first issue is whether the final alternative plans demonstrate that the Tentatively Selected Plan (TSP) (which is Alternative C) is the NED plan. For a flood risk management study, identification of the NED plan requires formulation and evaluation of alternatives that offer different degrees of net benefits, such that determination of the alternative that offers the greatest net benefits is feasible. Currently, only Alternative C has positive net NED benefits. There are no other alternatives with positive net benefits. Without a range of alternatives that result in varying levels of positive net benefits, it is not possible to verify that Alternative C (the TSP) provides the greatest net NED benefits. The Panel recommends that the project team formulate and evaluate additional alternative plans designed to result in benefits that are lower than and greater than Alternative C, to verify that Alternative C does, in fact, provide the greatest net NED benefits.

The second major concern is focused on the structural and nonstructural management measures and how they are combined and presented within the report. The initial array of alternatives includes very few combinations of management measures types. As a result, it is not possible to evaluate benefit and cost tradeoffs between the extent of levees/floodwalls and pumps and that of channel improvements. It is possible that if nonstructural management measures (after screening) were included in one or more of the initial array of alternatives, benefits and costs might have been beneficially impacted. The Panel suggests that tradeoffs between management measures be evaluated (e.g., evaluate increased channelization vs. reduced levees/floodwalls) to ensure that the alternatives perform efficiently.

The third major plan formulation issue is that the inclusion of an impractical alternative (Alternative A, the Buyout Plan) in the final array of alternative plans precludes an efficient evaluation of the alternatives that best meet the planning objectives. Because of the detailed and time-consuming evaluation required of the final alternative plans, inclusion of an impractical alternative such as Alternative A prevents consideration of another, practical plan. In order to identify the TSP, alternatives must be identified that provide fewer and greater net NED benefits than the TSP. The Panel recommends that the Buyout Plan be screened out and replaced with another, promising alternative from the initial array of alternatives.

Engineering: The Panel had one primary concern with the engineering analysis and several other lower-level issues. Overall, panel members found the main report concise; however, the lack of detail in the conceptual engineering design affects the evaluation of potential impacts and the cost estimates. For example, Appendix C (Engineering) provides limited engineering documentation to evaluate the possible impacts and costs of Alternatives B and C. The discussions refer to the previous levee and lake plans, the details of which are not presented. Additionally, Section 2.5.2.3 of the Draft FS/EIS, Pearl River Tributaries and Interior Drainage, refers to engineering analyses of interior drainage which resulted in the addition of several new pump stations for Alternative B but not for Alternative C. The models, assumptions, and results of these analyses are not provided in the report. Since pump station costs are a significant component of Alternative B, this issue could affect the selection of the most cost-effective alternative. The lack of detail in the engineering analysis may be exacerbating uncertainty to the extent that the selection of the TSP could be affected. The Panel recommends providing conceptual levee plans and cross-sections showing the extent of the proposed improvements, approximate grades, and location of key features. Additional details in Appendix C (Engineering) regarding interior drainage engineering analyses should also be provided.

The Panel is concerned that the economic feasibility of the TSP is uncertain due to the lack of connection between the modeling results, engineering analysis, design drawings, and cost estimates. For example, the results of the H&H analysis include the modeled water surface and top-of-levee elevations along the

project area for Existing Conditions and With-Project. It is not clear, however, if the top-of-levee elevations shown in the figures for Alternatives B and C correspond to the proposed levee work. Additionally, the Interior Analysis section of the H&H analysis discusses the modeling conducted to determine interior drainage needs, including pumping requirements, but there is no explicit connection with the typical plan view and typical cross section, nor with the quantities and cost estimates subsequently presented in the Cost Engineering section.

Another prominent issue is related to the Hydrologic Engineering Center-River Analysis System (HEC-RAS) calibration of Existing Conditions against the 2007 Pearl River Watershed Feasibility Study results. There appears to be contradictory information within the tables and text, raising questions about the applicability of the results and the potential impact on the determination of benefits for the with-project alternatives. If the calibration had been performed against the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) results, the water surface elevations modeled for Existing Conditions would be lower, and potentially the benefits would be smaller because the flood level reduction attributable to the with-project alternatives would be consequently smaller. The Panel suggests that the rationale for calibrating the hydraulic model for Existing Conditions against the 2007 Pearl River Watershed Feasibility Study instead of the FEMA FIS results be described in the report.

The Panel noted that the potential construction means and methods associated with excavation and placement of a large quantity of soil are not addressed. As a result, the lack of detail associated with construction makes it difficult to evaluate air quality, water quality, noise impacts, and cost implications. The Panel suggests that (1) further discussion and evaluation of the impacts be included in the report (including a discussion of the possible mix of equipment for various alternatives, methods, and approximate durations) and (2) the assumption that unit costs in the cost estimates are consistent with the proposed range of means and methods be confirmed.

Environmental/NEPA: The Panel found that the discussion regarding wetland delineation and the Habitat Evaluation Procedures (HEPs) was detailed and comprehensive; however, panel members did have several concerns regarding the environmental analysis. The HEP analysis in the Draft FS/EIS does not clearly state whether proposed mitigation techniques are consistent with the current TSP, and, if so, how successful the opportunities for in-kind mitigation would be. Potential adverse impacts to obligate and facultative riverine guilds due to project construction may not be successfully mitigated if the mitigation techniques are not consistent with the TSP. The Panel recommends clarifying whether the mitigation for aquatic resources under the current TSP will provide suitable habitat for riverine fish species and will include in-kind mitigation for loss of obligate riverine fish habitat.

The Panel also found that the Draft FS/EIS identifies three hazardous, toxic, and radioactive waste (HTRW) sites that present issues of concern. While the existence of these sites has been identified, the potential costs for site remediation may be significantly understated in the cost estimates and risk analysis, potentially affecting the selection of the TSP. The Panel recommends that additional site characterizations be conducted and that a detailed evaluation of possible remedial measures/costs, including contaminated soil/landfill waste disposal and groundwater remediation, be provided.

The Panel found that the discussion of climate change acknowledges the significant uncertainty of climate change forecasts but does not evaluate potential impacts under the no action plan or the alternatives. Without an assessment of potential climate change impacts, it is not possible to evaluate how project benefits might be impacted. The Panel recommends a qualitative analysis that considers both past (observed) impacts and potential future (projected) impacts to relevant hydrologic inputs based on

applicable USACE guidance. The analysis should explain how the performance of the no action plan and the alternatives might be impacted.

The Panel noted that the Draft FS/EIS is not consistent in explaining the applicability of the listed environmental laws and compliance requirements to the TSP. Applicable Federal statutes and executive orders are listed in Section 6.0. In some cases, the Draft FS/EIS explains how a requirement relates to the TSP (for example, Federal Aviation Administration Hazardous Wildlife Attractants On or Near Airports). In most cases, however, no explanation is provided to demonstrate TSP compliance with these environmental laws. The Panel suggests that the Draft FS/EIS explain how compliance with each executive order/compliance requirement has been or will be achieved.

4.2 Final Panel Comments

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members.

Final Panel Comment 1

The final alternative plans do not definitively demonstrate that the TSP is the NED plan.

Basis for Comment

Engineer Regulation (ER) 1105-2-100 (USACE, 2000; p. 2-7) states that "For all project purposes except ecosystem restoration, the alternative plan that reasonably maximizes net economic benefits consistent with protecting the Nation's environment, the NED plan, shall be selected." There is no minimum level of USACE participation in flood risk management (ER 1105-2-100, paragraph 3-3.b.(2(c)). For a flood risk management study, identification of the NED plan requires formulation and evaluation of alternatives that provide a range in the level of protection to show how net NED benefits incrementally increase with increasing levels of protection until net NED benefits and the level of protection no longer increase in tandem. Table 3-8 (Draft FS/EIS, p. 124) shows the net NED benefits for the final alternative plans and is used to identify the NED plan; however, only one of the final alternative plans has positive net NED benefits. There is no alternative that provides greater NED benefits than the TSP, but due to higher costs results in lower net NED benefits.

Significance – High

Without an evaluation of a range of alternatives that provide varying levels of protection (both lower than and greater than Alternative C), it is not possible to verify that the TSP provides the greatest net NED benefits.

Recommendations for Resolution

1. Formulate and evaluate additional alternative plans designed to provide levels of protection that are lower than and greater than Alternative C to verify that it provides the greatest net NED benefits.

Literature Cited

USACE (2000). Planning Guidance Notebook. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) No. 1105-2-100. April 22, 2000.

Final Panel Comment 2

The report does not provide a rationale for how structural and nonstructural management measures were combined to form the initial array of alternative plans.

Basis for Comment

The initial array of 16 alternative plans (Draft FS/EIS, pp. 101 and 102) is presented in five structural management measure categories. There is no description of a comprehensive set of structural flood control management measures, techniques for screening management measures, or a process by which structural and nonstructural management measures were combined to form alternative plans. The initial array of alternatives includes very few combinations of management measure types. As a result, it is not possible to evaluate benefit and cost tradeoffs between the extent of levees/floodwalls and pumps and that of channel improvements. It is possible that if additional channelization was included in one or more of the Levees, Floodwalls, and Pumps alternatives described on p. 102 of the Draft FS/EIS, a plan that provides greater benefits with lower costs might exist. It is also possible that if nonstructural management measures (after screening) were included in one or more of the initial array of alternatives, benefits and costs might have been beneficially impacted. As a result, the initial array of alternatives that were considered may have not considered a plan that would be superior to the TSP.

Significance – High

The plan formulation methodology may have failed to identify another alternative that might provide the same or greater NED benefits at a reduced cost.

Recommendations for Resolution

1. Evaluate tradeoffs between management measures (i.e., evaluate increased channelization vs. reduced levees/floodwalls and pumps) to ensure that the alternatives perform efficiently by:
    a. Formulating an expanded initial array of alternative plans consisting of a mix of one or more structural and nonstructural management measures.
    b. Applying a quantitative or qualitative evaluation of the initial array of alternatives to identify the alternative plans to be evaluated in greater detail.
    c. Refining the final alternatives so the mix and relative extent of structural and nonstructural management measures provides the greatest benefits at the lowest cost.

Final Panel Comment 3

Alternative A, the Buyout Plan, is impractical, and its inclusion in the final array of alternative plans precludes an efficient evaluation of the alternatives that best meet the planning objectives.

Basis for Comment

The Draft FS/EIS (p. ix) and Appendix A (Section A.5.2.1) state that the buyout plan was included in the final array of alternatives to comply with a USACE requirement (Engineer Pamphlet [EP] No. 1165-2-314) that a stand-alone nonstructural alternative be considered through the entire planning process (USACE, 1995). However, EP 1165-2-314, *Flood Proofing*, establishes USACE flood-proofing regulations to specify the minimum building standards and requirements to "… safeguard life or limb, health, property, and public welfare …" (p. 2-1). Planning Bulletin (PB) 2016-01 (USACE, 2015), *Clarification of Existing Policy for USACE Participation in Nonstructural Flood Risk Management and Coastal Storm Damage Reduction Measures*, states (p. 2): "While a minimum of one primarily nonstructural plan (Section 73 of the Water Resources Development Act of 1974 (WRDA 1974)) must be considered, the combination of structural and nonstructural measures should be utilized to formulate complete plans." Under this guidance, a nonstructural plan that is not practical does not need to be considered among the final alternatives.

Because of the detailed and time-consuming evaluation required of the final alternative plans, inclusion of an impractical alternative prevents consideration of another, practical plan. In order to identify the TSP, a range of alternatives that provide both fewer and greater net NED benefits than the TSP must be identified.

Significance – High

By including an impractical alternative in the final evaluation, limited planning resources are wasted, and it is not possible to definitively identify the TSP.

Recommendations for Resolution

1. Screen the buyout plan based on the reason that it is considered to be impractical, and do not include it in the final alternatives.
2. Replace the buyout plan with another, promising alternative from the initial array of alternatives.

Literature Cited

USACE (1995). Flood Proofing. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Pamphlet (EP) No. 1165-2-314. December 15, 1995.

USACE (2015). Clarification of Existing Policy for USACE Participation in Nonstructural Flood Risk Management and Coastal Storm Damage Reduction Measures. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Planning Bulletin (PB) No. 2016-01. December 22, 2015.

WRDA (1974). Water Resources Development Act of 1974, Public Law 93-215, March 7, 1974.

Final Panel Comment 4

The lack of detail in the conceptual engineering design affects the evaluation of potential impacts and the cost estimates.

Basis for Comment

Appendix C (Engineering) provides limited engineering documentation to evaluate the possible impacts and costs of Alternatives B and C. The discussions refer to the previous levee and lake plans, the details of which are not presented. Appendix C does not include conceptual levee plans showing the extent/grades of the proposed improvements or the features.

Figure 3-5 in the Draft FS/EIS shows Alternative B. Figures 3-6, 5-1, 5-2, and 5-3 show the Channel Improvement Alternative Layout. Appendix C includes limited plan and profile information of weir and levee improvements for Alternative B. However, these schematic illustrations do not provide sufficient detail to evaluate the engineering aspects of the project alternatives.

Section 2.5.2.3 of the Draft FS/EIS, *Pearl River Tributaries and Interior Drainage*, refers to engineering analyses of interior drainage which resulted in the addition of several new pump stations for Alternative B but not for Alternative C. The models, assumptions, and results of these analyses are not provided in the report. Since pump station costs are a significant component of the Alternative B, this issue could affect the selection of the most cost-effective alternative.

Appendix C briefly discusses subsurface conditions and includes excerpts of boring location plans, profiles at various locations, and limited geotechnical calculations. However, the report does not provide a rationale for the development of geotechnical models or explain how the limited geotechnical calculations relate to the alternative designs. For the selected Alternative C, an assessment of the material types, moisture condition, and strength of the soil in the excavation may have a significant effect on the construction means and methods. This could affect project costs as well as impacts during construction.

For Alternative B, the Abbreviated Risk Analysis in the cost engineering section of Appendix C indicates that a contingency of 74% was applied to “Levees and Earthwork” and 71% to the “Pumping Plant” line items. These two items account for a significant portion of the total project cost.

The lack of detail in the engineering analysis may be exacerbating uncertainty to the extent that it could affect the selection of the TSP.

Significance – High

A better understanding of conceptual engineering analyses and detail is necessary to validate the selection of the TSP.

Recommendations for Resolution

1. Provide conceptual levee plans and cross-sections showing the extent of the proposed improvements, approximate grades, and location of key features.
2. Provide additional details in Appendix C (Engineering) regarding interior drainage engineering analyses.
3. Provide preliminary interpretative cross sections showing the variation subsurface conditions as they relate to the Alternatives B and C improvements.

Final Panel Comment 4

4. Discuss how geotechnical conditions will impact design of levees, new cut and fill slopes, and placement and compaction of new mass fill.
5. Explain the selection of contingency applied to various work features.

Final Panel Comment 5

The three HTRW sites identified in the Draft FS/EIS are not sufficiently characterized to determine the adverse impacts on the Pearl River and on the overall project cost.

Basis for Comment

Section 2.5.14 of the Draft FS/EIS identifies three HTRW sites that present issues of concern. Alternative C is the only alternative which would have direct impacts on these sites. Although, the HTRW Environmental Evaluation Study (Appendix C) states that the potential costs for remedial actions for the sites is included in the Alternative C total cost, it is not clear that these costs are sufficient. The cost estimate has a section for "Landfill Removal" which has line items for landfill excavations and landfill lining.

For Alternative C, the most significant of the HTRW sites, is the former Gulf States Creosote Company site. The Environmental Evaluation Study indicates that portions of the channel excavation would occur within the area impacted by the former creosote company operations. Possible remedial measures have been identified "as capping in order to permanently cover and not disturb the sediments, or excavating and removing the impacted sediments prior to dredging the lake". If a capping alternative is selected, sediments would be capped and left in place, and the limits of the new channel would be reduced. The hydraulic impact of a reduced channel width has not been addressed. Depending on the concentrations of heavy metals and polynuclear aromatic hydrocarbons in the sediment and groundwater, excavation and onsite reburial may not be permitted by the regulatory agencies. If offsite disposal at a properly licensed facility were required, the costs of excavation and disposal may be many times the current estimated costs.

A similar concern exists for the Former Gallatin Street Dump site. While this site appears to primarily contain municipal wastes, large portions (2/3) of the landfill will be excavated and relocated, possibly to the other remaining portion of the landfill, increasing the elevation. The Environmental Evaluation Study suggests that the elevated mound could provide public access for a park and recreational facilities, but that assumes that the waste characterization would prove the materials suitable for such a use and that the regulatory agencies would approve. The potential cost of disposal may be less that that associated with the Gulf States site, but substantially more than that assumed in the cost estimate.

For the LeFleurs Landing Site/Jefferson Street landfill area, the Environmental Evaluation Study indicated that during previous investigations of the underground storage tank (UST) area, one monitoring well was sampled in 2004 and the benzene concentration in groundwater was 3.8 ppm. The current regulatory standard for benzene is .005 ppm. The study also indicates that the landfill portion of the site was investigated, and that soil and groundwater samples were collected but there is no discussion of the results. Soil excavation has been conducted in the UST area of the site, however, there is no indication that the extent of the impacted groundwater has been defined.

The implementation of Alternative C will require comprehensive site characterization, and the engineering and implementation of remediation techniques to address potential impacts. It is not clear that all of these costs have been considered. The remediation techniques identified in the Environmental Evaluation Study include the installation of slurry cutoff wall, groundwater pump/treat systems, impermeable caps, or the use of in-situ bioremediation techniques, among others. Because the sites have not been fully characterized, these costs are unknown but are likely to far exceed the cost section for "Landfill Removal".

Significance – High

The potential costs of HTRW site remediation may be significantly understated in the cost estimates and risk analysis, potentially affecting the selection of the TSP.

Recommendations for Resolution

1. Conduct full site characterizations to assess the nature and extent of soil and groundwater contamination and to determine leachate and groundwater flow patterns.
2. Provide a more detailed evaluation of possible remedial measures/costs, including contaminated soil/landfill waste disposal and groundwater remediation.
3. Evaluate the potential impact of avoiding or reducing excavation limits in HTRW sites on river hydraulic analysis.

Final Panel Comment 6

There is minimal explicit connection between the modeling results, the dimensioning of the structures, and the associated cost estimates for the alternatives evaluated, including the TSP.

Basis for Comment

The results of the H&H analysis presented in Figures 3-5, 3-6, and 3-7 of Appendix C include the modeled water surface and top-of-levee elevations along the project area for Existing Conditions and With-Project. It is not clear, however, if the top-of-levee elevations shown in these figures for Alternatives B and C correspond to the proposed levee work. Furthermore, and more importantly, there are no summary tables connecting these modeling results with the plan and profile drawings for the different levee segments that are included in the same Appendix C, nor with the quantities and cost estimates subsequently presented in the Cost Engineering section of Appendix C. Providing such connection in a more explicit form will facilitate review of the proposed design and cost estimates.

Similarly, the Interior Analysis section of the H&H analysis presented in Appendix C discusses the modeling conducted to determine interior drainage needs, including pumping requirements, but there is no explicit connection with the typical plan view and typical cross section shown in the same Appendix C, nor with the quantities and cost estimates subsequently presented in the Cost Engineering section of Appendix C. Additionally, potential issues that should be included in the risk register of the project may not have been identified.

Significance – Medium/High

The economic feasibility of the TSP is uncertain due to the lack of connection between the modeling results, engineering analysis, design drawings, and cost estimates.

Recommendations for Resolution

1. Include a roadmap and summary tables that provide a clear link between the different sections of Appendix C dealing with modeling, engineering analysis, drawings, quantities, and cost estimates.

Final Panel Comment 7

The HEC-RAS calibration of Existing Conditions against the 2007 Pearl River Watershed Feasibility Study results does not appear to be consistent with the decision to use the FEMA discharge estimates for this study.

Basis for Comment

Appendix C of the Draft FS/EIS presents the H&H analysis and the calibration of the hydraulic model (HEC-RAS). However, there appears to be contradictory information within the tables and text, raising questions about the applicability of the results and the potential impact on the determination of benefits for the with-project alternatives. For example.

1. The paragraph below Table 2-1 (Appendix C, Hydrologic and Hydraulic Analysis section, p. 3) of the H&H analysis states the following: "It was decided to utilize the FEMA discharge estimates for this study." However, Section 3.4.1 (Appendix C, Hydrologic and Hydraulic Analysis section, p. 7) states that "The existing conditions model was…calibrated for the 1% annual chance flood event to the respective estimated stage-discharge relations published in 2007 USACE Feasibility Study, while using the FEMA FIS as a check." Section 3.4.1 then states that the calibration criteria of a maximum 0.5-foot elevation differential is applied to the 2007 USACE Feasibility Study only.
2. In Table 3-1, the FEMA FIS water surface elevations are lower than those corresponding to the 2007 USACE Feasibility Study by as much as approximately 2.5 feet.
3. In Table 3.1, the difference in water surface elevations between the Existing Conditions modeled in this study and the FEMA FIS results is in the range of 1 to 2 feet, which does not meet the calibration criteria threshold of a 0.5-foot elevation differential.

If the calibration had been performed against the FEMA FIS results, the water surface elevations modeled for Existing Conditions would be lower, and potentially the benefits would be smaller because the flood level reduction attributable to the with-project alternatives would be consequently smaller.

Significance – Medium/High

Developing and applying models that are consistent with decisions pertaining to the design flow estimates to use will influence the evaluation of project impacts and the determination of benefits for Alternatives B and C.

Recommendations for Resolution

1. Describe the rationale for calibrating the hydraulic model for Existing Conditions against the 2007 Pearl River Watershed Feasibility Study instead of the FEMA FIS results.
2. Depending on the answer to the first recommendation:
    a. recalibrate the hydraulic model for Existing Conditions against the FEMA FIS results.
    b. rerun the hydraulic models for Alternatives B and C using the recalibrated model per 2(a).

Final Panel Comment 8

The impacts of construction involving 25 million cubic yards of excavation are not addressed.

Basis for Comment

The Draft FS/EIS does not address the potential construction means and methods associated with excavation and placement of a large quantity of soil. As a result, the lack of detail associated with construction makes it difficult to evaluate air quality, water quality, noise impacts, and cost implications.

Use of excavators and haul trucks, as compared to various dredging methods, will affect the mix and duration of equipment used. Equipment type and duration of use will affect air quality and create noise during construction. In addition, different excavation methods will involve varying dewatering and storm water control measures, which could affect the assessment of water quality impacts during construction. In addition, construction impacts associated with work occurring over multiple construction seasons are not evaluated. Such work may include interim dewatering and erosion control in addition to long-term measures for the completed work. Finally, discussion of potential construction means and methods can be used to validate the unit cost assumed in the cost estimates.

Significance – Medium

Potential environmental impacts during construction cannot be fully evaluated without a better understanding of the possible range of construction means and methods.

Recommendations for Resolution

1. Describe potential construction means and methods, including use of excavators, haul trucks, and dredging.
2. Evaluate measures to mitigate water quality impacts from excavation and fill site dewatering during construction and long-term, including consideration of construction occurring over multiple construction seasons.
3. Discuss the possible mix of equipment for various alternatives, methods, and approximate durations.
4. Confirm that unit costs assumed in the cost estimates are consistent with the proposed range of means and methods.

Final Panel Comment 9

The Draft FS/EIS does not clearly state whether the mitigation techniques presented are consistent with the current TSP or explain how mitigation would be implemented.

Basis for Comment

The Draft FS/EIS Habitat Evaluation Procedure (HEP) analysis uses a 2006 aquatic evaluation previously developed for a previously considered project, the Pearl River Watershed Feasibility Study Two Lakes Flood Control Plan. It is not stated in the draft FS/EIS that the same mitigation approach for aquatic resources described in the 2006 aquatic evaluation is also being utilized for the TSP. The 2006 aquatic evaluation recommends a mitigation approach of a 1:1 ratio for obligate riverine species, and states that tradeoffs among guilds and opportunities for in-kind mitigation will be important considerations in the final mitigation plan.

The 2006 aquatic evaluation determined that obligate and facultative riverine guilds would be adversely impacted, and that obligate riverine species (which represent approximately 20% of the fish assemblage) would become rare or be extirpated from the project area after construction was completed. The lake habitat suitability index for facultative riverine species was more than 50% lower than for existing conditions.

However, the 2006 aquatic evaluation stated that in-kind mitigation for loss of obligate riverine fish habitat would be limited, and four potential mitigation techniques were proposed: (1) reconnecting secondary channels, (2) reconnecting or managing water levels of backwaters, (3) protecting/creating gravel bars, and (4) constructing in-lake weirs. The HEP analysis in the Draft FS/EIS does not clearly state whether these proposed mitigation techniques are consistent with the current TSP, and, if so, how successful the opportunities for in-kind mitigation would be.

Significance – Medium

Potential adverse impacts to obligate and facultative riverine guilds due to project construction may not be successfully mitigated if the mitigation techniques recommended in the 2006 aquatic evaluation are not consistent with the TSP.

Recommendations for Resolution

1. Clarify that mitigation for aquatic resources under the current TSP will provide suitable habitat for riverine fish species and will include in-kind mitigation for loss of obligate riverine fish habitat.

Final Panel Comment 10

The evaluation of the project is focused on the area where flood risk reduction will be provided, but impacts on the river morphology can occur farther downstream, impacting costs under the TSP.

Basis for Comment

One of the main recommendations of the preliminary sediment impact assessment presented in Appendix C is that additional analysis or investigations will be required during the feasibility assessment. In this regard, channel erosion, sedimentation, or changes to the river planform downstream of the project area could be triggered by the substantial modification of the river channel between RM 284 and RM 293.5. The potential for these impacts should be evaluated, including estimation of the associated mitigation costs that might be required, because these potential impacts would affect the overall evaluation of the TSP feasibility and cost. Information in the preliminary sediment impact assessment presented in Appendix C can serve as input for this evaluation.

Significance – Medium

Impacts on the river morphology downstream of the project area may need to be addressed through mitigation measures, and the cost and timing of such measures may affect overall implementation of the TSP.

Recommendations for Resolution

1. Evaluate the potential for channel erosion, sedimentation, or changes to the river planform downstream of RM 284.
2. Estimate mitigation costs associated with these impacts for the TSP.

Final Panel Comment 11

It is not clear whether stormwater ponded behind the levees/floodwalls under Alternative B will induce flooding.

Basis for Comment

The H&H analysis presented in Appendix C discusses potential needs for interior drainage, including pumping requirements, but it is not clear if the discussion in the Interior Analysis section is comprehensive for Alternative B. Although the cost estimate includes nearly $200 million for pumping, there are several indications in the Draft FS/EIS that an engineering analysis has not been completed for Alternative B.

- "Alternative B is expected to result in indirect short-term impacts to existing hydrology with respect to areas behind levees where an additional amount of water will pond. This ponded water will have the potential to back up into adjacent areas and be stored until the water elevation subsides as a result of levee gate opening, pumping, and/or evaporation." (p. 133)
- "…some areas will have direct adverse impacts due to the potential for impounding drainage in the sump areas" with Alternative B. (p. 143)
- "This alternative [B] will have minimal beneficial direct and indirect impacts on the community's ability to further develop its business and industrial activities. Some areas will have moderate adverse direct and indirect impacts on thee resources due to possible impoundment drainage in sump areas." (p. 145)

Significance – Medium

Not accounting for the potential to induce flooding or for additional interior drainage requirements will have an impact on the economic feasibility of the alternatives evaluated.

Recommendations for Resolution

1. Present the engineering analysis for interior drainage of Alternative B
2. Explicitly list the pumping requirements that will support the cost estimates of Alternative B.

Final Panel Comment 12

The discussion of climate change addresses the significant uncertainty of climate change forecasts but does not evaluate potential impacts under the no action plan or the alternatives.

Basis for Comment

USACE policy requires consideration of climate change in all current and future studies to reduce vulnerabilities and enhance the resiliency of the U.S. water resource infrastructure. USACE Engineering and Construction Bulletin No. 2016-25 (USACE, 2016) provides USACE with initial guidance for incorporating climate change information in hydrologic analyses in accordance with USACE's overarching climate change adaptation policy. Section 3.6 of the Draft FS/EIS states that, "… changes to the climate were considered …" However, the only discussion relates to the uncertainty of climate change forecasts and no description is provided of potential impacts of climate change on the no action plan or the final alternatives.

Significance – Medium/Low

Without an assessment of potential climate change impacts, it is not possible to evaluate how project benefits might be impacted.

Recommendations for Resolution

1. Provide a qualitative analysis that considers both past (observed) impacts and potential future (projected) impacts to relevant hydrologic inputs based on applicable USACE guidance, including how the performance of the no action plan and the alternatives might be impacted.

Literature Cited

USACE (2016). Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineering and Construction Bulletin No. 2016-25. September 16, 2016.

Final Panel Comment 13

The location and type of the hydraulic model's downstream boundary condition could be affecting the model results.

Basis for Comment

The hydraulic model results for the with-project condition are presented in Table 3-2 (for Alternative B) and Table 3-3 (for Alternative C) of the H&H analysis section in Appendix C. A review of the results suggests that the location of the model downstream boundary condition may be "artificially" fixing the water surface elevations along the downstream segment of the model domain, particularly for Alternative C in the reach between RM 279 and RM 284. Given the expected hydrograph attenuation of the Pearl River downstream of RM 284 (due to the massive channel excavation and widening upstream), it does not seem intuitive that the water surface profile will be the same for Existing Conditions and With-Project downstream of this location. An alternative explanation could be given by the type of downstream boundary condition set in the model, or the possible use of an "internal" boundary condition at the weir location in RM 284, yet the result is not intuitive and may be a model artifact.

Furthermore, the location of the model's downstream boundary condition may influence model results in the case of a relatively low gradient riverine system like the Pearl River, but the Draft FS/EIS does not discuss the reasons for selecting RM 279 as an appropriate location for such boundary condition.

Significance – Medium/Low

If the hydraulic model results are biased due to the type and location of the model's downstream boundary, the project design and evaluation of impacts could be affected.

Recommendations for Resolution

1. Describe the type of boundary condition (from a hydraulics viewpoint—e.g., rating curve for Existing Conditions) used at the model's downstream boundary condition, and discuss its effect on the modeled water surface elevations along the downstream segment of the model domain.
2. Indicate what type of hydraulics representation has been given for the weir (in RM 284) included in Alternative C, and discuss its impact on the water surface elevations downstream of the weir.
3. Conduct a sensitivity analysis of the location of the model's downstream boundary condition on the water surface elevations modeled in the project area, including upstream of RM 284 for Alternative C.

Final Panel Comment 14

The process for screening nonstructural management measures is not clearly described, was applied inconsistently, and does not comply with USACE guidance.

Basis for Comment

Explanations for why some nonstructural management measures were dropped while others were carried forward are not consistent or are not clear (Draft FS/EIS, p. 100; Section A.5.1 of Appendix A). For example, Flood Warnings, Flood Insurance, and Flood Plain Ordinances are all currently in place and are included in the future without-project condition, but only flood insurance and flood plain ordinances are carried forward.

Many USACE flood risk management studies do not consider management measures in alternative plan formulation if they are included in the future without-project condition. Flood proofing was dropped from consideration because "…it is not recognized by the National Flood Insurance Program (NFIP) for any flood insurance premium rate reduction…" (Draft FS/EIS, p. 100). Planning Bulletin 2016-1 (USACE, 2015), *Clarification of Existing Policy for USACE Participation in Nonstructural Flood Risk Management and Coastal Storm Damage Reduction Measures*, states: "Local flood ordinances and National Flood Insurance Program (NFIP) regulations alone are not sufficient criteria for screening nonstructural measures" (p. 2). Furthermore, the nonstructural management measures that were retained for further consideration were not used in any alternatives. No explanation for this is provided in the Draft FS/EIS; therefore, it is unclear why nonstructural management measures were not included in the initial array of alternatives.

Significance – Medium/Low

Without a clear explanation, and rigorous application, of the screening process for nonstructural measures, the analysis of alternatives cannot be considered complete.

Recommendations for Resolution

1. Develop screening criteria based on the planning objectives and apply them in a consistent manner to the full set of nonstructural management measures.
2. Include the nonstructural management measures that remain after screening in the initial array of alternative plans.

Literature Cited

USACE (2015). Clarification of Existing Policy for USACE Participation in Nonstructural Flood Risk Management and Coastal Storm Damage Reduction Measures. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Planning Bulletin (PB) No. 2016-01. December 22, 2015.

Final Panel Comment 15

The description of Alternative A, the Buyout Plan, is not complete.

Basis for Comment

A comprehensive description of Alternative A is required for preparing a cost estimate and for assessing the impacts of the alternative relative to the other final alternatives. The following issues are not addressed in the report.

- The Draft FS/EIS states (p. 111) that "… no risk management improvement would be realized at the $300 million [wastewater treatment] plant …" under the buyout plan. It does not explain why the wastewater treatment plant (WWTP) would not be relocated as part of the plan.
- There is no discussion of whether the WWTP would still be needed if the structures in the study area serviced by the WWTP were relocated.
- Section 3.7 of the Draft FS/EIS (p. 123) states that the NED benefits of the buyout plan would be negligible and that environmental quality (EQ) would not improve. Buyout of the existing structures in the floodplain would result in flood damage reduction benefits relative to the without-project condition, resulting in NED benefits that could be comparable to the TSP. It is not clear why removal of the existing structures in the floodplain would not increase available fish and wildlife habitat, thereby improving EQ.
- The Draft FS/EIS does not explain why the WWTP would not be provided with a ring levee under the buyout plan, as it is with the TSP.
- Table 3-8 of the Draft FS/EIS (p. 125) does not include interest during construction for the buyout plan. Although there would be no construction under the plan, it would take many years to implement the buyout plan, so the cost of money associated with the implementation timeframe should be accounted for in the total project cost.
- Table 3-8 does not include costs for interest/amortization/initial investment or for operation and maintenance, repair, replacement and rehabilitation. Both of these costs should be documented, in addition to average annual benefits, net annual benefits, and benefit-cost ratio.
- The Draft FS/EIS does not state whether the buyout plan would include physical removal of the structures or explain how the area would be maintained after implementation.

Significance – Medium/Low

Without a clear description of the buyout plan, its costs, benefits, and impacts cannot be fully evaluated.

Recommendations for Resolution

1. Provide a comprehensive description of the buyout plan: what it would consist of, how it would be implemented, and what maintenance would be required.
2. Verify that the documented benefits and costs are accurate based on the comprehensive description of the plan.

Final Panel Comment 16

The Draft FS/EIS does not fully describe the direct impacts of the TSP on the ringed sawback (map) turtle, a Federally listed species.

Basis for Comment

Review of the USFWS 5-Year Review: Summary and Evaluation for the ringed sawback (map) turtle (*Graptemys oculifera*) (2010) indicates that:

> "An impoundment for flood control of the Pearl River within ringed map turtle habitat at Jackson, Mississippi, south of the existing Ross Barnett Reservoir, has been considered…If the proposed reservoir is completed, it would likely result in the extirpation of the known ringed map turtle population at this location. The population at this location represents the best-known population on the Pearl River south of the Ross Barnett Reservoir".

The Draft FS/EIS describes the direct impacts to the species from implementation of the TSP as minor in intensity and long-term in duration. The Draft FS/EIS also acknowledges that ringed sawback turtle survey efforts have been limited and that the exact extent of the turtle population within the project area is not known at this time. Although the Mississippi Department of Wildlife Fisheries and Parks (MDWFP) and USFWS believe that ringed sawback turtles are present and utilize the stretch of the river within the TSP, their survey and monitoring efforts have not included most of the stretch of the Pearl River encompassing the TSP project area.

The first criterion listed in the USFWS 5-Year Review for the ringed sawback turtle's recovery plan calls for protection of a total of 150 miles of the turtle's habitat in two reaches of the Pearl River located on opposite ends of the Ross Barnett Reservoir at Jackson. No areas have been formally protected south of the Ross Barnett Reservoir. The first Recommendation for Future Actions in the USFWS 5-Year Review is "Conduct an analysis of potential effects to the ringed map turtle from a proposed impoundment of the Pearl River at Jackson, Mississippi." As stated in the FS/EIS, the extent of the ringed sawback (map) turtle population within the project area is not known at this time; therefore, the extent of potential impacts cannot be determined.

The FS/EIS suggests that due to the limited amount of survey efforts and significant data available for the ringed sawback (map) turtle in the project area, an adaptive management approach could provide the optimal opportunity to monitor the potential utilization of the project area by the species. There is no explanation of how potential adaptive management options could be included in the final design to avoid impacts to the species.

Significance – Medium/Low

An understanding of the potential impacts to the ringed sawback (map) turtle is not provided, which could affect selection or implementation of the recommended plan.

Recommendations for Resolution

1. Conduct a ringed sawback (map) turtle population and habitat survey in the TSP project area to determine potential effects.

2. Provide clarification on how “ongoing monitoring of these adaptive management measures” described in the Draft FS/EIS will ensure protection of the species and its habitat prior to project implementation.

Literature Cited

USFWS (2010). Ringed map turtle (*Graptemys oculifera*). 5-Year Review: Summary and Evaluation. Department of the Interior, U.S. Fish and Wildlife Service, Southeast Region, Mississippi Ecological Services Field Office, Jackson, Mississippi.

Final Panel Comment 17

Section 6.0 of the Draft FS/EIS is not consistent in explaining the applicability of the listed environmental laws and compliance requirements to the TSP.

Basis for Comment

Applicable Federal statutes and executive orders are listed in Section 6.0. In some cases, there is an explanation of how this requirement relates to the TSP (for example, Federal Aviation Administration Hazardous Wildlife Attractants On or Near Airports). In most cases, however, no explanation is provided, so how the TSP is compliant with these environmental laws is unclear. For example:

1. For the Coastal Zone Management Program, the project area is not located within the Coastal Zone of Mississippi; therefore, the TSP is in compliance, but Section 6.0 of the Draft FS/EIS does not explicitly state so.
2. Endangered Species Act consultations will continue with the United States Fish and Wildlife Service (USFWS), but Section 6.0 of the Draft FS/EIS does not explicitly state so.
3. Bald and Golden Eagle Act coordination is not described in Section 6.0 of the Draft FS/EIS.
4. Magnuson-Stevens Fisheries Act coordination is not described in Section 6.0 of the Draft FS/EIS.
5. For the National Historic Preservation Act, coordination with the Mississippi Department of Archives and History (MDAH) will continue, but Section 6.0 of the Draft FS/EIS does not explicitly state that.
6. Resource Conservation and Recovery Act issues have been addressed in the Environmental Evaluation of HTRW Site (Appendix C), but a Phase I Environmental Site Assessment was not conducted.
7. For Tribal Consultation, Section 6.0 of the Draft FS/EIS does not state that the USACE Vicksburg District will assist with tribal coordination upon completion of the MDAH review.
8. For EO 11988, the Draft FS/EIS does not address the impacts to floodplains, nor does it state that the 8-step floodplain decision-making process will be implemented. Section 6.0 does not describe how the TSP is compliant with EO 11988.

Significance – Low

An explanation of the status of environmental compliance is necessary for completeness of the document.

Recommendations for Resolution

1. In the Draft FS/EIS, explain how compliance with each executive order/compliance requirement has been or will be achieved.

Final Panel Comment 18

The data and conclusions presented in Appendix E (Environmental Justice) are not provided in the text of the Draft FS/EIS.

Basis for Comment

The Environmental Justice section in the Draft FS/EIS is missing key data points. For example:

1. Table 2-7 does not include any information concerning income and does not specify which areas have a high-percentage minority population.
2. In Section 2.4.8.2, the text does not explain where “Northeast Jackson” fits into the table. The text mentions “three areas with recognized environmental justice concerns,” but the discussion does not explain which three areas in Table 2-7 have been so identified, or how they were identified using the data presented in the table.
3. In Section 2.4.8.2, the only flooding risk discussed is limited to economic damages.
4. Section 4.4.8 includes a discussion about meaningful involvement of all people in the decision-making process, as required by Executive Order (EO) 12898, but does not include a discussion that the involvement has occurred or will occur.

Significance – Low

A comprehensive summary of environmental justice impacts in the Draft FS/EIS that reflects the results of the analysis in Appendix E (Environmental Justice) would improve the understanding of the report.

Recommendations for Resolution

1. Provide a more complete summary of the environmental justice analysis in the Draft FS/EIS.
2. Revise Table 2-7 to include income data and define the three areas with recognized environmental justice concerns.
3. Correct the name of Alternative C (River Channelization) in Appendix E (Environmental Justice) to be consistent with the name of Alternative C (Channel Improvements Plan) in the Draft FS/EIS.
4. Include a discussion of the meaningful public involvement which has occurred and will occur.

Final Panel Comment 19

It is unclear why the planning objectives are limited to reducing flood impacts only for transportation routes with more than 10,000 Average Daily Traffic (ADT) counts.

Basis for Comment

No explanation is provided for how many traffic routes with fewer than 10,000 ADT counts would be impacted and what the economic impacts would be. If there are a very large number of traffic routes with fewer than 10,000 ADT counts that are impacted by flooding, the economic impact could be comparable to the impacts to routes with more than 10,000 ADT counts.

Significance –Low

Without a complete assessment of flood impacts, the analysis of transportation-related economic impacts may be incomplete.

Recommendations for Resolution

1. Explain why 10,000 ADT counts were used as a threshold for the economic analysis.

Final Panel Comment 20

The basis for the designs flows is not fully described in Appendix C of the Draft FS/EIS.

Basis for Comment

Table 2-1 of the H&H analysis in Appendix C summarizes estimated peak discharges at the City of Jackson gage, and the paragraph below Table 2.1 sets forth the decision made about the model source used for this study. This is a key decision for project design and evaluation of impacts, because the flows estimated by different model sources can vary by several thousand cubic feet per second. Therefore, the reasons for arriving at this decision require supporting documentation. Expanding on the reasons discussed during the September 2013 Charrette Meeting with various agency officials and the January 2014 meeting with the United States Geological Survey (USGS) Mississippi Branch would provide a more rigorous basis for the decision-making process.

Significance –Low

Because estimated flows can vary substantially, depending on the model source, project design and evaluation of impacts can be affected.

Recommendations for Resolution

1. Attach the meeting notes of the September 2013 Charrette Meeting with various agency officials and the January 2014 meeting with the USGS Mississippi Branch to Appendix C.

Final Panel Comment 21

There is no discussion of energy requirements and conservation potential of various alternatives and mitigation measures, as specified in Council on Environmental Quality (CEQ) regulations.

Basis for Comment

CEQ regulations (40 CFR § 1500-1508) state that the Environmental Consequences section of NEPA documents should discuss the energy requirements and conservation potential of various alternatives and mitigation measures (40 CFR § 1502.16e; CEQ, 2005). Currently, the Draft FS/EIS does not discuss these items.

Significance –Low

Consideration of energy requirements and conservation potential is required for NEPA consistency.

Recommendations for Resolution

1. Analyze the energy requirements and conservation potential of the various alternatives and mitigation measures.

Literature Cited

CEQ (2005). Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President, 40 CFR § 1500-1508.

Final Panel Comment 22

The direct adverse impacts to aquatic resources are not clearly defined in the Draft FS/EIS.

Basis for Comment

The Draft FS/EIS (p. 186) states that for Alternative C "Some aquatic and fisheries habitats within the proposed fill area would be impacted. However, the project design associated with fill areas will avoid and limit impacts, and a significant "net loss" in aquatic habitat is not anticipated. Given these design considerations, the limited direct impacts would be evident but are not specifically measurable at this time." The aquatic and fisheries habitats within the fill area would be impacted by fill, but unless the approximate acreage of fill is calculated and presented in the report, total impacts under the TSP cannot be assessed and classified according to the impacts terminology defined on p. 128 of the Draft FS/EIS. Additionally, the report states (p. 187) that "Accordingly the construction of Alternative C would not lead to any significant direct impact to these resources within the project area. Given this, the direct, adverse impacts associated with the implementation of Alternative C would be moderate in intensity and long-term in duration." These two statements seem contradictory; therefore, it is unclear whether aquatic resources will be adversely impacted under the TSP.

Significance –Low

Consistent definition of direct adverse impacts to aquatic resources would improve the understanding of the report.

Recommendations for Resolution

1. Define the impacts on aquatic and fisheries habitats within the proposed fill area.

Final Panel Comment 23

It is unclear whether the cost estimates for Alternative C consider the future use of the filled land or account for unspecified (but anticipated) costs associated with fill placement requirements.

Basis for Comment

The Draft FS/EIS states that portions of the newly filled land will be used for construction of new recreation facilities, including roads, parking lots, campgrounds, and other public access improvements. The report does not specify whether the fill will be placed in a manner suitable to support future development or will be placed as an uncompacted mass fill similar to a dredge disposal site.

The cost estimate for Alternative C includes a line item for "Unclassified Excavation." Unclassified excavation typically includes excavating haul roads; clearing and grubbing; or draining the borrow source, removing unsuitable material, excavating the borrow material, and hauling and delivering the material to the fill site. However, it is unclear if subgrade preparation, dewatering of the fill site, moisture conditioning, or compaction of the fill are included in the unit cost for this item. Excavation of clayey soil from the floodplain will result in soils that are wet of optimum and may require extensive effort to dry and compact.

Significance –Low

Fill placement requirements and moisture condition of the excavated soil may impact the cost of fill placement.

Recommendations for Resolution

1. Clarify the anticipated fill placement requirements for the proposed future use.
2. Provide unit costs consistent with anticipated efforts to meet project fill requirements.

5. REFERENCES

CEQ (2005). Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President, 40 CFR § 1500-1508.

OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, D.C. Memorandum M-05-03. December 16, 2004.

The National Academies (2003). Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. The National Academies (National Academy of Science, National Academy of Engineering, Institute of Medicine, National Research Council). May 12, 2003.

USACE (2016). Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineering and Construction Bulletin No. 2016-25. September 16, 2016.

USACE (2015). Clarification of Existing Policy for USACE Participation in Nonstructural Flood Risk Management and Coastal Storm Damage Reduction Measures. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Planning Bulletin No. 2016-01. December 22, 2015.

USACE (2018). Water Resources Policies and Authorities: Review Policy for Civil Works. Engineer Circular (EC) 1165-2-217. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. February 20, 2018.

USACE (2000). Planning – Planning Guidance Notebook. Engineer Regulation (ER) 1105-2-100. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. April 22, 2000.

USACE (1995). Flood Proofing. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Pamphlet No. 1165-2-314. December 15, 1995.

USFWS (2010). Ringed map turtle (*Graptemys oculifera*). 5-Year Review: Summary and Evaluation. Department of the Interior, U.S. Fish and Wildlife Service, Southeast Region, Mississippi Ecological Services Field Office, Jackson, Mississippi.

WRDA (1974). Water Resources Development Act of 1974, Public Law 93-215, March 7, 1974.

NOTICE TO READER – this document contains deliberative discussions between Rankin Hinds Pearl River Flood and Drainage Control District (FCD) and Battelle. Substantive edits to the referenced documents have been made after this report was produced. The reader should not rely on this report as a final position of the FCD.

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APPENDIX A

IEPR Process for the Rankin-Hinds IEPR

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A.1 Planning and Conduct of the Independent External Peer Review (IEPR)

Table A-1 presents the major milestones and deliverables of the Rankin-Hinds IEPR. Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by the Flood Control District on March 27, 2018. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the Comment Response Record (the final deliverable) on June 29, 2018, if all remaining deadlines are met by the Flood Control District Project Team. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table A-1. Major Milestones and Deliverables of the Rankin-Hinds IEPR

Task		Due Date
1	Award/Effective Date	1/22/2018
	Review documents available	3/27/2018
	Public comments available	TBD
	Battelle submits draft Work Plan[a]	2/14/2018
	Flood Control District provides comments on draft Work Plan	3/10/2018
	Battelle submits final Work Plan[a]	3/30/2018
2	Battelle submits list of selected panel members[a]	2/9/2018
	Flood Control District confirms the panel members have no COI	2/28/2018
3	Battelle convenes kick-off meeting with the Flood Control District	1/29/2018
	Battelle convenes kick-off meeting with panel members	4/2/2018
	Battelle convenes kick-off meeting with the Flood Control District and panel members	4/2/2018
4	Panel members complete their individual reviews	4/30/2018
	Panel members provide draft Final Panel Comments to Battelle	5/8/2018
	Rankin-Hinds provides responses to the mid-review questions	6/5/2018
	Panel provides revisions to the Final Panel Comments	6/15/2018
	Panel finalizes Final Panel Comments	6/18/2018
5	Battelle submits Final IEPR Report to the Flood Control District[a]	6/26/2018
6[b]	Battelle convenes Comment Response Teleconference with panel members and the Flood Control District	7/23/2018
	Battelle submits pdf printout of Comment Response Record project file	8/6/2018
	Contract End/Delivery Date	9/4/2018

[a] *Deliverable.*
[b] *Task 6 occurs after the submission of this report.*

At the beginning of the Period of Performance for the Rankin-Hinds IEPR, Battelle held a kick-off meeting with Flood Control District to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope. Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 27 charge questions provided by Flood Control District,

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plus two overview questions and one public comment question added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and after their subcontracts were finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which Flood Control District presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge, as well as the review documents and reference/supplemental materials listed in Table A-2.

Table A-2. Documents to Be Reviewed and Provided as Reference/Supplemental Information

Report Title	No. of Pages
Integrated Draft Feasibility Study and Environmental Impact Statement, Pearl River Watershed, Hinds and Rankin Counties, Mississippi	287
Appendix A – Plan Formulation	46
Appendix B – Economics	50
Appendix C – Engineering	597
Appendix D – Environmental	532
Appendix E – Environmental Justice	19
Appendix F – Cultural Resources Survey	816
Public Comments *(estimate)*[a]	100
Total (including text, tables, and graphics)	**2,447**

[a] *Flood Control District will submit public comments to Battelle upon their availability according to the schedule in Table A-1. Battelle will in turn submit the comments to the IEPR Panel for review. A separate Addendum to the Final Report will be submitted if additional Final Panel Comments are necessary.*

In addition to the materials provided in Table A-2, the panel members were provided the following USACE guidance documents.

- USACE guidance, *Review Policy for Civil Works* (EC 1165-2-217), February 20, 2018
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review,* December 16, 2004.

About three-fourths of the way through the review, a teleconference was held with the Flood Control District, Battelle, and the Panel so that the Flood Control District could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 53 panel member questions to the Flood Control District. The Flood Control District was able to provide responses to most of the questions during the teleconference. They provided their complete response via email to Battelle on June 5, 2018. The Final IEPR Report was held until the mid-review responses were received and the Panel could assess any potential changes to their Final Panel Comments.

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A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response form provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments into a preliminary list of overall comments and discussion points. Each panel member's individual comments were shared with the full Panel.

A.3 IEPR Panel Teleconference

Battelle facilitated a 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 should 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 significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle distributed 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 Rankin-Hinds IEPR:

- 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 a summary email 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 the other panel members as needed and 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/high, medium, medium/low, and 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:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

  2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

  3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

  4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.

  5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.

- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that the Flood Control District 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).

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. At the end of this process, 23 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and the Flood Control District during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.6 Final IEPR Report

After concluding the review and preparation of the Final Panel Comments, Battelle prepared a final IEPR report (this document) on the overall IEPR process and the IEPR panel members' findings. Each panel member and Battelle technical and editorial reviewers reviewed the IEPR report prior to submission to the Flood Control District.

A.7 Comment Response Process

As part of Task 6, Battelle will provide the 23 Final Panel Comments developed by the Panel in a template designed for the Comment Response Process. The Flood Control District will provide responses

(Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All Flood Control District and Panel responses will be documented by Battelle. Battelle will provide the Flood Control District and the Panel a pdf printout of all Final Panel Comments and the associated Evaluator and BackCheck Responses, through comment closeout, as a final deliverable and record of the IEPR results.

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APPENDIX B

Identification and Selection of Panel Members for the Rankin-Hinds IEPR

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B.1 Panel Identification

The candidates for the Rankin-Hinds IEPR Panel were evaluated based on their technical expertise in the following key areas: Civil Works planning/economics, environmental scientist/NEPA, hydrology and hydraulic (H&H) engineering, civil/geotechnical engineering. These areas correspond to the technical content of the review documents and overall scope of the Rankin-Hinds project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected four experts for the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

Candidates were screened for the following potential exclusion criteria or COIs. These COI questions were intended to serve as a means of disclosure to better characterize a candidate's employment history and background. Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE funding have sufficient independence from the Flood Control District and USACE to be appropriate peer reviewers. Guidance in OMB (2004, p. 18) states,

> "…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."

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. The term "firm" in a screening question referred to any joint venture in which a firm was involved. It applied to whether that firm serves as a prime or as a subcontractor to a prime. Candidates were asked to clarify the relationship in the screening questions.

Panel Conflict of Interest (COI) Screening Questionnaire for the Independent External Peer Review (IEPR) of the Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study	
1. Previous and/or current involvement by you or your firm in the Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study and related projects.	

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Panel Conflict of Interest (COI) Screening Questionnaire for the Independent External Peer Review (IEPR) of the Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study	
2. Previous and/or current involvement by you or your firm in flood control projects in the south-central portion of Mississippi and southeastern Louisiana or the Pearl River Watershed.	
3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&M) of any projects in the Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study related projects.	
4. Current employment by the Rankin-Hinds Pearl River Flood and Drainage Control District (the Flood Control District) (a political subdivision of the State of Mississippi).	
5. Previous and/or current involvement with paid or unpaid expert testimony related to Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study.	
6. Previous and/or current employment or affiliation the Rankin-Hinds Pearl River Flood and Drainage Control District (the Flood Control District) or any of the following cooperating Federal, State, County, local and regional agencies, environmental organizations, and interested groups *(for pay or pro bono):* • State of Mississippi • Municipalities: Jackson, Flowood, Pearl, and Richland • Counties: Hinds and Rankin • USACE	
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to in the south-central portion of Mississippi and southeastern Louisiana, specifically the Pearl River Watershed.	
8. 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 position/role. Please highlight and discuss in greater detail any projects that are specifically with the Flood Control District.	
9. Previous or current involvement with the development or testing of models that will be used for, or in support of, the Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study project.	
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Flood Control District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly	

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Panel Conflict of Interest (COI) Screening Questionnaire for the Independent External Peer Review (IEPR) of the Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study	
delineate the percentage of work you personally are currently conducting for the Flood Control District. Please explain.	
11. Any previous employment by USACE as a direct employee, notably if employment was with the Flood Control District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.	
12. Any previous employment by USACE as a contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the Flood Control District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.	
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood control and include the client/agency and duration of review (approximate dates).	
14. Pending, current, or future financial interests in Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study related contracts/awards from USACE.	
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.	
16. Significant portion of your personal or office's revenues within the last three years came from USACE Vicksburg, Mississippi district contracts.	
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study.	
18. Participation in relevant prior and/or current Federal studies relevant to this project and/or Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study.	
19. Previous and/or current participation in prior non-Federal studies relevant to this project and/or Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study.	
20. Has your research or analysis been evaluated as part of the Draft Feasibility Study/Environmental Impact Statement for the Rankin and Hinds Counties, Mississippi, Flood Damage Reduction Study.	
21. 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.	

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B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member's affiliation, location, education, and overall years of experience. 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. The Flood Control District was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. Rankin-Hinds IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Civil Works Planning/Economist					
Lewis Hornung	DR Reed & Associates, Inc.	Jupiter, FL	B.S., Civil Engineering	No	40
Environmental Scientist/NEPA					
Alane Young	Covington Civil & Environmental, LLC	Gulfport, MS	M.S., Geology	N.A.	30
Hydrology and Hydraulic (H&H) Engineer					
Miguel Wong	Barr Engineering Co.	Minneapolis, MN	Ph.D., Civil Engineering	Yes	20+
Civil/Geotechnical Engineer					
R. William Rudolph	Independent Consultant	Tahoe City, CA	M.S., Geotechnical Engineering	Yes	37

Table B-2 presents an overview of the credentials of the final four members of the Panel and their qualifications in relation to the technical evaluation criteria. More detailed biographical information on the panel members and their areas of technical expertise is given in Section B.3.

Table B-2. Rankin-Hinds IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Hornung	Young	Wong	Rudolph
Civil Works Planning/Economist				
Minimum 10 years of demonstrated experience in public works planning	X			
Very familiar with USACE plan formulation process, procedures, and standards	X			
Familiar with evaluation of alternative plans for flood risk management	X			
Very familiar with USACE plan formulation process, procedures, and standards as they relate to flood risk management	X			
Minimum of five years of experience directly dealing with the USACE six-step planning process, which is governed by ER 1105-2-100, Planning Guidance Notebook	X			
Experience related to evaluating traditional National Economic Development plan benefits associated with flood risk management projects, to include experience in USACE methodologies and use of HEC-FDA	X			
NEPA/Environmental Scientist				
At least 15 years of experience directly related to water resource environmental evaluation or review and National Environmental Policy Act (NEPA) compliance		X		
Minimum M.S. degree or higher in a related field		X		
Familiar with the habitat, fish, and wildlife species that may be affected by the project alternatives in this study area		X		
An expert in compliance with additional environmental laws, policies, and regulations, including compliance with Fish and Wildlife Coordination Act and Endangered Species Act		X		
Familiar with United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) (USFWS, 1980)		X		
Hydrology and Hydraulic (H&H) Engineer				
Minimum of 15 years of experience in hydrologic and hydraulic engineering			X	
Experienced with all aspects of hydrology and hydraulic engineering including: urban hydrology, interior drainage systems, riverine/tidal hydraulics, open channel systems, effects of management practices and low impact development on hydrology, design of earthen levees and floodwalls, and use of non-structural systems as they apply to flood proofing, warning systems, and evacuation			X	

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Table B-2. Rankin-Hinds IEPR Panel: Technical Criteria and Areas of Expertise (continued).

Technical Criterion	Hornung	Young	Wong	Rudolph
Familiar with USACE policy in regards to evaluation of projects with respect to sea-level change including impacts, responses and adaptations of projects to sea-level change			X	
Familiar with Hydrologic Engineering Center (HEC) modeling computer software including HEC River Analysis System (RAS), HEC Flood Damage Reduction Analysis (FDA), and HEC Hydrologic Modeling System (HMS)			X	
Registered Professional Engineer			X	
Civil/Geotechnical Engineer				
Minimum of 15 years of experience in geotechnical engineering				X
Preferably an M.S. degree or higher in engineering				X
Demonstrated experience in performing geotechnical evaluation and geo-civil design for all phases of flood risk management projects				X
Experience in urban levees, floodwalls, and channel structures along large river systems				X
Knowledge in earthen levee and floodwall design, pre- and post- construction evaluation and rehabilitation				X
Familiar with and have demonstrated experience related to USACE geotechnical practices associated with flood management channels, construction, and soil engineering				X
Experience in geotechnical risk and fragility analysis				X
Registered Professional Engineer				X

B.3 Panel Member Qualifications

Detailed biographical information on each panel members' credentials and qualifications and areas of technical expertise are summarized in the following paragraphs.

Name	Lewis Hornung
Role	Civil Works Planner/Economist
Affiliation	DR Reed & Associates, Inc.

Mr. Hornung is a planning expert with DR Reed & Associates in Jupiter, Florida, specializing in the planning, economics, design phase, and operation of integrated water resources and public works projects. He earned his B.S. in civil engineering from the University of Houston. His 40-year career includes 19 years with USACE, seven with the South Florida Water Management District, and 14 with architectural/engineering firms. Mr. Hornung has worked on dozens of USACE Civil Works projects since 1977 and is very familiar with applying the Principles and Guidelines. He has taken part in previous IEPR panels for Battelle as a Civil Works planning/economist expert.

Mr. Hornung has direct experience in USACE plan formulation processes, procedures, and standards. He spent more than 12 years in the Planning Divisions of the Galveston and Jacksonville Districts. He then moved to Project Management where he continued to lead planning projects, including the Kissimmee River Restoration Feasibility Study and the Comprehensive Everglades Restoration Plan Feasibility Study. In both cases, he managed the projects through the planning phase and Congressional authorization.

He applied the USACE six-step planning process, governed by Engineer Regulation (ER) 1105-2-100 (Planning Guidance Notebook), for dredged material management plans, reconnaissance studies, feasibility studies, limited re-evaluation reports, general reevaluation reports (GRRs), major rehabilitation reports, and continuing authority studies. He has experience evaluating whether adequate information was available and appropriate technical analyses were completed to support selection of a tentatively selected plan within the context of the risk-informed decision-making process for these studies.

Mr. Hornung's experience includes structural and non-structural flood risk management projects; water quality; inland, deep-, and shallow-draft navigation; and water supply studies. Relevant studies include the C-111 GRR, Jacksonville District; the C-51 West GRR; the Lake Okeechobee Watershed Feasibility Study; the Herbert Hoover Dike Major Rehabilitation Report; the Alexandria to the Gulf of Mexico Flood Control Feasibility Study, New Orleans District; and the North West El Paso Flood Risk Management Feasibility Study, Albuquerque District.

Mr. Hornung has direct experience with mitigation planning procedures and standards. He has led efforts for many projects to avoid and minimize environmental impacts and, when necessary, to identify cost-effective mitigation measures. Such projects include the Calcasieu Lock Feasibility Study and the Pajaro River Flood Risk Management Feasibility Study. Mr. Hornung also has more than 30 years of experience conducting traditional National Economic Development (NED) plan benefits analyses associated with flood risk management and inland navigation projects. This experience includes economic analyses for

the Alexandria to the Gulf Flood Risk Management Feasibility Study, the C-111 GRR (flood risk management), the Houma Navigation Canal Feasibility Report, and the Redwood City Navigation Improvement Feasibility Study.

In addition, Mr. Hornung served on the IEPR Panel to evaluate the NED analysis that was performed using the HEC River Analysis System (HEC-RAS) and the HEC Flood Damage Assessment (HEC-FDA) models for the West Sacramento Flood Risk Management GRR by the Sacramento District. His extensive experience conducting NED evaluations reflects his capability in evaluating traditional NED plan benefits associated with hurricane and coastal storm risk management projects.

Mr. Hornung has more than twelve years of experience working with HEC-FDA modeling software for many USACE studies. His involvement in the Alexandria to the Gulf of Mexico Feasibility Study for the New Orleans District illustrates his experience with HEC-FDA. As a consultant to the New Orleans District, he served as study manager and used HEC-RAS to simulate the complex system of primary and secondary flood control canals in the town of Alexandria and downstream areas, and then applied an innovative application for automating data input to HEC-FDA, which was used to calculate flood damages for the without- and with-project alternatives. The application was so successful that he later managed a contract with HEC to modify the application for broader use.

Name	Alane Young
Role	Environmental Scientist/NEPA
Affiliation	Covington Civil & Environmental, LLC

Ms. Young is a project manager/senior geologist at Covington Civil & Environmental, LLC. She earned her M.S. in geology from Mississippi State University in 1986. She has 30 years of experience in managing environmental projects. Her key responsibilities through her career have been conducting NEPA environmental documentation, including categorical exclusions, environmental assessments (EAs), and assisting in the preparation of environmental impact statements (EISs). Her expertise also includes performing Phase I and Phase II environmental site assessments (ESAs), site characterizations, soil and groundwater remediation projects, wetland delineations, environmental permitting, and managing U. S. Environmental Protection Agency Brownfield Assessments Grants.

Ms. Young has experience with water resource environmental evaluation and review. She has been integrally involved in ecosystem and water resource project development, planning, permitting, implementation, management, and monitoring of Mississippi's Natural Resource Damage Assessment (NRDA) Early Restoration Phases I, III, and IV projects, with over $100 million in projects funded. She works with the Mississippi Deep Water Horizon Trustee Implementation Group to develop NRDA restoration projects for NRDA settlement monies in accordance with the Programmatic Damage Assessment and Restoration Plan and Programmatic EIS. Following Hurricane Katrina in 2005, Ms. Young was responsible for NEPA compliance for 21 Hurricane Katrina disaster recovery projects (funded by the Federal Emergency Management Agency and the U.S. Department of Housing and Urban Development) across the Mississippi Gulf Coast, and she was Task Lead for NEPA environmental compliance for the Galveston County (Texas) Housing Assistance Program Round 2 for Hurricane Ike.

These disaster recovery projects required preparation of NEPA EAs and, in some cases, included Phase I ESAs, Phase II ESAs, and environmental remediation.

Ms. Young is familiar with the habitat, fish, and wildlife species that may be affected by the project alternatives in this study area. Ms. Young serves as a NRDA coordinator for the implementation of three early restoration projects and as NRDA Project Manager for the Popp's Ferry Causeway Park, a NRDA Phase III Early Restoration recreational loss project that includes construction of piers, a visitor center, kayak rental, and parking. Construction compliance includes an on-site archaeologist for a portion of the construction and Marine Mammal Protection Act compliance (dolphin monitoring) for the installation of piles associated with piers. She also manages the long-term monitoring for Mississippi's two Phase I Early Restoration projects, Mississippi Oyster Cultch Restoration and Mississippi Artificial Reef Habitat. This includes the compilation and review of basket and tray data, organism counts, measures of secondary productivity, and comparison to the goals and outcomes for the early restoration projects.

Ms. Young is an expert in compliance with additional environmental laws, policies, and regulations, including compliance with the Fish and Wildlife Coordination Act, Clean Water Act and Endangered Species Act. Her NEPA and environmental compliance experience includes USACE permitting and Clean Water Act compliance, Endangered Species Act Consultations/Biological Assessments, Coastal Zone Management Act, socioeconomic factors, Section 106 Historic Preservation Act consultations, Marine Mammal Protection Act coordination/Assessments, Magnuson-Stevens Fishery Conservation and Management Act-Essential Fish Habitat coordination/assessments, Fish and Wildlife Coordination Act compliance, Migratory Bird Treaty Act coordination, and Bald and Golden Eagle Protection Act coordination.

Ms. Young is familiar with U.S. Fish and Wildlife Service (USFWS) Habitat Evaluation Procedure (HEP) and other methods of determining nonmonetary values of fish and wildlife resources and evaluating suitability, assessing habitat impacts, and formulating mitigation. Ms. Young was actively involved in the development of the Grand Bay National Estuarine Research Reserve/National Wildlife Refuge Land Acquisition and Habitat Management project. The project consists of acquisition of up to 8,000 acres and land management of up to 17,500 acres. Historic project development included Habitat Equivalency Analysis (HEA) to determine the marsh benefits from acquisition and management actions. Monitoring data will be collected to assess project success using the USFWS Rapid Assessment Metrics to Enhance Wildlife Habitat and Biodiversity within Southern Open Pine Ecosystems, which includes metrics on Wet Longleaf and Slash Pine Flatwoods and Savannas.

Ms. Young was also actively involved in the development of the Hancock County Marsh Living Shoreline Project, which includes the construction of approximately 6 miles of breakwater (Living Shoreline), as well as the creation of 46 acres of subtidal reef and 46 acres of marsh. Project development included HEA to determine marsh benefits resulting from reduced shoreline erosion and the creation of marsh. Project development also included Resource Equivalency Analysis to determine the biomass of secondary productivity that will result from the colonization of the breakwater, establishment of the living shoreline/reef, and colonization of the subtidal reef. Monitoring data will be collected to assess project success.

Name	Miguel Wong, Ph.D., P.E.
Role	Hydrology and Hydraulic (H&H) Engineer
Affiliation	Barr Engineering Co.

Dr. Wong is a senior water resources engineer with Barr Engineering, Inc. He earned his Ph.D. in civil engineering from the University of Minnesota in 2006 and is a registered professional engineer in the states of Minnesota and North Dakota and the provinces of Newfoundland and Labrador. He has more than 20 years of combined experience in basic and applied research, river mechanics analysis, environmental evaluations, water balance and water quality modeling, and hydrologic modeling and hydraulic design.

Dr. Wong is experience in all aspects of H&H engineering including urban hydrology, interior drainage systems, riverine/tidal hydraulics, and open channel systems through his work on flood risk reduction projects for the cities, Fargo and Minot, North Dakota. He was the H&H expert for the Upper Des Plaines flood risk management IEPR. He has worked on large projects with both public and private stakeholders and interagency interests, which have included the planning of stream restorations, conducting environmental impact studies, flood risk reduction and design, and independent quality reviews for the engineering facets of projects. He has niche expertise in river evaluation and analysis that includes civil engineering and geomorphologic perspectives for gravel-, sand-, and silt/clay-bed riverine systems. He was involved in the design and construction of stream and river restoration and stabilization projects in tributaries of the Minnesota River and St. Croix River, including Bluff Creek, Riley Creek, Nine Mile Creek, and Valley Creek, and was the technical lead for the Fargo-Moorhead Flood Risk Management project that required the analysis, modeling, and design of a proposed 30-mile long meandering channel to be constructed within the main diversion of the Red River of the North. He is experienced in the planning, feasibility, and detailed design of large ecosystem restoration with demonstrable experience in river restoration.

Dr. Wong is also experienced in the effects of management practices and low impact development on hydrology, and the design of earthen levees and floodwalls. His experience with the design and construction of levees is reflected in such studies as the Mouse River and Fargo-Moorhead projects, which included miles of levee and dam design (the former included 21.6 miles of levees and 2.8 miles of floodwalls, while the later dealt with 15 miles of dams and levees). He has worked on the design and construction of diversion channels on such projects as the Ferrominera, Venezuela, and Antamina, Peru, projects in which channels were designed and constructed around mine waste facilities. He has been involved in the design and construction of large woody debris structures such as the Nine Mile Creek project that recreated a meandering river through wetland areas. He is also familiar with road removal and location and participated in such projects as the Fargo-Moorhead Flood Risk Management project and the Mouse River enhanced flood protection project. He also was one of the primary authors for USACE's Final Feasibility Report and EIS for the Fargo-Moorhead study.

Dr. Wong is familiar with USACE policy on the evaluation of projects with respect to sea-level change, specifically impacts, responses, and adaptations of projects to sea-level change. This was demonstrated during his participation in the IEPR panel for the Puget Sound nearshore ecosystem restoration project from the Seattle District.

Dr. Wong is familiar with HEC modeling computer software, including HEC-RAS, HEC-FDA, and HEC Hydrologic Modeling System, having worked on the Fargo-Moorhead Flood Risk Management project and the Mouse River enhanced flood protection project. His Ph.D. work led to a proposed modification of the widely used Meyer-Peter and Muller bedload-transport relationship (about 350 citations in scientific and professional publications), which was adopted by in the sediment transport module of HEC-RAS.

Dr. Wong is a member of the American Geophysical Union, the International Association for Hydro-Environment Engineering and Research, and the Society of American Military Engineers. He has conducted technical peer reviews of manuscripts submitted to refereed journals such as Water Resources Research and the Journal of Hydraulic Engineering and presents regularly at technical conferences.

Name	R. William Rudolph, P.E.
Role	Civil/Geotechnical Engineer
Affiliation	Independent Consultant

Mr. Rudolph is an independent, licensed P.E., G.E., and Principal Engineer with 39 years of experience on a wide variety of geotechnical engineering projects throughout the western United States. He earned his M.S. degree in geotechnical engineering from the University of California at Berkeley in 1978 and is an active member of the American Society of Civil Engineers and the Coasts, Oceans, Ports, and Rivers Institute.

Mr. Rudolph has project experience with large river and Civil Works projects with high levels of public and interagency interest, having worked on the American, Sacramento, and San Joaquin Rivers near Sacramento, California, and projects on the Mississippi River in Illinois, Missouri, and New Orleans, Louisiana. He has consulted on projects performing geotechnical evaluation and geo-civil design for all phases of flood risk management projects. He is currently principal consultant to the Marin County Flood Control and Water Conservation District on the evaluation of Corte Madera Creek and levee system in the San Francisco Bay Area, California. The Corte Madera Creek project is in a dense urban area and will involve a wide variety of improvements including tidal gates, levee raises, flood walls, and channel dredging to reduce flood risks. He has supervised geomorphologic studies in support of geotechnical evaluations of complex river systems and levee designs across the western United States. He has also worked closely with sediment transport modeling on numerous studies and has provided geotechnical input to the sediment transport models.

Mr. Rudolph is experienced in urban levees, floodwalls, and channel structures along large river systems and in the design and construction of secondary channels on large river systems. He has been involved in many flood control projects with elements including secondary channels in large river systems such as the Truckee River in Reno, Nevada. His experience in the design and construction of engineered structures in large river systems and estuaries is reflected in his involvement with projects that included the construction of weirs, bridge piers, and intake and outlet structures. He has extensive design and construction experience with foundations and earthworks for low-head dams, and has designed and evaluated deep foundations, such as driven piles and cast-in-drilled-hole piles. He also has extensive experience in the design and construction of ground improvement for enhanced foundation support and

lateral stability, which includes cement deep soil mixing columns, stone columns, and grouting. Mr. Rudolph has designed and monitored large earthworks, including earthfill dams and mass grading, and has designed and monitored many earthfill dams and reservoirs.

Mr. Rudolph has been a principal consultant on more than 150 small earth-fill dams and reservoirs for the Vineyard Development Water Supply Reservoirs in California, and has consulted on site selection, reviewing geologic and seismic assessment, material sources, and design alternatives. Several of the projects involved diversion structures within nearby rivers. Many of the projects are in sensitive environments and required coordination with the Department of Fish and Game for spillway design and modification, including seepage cutoffs and construction of paved weirs for low-head dams.

Mr. Rudolph is familiar with, and has demonstrated experience related to, USACE geotechnical practices associated with flood management channels, construction, and soil engineering. He managed numerous geotechnical investigations for USACE projects as well as local projects that have applied USACE practices. Additionally, he has experience in geotechnical risk and fragility analysis. He provided detailed review of risk and fragility analyses for the American River Common Features project in Sacramento California as well as other projects in the California Central Valley.

APPENDIX C

Final Charge for the Rankin-Hinds IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Integrated Draft Feasibility and Environmental Impact Statement, Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi

This is the final Charge to the Panel for the Rankin-Hinds IEPR. This final Charge was submitted to Rankin-Hinds as part of the final Work Plan, originally submitted on March 30, 2018.

BACKGROUND

The Integrated Draft Feasibility Study and Environmental Impact Statement, Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi, was prepared pursuant to Congressional authorization originally enacted in 1986 and most recently reconfirmed in 2016. The Water Infrastructure Improvements for the Nation Act (the WIIN Act), now codified as Public Law 114-322, continues the long-standing Congressional authorization for the project (Section 1322(b)(4)(A)). This newest project authorization instructs the Secretary to "expedite a review and decision on recommendations" made for the project by continuing and modifying the language found in Section 3104 of the Water Resources Development Act (WRDA) of 2007. Section 3104 in turn modifies the Pearl River Basin project originally authorized by Section 401(e)(3) of WRDA 1986 by allowing the Assistant Secretary of the Army for Civil Works (ASACW) to construct a project generally in accordance with the plan described in the Pearl River Watershed, Mississippi, Feasibility Study Main Report, Preliminary Draft, dated February 2007, and to determine the appropriate plan based upon the requirements set out in Section 3104. Section 3104 provides that the ASACW may construct the National Economic Development (NED) plan, the Locally Preferred Plan (LPP), or some combination thereof subject to a determination by the ASACW that the LPP provides the same level of flood protection as the NED plan and that the LPP is environmentally acceptable and technically feasible. Further, Section 3104 provides that the non-Federal interests may carry out the project under Section 211 of WRDA 1996, as amended.

Section 211 of WRDA 1996 provides authority for non-Federal sponsors to conduct feasibility studies/environmental impact statements (FS/EIS) and to design and construct Federally authorized flood risk management projects without Federal funding. The United States Army Corps of Engineers (USACE) may provide technical assistance to the non-Federal sponsor during the FS/EIS.

The Rankin-Hinds Pearl River Flood and Drainage Control District (the Flood Control District) is a political subdivision of the State of Mississippi created in 1962 pursuant to the Urban Flood and Drainage Control Law, Miss. Code Ann. § 51-35-301, et seq. Its responsibilities include construction of flood and drainage control improvements for the protection of property in the Jackson metropolitan area. Its Board of Directors consists of the mayors representing four municipalities (Jackson, Flowood, Pearl, and Richland) and the representatives of the two counties (Hinds and Rankin) in which the district's boundaries lie, along with a representative from the state appointed by the Governor of Mississippi.

Effective July 19, 2012, the Flood Control District and USACE entered into a Memorandum of Agreement to undertake and complete a Section 211 Feasibility Report to identify the Federal interest in the Pearl River Watershed, Mississippi, Project, in accordance with the Economic and Environmental Principles and Guidelines (P&G) for Water and Related Land Resources, March 10, 1983, and the Planning

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Guidance Notebook, Engineer Regulation (ER) 1105-2-100 (USACE, 2000). The Section 211 Feasibility Report for the Pearl River Basin, titled the Integrated Draft Feasibility Study and Environmental Impact Statement, Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi (Draft FS/EIS), will serve as the decision document for review by the Secretary of the Army. The Draft FS/EIS is being undertaken in accordance with the National Environmental Policy Act of 1969 (NEPA) and USACE regulations for implementing NEPA.

The Pearl River Watershed is located in the south-central portion of Mississippi and in a small part of southeastern Louisiana. The river drains an area of 8,760 square miles consisting of all, or parts, of 23 counties in Mississippi and parts of three Louisiana parishes. The primary study area comprises the Pearl River Watershed between River Mile (RM) 280.0, located south of Richland, Mississippi, and RM 301.77, located at the dam of Ross Barnett Reservoir.

Municipalities within the study area include Flowood, Jackson, Pearl, and Richland. The study area includes parts of Hinds and Rankin counties. Major tributaries of the Pearl River within the study area include Caney, Eubanks, Hanging Moss, Hog, Lynch, Prairie Branch, Purple, Richland, and Town Creeks. The study area is primarily affected by headwater flooding caused by unusually heavy and intense rainfall over the upper Pearl River Watershed. Although the study area is located primarily within the boundaries described, additional areas downstream were included to address any potential downstream impacts of the proposed project alternatives.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Pearl River Basin IDF/EIS in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-217, dated February 20, 2018), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (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 1165-2-217) for the decision 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) who meet the technical criteria and areas of expertise required for and relevant to the project.

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 1165-2-217 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.

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DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review. The review assignments per panel member may vary slightly according to discipline.

Report Title	Approximate No. of Pages
Integrated Draft Feasibility Study and Environmental Impact Statement, Pearl River Watershed, Hinds and Rankin Counties, Mississippi	287
Appendix A – Plan Formulation	46
Appendix B – Economics	50
Appendix C – Engineering	597
Appendix D – Environmental	532
Appendix E – Environmental Justice	19
Appendix F – Cultural Resources Survey	816
Public Comments *(estimate)***	100
Total (including text, tables, and graphics)	**2,447**

** Page count for public comments is approximate. Rankin-Hinds will submit public comments to Battelle, which will in turn submit the comments to the IEPR Panel.

Documents for Reference

- USACE guidance *Civil Works Review* (EC 1165-2-217, February 20, 2018)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

SCHEDULE

The following schedule is based on the receipt date of the final review documents and may be revised if review document availability changes. This schedule may also change due to circumstances out of Battelle's control, such as changes to Rankin-Hinds' project schedule and unforeseen changes to panel member and Rankin-Hinds availability. As part of each task, the panel member will prepare deliverables by the dates indicated in the table (or as directed by Battelle). All deliverables will be submitted in an electronic format compatible with MS Word (Office 2003).

Task	Action	Due Date
Attend Meetings and Begin Peer Review	Battelle sends review documents to panel members	3/30/2018
	Battelle convenes kick-off meeting with panel members	4/2/2018
	Battelle convenes kick-off meeting with Rankin-Hinds and panel members	4/2/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of Rankin-Hinds	4/27/2018

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Task	Action	Due Date
Prepare Final Panel Comments	Panel members complete their individual reviews	4/30/2018
	Battelle provides talking points for Panel Review Teleconference to panel members	5/1/2018
	Battelle convenes Panel Review Teleconference	5/2/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	5/3/2018
	Panel members provide draft Final Panel Comments to Battelle	5/8/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	5/09/2018 - 5/13/2018
	Panel finalizes draft Final Panel Comments	5/14/2018
	Rankin-Hinds provides responses to the mid-review questions	6/5/2018
	Battelle provides the responses to the Panel	6/6/2018
	Panel provides an updated Final Panel Comment List	6/11/2018
	Panel provides revised Final Panel Comments	6/15/2018
	Panel finalizes Final Panel Comments	6/18/2018
Review Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	6/20/2018
	Panel members provide comments on Final IEPR Report	6/22/2018
	*Battelle submits Final IEPR Report to Rankin-Hinds	6/26/2018
Comment/ Response Process	Battelle provides Final Panel Comment response template to Rankin-Hinds	6/29/2018
	Battelle convenes teleconference with Rankin-Hinds to review the Comment Response process	6/29/2018
	Battelle convenes teleconference with Panel to review the Comment Response process	7/2/2018
	Rankin-Hinds provides draft Evaluator Responses to Battelle	7/13/2018
	Battelle provides draft Evaluator Responses to panel members	7/16/2018
	Panel members provide draft BackCheck Responses to Battelle	7/19/2018
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	7/20/2018
	Battelle convenes Comment Response Teleconference with panel members and Rankin-Hinds	7/23/2018
	Rankin-Hinds provides final Evaluator Responses to Battelle	7/30/2018

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Task	Action	Due Date
Comment/ Response Process	Battelle provides final Evaluator Responses to panel members	7/31/2018
	Panel members provide final BackCheck Responses to Battelle	8/2/2018
	Battelle consolidates panel members' final BackCheck Responses into the Comment Response Record	8/3/2018
	*Battelle submits pdf printout of Comment Response Record project file	8/6/2018

* Deliverables

** Battelle will provide public comments to the Panel after they have completed their individual reviews of the project documents to ensure that the public comment review does not bias the Panel's review of the project documents.

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the decision documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and 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 decision 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 that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-217).

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.

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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 or prepared the subject documents.

2. Please contact the Battelle Project Manager Jessica Tenzar (tenzarj@battelle.org) for requests or additional information.

3. In case of media contact, notify the Battelle Project Manager Jessica Tenzar (tenzarj@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 the Project Manager, Jessica Tenzar no later than 10 pm ET by the date listed in the schedule above.

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Charge Questions and Relevant Sections as Supplied by Rankin-Hinds

The following Review Charge to Reviewers outlines the objectives of the Independent External Peer Review (IEPR) for the subject study and identifies specific items for consideration for the IEPR Panel.

The objective of the IEPR is to obtain an independent evaluation of whether the interpretations of analysis and conclusions based on analysis are reasonable for the subject study. The IEPR Panel is requested to offer a broad evaluation of the overall study decision document in addition to addressing the specific technical and scientific questions included in the Review Charge. The Panel has the flexibility to bring important issues to the attention of decision makers, including positive feedback or issues outside those specific areas outlined in the Review Charge. The IEPR Panel can use all available information to determine what scientific and technical issues related to the decision document may be important to raise to decision makers.

The Panel review is to focus on scientific and technical matters, leaving policy determinations for the Rankin-Hinds, and subsequently to USACE and the Army, following submittal of the report to the Assistant Secretary of the Army (Civil Works) in accordance with Section 211 of the Water Resources Development Act of 1996. The Panel should not make recommendations on whether a particular alternative should be implemented or present findings that become “directives” in that they call for modifications or additional studies or suggest new conclusions and recommendations. In such circumstances, the IEPR Panel would have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review.

Panel review comments are to be structured to fully communicate the Panel’s intent by including the comment, why it is important, any potential consequences of failure to address, and suggestions on how to address the comment.

The IEPR Panel is asked to consider the following items as part of its review of the decision document and supporting materials.

General

1. Were all models in the analyses used in an appropriate manner?
2. Are the models sufficiently discriminatory to support the conclusions drawn from them? In your opinion, are there sufficient analyses upon which to base the recommendation?
    a. Does the environmental assessment satisfy the requirements of the National Environmental Policy Act (NEPA)?

Problem, Needs, Constraints, and Opportunities

3. Do the identified problems, needs, constraints, and opportunities include a geographic area large enough to ensure that plans address the cause-and-effect relationships between affected resources and activities that are pertinent to achieving the study objectives? Does the study appropriately address the resources identified during the scoping process as important in making decisions relating to the identification of a tentatively selected plan (TSP)?

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4. Does the study adequately address post-project downstream conditions, including water quantities and water quality to the lower Pearl River and the Mississippi Sound?

Plan Formulation/Evaluation

5. Was a reasonably complete array of possible measures considered in the development of alternatives?
6. Are the problems, needs, constraints, and opportunities adequately and correctly defined?
7. Does each Final Array Alternative meet the formulation criteria?

Environmental Consequences

8. Have impacts on significant resources been adequately and clearly described?
9. To what extent have the potential impacts of the alternatives on significant resources been addressed and supported?
10. Are the scope and detail of the potential adverse effects that may arise as a result of project implementation sufficiently described and supported?
11. Are cumulative impacts adequately described and discussed? If not, please explain.

Tentatively Selected Plan (TSP)

12. Does the TSP meet the study objectives and avoid violating the study constraints?

Affected Environment

13. Are mitigation measures adequately described and discussed?
14. Have prior projects and their associated environmental impacts (past and future) in the project area been incorporated into the study?
15. Is the description of the climate in the study area sufficiently detailed and accurate?
16. Is the description of wetland resources in the project area complete and accurate?
17. Is the description of aquatic resources in the project area complete and accurate?
18. Is the description of threatened and endangered species resources in the study area complete and accurate?
19. Is the description of the historical and existing recreational resources in the study area complete and accurate?
20. Is the description of the cultural resources in the study area complete and accurate?
21. Is the description of the historical and existing socioeconomic resources in the study area complete and accurate? Were specific socioeconomic issues not addressed?

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22. Within the context of risk-informed decision-making, comment on the extent to which impacts of the alternatives may have on hazardous, toxic, and waste issues.

Engineering

23. Were the technical assumptions outlined in the engineering appendix sufficient for a feasibility study, given the level of design detail?

24. Was the hydrology and hydraulics discussion sufficient to characterize current base-line conditions and to allow for evaluation of the forecasted conditions? Have the design and engineering considerations been clearly outlined, and will they achieve the project objectives?

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

Real Estate Plan

26. 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.

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

Battelle Summary Charge Questions to the Panel Members

Summary Questions

1. Please identify the most critical concerns (up to five) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.

2. Please provide positive feedback on the project and/or review documents.

Public Comment Questions

3. Do the public comments raise any additional discipline-specific technical concerns with regard to the overall report?

ADDITIONAL COMMENTS OR ISSUES IDENTIFIED

Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review, including any typographical errors or editorial issues that you caught. Typos and editorial issues *typically do not rise* to a significance level or a Final Panel Comment, but instead can be provided separately to Rankin-Hinds.

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BATTELLE

It can be done

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