Final Independent External Peer Review Report Amite River and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Flood Risk Management Planning Center of Expertise
Baltimore District

Contract No. W912HQ-15-D-0001
Task Order: W912HQ19F0148

February 11, 2020

Photo by Louisiana Department of Wildlife and Fisheries

BATTELLE
It can be done

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Columbus, Ohio 43201

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Executive Summary

Project Background and Purpose

The Amite River Basin (ARB) covers portions of Amite, Lincoln, Franklin, and Wilkinson Counties in southwest Mississippi, and East Feliciana, St. Helena, East Baton Rouge, Livingston, Ascension, and Iberville Parishes in southeast Louisiana. The study area consists of these counties and parishes plus St. James and St. John the Baptist Parishes in Louisiana.

The Amite River and its tributaries can cause flood damages to industrial, commercial, and agricultural facilities, and to residential and nonresidential structures. The ARB primarily has flooding from two different sources. The upper basin flooding is caused from headwater flooding from rainfall events. The lower basin flooding is caused by a combination of drainage from headwaters and backwater flooding from tides and wind setup. Critical infrastructure throughout the region, including the Interstate 10 (I-10) and Interstate 12 (I-12) transportation systems, government facilities, and schools, are expected to have increased risk of damage from rainfall events as a result of climate change.

As recently as August 2016, the United States President issued disaster declarations for parishes in the ARB due to impacts from “The Great Flood of 2016.” The flood was responsible for 13 deaths and the rescue of at least 19,000 people by the Louisiana National Guard. The area experienced historic flooding to thousands of homes and businesses and impacts to the Nation's critical infrastructure by shutting down both the I-10 and I-12 transportation systems for days. Major urban centers in the basin saw significant flooding well outside of normal flood stages. The study will develop flood risk management (FRM) alternatives to reduce the risks to public, commercial, and residential property, real estate, infrastructure, and human life; increase the reliability of the I-10/I-12 transportation corridors by providing alternatives that will potentially lessen damages from rainfall and wind/tide-induced flooding; and enhance public education and awareness of flood risks.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the Amite River and Tributaries (ART) – East of the Mississippi River, Louisiana, Feasibility Study (hereinafter: ART FS 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 (OEO) per guidance described in USACE (2018). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and was 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: plan formulation/ economics, environmental law compliance, civil/structural engineering, hydrology and hydraulics (H&H) engineering, and geotechnical engineering. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE 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 five-person Panel from this list.

The Panel received electronic versions of the decision documents (708 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

The USACE Project Delivery Team (PDT) 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 USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE 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 USACE. 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, 15 Final Panel Comments were identified and documented. Of these, two were identified as having high significance, four had medium significance, four had medium/low significance, and five had low significance.

Battelle received public comments from USACE on the Draft Integrated Feasibility Study with Environmental Impact Statement (FS/EIS) (approximately 102 pages of comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the Draft Integrated FS/EIS. After completing its review, the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments.

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 Draft Integrate FS/EIS. 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 the document presented the material in a comprehensive and logical approach. However, the Panel identified several elements of the project where additional analysis is needed and project findings and objectives need to be documented or clarified.

Engineering: While the Panel believes that the H&H model chosen to assess the project was the correct model to use, the panel members are concerned that the H&H modeling and calculations of exceedance probability do not take into account predicted increases in rainfall, streamflow, and tropical storms due to climate change or their potential impacts to project planning, design, function, and cost. If the frequency and intensity of rainfall, streamflow, and tropical storms increase in the future, as indicated by the stationarity analysis documented in Appendix G-2, the rainfall, streamflow, and annual exceedance probabilities (AEPs) utilized in the study could prove to be substantially underestimated. The Panel also raised concerns that the configuration and location of the proposed outlet works could result in the structure being impacted by long-term settlement and is concerned that settlement may lead to damage to the outlet works, which could create the potential for harmful leakage and piping.

Economics/Plan Formulation: The Draft Integrated FS/EIS does a good job of describing the flood risks in the study area. However, the Panel identified a couple of areas where additional analysis of the alternatives would strengthen the overall findings. The Panel noted that the Tentatively Selected Plan (TSP) is the alternative with the greatest National Economic Development (NED) benefits and net NED benefits; however, based on the documentation provided, it is unclear whether a more comprehensive FRM alternative that could provide greater NED benefits is available. Analyzing a more comprehensive alternative with greater NED benefits (or providing documentation that one does not exist) would help support the choice of the TSP. The Panel also observed that although one of the Draft Integrated FS/EIS objectives is the reduction of transportation interruption, potential beneficial impacts to the national or local transportation system were not considered and described under the alternative plans. Therefore, it is unclear whether this objective is met and whether potential NED benefits that were not considered could be realized.

Environmental: The Panel noted several areas of the Draft Integrated FS/EIS where documentation regarding project impacts could be strengthened. The Panel is concerned that uncertainty regarding future habitat mitigation requirements could impact both the project schedule and cost. If the purchase of sufficient habitat mitigation credits is not available, delays and additional costs could be incurred due to the need to purchase land and construct mitigation infrastructure. Based on the information provided, it is unclear how this might impact the overall feasibility of the project given the additional cost and project implementation time. The Panel also noted that USACE states in the Draft Integrated FS/EIS that scraping, clearing, and snagging riverbanks would be conducted to avert the potential for flooding and reduce environmental impacts, a procedure that is not environmentally sustainable. The Draft Integrated FS/EIS does not evaluate and analyze the impacts of scour and sedimentation on infrastructure and the project alternatives and does not consider USACE's Engineering with Nature initiative for potential solutions.

In USACE's analysis of impacts related to environmental justice concerns, negative and disproportionate impacts to low-income and minority communities within the potential footprint of the TSP are noted, yet no information on potential avoidance measures or mitigation plans have been included. Inclusion of the avoidance measures or mitigation plans is outlined in the U.S. Department of Defense (DoD) guidance document *Strategy on Environmental Justice*.

Table ES-1. Overview of 15 Final Panel Comments Identified by the ART FS IEPR Panel

No.	Final Panel Comment
Significance – High	
1	H&H modeling and calculations of exceedance probability do not take into account increases in rainfall, streamflow, and tropical storms due to climate change and their impacts to project planning, design, function, and cost.
2	It is unclear why a more comprehensive FRM alternative was not analyzed given the potential for greater net NED benefits to be realized.
Significance – Medium	
3	Uncertainty regarding future required habitat mitigation could impact both the project schedule and cost.
4	The H&H and economic analyses do not take into account potential beneficial impacts that could accrue to the national or local transportation system under the alternative plans.
5	Erosion and sedimentation are not fully discussed and evaluated in the Draft Integrated FS/EIS in support of the TSP.
6	The configuration and location of the proposed outlet works raises concerns regarding long-term settlement and the potential for harmful seepage.
Significance – Medium/Low	
7	Impacts related to environmental justice concerns under the TSP are presented, but there is no documentation of avoidance and mitigation measures.
8	The Draft Integrated FS/EIS does not provide complete and clear documentation of water surface profiles or information on the 10-year, 25-year, and 100-year storm frequencies under each alternative, which affects the level of H&H review.
9	The Draft Integrated FS/EIS lacks information defining the configuration and operation of the Darlington Dry Dam.
10	The Sandy Creek and the Lilley and Bluff Creek embankments are presented as alternatives to the TSP, but no geotechnical or hydrologic data are presented to support the cost development used in the economic evaluation of alternatives employing these structures.

Table ES-1. Overview of 15 Final Panel Comments Identified by the ART FS IEPR Panel (continued)

No.	Final Panel Comment
Significance – Low	
11	The Draft Integrated FS/EIS does not include all the benefits related to reduced emergency costs.
12	Residual risk of loss of life under both the “without” and “with” project conditions has not been documented in the Draft Integrated FS/EIS
13	The Draft Integrated FS/EIS does not describe what actions would be required under the TSP to address the Amite River’s Wild and Scenic River designation.
14	Avoidance of future development in undeveloped areas protected by the TSP is not discussed in the Draft Integrated FS/EIS.
15	Impacts and remaining risks to small boat traffic due to construction of the Darlington Dry Dam are not addressed in the Draft Integrated FS/EIS.

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LIST OF ACRONYMS

AAHU	Average Annual Habitat Unit
ADM	Agency Decision Milestone
AEP	Annual Exceedance Probability
ARB	Amite River Basin
ARBNM	Amite River Basin Numerical Model
ART	Amite River and Tributaries
ATR	Agency Technical Review
BCR	Benefit-Cost Ratio
COI	Conflict of Interest
DoD	United States Department of Defense
DOE	United States Department of Energy
DrChecks	Design Review and Checking System
EC	Engineer Circular
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EM	Engineer Manual
EJ	Environmental Justice
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FRM	Flood Risk Management
FS	Feasibility Study
GIS	Geographic Information System
GRR	General Re-evaluation Report
H&H	Hydrology and Hydraulics
HEC-FDA	Hydrologic Engineering Center-Flood Damage Reduction Analysis
HEC-FIA	Hydrologic Engineering Center-Flood Impact Analysis
HEC-LifeSim	Hydrologic Engineering Center-Life Loss/Direct Damage Estimate Simulation
HEC-RAS	Hydrologic Engineering Center-River Analysis System

IEPR	Independent External Peer Review
LA DOTD	Louisiana Department of Transportation & Development
NAEP	National Association of Environmental Professionals
NED	National Economic Development
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
O&M	Operation and Maintenance
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
OPSEC	Operations Security
PCX	Planning Center of Excellence
PDT	Project Delivery Team
PED	Preconstruction Engineering and Design
PFMA	Potential Failure Mode Analysis
QA/QC	Quality Assurance / Quality Control
SAR	Safety Assurance Review
SFWMD	South Florida Water Management District
TSP	Tentatively Selected Plan
URA	Uniform Relocation Assistance
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

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1. INTRODUCTION

The Amite River Basin (ARB) covers portions of Amite, Lincoln, Franklin, and Wilkinson Counties in southwest Mississippi, and East Feliciana, St. Helena, East Baton Rouge, Livingston, Ascension, and Iberville Parishes in southeast Louisiana. The study area consists of these counties and parishes plus St. James and St. John the Baptist Parishes in Louisiana.

The Amite River and its tributaries can cause flood damages to industrial, commercial, and agricultural facilities, and to residential and nonresidential structures. The ARB primarily has flooding from two different sources. The upper basin flooding is caused from headwater flooding from rainfall events. The lower basin flooding is caused by a combination of drainage from headwaters and backwater flooding from tides and wind setup. Critical infrastructure throughout the region, including the Interstate 10 (I-10) and Interstate 12 (I-12) transportation systems, government facilities, and schools, are expected to have increased risk of damage from rainfall events as a result of climate change.

As recently as August 2016, the United States President issued disaster declarations for parishes in the ARB due to impacts from “The Great Flood of 2016.” The flood was responsible for 13 deaths and the rescue of at least 19,000 people by the Louisiana National Guard. The area experienced historic flooding to thousands of homes and businesses and impacts to the Nation's critical infrastructure by shutting down both the I-10 and I-12 transportation systems for days. Major urban centers in the basin saw significant flooding well outside of normal flood stages. The study will develop flood risk management (FRM) alternatives to reduce the risks to public, commercial, and residential property, real estate, infrastructure, and human life; increase the reliability of the I-10/I-12 transportation corridors by providing alternatives that will potentially lessen damages from rainfall and wind/tide-induced flooding; and enhance public education and awareness of flood risks.

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 Amite River and Tributaries (ART) – East of the Mississippi River, Louisiana, Feasibility Study (hereinafter: ART FS IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (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 ART FS 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 USACE in the final Work Plan according to the schedule listed in Table A-1. Appendix D presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources prior to the award of the ART FS IEPR.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review, as described in USACE (2018).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the 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 IEPR of the ART FS was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (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.

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 due dates for milestones and deliverables as part of the final Work Plan; the due dates are based on the award/effective date and the receipt of review documents.

Battelle identified, screened, and selected five panel members to participate in the IEPR based on their expertise in the following disciplines: plan formulation/economics, environmental law compliance, civil/structural engineering, hydrology and hydraulics (H&H) engineering, and geotechnical engineering. The Panel reviewed the ART FS documents and produced 15 Final Panel Comments in response to 16 charge questions provided by USACE for the review. This charge also included two overview questions and one public comment question added by Battelle, for a total of 19 questions. 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 USACE 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 ART Draft Integrated Feasibility Study with Environmental Impact Statement (FS/IEIS). The following summarizes the Panel's findings.

Based on the Panel's review, the report is well-written, and the document presented the material in a comprehensive and logical approach. However, the Panel identified several elements of the project where additional analysis is needed and project findings and objectives need to be documented or clarified.

Engineering: While the Panel believes that the H&H model chosen to assess the project was the correct model to use, the panel members are concerned that the H&H modeling and calculations of exceedance probability do not take into account predicted increases in rainfall, streamflow, and tropical storms due to climate change or their potential impacts to project planning, design, function, and cost. If the frequency and intensity of rainfall, streamflow, and tropical storms increase in the future, as indicated by the stationarity analysis documented in Appendix G-2, the rainfall, streamflow, and annual exceedance probabilities (AEPs) utilized in the study could prove to be substantially underestimated. The Panel also raised concerns that the configuration and location of the proposed outlet works could result in the structure being impacted by long-term settlement and is concerned that settlement may lead to damage to the outlet works, which could create the potential for harmful leakage and piping.

Economics/Plan Formulation: The Draft Integrated FS/EIS does a good job of describing the flood risks in the study area. However, the Panel identified a couple of areas where additional analysis of the alternatives would strengthen the overall findings. The Panel noted that the Tentatively Selected Plan (TSP) is the alternative with the greatest National Economic Development (NED) benefits and net NED benefits; however, based on the documentation provided, it is unclear whether a more comprehensive FRM alternative that could provide greater NED benefits is available. Analyzing a more comprehensive alternative with greater NED benefits (or providing documentation that one does not exist) would help support the choice of the TSP. The Panel also observed that although one of the Draft Integrated FS/EIS objectives is the reduction of transportation interruption, potential beneficial impacts to the national or local transportation system were not considered and described under the alternative plans. Therefore, it is unclear whether this objective is met and whether potential NED benefits that were not considered could be realized.

Environmental: The Panel noted several areas of the Draft Integrated FS/EIS where documentation regarding project impacts could be strengthened. The Panel is concerned that uncertainty regarding future habitat mitigation requirements could impact both the project schedule and cost. If the purchase of sufficient habitat mitigation credits is not available, delays and additional costs could be incurred due to the need to purchase land and construct mitigation infrastructure. Based on the information provided, it is unclear how this might impact the overall feasibility of the project given the additional cost and project implementation time. The Panel also noted that USACE states in the Draft Integrated FS/EIS that scraping, clearing, and snagging riverbanks would be conducted to avert the potential for flooding and

reduce environmental impacts, a procedure that is not environmentally sustainable. The Draft Integrated FS/EIS does not evaluate and analyze the impacts of scour and sedimentation on infrastructure and the project alternatives and does not consider USACE's Engineering with Nature initiative for potential solutions.

In USACE's analysis of impacts related to environmental justice concerns, negative and disproportionate impacts to low-income and minority communities within the potential footprint of the TSP are noted, yet no information on potential avoidance measures or mitigation plans have been included. Inclusion of the avoidance measures or mitigation plans is outlined in the U.S. Department of Defense (DoD) guidance document *Strategy on Environmental Justice*.

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

H&H modeling and calculations of exceedance probability do not take into account increases in rainfall, streamflow, and tropical storms due to climate change and their impacts to project planning, design, function, and cost.

Basis for Comment

Table 3-1a in the Draft Integrated FS/EIS shows how the frequencies of all tropical storms and major hurricanes are projected to change during the period from 2015 through 2065. These projections were developed in support of the 2017 Coastal Master Plan by the Louisiana Coastal Protection and Restoration Authority (Fischback and Johnson, 2017). Projections in the table indicate that the average annual number of all tropical storms in the North Atlantic Basin will decline from 12.1 experienced during the period from 1981 to 2010 to between 8.8 and 12.6 for the 2015-to-2065 period. Similarly, the stationarity analysis described in Section 4.3 of Appendix G-1 indicates an expected downward trend in annual maximum monthly streamflow. As a result, it was concluded that "… climate-based changes are not expected to adversely affect project performance…" (p. 8).

The Draft Integrated FS/EIS and appendices contain additional information that indicates climate change is likely to significantly impact flood risk. Fischback and Johnson (2017) concluded that the average annual number of major hurricanes (Category 3 or greater) is projected to increase from 2.7 for the 1981-to-2010 period to between 3.1 and 8.6 for the 2015-to-2065 period.

Additionally, the discussions of stationarity analysis in Appendix G-1 and Appendix G-2 are not in agreement and contribute to confusion in determining if the stationarity trend is increasing or decreasing, which leads to climate impacts used in the evaluation of alternatives and the TSP. Section 4.3 of Appendix G-1 discusses the evaluation of possible future project impacts due to climate change utilizing the USACE non-stationarity detection tool. The analysis was performed for a single gage station at the Amite River Port Vincent gage; the results showed a downward trend in the annual maximum monthly streamflow.

The Project Delivery Team (PDT) utilized the Louisiana Department of Transportation & Development (LA DOTD) Amite River Basin Numerical Model (ARBNM) described in Appendix G-2 as the basis for project evaluation and the development of alternatives, including the TSP. LA DOTD summarizes the stationarity analysis performed for the modeling project (Appendix G-2, p. 135) and detected a positive trend for both streamflow and precipitation within the Amite River Basin (ARB). Appendix 5 of the LA DOTD ARBNM details the stationarity analysis performed for that project. The analysis evaluated gages with a minimum of 60 years of data from 35 gage locations qualifying for rainfall and 6 gage stations for streamflow. The analysis results show positive trends, indicating a regional-scale non-stationarity for increased daily rainfall and streamflow.

The stationarity analysis in Appendix G-2 takes into account multiple gage stations, whereas the analysis in Appendix G-1 uses one gage station. The Panel concludes that a single gage station does not provide sufficient data to evaluate a regional stationarity trend and that the analysis performed in Appendix G-2 using multiple gage stations would be more reliable to determine trends for the project.

The LA DOTD ARBNM (Appendix 5, p. 5-8, of Appendix G-2) discusses the effects of the August 2016 flood as having significantly higher stream flow than predicted by the 1% annual exceedance

Final Panel Comment 1

probability (AEP). Appendix G-1 model design storm frequencies derived from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 may have a tendency to underestimate future rainfall frequencies and intensity. If the frequency and intensity of rainfall, streamflow, and tropical storms increase in the future as indicated by the stationarity analysis documented in Appendix G-2, the rainfall, streamflow, and AEPs utilized in the study could prove to be substantially underestimated.

Significance – High

H&H modeling utilizing projected trends in rainfall, streamflow, and tropical storm intensities are fundamental to plan formulation and evaluation. Expected annual damages could be underestimated, the design of the TSP may not be capable of reducing flood risk as predicted, the design of embankments, spillways, etc. may be exceeded, and cost estimates for the TSP could be underestimated.

Recommendations for Resolution

1. Adopt the stationarity analysis results determined by the LA DOTD ARBNM report and revise the Draft Integrated FS/EIS and Appendix G-1 accordingly.
2. Provide a more detailed assessment of future climate change impacts in the context of future conditions, and clarify whether the hydrologic parameters are extended to the future project conditions.
3. Include references to the documentation used to determine the various design storm frequencies for this area of Louisiana.
4. Evaluate potential changes in:
    a. Expected annual flood damages
    b. Design of alternatives and the TSP
    c. Cost estimates of alternatives and the TSP
5. Present the findings of the above analyses in the discussion of risk and uncertainty.

Literature Cited

Fischback, J., and D. Johnson (2017). 2017 Coastal Master Plan, Attachment C2-4: *Tropical Storm Intensity and Frequency*. Prepared for Coastal Protection and Restoration Authority. Baton Rouge, Louisiana. April 2017.

Final Panel Comment 2

It is unclear why a more comprehensive FRM alternative was not analyzed given the potential for greater net NED benefits to be realized.

Basis for Comment

Table 4-7 of the Draft Integrated FS/EIS shows costs and benefits of the focused array of alternatives. Based on the table, the Darlington Dry Dam alternative provides the greatest NED benefits and net NED benefits, which led to its selection (with the addition of non-structural measures) as the TSP. No alternative was considered that provided greater total NED benefits. The addition of 0.04 AEP non-structural measures to the Darlington Dry Dam raised the expected annual NED benefits to $109,065,000 (Appendix F, Table F:5-8).

The Draft Integrated FS/EIS does not demonstrate that a more comprehensive FRM alternative that might provide greater NED benefits does not exist. The magnitude of expected annual residual damages of $64,918,000 that remain with the TSP in place demonstrates the potential for significant additional NED benefits. No explanation is provided for why the Sandy Creek Dry Dam (or a scaled-down version) could not be combined with the Darlington Dry Dam to provide greater net NED benefits. Additionally, there is no explanation for why greater use of non-structural measures would not increase net NED benefits. It is also unclear why additional structural measures could not be added to an alternative with the Darlington Dry Dam.

Significance – High

Without evaluating a more comprehensive FRM alternative that provides greater NED benefits, it cannot be demonstrated that the TSP provides the greatest net NED benefits.

Recommendations for Resolution

1. Develop and document a more comprehensive alternative that provides greater NED benefits. Include the results in Table 4-7 to support the conclusion that the TSP provides the greatest net NED benefits.
2. Provide tables or figures that show the geographic distribution of expected annual flood damages (or benefits) that exist under the alternatives.

Final Panel Comment 3

Uncertainty regarding future required habitat mitigation could impact both the project schedule and cost.

Basis for Comment

For preparation of the cost estimate and implementation schedule for the TSP, it was assumed that habitat mitigation credits would be acquired from existing approved mitigation banks (Appendix D, Real Estate Plan, Section 2.1). However, Section 6.2.1 of the Draft Integrated FS/EIS states that it is not determined whether habitat mitigation credits will be provided or whether USACE will acquire land and construct the required mitigation sites. If it is necessary for USACE to construct mitigation sites, 15,165 acres of land (or more) would have to be acquired. The cost estimate (Table B:24-2 of Appendix B, Cost Engineering) includes a contingency of only 20% for fish and wildlife facilities. Other cost features include contingencies of 38% or more (except lands and damages, which is 23%). Based on the Panel's review, the factors described below indicate that the uncertainties regarding the extent of mitigation that will be required and how it will be provided are not fully addressed.

- There is uncertainty regarding whether sufficient mitigation credits will be available for acquisition. Table 7-1 in the Draft Integrated FS/EIS indicates that only 1,555 average annual habitat units (AAHUs) are currently available for purchase. The Draft Integrated FS/EIS states (Section 7.1, second paragraph) that there are 1,332 AAHUs of bottomland hardwood in the Darlington Dam footprint. Additional mitigation is also likely to be needed for staging areas and borrow sites which have not yet been identified.
- Since the wetland impacts are at present only estimated and the wetland assessments have been primarily conducted through windshield survey, the actual extent and cost of mitigation is uncertain. The estimated impact numbers appear to indicate a shortage of available mitigation bank credits. Thus, it would appear that some land would need to be acquired, although that is not easily understood to be part of the mitigation cost analysis.
- There is no discussion in the Draft Integrated FS/EIS or the appendices concerning the potential mitigation banks within the Amite Basin. Out-of-basin mitigation could potentially increase the mitigation ratios and the related number of credits needed to meet mitigation requirements. Restoration of lands directly adjacent to the river and tributary streams (along the Amite or Comite Rivers) could provide more ecological lift to mitigation undertaken for the project and potentially have an impact on the economic benefits of the TSP. This could include some of the non-operational sand mine areas. Restoration of damaged wetlands along the rivers and tributaries could have the potential for reducing some flooding risk through reduction in frequency and severity of flooding, particularly in the middle Amite reach.

Significance – Medium

If it is necessary to construct mitigation sites, the acquisition of 15,165 acres and construction of mitigation infrastructure could significantly impact the project implementation schedule and cost.

Recommendations for Resolution

1. Provide a well-documented analysis of available mitigation credits specifically within the Amite and Comite basins.

Final Panel Comment 3

2. Evaluate potential impacts to project schedule and cost if sufficient credits are not available at the time of construction and it is necessary to construct mitigation facilities.
3. Adjust cost contingencies to better reflect uncertainties related to the type and extent of mitigation that will be required.
4. Provide a tabular breakdown of mitigation bank locations (complete with appropriate scale mapping) and available credits to provide a better understanding of the potential costs of mitigation for stakeholders and cooperating agencies.
5. Include relevant references in the appropriate appendices and in the Draft Integrated FS/EIS.

Final Panel Comment 4

The H&H and economic analyses do not take into account potential beneficial impacts that could accrue to the national or local transportation system under the alternative plans.

Basis for Comment

Section 2.2 of the Draft Integrated FS/EIS lists "Reduce interruption to the nation's transportation corridors, particularly the I-10/I-12 infrastructure" as a planning objective (p. 20). However, there is no documentation of how the alternative plans might impact flood damages or delays and detours related to either highways or railways in the study area. The reduction or avoidance of flood damages to transportation infrastructure and of delays and detours represent potential NED benefits that are often included in the evaluation of alternative plans and the selection of a TSP. Recent flooding has impacted interstate highways in the study area, and FRM efforts could potentially offer significant NED benefits, depending on where the alternatives provide flood risk benefits. The H&H analysis does not provide any information that could be used to assess how the alternatives might impact transportation; without such an assessment, the H&H analysis does not fully comply with the National Environmental Policy Act (NEPA). Also, the economic analysis described in Appendix F does not include NED impacts of the alternatives on transportation. Additional NED benefits related to transportation could be advantageous to increase the budgetary priority of the project during the preconstruction engineering and design (PED) phase.

Significance – Medium

NED benefits related to the reduction of flood damages to transportation infrastructure and of the costs of delays and detours might provide significant NED benefits under the alternative plans. Additionally, describing impacts on transportation would provide a more complete NEPA evaluation.

Recommendations for Resolution

1. Develop H&H output to describe the frequency, depth, and duration of flooding of major transportation infrastructure in the study area under the alternative plans. Include identification of significant landmarks such as bridges on water surface profiles for the 10-year, 25-year, 100-year, and 500-year storms to indicate potential impacts.
2. If flooding of transportation infrastructure is reduced, calculate flood damage reduction benefits and describe the methodology and results in Appendix F.
3. Document impacts on transportation in the Draft Integrated FS/EIS.

Final Panel Comment 5

Erosion and sedimentation are not fully discussed and evaluated in the Draft Integrated FS/EIS in support of the TSP.

Basis for Comment

The Draft Integrated FS/EIS indicates that snagging would be conducted at bridge crossings to avert the potential of flooding and reduce environmental impacts. Scraping, clearing, and snagging riverbanks is not ecologically sustainable. Appendix E of the Draft Integrated FS/EIS (Table 2, Management Measures) indicates “engineering with nature” as a possibility; however, there is no discussion on this in the Draft Integrated FS/EIS to determine if the measures are reasonable as one possible means of reducing the risk of flood damages. “Engineering with Nature” is an Engineer Research and Development Center (ERDC) initiative to include natural and engineering processes to support sustainable development (Bridges et al., 2018). There is no reference to this initiative in the Draft Integrated FS/EIS, nor is the concept mentioned as a source for developing any of the alternatives. Given the concerns over scour, sedimentation, and potential project features, a more detailed discussion of the potential for scour and sedimentation along the ARB under each of the project alternatives is warranted.

Significance – Medium

An analysis of the effects of scour and sedimentation is needed to understand and determine project impacts to infrastructure and the natural environment.

Recommendations for Resolution

1. Evaluate and analyze the impacts of scour and sedimentation to infrastructure and project alternatives.
2. Include a discussion of scour and sedimentation in the Draft Integrated FS/EIS and supporting decision documents.
3. If “engineering with nature” concepts are used in the appendices and in the Draft Integrated FS/EIS, include references to USACE guidelines for deploying these concepts.

Literature Cited

Bridges, T.S., E.M. Bourne, J.K. King, H.K. Kuzmitski, E.B. Moynihan, and B.C. Suedel (2018). Engineering with Nature: An Atlas. ERDC/EL SR-18-8. Vicksburg, MS: U.S. Army Engineer Research and Development Center. http://dx.doi.org/10.21079/11681/27929.

Final Panel Comment 6

The configuration and location of the proposed outlet works raises concerns regarding long-term settlement and the potential for harmful seepage.

Basis for Comment

The Draft Integrated FS/EIS provides a brief description of the outlet works for the Darlington Dam project but does not include any drawings showing the currently proposed configuration for the outlet structure. The Panel therefore assumed that the configuration and description shown in the 1997 Darlington Reservoir Re-evaluation Study (Appendix C, Plate 30) (USACE/LA DOTD, 1997) represents the current concept design for the three 10-foot by 10-foot box culverts forming the outlet works. The Panel has concerns with the overall location of the proposed outlet works and the location of the gate tower. Boring D0 – 5U, shown on Plate 16 of the 1997 Re-evaluation Study, indicates that the foundation material underlying the conduit would consist of up to 70 feet of clay. The geotechnical evaluation contained in Appendix A of the Draft Integrated FS/EIS does not recognize or address the potential for large amounts of potentially damaging foundation settlement caused by the loads attributable to 70 feet of embankment fill placed over the conduit. This concern is supported by guidance stated in Engineer Manual (EM) 1110-2-2300 (USACE, 2004), which states: “If the dam's foundation consists of compressible soils, the outlet works tower and conduit should be founded upon or in stronger abutment soils or rock where less settlement and horizontal spreading will occur and where the embankment is lower.” (Section 8.1, p. 8-1)

The profile of the outlet works illustrated on Plate 30 of the 1997 study also indicates that the gate tower and slide gate which control flow through the outlet works would be located in the downstream portion of the embankment. This configuration does not conform to current design practice, since it creates the potential for highly pressurized water within the outlet works to extend throughout a major portion of the embankment section, including the impervious core section. This configuration creates a potential for leakage through the culverts, which would allow for harmful seepage, piping, and erosion that could compromise the integrity of the embankment. Current design practice requires that gate structures be placed near the upstream end of the outlet works. Typically, a bridge structure extending from the top of the embankment to the upstream gate control tower would be required to meet commonly accepted design standards. The cost for this type of configuration is not included in the current estimates.

The profile of the outlet works contained on Plate 30 of the 1997 study, and the estimated quantities shown in Table A:6-1 of Appendix A (p. 18) of the Draft Integrated FS/EIS, indicate that 750 “Alignment Collars” would be incorporated in the design. Alignment collars are typically used for precast concrete culverts. Based upon the need for alignment collars, it is unclear whether the proposed design envisions that the outlet works would be constructed using precast 10-foot by 10-foot culvert sections or if the conduit would be constructed as a totally cast-in-place structure. The use of precast concrete sections for a highly pressurized outlet conduit creates a high potential for damaging seepage and leakage and does not meet current design practice.

Significance –Medium

A future in-depth evaluation of the potential for damaging settlement of the outlet works could require significantly increased cost and construction time associated with relocating the outlet works or

Final Panel Comment 6

preloading the foundation to minimize settlement. The upstream relocation of the gate structure could also increase the project cost estimates.

Recommendations for Resolution

1. Conduct a detailed evaluation of potential settlement based upon additional geotechnical borings and testing in future design stages.
2. Consider relocating the outlet works to areas less susceptible to long-term settlement.
3. Design the conduit to utilize cast-in-place concrete and locate the gate structure near the upstream toe of the embankment to minimize the potential for damaging seepage conditions.

Literature Cited

USACE (2004). General Design and Construction Considerations for Earth and Rock-Fill Dams. U.S. Army Corps of Engineers, Washington, D.C. Engineer Manual (EM) 1110-2-2300. July 30.

USACE/LA DOTD (1997). Amite River and Tributaries, Louisiana: Darlington Reservoir Re-evaluation Study (Reconnaissance Scope). U.S. Army Corps of Engineers New Orleans District/Louisiana Department of Transportation and Development. September 1997.

Final Panel Comment 7

Impacts related to environmental justice concerns under the TSP are presented, but there is no documentation of avoidance and mitigation measures.

Basis for Comment

Under NEPA, the identification of a disproportionately high and adverse human health or environmental effect on a low-income population, minority population, or Indian tribe does not preclude a proposed agency action from going forward, nor does it necessarily compel a conclusion that a proposed action is environmentally unsatisfactory. Rather, the identification of such an effect should heighten agency attention to alternatives (including alternative sites), mitigation strategies, monitoring needs, and preferences expressed by the affected community or population (CEQ, 1997).

U.S. Department of Defense (DoD) guidance on strategies for addressing environmental justice concerns calls for implementation efforts that will, among other measures, "identify opportunities to avoid or mitigate disproportionately high and adverse environmental impacts on minority and low-income populations, and identify and undertake new or existing model demonstration programs to reduce such effects" (DoD, 1995; p. 9).

Appendix C-1, Section 3.8, of the Draft Integrated FS/EIS describes the definite environmental justice needs associated with the potentially affected parishes (Louisiana) and counties (Mississippi) in the ARB project area, including rural communities in the upper Amite reach. The impacted communities meet the requirements for addressing environmental justice for low-income and minority thresholds. Section 3.2.2.4 in the Draft Integrated FS/EIS also confirms that there would be a disproportionate impact to such communities.

Table 5-1 of the Draft Integrated FS/EIS lists environmental justice as a relevant resource that could potentially impact locations in or near the project area. However, the text in Table 5-1 purporting to describe the project's "Negative Impact" is not easily understood. The use of "potential" appears to cast doubt on the previous understanding that environmental justice would be a concern.

Section 5.3.1.12 of the Draft Integrated FS/EIS describes the impacts of considered alternatives. For the Darlington Dam discussion, the mitigation appears to be solely reliant on Uniform Relocation Assistance (URA). While this might be the eventual outcome of community outreach, according to the DoD and CEQ guidance, a range of solutions should be provided to the affected communities to allow for agreement.

URA is based on the market value of an individual home if sold today. The URA calculation is based on the existing location and not the potential area where the resident would relocate. The market value of the existing home would be based on age and condition, which would reduce the compensation to the individual. This value is unlikely to be sufficient to compensate for relocation. There is no analysis of affordable housing in the region or the availability of similar housing (not dependent on condition). Market value in the area of impact is likely to be less than similar housing in other locations in the region.

There is no discussion in the Draft Integrated FS/EIS of how the acquisition of generationally owned farm and timber lands in East Feliciana Parish, a low-income parish, might affect tax revenues and the ability of the parish to provide adequate public services to its residents. The description of Other Social

Final Panel Comment 7

Effects in Section 4.6.1 and Table 4-9 does not describe the impacts of the loss of severance tax revenues from timber harvesting.

Received public comments are overwhelmingly against the TSP. Most emphasize the lack of regular flooding in the upper reach of the Amite River and the complete loss of culturally significant rural communities behind the TSP dam. The negative public opinions cite historical, archeological, environmental justice, and economic hardship associated with the TSP. An email found on page 50 of the public comments, which included a letter attachment addressed to USACE, reiterates many concerns expressed by the panel.

The lower river development has been cited in numerous comments as the area where corrections should be made. The suggested corrections are primarily related to the continued development of residential housing within known flood zones.

For the Darlington Dam alternative (and TSP) (Section 5.3.1.12 of the Draft Integrated FS/EIS), the Cumulative Impact analysis ascribes a positive cumulative project impact based on the assertion that there could be regional economic growth associated with implementation of this project and other Federal, state, and local projects. There is no supporting evidence that such growth would happen. This analysis needs more detail to support conclusions of improved housing and employment conditions.

At the end of the Cumulative Impacts analysis of the Darlington Dam alternative in Section 5.3.1.12 (Environmental Justice), the report states that “there is a potential for high, adverse, disproportionate impacts to EJ communities from construction of the Darlington Dam.” The Draft Integrated FS/EIS does not discuss or even identify avoidance measures in other areas of the basin that could offset or reduce known disproportionate impacts, particularly those community impacts associated with the footprint of the TSP.

Mitigation and avoidance measures that could be considered include:

1. Discontinuing development along the riverbanks within the entire Amite River and tributaries basin.
2. Acquiring undeveloped properties along the river and tributaries and using that acquisition to offset wetland impacts by placing all of the floodplain lands within perpetual conservation easement.
3. Restoring the wetlands lost to development along the river and tributaries.
4. Restoring the river meanders in the lower Amite reach (from Port Vincent to Lake Maurepas), which could reduce or eliminate flooding from wind-driven events.
5. Focusing on the higher employment and proximity of the communities to the Baton Rouge and New Orleans markets as areas that would appear to provide more direct and immediate employment and economic improvement than the opportunities available to the communities in the Upper and Middle Amite reaches.

Final Panel Comment 7

Significance – Medium/Low

According to CEQ and DoD guidance, an environmental justice analysis should consider a range of solutions using viable demonstration projects developed with input from the impacted communities. The impacts to environmental justice communities are described, but without documentation of avoidance measures or mitigation plans.

Recommendations for Resolution

1. Provide document references in the References and Resources section concerning the analysis used to determine environmental justice impacts.
2. Use the referenced documents to further augment plans for addressing environmental justice impacts that are known to be associated with the TSP.
3. Initiate community outreach to potentially disproportionately impacted low-income and minority communities.
4. Include community ideas into the discussion of potential mitigation planning associated with environmental justice impacts.
5. Include potential mitigation and avoidance measures in accordance with the recommended guidance by CEQ and DoD.
6. Describe the impacts on parish tax revenues that might result from the loss of timber lands.

Literature Cited

CEQ (1997). Environmental Justice Guidance under the National Environmental Policy Act. Council on Environmental Quality, 40 pp. December 10, 1997. Accessed at: https://www.epa.gov/sites/production/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf

DoD (1995). Strategy on Environmental Justice. U.S. Department of Defense, 22 pp. March 24, 1995. Accessed at: https://www.denix.osd.mil/references/dod/strategy/dod-environmental-justice-strategy/

Final Panel Comment 8

The Draft Integrated FS/EIS does not provide complete and clear documentation of water surface profiles or information on the 10-year, 25-year, and 100-year storm frequencies under each alternative, which affects the level of H&H review.

Basis for Comment

The water surface profiles (Figures G-29, G-30, G-32, G-33, G-35, G-36, G-38, G-39, G-41, G-42, G-44, G-45, G-47, G-48, G-50, and G-51 in Appendix G-1, Hydrologic and Hydraulic Models) do not show enough information on the graphics to be able to determine how each of the alternatives and the TSP are impacting the ARB. Based on these figures, the results of modeling for the design storms do not clearly support and document the benefits of flood risk reduction for transportation facilities (Highways I-10, I-12, and others Amite River crossings). The water surface profiles do not show significant landmarks such as bridges and other points of reference along the Amite River, nor do they cross reference station location to mapped location or model reference. The illustrated frequency in the decision document includes only the 10-year and 500-year events to show a low- and high-frequency event. The intent appears to be to limit the size of the graphics within the report; however, the smaller-sized graphics do not aid with evaluating the impacts of the alternatives. The water surface profile graphics should include, at a minimum, the profiles for the frequencies covering the Focus Array of Alternatives (10-year, 25-year, and 100-year).

In addition, inundation maps (Figures G-31, G-34, G-37, G-40, G-43, G-46, G-49 and G-52) do not include frequencies for the 10-year, 25-year, and 100-year frequencies.

Significance – Medium/Low

Results from H&H modeling that show how each of the alternatives and the TSP impact the ARB for each design storm frequency would provide better information for evaluating the alternatives analysis and the selection of the TSP.

Recommendations for Resolution

1. Revise each of the water surface profiles and inundation maps to include clarifying data and develop profiles for each of the design frequencies.

Final Panel Comment 9

The Draft Integrated FS/EIS lacks information defining the configuration and operation of the Darlington Dry Dam.

Basis for Comment

The TSP includes the Darlington Dry Dam, which is largely based on a reconnaissance-level design completed for a 1997 Darlington Reservoir Re-evaluation Study prepared by USACE and the LA DOTD (USACE/LA DOTD, 1997). Section 4.3.3 of the Draft Integrated FS/EIS includes a three-paragraph description of the dam along with a large-scale map of the flood pool (Figure 4-3) and a typical section (Figure 4-4). No plan views or profiles of the embankment, outlet works, and spillway structures, which are typically required to provide definition for a proposed conceptual design, are presented. A degree of detail similar to the 1997 Darlington Reservoir Re-evaluation Study would improve the understanding of the proposed structural components under the TSP.

The 1997 Darlington Reservoir Re-evaluation Study (p. 15) presents some discussion of the time required for a flood to pass through the reservoir, but this is not mentioned in the description of the TSP in the Draft Integrated FS/EIS. The duration and extent of flooding within the reservoir footprint would likely have environmental and real estate impacts, which would affect mitigation costs.

Significance – Medium/Low

If the operational aspects of a dry dam are clearly presented and considered, there may be some reduction to the estimated costs associated with environmental, real estate, and other potential impacts.

Recommendations for Resolution

1. Add a plan view, profiles, and cross section drawings similar to those included in the 1997 Re-evaluation Study to document the configuration of the structures under the TSP.
2. Expand the written description in Section 4.3.3 or Section 4.7 to briefly summarize the dam operation, including some discussion of the frequency and duration of the reservoir impoundment.

Literature Cited

USACE/LA DOTD (1997). Amite River and Tributaries, Louisiana: Darlington Reservoir Re-evaluation Study (Reconnaissance Scope). U.S. Army Corps of Engineers New Orleans District/Louisiana Department of Transportation and Development. September 1997.

Final Panel Comment 10

The Sandy Creek and the Lilley and Bluff Creek embankments are presented as alternatives to the TSP, but no geotechnical or hydrologic data are presented to support the cost development used in the economic evaluation of alternatives employing these structures.

Basis for Comment

Section 3, Geotechnical Investigations and Designs, of Appendix A describes the Sandy Creek and the Lilley and Bluff Creek embankments as follows: "Foundation conditions are unknown within the proposed alignments and no subsurface investigations were conducted as part of this study. For cost estimating purposes, a scaled down dam cross section was derived from the Darlington Dam cross section." (Section 3.2, p. 8). The conceptual design of the Darlington reservoir was based upon stability analyses related directly to the site-specific foundation conditions at the Darlington site. A 70-foot-deep slurry cutoff trench was also included in the Darlington design based upon the potentially pervious nature of the subsurface deposits at that site. The use of a "scaled down dam cross section" based upon the Darlington embankment design to estimate quantities for an entirely different site such as Sandy Creek creates a large measure of uncertainty regarding the accuracy of the cost estimate. This uncertainty is further compounded by the fact that the Sandy Creek site is located in a different geologic area than the Darlington site. The Louisiana Department of Natural Resources SONRIS database indicates that the Sandy Lake site is located in the High Terrace Loess formation, whereas Darlington is in the High Terrace unit area. This difference in geology could allow for a significant cost reduction for the Sandy Lake Dam alternative.

The uncertainties in the estimated cost created by the lack of geotechnical information are compounded by the lack of hydrologic data at the other two sites, which creates uncertainties regarding the size and cost estimates for required spillways and outlet works. Estimated costs contained in Appendix B indicate that the uncertainty associated with the cost estimates for the Sandy Creek and the Lilley and Bluff Creek embankments resulted in the use of higher contingency values for these estimated costs. If there are better geologic site conditions at the Sandy Creek and the Lilley and Bluff Creek embankments than at the Darlington site, the resulting estimated costs would be lower than those computed using the Darlington design. However, the increased contingency values would further distort the economic comparison of the three alternatives. The lack of conceptual designs that meets current design standards and an increased level of contingencies creates a large degree of uncertainty in the comparison of alternatives summarized in Table 4.7 of the Draft Integrated FS/EIS.

Significance – Medium/Low

During the midpoint conference, the PDT indicated that the estimated costs for the Sandy Creek and the Lilley and Bluff Creek embankments alternatives would not impact the selection of the TSP since the Darlington alternative utilized a large part of the benefits that would be attributable to these alternatives. For this reason, the comment is categorized as having "Medium/Low" significance since it raises concerns regarding the accuracy of the overall alternative evaluation but would apparently not affect the final selection of the TSP.

Final Panel Comment 10

Recommendations for Resolution

1. Include a statement in the evaluation of alternatives that indicates the level of uncertainty related to the cost for the Sandy Creek and the Lilley and Bluff Creek embankments and provides a justification for accepting this level of uncertainty.
2. To more adequately meet industry standards for a conceptual design, consider obtaining and analyzing additional geotechnical information to decrease the uncertainty of the design and cost estimates under the Sandy Creek and the Lilley and Bluff Creek embankments alternatives. The refined conceptual design and cost estimate could be incorporated in an alternative that provided a greater degree of protection and net benefits.

Final Panel Comment 11

The Draft Integrated FS/EIS does not include all the benefits related to reduced emergency costs.

Basis for Comment

Benefits related to reduced emergency costs are addressed only for debris removal. Other emergency costs that are typically addressed in USACE FRM studies are not included; these costs include flood fighting (e.g., sandbagging), police and fire personnel costs, evacuation and reoccupation costs, and landscaping replacement. Table 4-7 of the Integrated FS/EIS indicates that the benefit-cost ratio (BCR) for the TSP is 1.29 (without including the additional emergency cost benefits), which would be sufficient for project authorization. However, additional reduced emergency costs could be advantageous to increase the budgetary priority of the project during the PED phase.

Significance – Low

While the BCR for the TSP of 1.29 (without including the additional emergency cost benefits) would be sufficient for project authorization, it may not fully reflect the value of the project when it competes for PED funding with other authorized projects.

Recommendations for Resolution

1. Calculate additional emergency cost benefits and include them in cost and benefits tables in the Draft Integrated FS/EIS and appendices.

Final Panel Comment 12

Residual risk of loss of life under both the "without" and "with" project conditions has not been documented in the Draft Integrated FS/EIS.

Basis for Comment

Section 2.2 of the Draft Integrated FS/EIS lists "Reduce risk to human life from flooding" as a planning objective. However, there is no description of risks to human life under the future without-project condition. Typically, risks to human life are presented in terms of combinations of flow velocities and depths that people might be exposed to during flooding in the study area. Additionally, there is no description of how the alternatives would impact the conditions that might pose a risk to human life.

Significance – Low

Demonstrating that the TSP provides a significant reduction in risk to human life would strengthen its recommendation. Documentation of such impacts would also provide a more comprehensive assessment of impacts in compliance with NEPA.

Recommendations for Resolution

1. Develop quantitative or qualitative evaluations of the risks to human life that exist under both the without-project condition and the alternative plans.

Final Panel Comment 13

The Draft Integrated FS/EIS does not describe what actions would be required under the TSP to address the Amite River's Wild and Scenic River designation.

Basis for Comment

There is no description of what actions will be required to address the impacts of the TSP relative to the Amite River's designation as a Wild and Scenic River by the Louisiana Scenic Rivers Act. Section 2.3 of the Draft Integrated FS/EIS states that legislation may be required if the TSP impacts the river. Sections 5.3.1.10 and 5.3.1.11 of the Draft Integrated FS/EIS states that the large-scale 0.04 AEP Darlington Dry Dam alternative would have direct impacts related to the Louisiana Scenic Rivers designation. There is no description of what action would be required related to the Wild and Scenic River designation for implementation of the TSP. Impacts to this Wild and Scenic River designation was mentioned as a concern in the public comments.

Significance – Low

The discussions of project implementation (Section 6.2 of the Draft Integrated FS/EIS) and environmental laws and regulations (Section 8 of the Draft Integrated FS/EIS) will be more comprehensive with a description of actions that would be required to address the Amite River's Wild and Scenic River designation.

Recommendations for Resolution

1. Document what actions would be required to address the Amite River's designation as a Wild and Scenic River and describe the required actions in Section 6.2 and Section 8 of the Draft Integrated FS/EIS.

Final Panel Comment 14

Avoidance of future development in undeveloped areas protected by the TSP is not discussed in the Draft Integrated FS/EIS.

Basis for Comment

The Draft Integrated FS/EIS addresses planning constraints in Section 2.3 (p. 20), with the initial constraint detailing the requirement to avoid induced development that would increase life safety risks. The Draft Integrated FS/EIS goes through a detailed evaluation of project alternatives that ultimately arrives at the TSP: the Darlington Dry Dam combined with nonstructural measures. The Darlington Dry Dam is a 25-year design and could be a factor to discourage development in the floodplain and thereby contribute to a reduction of life safety hazards. The Draft Integrated FS/EIS does not discuss the factors under the TSP that would assist with life safety hazard reduction.

Significance – Low

Reduction of life safety risks is a key part of achieving project objectives and is necessary to validate TSP benefits.

Recommendations for Resolution

1. Include a discussion in the Draft Integrated FS/EIS of the benefits that the Darlington Dry Dam 25-year design would have on life safety risk.

Final Panel Comment 15

Impacts and remaining risks to small boat traffic due to construction of the Darlington Dry Dam are not addressed in the Draft Integrated FS/EIS.

Basis for Comment

In Table 5-1, Relevant Resources Impacts in and near the Project Area, negative impacts for recreation are described as "temporary for structural." With Darlington Dry Dam, navigation on the river through the dam location would no longer be possible. The culverts would be too long to allow safe transit for small craft. Compared to the current condition, there would be significantly increased hazards to anyone in the immediate vicinity of the dam during periods of flooding.

Significance – Low

Assuming that there would be infrequent small boat traffic on this portion of the river, the impacts to recreation and the hazards to the public would likely be minimal.

Recommendations for Resolution

1. Acknowledge the impact to recreation in Table 5-1.

5. REFERENCES

Bridges, T.S., E.M. Bourne, J.K. King, H.K. Kuzmitski, E.B. Moynihan, and B.C. Suedel (2018). Engineering with Nature: An Atlas. ERDC/EL SR-18-8. Vicksburg, MS: U.S. Army Engineer Research and Development Center. http://dx.doi.org/10.21079/11681/27929.

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USACE/LA DOTD (1997). Amite River and Tributaries, Louisiana: Darlington Reservoir Re-evaluation Study (Reconnaissance Scope). U.S. Army Corps of Engineers New Orleans District/Louisiana Department of Transportation and Development. September 1997.

APPENDIX A

IEPR Process for the ART FS Project

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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 Amite River and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study (hereinafter: ART FS 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 U.S. Army Corps of Engineers (USACE) on November 22, 2019. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on April 15, 2020. 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 ART FS IEPR

Task	Action	Due Date
1	Award/Effective Date	9/11/2019
	Review documents available	11/22/2019
	Public comments available	1/20/2020
	Battelle submits draft Work Plan[a]	9/19/2019
	USACE provides comments on draft Work Plan	9/30/2019
	Battelle submits final Work Plan[a]	10/2/2019
2	Battelle submits list of selected panel members[a]	10/2/2019
	USACE confirms the panel members have no COI	10/15/2019
3	Battelle convenes kick-off meeting with USACE	9/17/2019
	Battelle convenes kick-off meeting with panel members	11/19/2019
	Battelle convenes kick-off meeting with USACE and panel members	11/19/2019
4	Panel members complete their individual reviews	12/31/2019
	Panel members provide draft Final Panel Comments to Battelle	1/22/2020
	Battelle sends public comments to panel members for review	1/22/2020
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	1/28/2020
	Panel finalizes Final Panel Comments	1/28/2020
5	Battelle submits Final IEPR Report to USACE[a]	2/11/2020
6[b]	Battelle convenes Comment Response Teleconference with panel members and USACE	3/31/2020
	Battelle submits pdf printout of DrChecks project file[a]	4/15/2020
	Agency Decision Milestone (ADM) meeting[c]	3/19/2020
	Contract End/Delivery Date	9/30/2020

[a] *Deliverable.*
[b] *Task 6 occurs after the submission of this report.*
[c] *The ADM meeting was listed in the Performance Work Statement under Task 3 but was relocated in this schedule to reflect the chronological order of activities.*

At the beginning of the Period of Performance for the ART FS IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 16 charge questions provided by USACE, 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 USACE 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

Review Documents	No. of Review Pages
Draft Integrated Feasibility Study with Environmental Impact Statement	300
Engineering Appendix A	30
Cost Appendix B	30
Environmental Appendix C	151
Real Estate Appendix D	47
Plan Formulation Appendix E	30
Economic and Social Considerations Appendix F	60
H&H Appendix G-1	60
Total Number of Review Pages	**708**
Supplemental Information[a]	
Public Review Comments	102
H&H Reference Material (Appendix G-2 Models)	304
Total Number of Reference Pages	**406**

[a] *Supporting documentation only. These documents are not for Panel review and should be used as information sources only. They are not included in the total page count.*

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

- Review Policy for Civil Works (EC 1165-2-217, February 20, 2018)
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review (December 16, 2004)
- Foundations of SMART Planning
- Feasibility Study Milestones (PB 2018-01, September 30, 2018 and PB 2018-01(S), June 20, 2019)
- SMART – Planning Overview
- Planning Modernization Fact Sheet
- USACE Climate Change Adaptation Plan (2015)
- Procedures to Evaluate SLR Change Impacts Responses Adaptation (ETL 1100-2-1 – June 30, 2014)
- Incorporating SLR Change in CW Programs (ER 1100-2-8162 – December 31, 2013).

About halfway through the review, a teleconference was held with USACE, Battelle, and the Panel so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 23 panel member questions to USACE. USACE was able to provide responses to all the questions during the teleconference or was able to provide written responses to all the questions prior to the end of the review.

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 ART FS 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 descriptions 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 USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

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, 15 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE 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.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received a PDF file containing 102 pages of public comments on the ART Draft Integrated F/EIS from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

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

The Panel produced individual comments in response to the charge question. Each panel member's individual comments for the public comment review were shared with the full Panel. Battelle reviewed the comments to identify any new technical concerns that had not been previously identified during the initial IEPR. Upon review, Battelle determined, and the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments. However, the Panel noted some of the issues raised in the public comments were similar to concerns raised in the IEPR Final Panel Comments, particularly Final Panel Comments 7 and 13.

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 USACE for acceptance.

A.7 Comment Response Process

As part of Task 6, Battelle will enter the 15 Final Panel Comments developed by the Panel into USACE's DrChecks, a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will

provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

APPENDIX B

Identification and Selection of IEPR Panel Members for the ART FS Project

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B.1 Panel Identification

The candidates for the Amite River and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study (hereinafter: ART FS) IEPR Panel were evaluated based on their technical expertise in the following key areas: plan formulation/economics, environmental law compliance, civil/structural engineering, hydrology and hydraulics (H&H) engineering, and geotechnical engineer. These areas correspond to the technical content of the review documents and overall scope of the ART FS 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 five 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 in order 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 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."

The term "firm" in a screening question referred to any joint venture in which a firm was involved. It applied to any firm that serves in a joint venture, either 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 IEPR of the Amite FS and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study
1. Previous and/or current involvement by you or your firm in the Amite River and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study (hereinafter: ART FS) and related projects.
2. Previous and/or current involvement by you or your firm in flood control projects on the ART FS and its tributaries in Louisiana and Mississippi.
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 ART FS-related projects.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Amite FS and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study
4. Current employment by the U.S. Army Corps of Engineers (USACE).
5. Previous and/or current involvement with paid or unpaid expert testimony related to the ART FS project.
6. Previous and/or current employment or affiliation with members of the non-Federal sponsors any cooperating Federal, State, County, local and regional agencies, environmental organizations, parish or city governments within the study area, and interested groups (for pay or pro bono). The below list is not exclusive: • Louisiana Department of Transportation and Development • Amite River Basin Commission • Louisiana Parishes: East Feliciana, St. Helena, East Baton Rouge, Livingston, Iberville, St. James, St. John the Baptist, and Ascension • Mississippi Counties: Amite, Lincoln, Franklin, and Wilkinson Comite Taskforce
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the ART FS 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 New Orleans District.
9. Previous or current involvement with the development or testing of models (includes the HEC-RAS, DOTD basin wide model) that were used for, or in support of, the ART FS project.
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the New Orleans District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the New Orleans District. Please explain.
11. Any previous employment by USACE as a direct employee, notably if employment was with the New Orleans 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 New Orleans 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 management and flood risk management, and include the client/agency and duration of review (approximate dates).

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Amite FS and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study
14. Pending, current, or future financial interests in contracts/awards from USACE related to the ART FS project.
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 Louisiana Department of Transportation contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the ART FS project.
18. Participation in relevant prior and/or current Federal studies related to the ART FS project.
19. Previous and/or current participation in prior non-Federal studies related to the ART FS project.
20. Has your research or analysis been evaluated as part of the ART FS project?
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.

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.

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. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. ART FS IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Planning Formulator/Economist					
Lewis Hornung	DR Reed & Associates, Inc.	Jupiter, FL	B.S., Civil Engineering	Yes	40
Environmental Law Compliance Specialist					
Paul Looney	Independent Consultant	Pensacola, FL	M.S., Coastal Zone Studies/Biology	No	39
H&H Engineer					
Larry Fluty	Independent consultant	Brooksville, FL	Ph.D., Civil Engineering/Water Resources	Yes	41
Civil/Structural Engineer					
Robert Chantome	Hanson Professional Services Inc.	Springfield, IL	M.S., Civil Engineering	Yes	28
Geotechnical Engineer					
Doug Spaulding	Spaulding Consultants, Inc.	Golden Valley, MN	M.S., Geotechnical Engineering	Yes	50

Table B-2 presents an overview of the credentials of the final five 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. ART FS IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Hornung	Looney	Fluty	Chantome	Spaulding
Plan Formulator / Economist					
Minimum of 10 years of demonstrated experience in economics and planning from academia, a public agency, a non-governmental entity, or an architect-engineer or consulting firm	X				
	X				

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

Technical Criterion	Hornung	Looney	Fluty	Chantome	Spaulding
Plan Formulator / Economist (continued)					
Experience in economic evaluation of flood risk management projects and methods for evaluating flood damages and potential for life loss using tools such as HEC Flood Damage Reduction Analysis (HEC-FDA), HEC Flood Impact Analysis (HEC-FIA), and/or HEC Life Loss/Direct Damage Estimate Simulation (HEC-LifeSim)	X				
Environmental Law Compliance Specialist					
Minimum of 10 years of experience directly related to water resource environmental evaluation or review and National Environmental Policy Act (NEPA) compliance		X			
BS or higher degree in biological or environmental disciplines and works in academia, a public agency, a non-governmental entity, or a consulting firm		X			
Very familiar with the project area and environmental impact analysis and mitigation and with the habitat, fish and wildlife species that may be affected by the project alternative in the study area		X			
Very familiar with and has experience with Clean Water Act, Endangered Species Act (ESA), and National Oceanic and Atmospheric Administration (NOAA) Essential Fish Habitat (EFH)		X			
H&H Engineer					
Minimum of 10 years of experience in H&H engineering			X		
Registered professional engineer from academia, a public agency whose mission includes flood risk management, or an Architect-Engineer or consulting firm			X		
Familiar with hydrologic, hydraulic, and sediment transport analyses and models, such as HEC River Analysis System (HEC-RAS)			X		
Familiar with application of detention/retention basins, geomorphology, climate change, and nonstructural solutions involving flood warning systems and flood proofing			X		
Experience with USACE Safety Assurance Review (SAR)			X		
Civil/Structural Engineer					
Minimum of 10 years of experience in civil engineering and design				X	
Shall be a registered professional engineer with a minimum of a BS degree in engineering				X	

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

Technical Criterion	Hornung	Looney	Fluty	Chantome	Spaulding
Civil/Structural Engineer (continued)					
Experienced in designing channel modifications, levee systems, earthwork, and retention/detention facilities, such as dams and reservoirs				X	
Has a working knowledge of construction and is capable of making professional determinations based on experience				X	
Geotechnical Engineer					
Minimum of 10 years of experience in geotechnical engineering					X
Registered professional engineer or geologist with a BS degree or higher					X
Familiar with and experienced in working with geotechnical evaluations and geo-civil design for flood risk management projects, including foundation analysis and channel stability analysis.					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, P.E.**
Role	**Planning Formulator/Economist**
Affiliation	**DR Reed & Associates, Inc.**

Mr. Hornung is a planning expert with DR Reed & Associates, Inc., 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, 7 years with the South Florida Water Management District (SFWMD), and 14 years with architectural/engineering firms. Mr. Hornung has worked on dozens of USACE Civil Works projects since 1977 and is very familiar with applying USACE Principles and Guidelines. He has taken part in previous IEPR panels for Battelle as an economist/Civil Works planning 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 during the planning phase through Congressional authorization.

Mr. Hornung has 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 (FSs), limited re-evaluation reports, general re-evaluation 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 (TSP) within the context of the risk-informed decision-making process for these types of studies.

Mr. Hornung's experience includes structural and non-structural flood risk management projects; water quality; 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 FS; the Herbert Hoover Dike Major Rehabilitation Report; the Alexandria to the Gulf of Mexico Flood Control FS, New Orleans District; and the North West El Paso Flood Risk Management FS, Albuquerque District.

Mr. Hornung also has more than 30 years of experience conducting traditional National Economic Development (NED) benefits analyses associated with flood risk management and inland navigation projects. This experience includes applying the Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA) model for the Alexandria to the Gulf Flood Risk Management FS, the C-111 GRR (flood risk management), and the Northwest El Paso Flood Risk Management FS.

Mr. Hornung has applied the HEC-FDA model using HEC River Analysis System (HEC-RAS) model results on many projects, including Alexandria to the Gulf (2012), Pajaro River (2016), and Northwest El Paso (2017). In addition, Mr. Hornung served on the IEPR Panel to evaluate the NED analysis that was performed using the HEC-RAS and HEC-FDA models for the West Sacramento Flood Risk Management GRR (Sacramento District) and the Middle Mississippi River Study (Albuquerque 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 10 years of experience working with HEC-FDA modeling software for many USACE studies. His 2006 involvement in the Alexandria to the Gulf of Mexico FS for the New Orleans District illustrates his experience with HEC-FDA. As a consultant to the New Orleans District, he managed a project that 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	**Paul Looney, CEP, CSE, PWS**
Role	**Environmental Law Compliance Specialist**
Affiliation	**Independent Consultant**

Mr. Looney is an independent consultant and Senior Scientist at Scalar Consulting Group Inc. in Pensacola, Florida, has 39 years of professional experience, 30 of them as an ecologist. He has an M.S. in coastal zone studies/biology from the University of West Florida and is a Certified Environmental Professional, a Senior Ecologist, and a Senior Professional Wetland Scientist. The theme for his Master's thesis was research and documentation of the environmental impacts related to deposition of dredged material in a coastal environment.

Mr. Looney has extensive experience with the Clean Water Act (including permitting in coastal environments) and is expert in wetland delineation, assessment, and permitting. He has completed numerous Essential Fish Habitat (EFH) assessments in Louisiana, Alabama, and Florida as part of his normal National Environmental Policy Act (NEPA) compliance project documentation and has experience using the EFH Mapper tool. He has completed both formal and informal Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) concerning listed species impacts for coastal and transportation projects in the same states.

Mr. Looney has broad experience in water resource environmental evaluation and NEPA compliance in coastal environments. He was the lead scientist for the Alabama Port Authority Environmental Impact Statement (EIS) for the creation of a container port in Mobile, Alabama. In addition, for the Alabama Port Authority, Mr. Looney worked closely with the USFWS, National Marine Fisheries Service, USACE, U.S. Environmental Protection Agency, and Alabama Department of Natural Resources to develop an accepted wetland assessment technique for natural resource impact surveys of nearby wetlands and threatened and endangered species. He developed a coastal wetland evaluation model, based on the Hydrogeomorphic Model, for the evaluation of coastal fringing wetlands and tidal flats associated with the Choctaw Point Container Port EIS, Mobile, Alabama. The model was used for a multi-agency (Federal and state) evaluation of all impacted wetlands and was agreed upon after intensive collaboration among all agencies.

Mr. Looney is an active member of the National Association of Environmental Professionals (NAEP) and is a published scientific author with seven publications in recognized scientific journals. He has also been the main author on three papers concerning projects he has managed. These papers were published as part of the proceedings from the NAEP's Annual Meetings and were presented by Mr. Looney at the meetings.

Name	**Larry Fluty, Ph.D., P.E., CFM**
Role	**H&H Engineer**
Affiliation	**Independent Consultant**

Dr. Fluty has 41 years of experience managing and designing civil engineering facilities involving H&H solutions for water resources, flood control, stormwater drainage, detention/retention basin design, low-impact design with non-structural solutions, flood warning systems, and flood-proofing measures. He earned his Ph.D. in civil engineering/water resources from Grant University in 2012 and is a registered professional engineer in Florida, Kentucky, Ohio, Virginia, and West Virginia. Additionally, he is an Association of State Floodplain Managers Certified Floodplain Manager. Dr. Fluty has an extensive engineering background in hydraulic studies for levee design, erosion control measures, environmental compliance and restoration, stream geomorphology, climate change impacts, flood control, stream stabilization, low-impact design and non-structural alternatives, urban hydrology, waterway and wetland permitting, water control structures, and hydraulic safety audits and studies.

In his previous role as the Director of Water Resources for Cardno, Dr. Fluty was responsible for all water resource and drainage discipline projects. He was also responsible for planning, design, permitting, and construction administration for water resource projects, as well as all aspects of H&H modeling. As such, he is experienced with the USACE HEC model series (including HEC-RAS [2D] and HEC Hydrologic Modeling System). He is highly experienced with various integrated 2D modeling used for watershed

evaluations and flood impact. Dr. Fluty's experience includes Federal Emergency Management Agency (FEMA) floodplain analysis and mapping, master drainage plans, watershed management plans, and water quality improvement plans for large-scale regional and urban watersheds. He has also completed watershed projects involving low-impact development analysis and design, evaluation of structural and non-structural alternatives, flood warning systems including evacuation alternatives, and development of advanced and automated geographic information systems (GIS) for water resources. He has used these models on such studies as the SH-130 drainage improvements for the Texas Department of Transportation, where he evaluated variable storm durations and critical storm determinations for several watersheds in order to ensure no impacts upstream or downstream of all conveyance crossings; the Redwood Master Drainage Plan, Josephine County, Oregon, where he evaluated locations, source, extent, and depth of flooding (including providing alternative flood protection measures); and the Broadway & Rural Drainage Master Plan, Tempe, Arizona, where project goals included development of protective measures, use of structural and non-structural alternatives, and development of comprehensive alternatives to prevent flooding in the urban watershed. Dr. Fluty has specialized experience in river engineering and sediment transport as well as in geomorphology evaluations, including the Curlew Creek geomorphology assessment and natural channel design, Pinellas County, Florida. The project involved evaluation and development of hydro-modifications involving cross vanes with pools for energy reduction, sediment transport, and development of watershed-specific standards.

Dr. Fluty's experience includes preparing watershed management plans and studies that involve rural and urban watersheds, open-channel systems, and riverine systems. Watershed studies often require the evaluation of minimizing erosion impacts using low-impact development strategies involving structural and non-structural approaches. Dr. Fluty has also conducted riverine floodplain H&H studies that involved evaluating floodplain impacts; identifying flood zone hazard areas, sediment transport, and erosion; and evaluating flood reduction and control measures such as the design and analysis of water control structures and non-structural approaches.

Dr. Fluty's related project experience includes producing more than 1,000 FEMA map panels, completing six county-wide Digital Flood Insurance Rate map studies, and completing H&H modeling and mapping of more than 25,000 miles of streams. Dr. Fluty has also completed canal and riverine capacity assessments of existing riverine and canal systems. These evaluations included field inspection, survey, sediment sampling, and assessment of erosion potential, including sediment transport analysis.

Dr. Fluty is highly capable and experienced in addressing the requirements necessary for performing USACE Safety Assurance Reviews (SARs) and in completing and presenting risk management requirements per ER 1105-2-101 (Risk Assessment for Flood Risk Management Studies) and related guidance. This experience includes performing SARs for the Nolichucky River Watershed, Nashville District, and the L-40 Levee Conveyance Reconnaissance Study for the SFWMD and USACE Jacksonville District.

Dr. Fluty is very familiar with the impact of other disciplines on the outcome on flood risk management and flood reduction projects. He has worked with environmental professionals on impacts on natural systems, and he has collaborated with planners to evaluate future land use and with geotechnical engineers to evaluate potential constraints on hydraulic structures. Dr. Fluty has also worked with interdisciplinary project teams; for example, he served as the project manager on the SFWMD Everglades Protection Area Bc87(3) Project, West Palm Beach, Florida, and the Trinity River Restoration Project, Trinity County, California.

Dr. Fluty has experience evaluating risk for flood, damages, and life/safety aspects. Working with the USACE Jacksonville District and the SFWMD, he participated in peer design conferences, evaluated the H&H models developed by the project team, and reviewed and modified the proposed operating manuals to ensure consistent and compatible performance of the project components with the existing Central and Southern Florida Flood Control Project. Dr. Fluty also conducted risk management assessment of the alternatives and final project for flood risk impact, life and safety, and other criteria as specified by ER 1105-2-101.

Dr. Fluty is a member of the American Water Resources Association, the American Society of Civil Engineers, the Association of State Floodplain Managers, and the Society of American Military Engineers. He served as the H&H engineering IEPR panel member for the Rio Grande de Arecibo, Puerto Rico; Leon Creek Watershed FS, San Antonio, Texas; Aliso Creek Mainstem, Orange County, California; Middle Rio Grande Flood Protection Project, Bernalillo to Belen, New Mexico; and DuPage River IEPR, Cook, DuPage and Will County, Illinois.

Name	**Robert Chantome, P.E.**
Role	**Civil/Structural Engineer**
Affiliation	**Hanson Professional Services Inc.**

Mr. Chantome has worked for 28 years as a geotechnical and structural engineer. His experience includes development of geotechnical investigation programs; geotechnical designs of slopes and foundations; structural designs of retaining walls, floodwalls, hydraulic structures and gates; and geotechnical and seismic designs of slopes and foundations. In addition, he performs foundation analyses, scour potential evaluations, and seismic engineering services. He is well-versed in the use of a variety of computer software programs, including AutoCAD, GROUP, GEOPAK, and InRoads.
Mr. Chantome holds both a B.S. (1989) and M.S. (1990) in civil engineering from the University of Illinois-Urbana, and is a professional engineer in Kentucky, Iowa, and Missouri. In Illinois, he is a registered structural engineer.

Mr. Chantome served as the structural/geotechnical engineer for a flood protection system for the West Side Phase I project in Cedar Rapids, Iowa, during which he completed structural and foundation design for 850 feet of permanent T-type floodwall founded on battered H-piles with a sheet pile cutoff wall. He also completed constructability assessments for a wall under an arch bridge with 1-inch clearance between the low chord and the top of the wall.

For the Nature Conservancy's Emiquon Preserve Water Control Structure Planning, Design and Construction Services in Illinois, Mr. Chantome was the lead structural engineer responsible for design of a water control structure within the net levee section, pedestrian bridge, and appurtenant sampling structures, which included the design of pump discharge penetrations and the riser structure wall, outlet channel improvements, integrated foundations for cranes on top of the water control structure, and sheet-pile cut-off walls and numerous other components to enhance the management of the 5,200-acre wetlands/fisheries restoration project. The wetland restoration area is surrounded by a 20-foot-high levee, and the water control structure and pump station are critical for managing water levels for the aquatic ecosystem.

For USACE's New Orleans District's Task Force Guardian Hurricane Protection Restoration project, Mr. Chantome provided geotechnical engineering expertise for monitoring and recording quality

assurance and quality control (QA/QC) test results on multiple levee and flood gate construction projects in Plaquemines Parish, Louisiana. Also, for the USACE New Orleans District, he was a geotechnical/structural engineer for the West Closure Complex, Plaquemines Parish, providing design, review, and QA to the support team. Further, for the USACE New Orleans District's Task Force Hope Cost Estimate Study, Mr. Chantome served as a geotechnical engineer on a multidisciplinary team responsible for preparing a cost estimate of all Hurricane Protection System projects in Southeast Louisiana following Hurricane Katrina and also served on a Lake Pontchartrain and Vicinity Levee Value Engineering Workshop. He was the geotechnical engineer on a multidisciplinary team that proposed value engineering alternatives for four levee and floodwall projects along the south shore of Lake Pontchartrain.

For the Illinois Department of Natural Resources Stratton Lock and Dam project, Mr. Chantome served as lead structural engineer for the lock wall extension and as civil/structural engineer for the replacement flow control gate structure. The project improved three main components of the existing lock and dam facility: the boat lock was extended in the downstream direction on the river to double the current locking capacity; a new flow control gate structure upstream replaced the existing structure; and the berm on the west side of the Fox River was rehabilitated to correct erosion problems. The new gate structure required staged construction with temporary and permanent channel modifications to maintain the flow of the Fox River throughout construction, reducing the risk of upstream flooding.

For USACE, St. Paul District, Mr. Chantome provided geotechnical engineering support for the design documentation report (design and analysis computations) for 8 miles of roads adjacent to Devils Lake, North Dakota, that were impounding water due to the flooding of Devils Lake. He completed the design of the alignments and features and documented the design analysis, including designing an embankment to minimize future construction costs. Mr. Chantome also assisted in developing standards for utility and infrastructure features crossing the embankments.

Name	**Douglas Spaulding, P.E.**
Role	**Geotechnical Engineer**
Affiliation	**Spaulding Consultants, Inc.**

Mr. Spaulding is a Principal and geotechnical/civil engineer with Spaulding Consultants, LLC, responsible for flood risk management projects involving dam, levee, and floodwall design and inspection. He earned his M.S. in geotechnical engineering from Purdue University and is a registered professional engineer in Wisconsin, Minnesota, and Michigan. He has 50 years of experience in the design, evaluation, and inspection of water-retaining structures.

During his career, Mr. Spaulding has provided geotechnical design and evaluation services for flood risk management levees, embankments, and hydroelectric projects in a 23-state area. His experience includes 10 years with USACE, where he served as Chief of the Levee and Channel Design Section for the St. Paul District. In that capacity, he managed the design of the Pembina levee project in North Dakota and provided geotechnical/civil design services for over $200 million worth of local flood protection projects in Wisconsin, Minnesota, and North Dakota. The Pembina project and the Mankato and Winona flood control projects in Minnesota all included extensive sections of floodwall (both I-wall and T-wall configurations). In addition, for the Winona project, Mr. Spaulding supervised the evaluation of underseepage using a drainage trench. He also served as the Program Manager for the National Dam

Safety Program in Wisconsin and Minnesota. He has experience with lock structures in Minnesota and Michigan and served on the design team for the rehabilitation of Lock and Dam No. 1 and No. 2 on the Mississippi River. He also managed the design of several hydroelectric projects at dams on the Mississippi and Red River in Louisiana.

Mr. Spaulding's geotechnical background includes evaluating the stability of levee sections founded on soft clay foundations. His experience also encompasses geotechnical design of bridge foundations, cellular sheet pile structures, sheet pile tieback walls, conventional gravity walls, and pump stations founded on sand and soft clay deposits. He has provided design services for embankments using preload fills to strengthen underlying foundation deposits. He recently served as a consultant to evaluate the instability caused by a sanitary landfill founded on more than 100 feet of soft lacustrine clay. All the local flood control projects for which Mr. Spaulding has provided design services have involved at least several gatewells to accommodate gravity drainage.

As part of his experience, Mr. Spaulding applied USACE risk-informed approaches to the evaluation of safety issues at USACE navigation, flood control, and hydroelectric projects. From 1988 to 2010, he also provided dam safety training for USACE operations personnel at navigation and flood control projects. Over the last 10 years, Mr. Spaulding has participated in more than 75 Potential Failure Mode Analysis (PFMA) evaluations of dams and hydroelectric projects. As a facilitator of PFMA evaluations authorized by the Federal Energy Regulatory Commission (FERC), Mr. Spaulding has directed more than 50 evaluations for embankment dams, concrete gravity structures, and arch dam structures.

In addition, Mr. Spaulding has served as a civil/geotechnical member of IEPR review panels dealing with local flood protection projects such as levees, channels and floodwalls, dam remediation, dam replacement, and seepage control system upgrades. This experience has given him an extensive background in USACE's SAR requirements. Mr. Spaulding has provided peer review services on two reaches of hurricane protection projects in the New Orleans area. In 2008, he peer-reviewed the geotechnical design of the New Orleans Group 1 to Group 3 pump stations. In 2010, Mr. Spaulding also served on the IEPR team reviewing the Olmsted Lock and Dam structure on the Ohio River. In 2014, he served on the IEPR evaluation team for the Pine Creek dam remediation in Oklahoma, assessing proposed methods to control internal embankment seepage around an existing conduit that had created large internal voids in the 50-year-old dam. In addition, Mr. Spaulding currently serves on two FERC-appointed Boards of Consultants reviewing the design of two major hydroelectric projects and was appointed to the U.S. Department of Energy (DOE) peer review panel to evaluate ongoing DOE-sponsored research related to dams and hydroelectric generation. He recently served on a Bureau of Reclamation review panel for the Folsom Dam spillway addition.

Mr. Spaulding is a lifetime member of the American Society of Civil Engineers. He is also a member of the Minnesota Geotechnical Society and the National Hydropower Association.

APPENDIX C

Final Charge for the ART FS IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Amite River and Tributaries – East of the Mississippi River, Louisiana

This is the final Charge to the Panel for the ART FS IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on October 2, 2019. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

The Amite River Basin covers portions of Amite, Lincoln, Franklin, and Wilkinson Counties in southwest Mississippi as well as East Feliciana, St. Helena, East Baton Rouge, Livingston, Ascension, and Iberville Parishes in southeast Louisiana. The study area is the Amite River Basin and tributaries which includes portions of southwest Mississippi and southeast Louisiana, as well as St. James and St. John the Baptist Parishes.

The Amite River and its tributaries can cause flood damages to industrial, commercial, and agricultural facilities, and to residential and nonresidential structures. The Amite River Basin primarily has flooding from two different sources. The upper basin flooding is caused from headwater flooding from rainfall events. The lower basin flooding is caused by a combination of drainage from headwaters and backwater flooding from tides and wind setup. Critical infrastructure throughout the region, including the Interstate 10 (I-10) and Interstate 12 (I-12) transportation systems, government facilities, and schools, are expected to have increased risk of damage from rainfall events as a result of climate change.

As recently as August 2016, the United States President issued disaster declarations for parishes in the Amite River Basin due to impacts from “The Great Flood of 2016.” The flood was responsible for 13 deaths and the rescue of at least 19,000 people by the Louisiana National Guard. The area experienced historic flooding to thousands of homes and businesses and impacts to the Nation's critical infrastructure by shutting down both the I-10 and I-12 transportation systems for days. Major urban centers in the basin saw significant flooding well outside of normal flood stages. The study will develop flood risk management (FRM) alternatives to reduce the risks to public, commercial, and residential property, real estate, infrastructure, and human life; increase the reliability of a National transportation corridor (I-10/I-12) by providing alternatives that will potentially lessen damages from rainfall and wind/tide-induced flooding; and enhance public education and awareness of flood risks.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Amite River and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study (hereinafter: ART FS IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities’ *Review Policy for Civil Works* (Engineer Circular [EC] 1165-2-217, dated February 20, 2018), and the Office of Management and Budget’s (OMB’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 and environmental assumptions and projections, project evaluation data, economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in evaluation of economic or environmental impacts, and any biological opinions" (EC 1165-2-217; p. 39) 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 (p. 41), review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

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

Review Documents	No. of Review Pages	Subject Matter Experts				
		Planning Formulator/ Economist	Environmental Law Compliance Specialist	Civil/ Structural Engineer	Hydrology and Hydraulic Engineer	Geotechnical Engineer
Draft Feasibility Study	200	200	200	200	200	200
Engineering Appendix	200			200	200	200
Cost Appendix	60	60				
Environmental Appendix	395		395			
Real Estate Appendix	30	30	30			
Plan Formulation Appendix	50	50	50	50	50	50
Economic and Social Considerations	40	40	40			
H&H Appendix	50				50	
Total Number of Review Pages	**1,025**	**380**	**715**	**450**	**500**	**450**
Public Review Comments[a,]	200	200	200	200	200	200

Review Documents	No. of Review Pages	Subject Matter Experts				
		Planning Formulator/ Economist	Environmental Law Compliance Specialist	Civil/ Structural Engineer	Hydrology and Hydraulic Engineer	Geotechnical Engineer
Supplemental Information						
H&H Reference Material	304				304	
Total Number of Reference Pages	**304**	**0**	**0**	**0**	**304**	**0**

[a] USACE will submit public comments to Battelle, which will in turn submit to the IEPR Panel.

Documents for Reference

- Review Policy for Civil Works (EC 1165-2-217, February 20, 2018)
- OMB Final Information Quality Bulletin for Peer Review (December 16, 2004)
- Foundations of SMART Planning
- Feasibility Study Milestones (PB 2018-01, September 30, 2018; PB 2018-01(S), June 20, 2019)
- SMART – Planning Overview
- Planning Modernization Fact Sheet
- USACE Climate Change Adaptation Plan (2015)
- Engineer Technical Letter (ETL) 1100-2-1 – Procedures to Evaluate SLR Change Impacts Responses Adaptation
- Engineer Regulation (ER) 1100-2-8162 – Incorporating SLR Change in CW Programs.

SCHEDULE

Task	Action	Due Date
Meetings	Subcontractors complete mandatory Operations Security (OPSEC) training	11/16/2019
	Battelle sends review documents to panel members	11/26/2019
	Battelle convenes kick-off meeting with panel members	11/27/2019
	Battelle convenes kick-off meeting with USACE and panel members	12/2/2019
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	12/12/2019

Task	Action	Due Date
Review	Panel members complete their individual reviews	12/31/2019
	Battelle provides talking points for Panel Review Teleconference to panel members	1/3/2020
	Battelle convenes Panel Review Teleconference	1/6/2020
	Battelle provides Final Panel Comment templates and instructions to panel members	1/7/2020
	Panel members provide draft Final Panel Comments to Battelle	1/13/2020
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	1/14/2020 - 1/21/2020
	Panel finalizes Final Panel Comments	1/22/2020
Public Comment Review**	Battelle receives public comments from USACE	1/13/2020
	Battelle sends public comments to Panel	1/15/2020
	Panel completes its review of public comments	1/21/2020
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	1/22/2020
	Panel drafts Final Panel Comment for public comments, if necessary	1/24/2020
	Panel finalizes Final Panel Comment regarding public comments, if necessary	1/28/2020
Final Report	Battelle provides Final IEPR Report to panel members for review	1/30/2020
	Panel members provide comments on Final IEPR Report	2/3/2020
	*Battelle submits Final IEPR Report to USACE	2/5/2020
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	2/12/2020
Comment Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	2/14/2020
	Battelle convenes teleconference with Panel to review the Comment Response process	2/14/2020
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	3/9/2020
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	3/13/2020
	USACE PCX provides draft PDT Evaluator Responses to Battelle	3/16/2020
	Battelle provides draft PDT Evaluator Responses to panel members	3/18/2020
	Panel members provide draft BackCheck Responses to Battelle	3/23/2020
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	3/24/2020

Task	Action	Due Date
	Battelle convenes Comment Response Teleconference with panel members and USACE	3/25/2020
	USACE inputs final PDT Evaluator Responses to DrChecks	4/1/2020
	Battelle provides final PDT Evaluator Responses to panel members	4/2/2020
	Panel members provide final BackCheck Responses to Battelle	4/7/2020
	Battelle inputs panel members' final BackCheck Responses to DrChecks	4/8/2020
	*Battelle submits pdf printout of DrChecks project file	4/9/2020
ADM	Agency Decision Milestone (ADM) Meeting	**3/19/2020**
	Contract End/Delivery Date	*9/30/2020*

* Deliverables.
** Battelle will provide public comments to panel members 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. Some sections have no questions associated with them; however, you may still 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.

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

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

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

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

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

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).

2. Please contact the Battelle Project Manager (in training) Patti Connaughton-Burns; burnsp@battelle.org or Program Manager Lynn McLeod; mcleod@battelle.org for requests or additional information.

3. In case of media contact, notify the Battelle Program Manager, Lynn McLeod (mcleod@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, no later than 10 pm ET by the date listed in the schedule above.

Independent External Peer Review of the Amite River and Tributaries – East of the Mississippi River, Louisiana, Feasibility Study

Charge Questions and Relevant Sections as Supplied by USACE

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 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. This includes comments received from agencies and the public as part of the public review process.

The Panel review is to focus on scientific and technical matters, leaving policy determinations for USACE and the Army. 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 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 Panel is asked to consider the following items as part of its review of the decision document and supporting materials.

Broad Evaluation Charge Questions

1. Is the need for and intent of the decision document clearly stated?
2. Does the decision document adequately address the stated need and intent relative to scientific and technical information?
3. Given the need for and intent of the decision document, assess the adequacy and acceptability of the project evaluation data used in the study analyses.
4. Given the need for and intent of the decision document, assess the adequacy and acceptability of the economic, environmental, social, and engineering assumptions that underlie the study analyses.
5. Given the need for and intent of the decision document, assess the adequacy and acceptability of the economic, environmental, social, and engineering methodologies, analyses, and projections.

6. Given the need for and intent of the decision document, assess the adequacy and acceptability of the models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives.

7. Given the need for and intent of the decision document, assess the adequacy and acceptability of the methods for integrating risk and uncertainty.

8. Given the need for and intent of the decision document, assess the adequacy and acceptability of the formulation of alternative plans and the range of alternative plans considered.

9. Given the need for and intent of the decision document, assess the adequacy and acceptability of the quality and quantity of the surveys, investigations, and engineering sufficient for conceptual design of alternative plans.

10. Given the need for and intent of the decision document, assess the adequacy and acceptability of the overall assessment of significant environmental impacts, social justice, and any biological analyses.

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

12. Assess the considered and tentatively selected alternatives from the perspective of systems, including systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

For the tentatively selected plan, assess whether:

13. The models used to assess life safety hazards are appropriate.

14. The assumptions made for the life safety hazards are appropriate.

15. The quality and quantity of the surveys, investigations, and engineering are sufficient for a concept design considering the life safety hazards and to support the models and assumptions made for determining the hazards.

16. The analysis adequately addresses the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project.

Battelle Summary Charge Questions to the Panel Members[1]

Summary Questions

17. 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.

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

Public Comment Questions

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

[1] Questions 17 through 19 are Battelle-supplied questions and should not be construed or considered part of the list of USACE-supplied questions. These questions were delineated in a separate appendix in the final Work Plan submitted to USACE.

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APPENDIX D

Conflict of Interest Form

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David Kaplan
USACE, Institute for Water Resources
September 5, 2019
C-2

Conflicts of Interest Questionnaire

Independent External Peer Review

Amite River and Tributaries - East of the Mississippi River, Louisiana, Feasibility Study

The purpose of this document is to help the U.S. Army Corps of Engineers identify potential organizational conflicts of interest on a task order basis as early in the acquisition process as possible. Complete the questionnaire with background information and fully disclose relevant potential conflicts of interest. Substantial details are not necessary; USACE will examine additional information if appropriate. Affirmative answers will not disqualify your firm from this or future procurements.

NAME OF FIRM: **Battelle Memorial Institute Corporate Operations**
REPRESENTATIVE'S NAME: **Courtney Brooks**
TELEPHONE: **614-424-5623**
ADDRESS: **505 King Avenue, Columbus, Ohio 43201**
EMAIL ADDRESS: **brooksc1@battelle.org**

I. INDEPENDENCE FROM WORK PRODUCT. Has your firm been involved in any aspect of the preparation of the subject study report and associated analyses (field studies, report writing, supporting research etc.) **No** Yes (if yes, briefly describe):

II. INTEREST IN STUDY AREA OR OUTCOME. Does your firm have any interests or holdings in the study area, or any stake in the outcome or recommendations of the study, or any affiliation with the local sponsor? **No** Yes (if yes, briefly describe):

III. REVIEWERS. Do you anticipate that all expert reviewers on this task order will be selected from outside your firm? No **Yes** (if no, briefly describe the difficulty in identifying outside reviewers):

IV. AFFILIATION WITH PARTIES THAT MAY BE INVOLVED WITH PROJECT IMPLEMENTATION. Do you anticipate that your firm will have any association with parties that may be involved with or benefit from future activities associated with this study, such as project construction? **No** Yes (if yes, briefly describe):

V. ADDITIONAL INFORMATION. Report relevant aspects of your firm's background or present circumstances not addressed above that might reasonably be construed by others as affecting your firm's judgment. Please include any information that may reasonably: impair your firm's objectivity; skew the competition in favor of your firm; or allow your firm unequal access to nonpublic information.

No additional information to report.

Courtney M. Brooks
Courtney Brooks

September 5, 2019
Date

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal

BATTELLE

It can be done