Final Independent External Peer Review Report Miami-Dade Back Bay Coastal Storm Risk Management Integrated Feasibility Report and Environmental Impact Statement, Miami-Dade County, Florida

Prepared by
Battelle Memorial Institute

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

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Executive Summary

Project Background and Purpose

The study area is Miami-Dade County (MDC), which is located on the southeast coast of Florida. The county includes the City of Miami and has a population of approximately 2.8 million people, making it the most populous county in Florida and the seventh most populous in the United Sates. The average elevation of the county is 6 feet above sea level. Based on its low-lying topography and dense population, the MDC area is recognized for risks associated with sea level rise (SLR) and coastal storms.

There are four primary problems occurring in MDC with relation to coastal flooding:

- The geographic location, low elevation, and high population of MDC make it vulnerable to storm surge from hurricanes and tropical storms.
- Increasing high tides and king tides resulting from SLR result in recurrent flooding to roads and properties.
- Increasing groundwater elevations from SLR result in flood risks to inland areas.
- Increasing flooding from rain events due to the higher groundwater elevations and higher tail water elevations from SLR threaten properties and infrastructure.

MDC is an important asset to the economic development of the United States, both as an economic hub to international business and also because of its large, dense coastal population. There is Federal interest in addressing high levels of risk and vulnerability to coastal storms, which are expected to be compounded by the combined effects of sea level change and climate change. Analysis completed during the scoping phase indicates that a variety of structural and non-structural solutions could have marked effects on resiliency and be economically justified, environmentally acceptable, and consistent with U.S. Army Corps of Engineers (USACE) policy.

This Federal interest is also echoed across the region in the South Atlantic Coastal Study and the 13 other Coastal Storm Risk Management (CSRM) studies that are currently being conducted within the state of Florida.

The study area will continue to be at risk due to the effects of coastal storms in the future. In addition to damages to structures and critical infrastructure, there is a significant life safety component that should be

considered due to the vulnerability of the population and study area to flooding impacts, as well as potential vulnerability of evacuation routes. Study risks include the accurate projection of SLR over the period of analysis and the potential limited ability to use existing models to analyze conditions in the study area due to unique geologic and hydrodynamic conditions.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an Independent External Peer Review (IEPR) of the Miami-Dade Back Bay CSRM Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida (hereinafter: Miami-Dade Back Bay CSRM Study 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 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; hydraulics, hydrology, and coastal engineering; and civil/geotechnical engineering. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. 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 four-person Panel from this list.

The Panel received electronic versions of the decision documents (1,483 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.

Battelle received public comments from USACE on the Miami-Dade Back Bay CSRM Study (approximately 185 individual 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 Miami-Dade Back Bay CSRM Study review documents. After completing its review, the Panel determined that a comment regarding the cumulative impacts analysis was appropriate.

Overall, 16 Final Panel Comments were identified and documented. Of these, three were identified as having medium/high significance, four have medium significance, six have medium/low significance, and three have low significance.

Results of the Independent External Peer Review

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

The Panel noted that a number of benefits and impacts remain to be identified, clarified, and addressed. The Final Panel Comments provided take into account USACE's statements that the Draft Integrated Feasibility Report/Programmatic EIS (Draft IFR/PEIS) is based on a 10 percent design and that USACE will prepare additional site-specific National Environmental Policy Act (NEPA) documents that assess the specific benefits and impacts of each project once details regarding each project have been determined.

Based on the Panel's review, the report is comprehensive, well-organized, and well-articulated, and follows logically with appropriate references between the main report and appendices. For such a large and expansive study, the Draft IFR/PEIS provides a good level of information on the setting and context while indicating the data gaps that remain to be filled during the Pre-Construction Engineering and Design (PED) phase. The Panel identified several elements of the project where additional analysis is warranted and places where project findings and objectives need to be clarified, documented, or revised.

Economics: To assess the project's long-term ability to perform as planned across the study area, information on the benefit exceedance probability relationship under the Tentatively Selected Plan (TSP) and other alternatives, as well as information on project performance by reach, is needed. Without this information, the Draft IFR/PEIS does not provide an understanding of the likelihood of the project to deliver on the projected returns.

Plan Formulation: The Panel noted that the Draft IFR/PEIS benefit calculations and ranking of alternatives are based on data developed using disparate approaches for analyzing critical infrastructure and the refined focus areas. This disparity creates a problem in that some benefits may be double-counted. The Panel suggests that more information on critical infrastructure, its role in protecting or improving resiliency, and a forecast of how it is expected to perform under Future Without Project (FWOP) conditions is needed. Then, using the additional information, the benefits of each alternative should be reassessed taking into account benefits attributable to critical infrastructure.

In addition, the Draft IFR/PEIS does not demonstrate that USACE considered natural and nature-based features (NNBFs) or hybrid combinations of NNBFs with structural measures in the analysis of alternatives. USACE feasibility reports for flood risk reduction projects are required to consider using both traditional measures and NNBFs, alone or in conjunction with each other (hybrid approaches). However, the Draft IFR/PEIS cites a lack of available sites and limited input from the local sponsor on opportunities

to implement NNBFs. The Panel believes that there are other opportunities to reduce flood risk than the single site where mangrove restoration was considered. At a minimum, the Draft IFR/PEIS should provide a clear rationale on why NNBFs are not feasible. For example, the Panel suggests that NNBFs such as dunes, reefs, and beach restoration are potentially applicable to the refined focus areas of North Beach and South Beach.

Engineering: The Panel observed that the Hazards of the U.S. (HAZUS) x Social Vulnerability Index (SVI) vulnerability analysis is innovative and highlighted the need for an extensive and equitable plan. However, the Panel is concerned that without information from some of the typical USACE SMART planning studies that are normally conducted, like the interior flooding analysis, the current hydrology and hydraulics (H&H) modeling findings may not reliably characterize actual flood processes and may underestimate the severity of flood risks and damages. The Panel believes that several of the H&H modeling assumptions need to be further documented and clarified to document the risks.

The Panel also noted that the first objective of the Draft IFR/PEIS calls for an increase in resiliency and a decrease in vulnerability. No analyses were presented for any of the alternatives that illustrated attainment of this objective, and specific, flexible, measurable, realistic, and attainable factors towards this objective were not discussed as required by Engineer Regulation (ER) 1105-2-100.

Environmental: As part of the NEPA assessment process, an analysis of environmental justice (EJ) must describe vulnerable populations (including, but not limited to, minority and low-income populations) and determine whether there would be disproportionately greater environmental effects on those populations. While the Draft IFR/PEIS describes the socioeconomic makeup of the study area and addresses social vulnerability, potential effects are limited to a brief discussion of protection afforded by the structural measures. The EJ analysis does not provide sufficient detail with respect to access to non-structural measures. The analysis must also consider cumulative effects (past, present, and future actions) in concert with the proposed project. One example of a foreseeable present and future action noted in the public comments is the project's interaction with the Comprehensive Everglades Restoration Plan.

Table ES-1. Overview of 16 Final Panel Comments Identified by the Miami-Dade Back Bay CSRM Study IEPR Panel

No.	Final Panel Comment
Significance – Medium/High	
1	The Draft IFR/PEIS does not present or discuss benefit exceedance probabilities under the TSP or other alternatives.
2	Several of the H&H modeling assumptions are not well documented and may contribute to substantial underestimation of risks.
3	Critical infrastructure protection measures are analyzed to a disparate level of detail than measures developed to protect the refined focus areas.
Significance – Medium	
4	Consideration of NNBFs and hybrid combinations of NNBFs with structural measures in the Draft IFR/PEIS is incomplete.
5	The EJ analysis, which has implications for NEPA compliance, lacks sufficient detail with respect to access to non-structural measures.
6	The resiliency objective does not identify specific, flexible, measurable, realistic, and attainable factors as required by ER 1105-2-100.
7	The cumulative effects analysis is overly brief, and some ongoing and planned future actions were not considered as required by NEPA.
Significance – Medium/Low	
8	Key characteristics of critical infrastructure assets that are subject to uncertainty are not identified or discussed as such in the Draft IFR/PEIS or Appendix C.
9	Environmental impacts may be underestimated because required studies have not yet been performed, potentially affecting project acceptance, schedule, and cost.
10	High residual risk is identified in some refined focus areas without explanation, indicating that key assumptions and screening decisions for these areas have not been documented.
11	The FWOP condition does not consider the potential for residents and businesses to act without public assistance to reduce risk from coastal storm damage and future sea level change.

Table ES-1. Overview of 16 Final Panel Comments Identified by the Miami-Dade Back Bay CSRM Study IEPR Panel (continued)

No.	Final Panel Comment
12	Communication of risk, reliability, and Future With Project (FWP) residual risk is unclear in the Draft IFR/PEIS.
13	Geotechnical analyses of the TSP and the alternatives have not been completed.
Significance – Low	
14	Section 5 of the Draft IFR/PEIS and Appendix C do not document the stepwise progression of the equivalent annual damages (EADs) computation process.
15	Loss of life/life safety was evaluated but not reported for any of the considered alternatives or the TSP.
16	It is unclear whether the number of iterations used in G2CRM resulted in a model result that was near the mean of the underlying distributions.

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LIST OF ACRONYMS

ADM	Agency Decision Milestone
AEP	Annual Exceedance Probability
ASCE	American Society of Civil Engineers
BCR	Benefit-Cost Ratio
COI	Conflict of Interest
CSRM	Coastal Storm Risk Management
CSU	Colorado State University
DrChecks	Design Review and Checking System
EAD	Equivalent Annual Damages
EC	Engineer Circular
EIS	Environmental Impact Statement
EJ	Environmental Justice
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
FRM	Flood Risk Management
FWOP	Future Without Project
FWP	Future With Project
G2CRM	Generation II Coastal Risk Model
H&H	Hydrology and Hydraulics
HAZUS	Hazards of the U.S.
HEC-FDA	Hydrologic Engineering Center–Flood Damage Reduction Analysis
HEC-HMS	Hydrologic Engineering Center–Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center–River Analysis System
HEP	Habitat Evaluation Procedures
IEPR	Independent External Peer Review
IFR/PEIS	Integrated Feasibility Report/Programmatic EIS
IWR	Institute for Water Resources
LiDAR	Light Detection and Ranging
MCACES	Micro-Computer Aided Cost Estimating System
MDC	Miami-Dade County

mm/yr	Millimeters per Year
NED	National Economic Development
NEPA	National Environmental Policy Act
NNBFs	Natural and Nature-Based Features
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 Expertise
PDT	Project Delivery Team
PED	Pre-Construction Engineering and Design
SAR	Safety Assurance Review
SLR	Sea Level Rise
SVI	Social Vulnerability Index
TSP	Tentatively Selected Plan
UC	University of California
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UWIN	Urban Water Innovation Network

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1. INTRODUCTION

The study area is Miami-Dade County (MDC), which is located on the southeast coast of Florida. The county includes the City of Miami and has a population of approximately 2.8 million people, making it the most populous county in Florida and the seventh most populous in the United Sates. The average elevation of the county is 6 feet above sea level. Based on its low-lying topography and dense population, the MDC area is recognized for risks associated with sea level rise (SLR) and coastal storms.

There are four primary problems occurring in MDC with relation to coastal flooding:

- The geographic location, low elevation, and high population of MDC make it vulnerable to storm surge from hurricanes and tropical storms.
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- Increasing flooding from rain events due to the higher groundwater elevations and higher tail water elevations from SLR threaten properties and infrastructure.

MDC is an important asset to the economic development of the United States, both as an economic hub to international business and also because of its large, dense coastal population. There is Federal interest in addressing high levels of risk and vulnerability to coastal storms, which are expected to be compounded by the combined effects of sea level change and climate change. Analysis completed during the scoping phase indicates that a variety of structural and non-structural solutions could have marked effects on resiliency and be economically justified, environmentally acceptable, and consistent with U.S. Army Corps of Engineers (USACE) policy.

This Federal interest is also echoed across the region in the South Atlantic Coastal Study and the 13 other Coastal Storm Risk Management (CSRM) studies that are currently being conducted within the state of Florida.

The study area will continue to be at risk due to the effects of coastal storms in the future. In addition to damages to structures and critical infrastructure, there is a significant life safety component that should be considered due to the vulnerability of the population and study area to flooding impacts, as well as potential vulnerability of evacuation routes. Study risks include the accurate projection of SLR over the period of analysis and the potential limited ability to use existing models to analyze conditions in the study area due to unique geologic and hydrodynamic conditions.

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 Miami-Dade Back Bay CSRM Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida (hereinafter: Miami-Dade Back Bay CSRM Study IEPR) in accordance with procedures described in the Department of the Army, 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 Miami-Dade Back Bay CSRM Study 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 (IWR) prior to the award of the Miami-Dade Back Bay CSRM Study 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 Miami-Dade Back Bay CSRM Study 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 four panel members to participate in the IEPR based on their expertise in the following disciplines: plan formulation/economics; environmental law compliance; hydraulics, hydrology, and coastal engineering; and civil/geotechnical engineering. The Panel reviewed the Miami-Dade Back Bay CSRM Study documents and produced 16 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 Miami-Dade Back Bay CSRM Study IEPR review documents. The following summarizes the Panel's findings.

The Panel noted that a number of benefits and impacts remain to be identified, clarified, and addressed. The Final Panel Comments provided take into account USACE's statements that the Draft Integrated Feasibility Report/Programmatic EIS (Draft IFR/PEIS) is based on a 10 percent design and that USACE will prepare additional site-specific National Environmental Policy Act (NEPA) documents that assess the specific benefits and impacts of each project once details regarding each project have been determined.

Based on the Panel's review, the report is comprehensive, well-organized, and well-articulated, and follows logically with appropriate references between the main report and appendices. For such a large and expansive study, the Draft IFR/PEIS provides a good level of information on the setting and context while indicating the data gaps that remain to be filled during the Pre-Construction Engineering and Design (PED) phase. The Panel identified several elements of the project where additional analysis is warranted and places where project findings and objectives need to be clarified, documented, or revised.

Economics: To assess the project's long-term ability to perform as planned across the study area, information on the benefit exceedance probability relationship under the Tentatively Selected Plan (TSP) and other alternatives, as well as information on project performance by reach, is needed. Without this information, the Draft IFR/PEIS does not provide an understanding of the likelihood of the project to deliver on the projected returns.

Plan Formulation: The Panel noted that the Draft IFR/PEIS benefit calculations and ranking of alternatives are based on data developed using disparate approaches for analyzing critical infrastructure and the refined focus areas. This disparity creates a problem in that some benefits may be double-counted. The Panel suggests that more information on critical infrastructure, its role in protecting or improving resiliency, and a forecast of how it is expected to perform under Future Without Project

(FWOP) conditions is needed. Then, using the additional information, the benefits of each alternative should be reassessed taking into account benefits attributable to critical infrastructure.

In addition, the Draft IFR/PEIS does not demonstrate that USACE considered natural and nature-based features (NNBFs) or hybrid combinations of NNBFs with structural measures in the analysis of alternatives. USACE feasibility reports for flood risk reduction projects are required to consider using both traditional measures and NNBFs, alone or in conjunction with each other (hybrid approaches). However, the Draft IFR/PEIS cites a lack of available sites and limited input from the local sponsor on opportunities to implement NNBFs. The Panel believes that there are other opportunities to reduce flood risk than the single site where mangrove restoration was considered. At a minimum, the Draft IFR/PEIS should provide a clear rationale on why NNBFs are not feasible. For example, the Panel suggests that NNBFs such as dunes, reefs, and beach restoration are potentially applicable to the refined focus areas of North Beach and South Beach.

Engineering: The Panel observed that the Hazards of the U.S. (HAZUS) x Social Vulnerability Index (SVI) vulnerability analysis is innovative and highlighted the need for an extensive and equitable plan. However, the Panel is concerned that without information from some of the typical USACE SMART planning studies that are normally conducted, like the interior flooding analysis, the current hydrology and hydraulics (H&H) modeling findings may not reliably characterize actual flood processes and may underestimate the severity of flood risks and damages. The Panel believes that several of the H&H modeling assumptions need to be further documented and clarified to document the risks.

The Panel also noted that the first objective of the Draft IFR/PEIS calls for an increase in resiliency and a decrease in vulnerability. No analyses were presented for any of the alternatives that illustrated attainment of this objective, and specific, flexible, measurable, realistic, and attainable factors towards this objective were not discussed as required by Engineer Regulation (ER) 1105-2-100.

Environmental: As part of the NEPA assessment process, an analysis of environmental justice (EJ) must describe vulnerable populations (including, but not limited to, minority and low-income populations) and determine whether there would be disproportionately greater environmental effects on those populations. While the Draft IFR/PEIS describes the socioeconomic makeup of the study area and addresses social vulnerability, potential effects are limited to a brief discussion of protection afforded by the structural measures. The EJ analysis does not provide sufficient detail with respect to access to non-structural measures. The analysis must also consider cumulative effects (past, present, and future actions) in concert with the proposed project. One example of a foreseeable present and future action noted in the public comments is the project's interaction with the Comprehensive Everglades Restoration Plan.

4.2 Final Panel Comments

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

Final Panel Comment 1

The Draft IFR/PEIS does not present or discuss benefit exceedance probabilities under the TSP or other alternatives.

Basis for Comment

Tables illustrating the benefit exceedance probability relationship, accompanied by a discussion of project performance by reach, are missing from the Draft IFR/PEIS and Appendix C. This information is needed for the Panel to assess the project's long-term ability to perform as planned across the study area. While the TSP is estimated to produce high net benefits and a high benefit-cost ratio (BCR), the ability of the project to perform as envisioned is unknown. Without this information, the Draft IFR/PEIS presents only a project with a potential to greatly improve MDC critical infrastructure resiliency and very high economic benefit. What is missing from the Draft IFR/PEIS is an understanding of the likelihood that the project will deliver on the projected returns.

This information is also needed for local sponsors, stakeholders, and Federal officials to understand that there is uncertainty associated with the performance expectations of each alternative, by reach. At a minimum, the Draft IFR/PEIS needs to include exceedance probability ratings, long-term risk, and project assurance.

A project with a high BCR and high net benefits that also carries broad uncertainty and a low chance of economic success would be considered a risky project. Conversely, a project with a much lower net productivity but a higher probability of economic success would be more attractive to risk-averse decision makers. This information is important when deciding which alternative plans should be considered for more detailed analysis and refinement, and ultimately how the alternatives are ranked.

Uncertainty in the Generation II Coastal Risk Model (G2CRM) inputs affects estimated uncertainty of equivalent annual damages (EADs) and BCR. Appendix C, Section 1, indicates that triangular distributions of uncertain input parameters were entered into G2CRM; however, the documentation is unclear on the degree of uncertainty that was assigned to some of the key inputs, including the hydraulic uncertainty associated with estimated flood stages. Confidence limits on EAD and BCR estimates are not provided.

ER 1105-2-101 (USACE, 2017), Appendix A, provides considerable information detailing what kind of information is needed on expected performance in reports proposing flood risk reduction.

Significance – Medium/High

Without key measures of performance probability, the Draft IFR/PEIS does not demonstrate the chance of the TSP's economic success.

Recommendations for Resolution

1. Provide exceedance probability ratings, long-term risk, and assurance tables as required by ER 1105-2-101, Appendix A.
2. Clarify how uncertainty was quantified in G2CRM.

Final Panel Comment 1

3. Provide confidence intervals on EAD and BCR estimates.
4. Explain why the TSP represents the best value in terms of expected economic performance risk.

Literature Cited

USACE (2017). Planning – Risk Assessment for Flood Risk Management Studies. ER 1105-2-101. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. July 17.

Final Panel Comment 2

Several of the H&H modeling assumptions are not well documented and may contribute to substantial underestimation of risks.

Basis for Comment

The H&H models selected for this study are appropriate; however, some of the modeling that is typical of USACE SMART planning studies is yet to be completed. For example, the interior flooding analysis has yet to be performed, and only one SLR scenario was examined for the TSP.

Estimating future floods risks in MDC with reasonable accuracy requires careful selection of H&H model inputs, parameters, and assumptions in a complex and changing operating environment. USACE is to be commended for using the 90% confidence limit water surface from the storm surge model and precautionary model boundary conditions in some of the analyses. However, in some instances, the H&H models were applied in a manner that does not reliably characterize actual flood processes, and that may underestimate the severity of flood risks (and, ultimately, damages):

- Storm surge effects are assumed to occur in isolation from other flooding mechanisms (heavy inland rainfall and interior flooding), when in fact there will be compounding effects.
- SLR is assumed to be 3.66 millimeters per year (mm/yr) (the USACE high curve is 3.85 mm/yr), but local tide gauges are likely showing substantially higher rates (Wdowinski et al., 2016).
- The Draft IFR/PEIS states that MDC does not have any land subsidence issues (page 9), but other sections of the report (pages 239, 331) and recent research (Fiaschi and Wdowinski, 2020) suggest that subsidence and increased relative SLR will increase future flood risks in portions of the study area.
- One future SLR estimate (without subsidence) was uniformly and linearly added to water surface elevations from a storm surge model that does not include SLR and interior rainfall flooding. Peer-reviewed research examining linear additions of SLR to storm surge models applied to Biscayne Bay shows that the linear/additive approach can underestimate inundation extent by 50% to140% compared to predictions of storm surge models that actually incorporate SLR (Zhang et al., 2013).
- The 1% annual exceedance probability (AEP) event is the primary basis for plan formulation and selection; however, this single event does not provide an adequate understanding of how the various plans (and potential inclusion of NNBFs and hybrid measures) would deliver benefits across the full range of events to which the project would be exposed.
- Historical records of tropical storm and rainfall intensities are assumed to be stationary and are extrapolated to the future without a documented rationale. Regional rainfall data (Appendix B – Hydraulics, Hydrology, & Coastal Sub-Appendix, Figure 3.7) and research (Abiy et al., 2019) suggest an increasing rainfall trend in the region. Recent studies indicate that Atlantic hurricanes are intensifying due to climate change (Hosseini et al., 2020; Kossin et al., 2020).

Overall, these simplifications and assumptions tend to bias the modeling outputs toward underestimation of flood risks and result in considerable uncertainty in the performance of the TSP over a 50-year planning horizon. The incompleteness of the H&H analysis raises the question of

Final Panel Comment 2

whether there is a minimum level of reasonably accurate information upon which to base the TSP. Refinement and completion of the H&H modeling in the PED phase is not listed in Table 7.5 of the Draft IFR/PEIS, which describes activities occurring in PED.

Significance – Medium/High

The assumptions and incompleteness of the H&H modeling are likely to result in underestimation of flood risks, which influences the justification of the TSP.

Recommendations for Resolution

1. Complete the rainfall and interior flooding analyses and integrate them with the other H&H modeling analyses.
2. Use multiple SLR curves to determine the overall potential performance of the TSP: the correct USACE high curve, National Oceanic and Atmospheric Administration (NOAA) high curve, and perhaps a third curve based on observed trends since 2006 at local tidal gauges.
3. Clarify the potential effects of subsidence in the Draft IFR/PEIS and incorporate relative SLR in the analysis as appropriate.
4. Document the key assumptions (bulleted above) and H&H analyses yet to be completed in Section 7.3, Risk and Uncertainty, of the Draft IFR/PEIS.
5. Explain the implications of the key assumptions and incomplete analyses listed above for uncertainty in the performance and reliability of the TSP in Section 7.3, Risk and Uncertainty, of the Draft IFR/PEIS.
6. Describe the H&H modeling activities that will occur during the PED phase in Table 7.5 of the Draft IFR/PEIS.
7. Evaluate how uncertainty resulting from the assumptions listed above translate into confidence limits on EADs and BCR.

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Final Panel Comment 3

Critical infrastructure protection measures are analyzed to a disparate level of detail than measures developed to protect the refined focus areas.

Basis for Comment

Flood damage reduction to critical infrastructure is proposed as a means of improving resiliency for the entire MDC jurisdiction. The Draft IFR/PEIS and Appendix C contain very little information on what constitutes critical infrastructure. The Draft IFR/PEIS defines “critical infrastructure” on page iv of the Executive Summary, but nowhere does the documentation specify what facilities within MDC fall under this category. There appears to be no discussion or analysis of the critical infrastructure inventory.

Furthermore, lack of resiliency is not stated as a problem to be addressed in the study. If critical infrastructure is not currently providing an acceptable or desirable level of resiliency consistent with the requirements of the Patriot Act of 2001 (as amended), or if lack of resiliency is expected to be a shortcoming in the FWOP condition, this needs to be stated and discussed.

By comparison, HAZUS and Centers for Disease Control data are used to identify seven refined focus areas based on a combination of high flood risk and high social vulnerability. The focus areas are described in much greater detail than is the critical infrastructure category. These two categories are the only two subjects of the study’s objectives, with critical infrastructure as the first objective.

Critical infrastructure is included with every other alternative, each of which consists of different measures to reduce risk to the focus areas and combinations thereof. None of the suite of alternatives are evaluated without critical infrastructure.

The refined focus areas are treated with a much more detailed analysis, with all the characteristics of these assets discussed within a risk-informed framework. Unlike the critical infrastructure analysis, the locations of these assets within MDC, elevations, values, and other data are presented and displayed in considerable detail.

If a project improves resiliency of critical infrastructure through flood risk reduction, then it is reducing the costs associated with performing the infrastructure’s basic functions. This presents an issue of double-counting benefits—critical infrastructure is involved in preparation, response, and recovery of residential and commercial assets within the refined focus areas, including emergency management and debris removal. Debris removal cost reduction is one of the benefits claimed to accrue to focus area risk reduction. For this reason, a suite of alternatives that do not include benefits to measures for critical infrastructure is warranted.

Significance – Medium/High

Using a disparate approach to analyze critical infrastructure as compared to the refined focus area analyses affects benefit calculations and the ranking of alternatives.

Final Panel Comment 3

Recommendations for Resolution

1. Identify the critical infrastructure inventory for which specific measures are contemplated and discuss their role in protecting or improving the resiliency of MDC.
2. Identify existing or anticipated shortcomings of critical infrastructure's ability to accomplish its missions as defined in the Patriot Act of 2001 (as amended).
3. Forecast and describe how critical infrastructure is expected to perform under FWOP conditions.
4. Analyze alternatives that do and do not include benefits attributable to critical infrastructure flood damage reduction.
5. Separate debris removal cost reductions to facilitate comparison of alternatives that do and do not address critical infrastructure flood risk.

Final Panel Comment 4

Consideration of NNBFs and hybrid combinations of NNBFs with structural measures in the Draft IFR/PEIS is incomplete.

Basis for Comment

USACE feasibility reports for flood risk reduction projects are required to consider using both traditional measures and NNBFs, alone or in conjunction with each other (hybrid approaches). All NNBFs other than mangrove restoration at one site (Cutler Bay) were deemed either not applicable or infeasible without a clear rationale. For example, beach fill, dunes, beach restoration, and reef measures are deemed not applicable in Table 6-1 of the Draft IFR/PEIS (page 199) for the refined focus areas with beaches (North Beach and South Beach) without explanation. Thus, it is unclear whether NNBFs and hybrid approaches received reasonably deliberate and thorough consideration.

The Draft IFR/PEIS cites a lack of available sites and limited input from the local sponsor on opportunities to implement NNBFs. However, there still appear to be opportunities to reduce flood risk across this large study area using NNBFs. NNBFs, including dunes, reefs, and beach restoration, are potentially applicable to the refined focus areas of North Beach and South Beach. There also appear to be opportunities to use mangroves or other energy-dissipating NNBFs in conjunction with structural measures to reduce wave energy and loading, while delivering a broad array of benefits in more locations. Including additional NNBFs and hybrid measures could yield a broader array of benefits beyond the National Economic Development (NED) account (per recent USACE policy) across a wider range of events besides the 1% AEP storm surge that was the focus of this study. Such an approach would also help fulfill the “multiple lines of defense” concept touted in this study (Draft IFR/PEIS, page 166).

Significance – Medium

A more deliberate consideration of NNBFs and hybrid infrastructure measures has the potential to identify additional opportunities and measures for flood risk reduction that could affect TSP selection.

Recommendations for Resolution

1. Conduct a more thorough analysis of opportunities for implementing NNBFs and hybrid combinations of conventional infrastructure with NNBFs in the refined focus areas, including North Beach and South Beach, before or during PED.
2. Incorporate any additional NNBFs and hybrid measures deemed feasible into the TSP before or during PED.
3. Evaluate the potential benefits delivered by NNBFs and hybrid approaches over time and for a broad range of events in addition to the 1% AEP.
4. Explain in the Draft IFR/PEIS main report why reefs, dunes, beach restoration, and other NNBFs are deemed either feasible, infeasible, or not applicable in the refined focus areas to clarify the plan formulation process.

Final Panel Comment 5

The EJ analysis, which has implications for NEPA compliance, lacks sufficient detail with respect to access to non-structural measures.

Basis for Comment

The EJ analysis must describe vulnerable populations (including, but not limited to, minority and low-income populations) and determine whether there would be disproportionately greater environmental effects on those populations under the proposed project. The analysis must consider cumulative effects (past, present, and future actions) in concert with the proposed project.

While the Draft IFR/PEIS describes the socioeconomic makeup of the study area (pages 112 through 118) and addresses social vulnerability in Figure 2-39, page 118, potential effects are limited to a brief discussion of protection afforded by the structural measures. In addition, EJ is defined inconsistently in the Draft IFR/PEIS main report (see page 114 vs. page 116).

Access to proposed non-structural measures, including elevating and acquiring residential structures and floodproofing non-residential structures, is a challenge for vulnerable populations. Taking the steps required to take advantage of these benefits, and thus contribute to the resulting reduced flood damages, may be impossible for some elderly, disabled, illiterate, low-income, and non-English speaking groups. Some measures require expenditures (as an example, for required environmental studies) on the part of property owners that are unaffordable for some.

There is no discussion in the Draft IFR/PEIS describing when and how vulnerable populations would be assisted in accessing the benefits afforded by the non-structural measures, nor is there a description of ongoing public education that will inform the general public and disadvantaged residents on the requirements for participation in the non-structural portion of the TSP.

Significance – Medium

The lack of discussion of vulnerable populations with respect to their inability to access or benefit from non-structural measures may create a NEPA compliance issue.

Recommendations for Resolution

1. Describe how vulnerable populations would be informed regarding the availability of non-structural measures, and how they would be assisted in performing the steps required to avail themselves of these benefits.
2. Expand the discussion of potential effects to include the likely protection afforded by non-structural measures, noting that some socially vulnerably areas are largely unaffected by structural measures.
3. Define EJ consistently in the report.

Final Panel Comment 6

The resiliency objective does not identify specific, flexible, measurable, realistic, and attainable factors as required by ER 1105-2-100.

Basis for Comment

The Draft IFR/PEIS presents two formal objectives (main report, page 165):

> *1. Increase the resiliency of MDC to function effectively before, during, and after coastal storm events by decreasing the vulnerability of critical infrastructure to flooding damage from storm surge with consideration for SLR over the period of analysis.*
>
> *2. Reduce economic damage to structures in MDC communities that have been identified as vulnerable to severe damage from storm surge with consideration for SLR over the period of analysis.*

The first objective calls for an increase in resiliency and a decrease in vulnerability. No analyses were presented for any of the alternatives that illustrated attainment of this objective.

ER 1105-2-100 (USACE, 2000) states that "…objectives are to be specific, flexible, measurable, realistic, attainable, and acceptable." While significant effort has gone into quantifying the NED benefits and costs, there is no formal analysis of resiliency of critical infrastructures consistent with ER 1105-2-100.

Significance – Medium

Formal delineation of "resiliency" factors would ensure that the intended outcomes are being achieved.

Recommendation for Resolution

1. As part of the upcoming PED phase, include formal delineation of "resiliency" factors (specific, flexible, measurable, realistic, and attainable) that satisfy ER 1105-2-100 to ensure that the intended outcomes are being achieved.

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Final Panel Comment 7

The cumulative effects analysis is overly brief, and some ongoing and planned future actions were not considered as required by NEPA.

Basis for Comment

Cumulative effects are defined by Code of Federal Regulations Title 40 Part 1508.7 as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions." Cumulative impacts can result from individually minor, but collectively significant, actions performed by other agencies or individuals taking place over a period of time.

The programmatic draft EIS considers cumulative effects very broadly, stating only that there are a "multitude" of projects planned for Miami Dade that could be affected. There is no specific list of or discussion of past or future projects that could affect (positively or adversely) the TSP. There is also no discussion of potential adverse or beneficial effects that the federal project could have regionally on existing, planned or ongoing efforts that could work in concert with the project. Mitigation of cumulative effects is not discussed. An example of a foreseeable present and future action taken from the public comments is the Comprehensive Everglades Restoration Plan.

The cumulative effects analysis mandated by NEPA requires a more comprehensive "hard look" inclusive of actions that may be undertaken by others. This analysis requires some recognition of and envisioning of future actions, or even types of actions, which may be undertaken in the project area unrelated to, but potentially affected by, the project.

Significance – Medium

The cumulative effects analysis and documentation put forward in the Draft IFR/PEIS do not provide the level of analysis required to comply with NEPA.

Recommendations for Resolution

1. Include a more comprehensive list of reasonably foreseeable future actions (based on known future or ongoing projects, planned and proposed projects, and past/predicted regional and local patterns) that may be undertaken in the project area.

2. Forecast and provide a general discussion of the potential cumulative effects, both adverse and beneficial, that the TSP may have on those types of activities or actions, as well as the potential effects that those activities may have on the TSP itself.

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

Final Panel Comment 8

Key characteristics of critical infrastructure assets that are subject to uncertainty are not identified or discussed as such in the Draft IFR/PEIS or Appendix C.

Basis for Comment

Reducing flood risk to critical infrastructure requires an understanding of the uncertainty associated with key characteristics of the assets under evaluation. Structure types, structure values, floor elevations, contents, and depth-damage functions are all key variables that are subject to uncertainty. These variables describe both the asset's vulnerability to flooding and the consequences of exposure to the hazard. An understanding of the uncertainty in these variables is needed to describe and communicate flood risk faced by the critical infrastructure inventory. However, critical infrastructure assets are not identified or described within a risk-informed framework to the same level of detail as those for the refined focus areas. Appendix C, Section 1, briefly mentions 'Average Government' occupancy types and content-structure value ratios, but it does not otherwise discuss these variables in a critical infrastructure context.

Due to the specialized role filled by critical infrastructure within a community, there may be variables with uncertain values or relationships other than those traditionally associated with at-risk properties within a flood zone. The existence of these variables is not explored, and their impacts on performance before, during, and after a storm event are not discussed.

Significance – Medium/Low

The absence of technical information on key variable uncertainties results in an incomplete understanding of risk to critical infrastructure.

Recommendations for Resolution

1. Identify and describe the key variables and associated uncertainties for structures within the critical infrastructure category.
2. Provide estimates of the values, and select appropriate ranges and distributions, for the structure types within the inventory.
3. Describe and discuss any unusual or non-traditional values or relationships subject to uncertainty and explain how vulnerability and consequence of exposure would affect resiliency.

Final Panel Comment 9

Environmental impacts may be underestimated because required studies have not yet been performed, potentially affecting project acceptance, schedule, and cost.

Basis for Comment

Environmental studies required in order to comply with NEPA will not be performed until the PED phase of the project or until site-specific elements of the TSP are moved forward. While potential impacts have been described in a general way, they cannot yet be fully assessed.

There is schedule and cost risk associated with performing these studies at a later time, as well as the risk that the public or natural resource agencies may not find the TSP, or portions of it, acceptable.

NEPA requires a “hard look” at environmental impacts, especially with respect to cumulative effects as well as indirect or secondary effects. Because site-specific, detailed studies have not been performed and will not be performed until the PED phase or until site-specific elements of the TSP move forward, the discussion in the documentation underemphasizes the potential risks of schedule delays, cost increases, and public/agency acceptance of site-specific project elements.

Significance – Medium/Low

Environmental effects may be underestimated, and the discussion of impacts may not be compliant with NEPA, potentially leading to schedule delays and additional cost for implementation of the TSP.

Recommendations for Resolution

1. Describe the risks associated with schedule delays and costs (e.g., for mitigation) should environmental effects be determined to be more complex and significant than expected.
2. Describe the risk of TSP implementation that could be associated with agency and public acceptance once the PED phase is completed.

Final Panel Comment 10

High residual risk is identified in some refined focus areas without explanation, indicating that key assumptions and screening decisions for these areas have not been documented.

Basis for Comment

High residual risk for areas not evaluated for structural measures is left unexplained in the Draft IFR/PEIS and Appendix C, indicating that the screening process used, or incorporated, assumptions and decision-making not documented in the Draft IFR/PEIS.

The Aventura, Cutler Bay, North Beach, and South Beach areas have relatively high vulnerability and are identified as focus areas for flood risk reduction; however, structural measures were not considered for these locations. Thus, reductions in flood exposure in these areas appear to depend largely on the effectiveness of non-structural measures. Flood inundation maps depicting FWOP vs. Future With Project (FWP) conditions show relatively small reductions in inundation in some of these priority areas (e.g., Aventura). The rationale for considering only non-structural measures in these areas, and the extent of residual risks associated with solely using non-structural measures, are unclear.

Appendix C states:

“The PDT performed additional planning iterations with a focus on screening measures and alternatives that would not meet the planning objectives in an effective and efficient manner. Without substantial data to base the screening on, professional judgment was used to assess how well measures met a set of criteria.”

The assumptions, criteria, and process by which this judgment was applied are not further discussed. Plan formulation is thus incomplete in terms of explaining key assumptions and decisions with respect to highly vulnerable communities that would not benefit from structural measures and would have high residual risk under the FWP condition.

Significance – Medium/Low

Without a clear explanation of the assumptions and criteria used to screen structural measures and alternatives, residents, businesses, and stakeholders in the areas of higher residual risk could conclude that they are being arbitrarily excluded from the full economic benefit of the TSP.

Recommendations for Resolution

1. Clarify the process, assumptions, and criteria used to screen high-residual-risk focus areas.
2. Explain why structural measures were not considered in some of the areas prioritized for flood risk reduction.
3. Describe differences in residual risk between vulnerable areas where the TSP relies solely on non-structural measures versus those areas where a broader set of measures are deployed.

Final Panel Comment 11

The FWOP condition does not consider the potential for residents and businesses to act without public assistance to reduce risk from coastal storm damage and future sea level change.

Basis for Comment

The Draft IFR/PEIS makes reasonable assumptions regarding relative SLR and describes the myriad of non-Federal public programs that are in place or expected to be implemented, with or without a USACE project. Each of these programs and initiatives is at least partially sponsored, funded, or backed by a public sector entity.

However, at some point in the future planning period, those with property or livelihoods at risk may decide that conditions are no longer tolerable and that no outside help can be expected. If they perceive that no external help will be provided within their perception of a reasonable time frame, some will seek to act in their own best interests. Their actions may range from structural modifications to their homes and/or businesses to simply abandoning flood-prone areas in favor of risk-free or less risky areas. While it is difficult to quantify the effects of these activities, it is not reasonable to assume that public assistance is the only alternative response to SLR. Section 3 of the Draft IFR/PEIS gives no explicit consideration to a scenario where study area residents act on their own and significantly affect the FWOP condition expected risk.

Some of these actions would cause regional transfers of wealth. However, these actions are likely to have impacts on the NED since they would lack the completeness and efficiencies brought about by both the Federal cost share and inherent economies of scale. Other significant effects and potentially beneficial impacts on the natural environment may also occur.

Practical experience in other parts of the United States makes it clear that private actions are taken when there are expectations of growing risk in the foreseeable future due to sea level change and when patience in public assistance has worn thin. One example is in southeastern Louisiana, where entire census tracts in St. Bernard and Plaquemines Parishes have been almost completely abandoned. Some parts of southern Mississippi show similar patterns of consumer behavior, as do parts of southern Texas. In coastal Alabama, property owners have abandoned deeds to property that now lies underwater due to a combination of sea level change and beach erosion. What is missing from the Draft IFR/PEIS is a discussion of how the FWOP would be affected by members of the public acting in their own self-interest.

Significance – Medium/Low

The Draft IFR/PEIS is incomplete without a discussion of how study area residents and businesses may act on their own accord to reduce risk.

Final Panel Comment 11

Recommendations for Resolution

1. Acknowledge that private action may be deployed to reduce risk in the absence of a Federal project.
2. Discuss the likelihood of private risk reduction, explaining why private actors would take action and why they would not.
3. Assess the impact of private risk reduction.
4. Modify the EADs in the study area under the No Action Alternative to incorporate private risk reduction measures.

Final Panel Comment 12

Communication of risk, reliability, and FWP residual risk is unclear in the Draft IFR/PEIS.

Basis for Comment

Flood risk concepts such as return periods (e.g., 100-year storm surge) and AEP (e.g., 1% AEP) are generally not well understood by many stakeholders. USACE policy and guidance underscore the importance of improving flood risk communication to stakeholders using terminology and concepts that are more understandable. The Draft IFR/PEIS does not appear to achieve this goal.

The phrases “100-year flood,” “100-year event,” and “100-year storm” are used several times in the Draft IFR/PEIS. The terms “risk” (probability of occurrence x consequence), “probability,” and “chance” are in some instances used interchangeably and incorrectly in the Draft IFR/PEIS.

The Draft IFR/PEIS correctly states that there is a 26% probability of a 100-year event occurring at least once in a 30-year planning horizon (page 185); however, the report does not clarify a number of concepts that are important for stakeholder understanding of flood probability and risk. For example, over the 50-year period of analysis for this project, there is ~40% probability that a 1% AEP event will be exceeded. Thus, 1% AEP level of protection only provides ~60% reliability that the design will not be exceeded in 50 years (on average) if the risk is accurately quantified. In the case of this planning analysis, there is considerable uncertainty in several key factors, including SLR rates, interior rainfall and compound flooding, interactions between SLR and storm surge levels, spatial variation in flood depths, and future storm intensities. These uncertainties essentially create large uncertainty bounds around the estimated reliability, resulting in a substantial likelihood that reliability is appreciably less than 60% over 50 years on average.

Residual risks are not described in an accessible manner. Many stakeholders would probably be surprised by the 1% FWP inundation maps (for example, Figure 7.10 in the Hydraulics, Hydrology, & Coastal Sub-Appendix of Appendix B). This type of image, along with a practical discussion of the risks that remain in the FWP, could be utilized in the Draft IFR/PEIS to improve risk communication to stakeholders.

Significance – Medium/Low

Unless flood risk concepts, residual risk, and the potential range of design reliability are explained to stakeholders in a more understandable manner, the Draft IFR/PEIS has the potential to foster misconceptions and a false sense of protection among stakeholders.

Recommendations for Resolution

1. Describe the reliability of the TSP over a 50-year planning horizon (quantitatively and qualitatively) and acknowledge that its actual reliability may be less than its estimated reliability.

2. Explain in common-sense terms the chance that different AEP events will be exceeded in a 50-year planning horizon.

Final Panel Comment 12

3. Include a figure in the Draft IFR/PEIS that clearly shows FWP inundation with rainfall and SLR included. Specify the units of water depth on the figure.
4. Provide a description of residual flood risk in the refined focus areas that is clear and accessible to laypersons.
5. Use the terms “probability,” “chance,” and “risk” consistently and throughout the Draft IFR/PEIS and appendices.

Final Panel Comment 13

Geotechnical analyses of the TSP and the alternatives have not been completed.

Basis for Comment

Appendix B, Engineering Appendix 3 of 6 (Geotechnical Sub-Appendix), presents basic geologic information and highlights sources of subsurface information to be used to inform design. Preliminary analyses (pile capacity and seepage/uplift analyses) were performed for conceptual T-walls. The analyses do not, however, provide any preliminary geotechnical analyses for the full suite of structural measures under each alternative, as required by EC 1165-2-217 (USACE, 2018).

The Draft IFR/PEIS acknowledges an intent to perform detailed analyses at a later time as the "….design level in this study is considered to be ten percent" (Geotechnical Sub-Appendix, page 14). Future design was identified for the T-walls, storm surge barriers, and pump stations/generators.

Significance – Medium/Low

Without sufficient geotechnical analyses, the methods, models, assumptions, and analyses used cannot be fully evaluated as required by USACE (2018).

Recommendation for Resolution

1. For the upcoming PED, complete the identified data collection and appropriate geotechnical analyses. Document results in the Design Documentation Report.

Final Panel Comment 14

Section 5 of the Draft IFR/PEIS and Appendix C do not document the stepwise progression of the EAD computation process.

Basis for Comment

The Draft IFR/PEIS documentation does not explain the process by which expected flood risk is determined. Expected annual flood risk is simply EADs expressed under conditions of uncertainty. While the technology and terminology have changed over the years, the basic concepts underlying the computations have not.

Chapters V and VI of the NED Procedures Manual – Urban Flood Damage (USACE, 1988) lay out the process used in USACE studies to estimate flood damage under existing and FWOP conditions. The process is the structural backbone of G2CRM and of precursor computer models such as the Hydrologic Engineering Center–Flood Damage Reduction Analysis (HEC-FDA) model; the EAD: Expected Annual Flood Damage Computation model; and macro-driven spreadsheet models.

While the general public does not need to understand how EADs are calculated, the layperson should be able to understand the relationships depicted in Figure V-1, Flood Damage Computation, in Chapter V of the 1988 NED Procedures Manual and understand where data such as first-floor elevations, structure values, and depth-damage relationships fit into the process.

Significance – Low

Without an explanation of the EAD computational process, the Draft IFR/PEIS lacks clarity and transparency.

Recommendations for Resolution

1. Describe the EAD computation procedure in broad terms.
2. Include Figure V-1 of the NED Procedures Manual (USACE, 1988) in the Draft IFR/PEIS and Appendix C.
3. Explain where data collected and used in developing the FWOP condition fit into the computational procedure.

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Final Panel Comment 15

Loss of life/life safety was evaluated but not reported for any of the considered alternatives or the TSP.

Basis for Comment

Loss-of-life/life-safety analyses were conducted as part of the G2CRM model (Appendix C – Economics, page C-35; page C-45). Page C-45 of Appendix C states: "The following Table presents the mean life loss estimates for each measure in the study area over the 50-year period of analysis." However, no table is provided.

The 'loss of life' analyses appear to have been performed, but the results are not included in the documentation. Gaining an understanding of the life safety impacts associated with reducing the magnitude of 'loss of life' under each alternative is an important risk communication

Significance – Low

Loss of life is a significant element in assessing the performance of the TSP.

Recommendation for Resolution

1. List the estimated 'loss of life' for each alternative, including the No Action Alternative.

Final Panel Comment 16

It is unclear whether the number of iterations used in G2CRM resulted in a model result that was near the mean of the underlying distributions.

Basis for Comment

The number of iterations for a Monte Carlo simulation model should be determined by trial and error along with the analyst's knowledge of uncertainty in the distributions used.

Almost all of the variables modeled in G2CRM are subject to uncertainty, with variables having widely different distribution types, ranges, and standard deviations. As the number and diversity of distributions rise, so does the complexity of the model. The more complex the model, the higher the number of simulation iterations needed to accurately depict the system being modeled. The "right" number of iterations is the number that causes the model's result to settle near the mean of the underlying distributions.

Mean EAD results that differ significantly from one another on successive runs is an indication of too few iterations. A mean that remains stable even after increasing the number of iterations is an indication of a sufficient iteration count.

Significance – Low

Without demonstrating a stable mean EAD result, the Draft IFR/PEIS and Appendix C do not confirm that the G2CRM is accurately simulating conditions in the MDC study area.

Recommendations for Resolution

1. Perform multiple G2CRM runs using different simulations and record results.
2. Plot and display the relationship between mean EADs and the number of iterations.
3. Confirm and state that the stability of mean EAD results indicates high confidence in the ability of G2CRM to model study area conditions.

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APPENDIX A

IEPR Process for the Miami-Dade Back Bay CSRM Study 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 Independent External Peer Review (IEPR) of the Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida (hereinafter: Miami-Dade Back Bay CSRM Study 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 May 22, 2020. 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 November 9, 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 Miami-Dade Back Bay CSRM Study IEPR

Task	Action	Due Date
1	Award/Effective Date	1/15/2020
	Review documents available	5/22/2020
	Public comments available	8/21/2020
	Battelle submits draft Work Plan[a]	1/27/2020
	USACE provides comments on draft Work Plan	2/4/2020
	Battelle submits final Work Plan[a]	2/6/2020
2	Battelle submits list of selected panel members[a]	2/3/2020
	USACE confirms the panel members have no COI	2/4/2020
3	Battelle convenes kick-off meeting with USACE	2/12/2020
	Battelle convenes kick-off meeting with panel members	5/18/2020
	Battelle convenes kick-off meeting with USACE and panel members	5/28/2020
4	Panel members complete their individual reviews	6/23/2020
	Panel members provide draft Final Panel Comments to Battelle	7/13/2020
	Battelle sends public comments to panel members for review	8/24/2020
	Panel confirms one additional Final Panel Comment is necessary	8/27/2020
	Panel finalizes Final Panel Comments	8/28/2020
5	Battelle submits Final IEPR Report to USACE[a]	9/3/2020
6[b]	Battelle convenes Comment Response Teleconference with panel members and USACE	10/23/2020
	Battelle submits pdf printout of DrChecks project file[a]	11/9/2020
	Agency Decision Milestone (ADM) meeting[c]	11/17/2020
	Contract End/Delivery Date	1/29/2021

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

Prior to beginning their review and after their subcontracts were finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which 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 Report and Programmatic EIS	443
Appendix A – Plan Formulation	24
Appendix B - Engineering	592
Appendix C - Economics	57
Appendix D – Environmental	271
Appendix E – Cultural Resources	46
Appendix F – Real Estate Plan	20
Appendix G – Nonstructural Implementation Plan	19
Appendix H – Correspondence with the NFS	11
Total Number of Review Pages	**1,483**
Public Comments[a,b]	**185**

[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.*

[b] *USACE will submit public comments to Battelle upon their availability according to the schedule in Table A-1. Battelle will in turn submit the comments to the IEPR Panel for review.*

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 19 panel member questions to USACE. USACE was able to provide responses to some of the questions during the teleconference, and provided 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 Miami-Dade Back Bay CSRM Study 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, 16 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 an Excel file containing public comments on the Miami-Dade Back Bay CSRM Study (approximately 185 written comments) 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. The panel members confirmed that one new Final Panel Comment would be developed to summarize an additional issue raised by the IEPR Panel. One panel member was identified by Battelle as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to the other panel members and Battelle. The Final Panel Comment was developed as part of the four-part structure following guidance previously described in Section A.4.

Battelle reviewed and edited the Final Panel Comment for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that the comment did not make any observations regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comment.

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 16 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 Miami-Dade Back Bay CSRM Study Project

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B.1 Panel Identification

The candidates for the Independent External Peer Review (IEPR) of the Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida (hereinafter: Miami-Dade Back Bay CSRM Study IEPR) Panel were evaluated based on their technical expertise in the following key areas: planning formulation/economics; environmental law compliance; hydraulics, hydrology, and coastal engineering; and civil/geotechnical engineering. These areas correspond to the technical content of the review documents and overall scope of the Miami-Dade Back Bay CSRM Study project.

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

Candidates were screened for the following potential exclusion criteria or COIs. These COI questions were intended to serve as a means of disclosure 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 Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida
1. Previous and/or current involvement by you or your firm in the Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, (hereinafter: Miami-Dade Back Bay CSRM Study) and related projects.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida

2. Previous and/or current involvement by you or your firm in coastal storm risk management in Miami-Dade County and southeastern Florida.

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 Miami-Dade Back Bay CSRM Study or related projects.

4. Current employment by USACE.

5. Previous and/or current involvement with paid or unpaid expert testimony related to the Miami-Dade Back Bay CSRM Study.

6. Previous and/or current employment or affiliation with the non-Federal sponsors or any of the following cooperating Federal, State, County, local and regional agencies, environmental organizations, and interested groups *(for pay or pro bono):*
    - Miami-Dade County
    - Florida Department of Transportation
    - Florida Department of Environmental Protection
    - Florida Fish and Wildlife
    - Biscayne Bay Aquatic Preserve
    - South Florida Water management District
    - Florida Division of Historic Resources
    - Seminole Tribe of Florida
    - Miccosukee Tribe of Indians of Florida.

7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to Miami-Dade County and southeastern Florida.

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 Jacksonville and Norfolk Districts.

9. Previous or current involvement with the development or testing of models that were used for, or in support of, the Miami-Dade Back Bay CSRM Study.

    Note that the following models were used in this study: G2CRM

10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Jacksonville and Norfolk Districts. 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 Jacksonville and Norfolk Districts. Please explain.

11. Any previous employment by USACE as a direct employee, notably if employment was with the Jacksonville and Norfolk Districts. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida
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 Jacksonville and Norfolk Districts. 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 coastal storm risk management and include the client/agency and duration of review (approximate dates).
14. Pending, current, or future financial interests in contracts/awards from USACE related to the Miami-Dade Back Bay CSRM Study.
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 Miami-Dade County contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Miami-Dade Back Bay CSRM Study.
18. Participation in relevant prior and/or current Federal studies related to the Miami-Dade Back Bay CSRM Study.
19. Previous and/or current participation in prior non-Federal studies related to the Miami-Dade Back Bay CSRM Study.
20. Has your research or analysis been evaluated as part of the Miami-Dade Back Bay CSRM Study?
21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.

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. Miami-Dade Back Bay CSRM Study IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (years)
Planning Formulator / Economist					
David Luckie	Independent Consultant	Mobile, AL	B.A., Economics and Finance	No	32
Environmental Law Compliance Specialist					
Greg Crouch	Independent Consultant	Santa Fe, NM	M.S., Biology/Ecology	No	42
Hydraulics, Hydrology, and Coastal Engineering					
Brian Bledsoe	Ecological Engineering International, LLC	Athens, GA	Ph.D., Civil Engineering – River Mechanics	Yes	30
Civil / Geotechnical Engineering					
Rune Storesund	Independent Consultant	Kensington, CA	D.Eng., Civil Engineering	Yes	20

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

Table B-2. Miami-Dade Back Bay CSRM Study IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Luckie	Crouch	Bledsoe	Storesund
Planning Formulator / Economist				
Minimum 10 years of demonstrated experience in public works planning	**X**			
Minimum M.S. degree or higher in economics	**W**[1]			
Demonstrated experience in public works planning with a minimum of five years of experience directly dealing with the USACE SMART Planning process and risk-informed planning as outlined in the Planning Manual Part II: Risk-Informed Planning and ER 1105-2-100, Planning Guidance Notebook	**X**			
Knowledge/experience with tools employed for economic analysis, risk analysis, and storm surge/sea level rise forecasts	**X**			
Familiarity with Generation 2 Coastal Risk Model (G2CRM) modeling and HEC LifeSim modeling	**X**			

Table B-2. Miami-Dade Back Bay CSRM IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Luckie	Crouch	Bledsoe	Storesund
Environmental Law Compliance Specialist				
Minimum 10 years demonstrated experience in evaluating and conducting National Environmental Policy Act (NEPA) impact assessments		X		
Experience in estimating the impacts associated with CSRM and dredging projects		X		
Extensive knowledge of estuarine and coastal ecology		X		
Expert in compliance requirements of environmental laws, policies, and regulations, including the Fish and Wildlife Coordination Act and the Endangered Species Act		X		
Expertise in estimating the impacts associated with structural and non-structural storm surge measures		X		
Knowledge of construction impacts on marine and coastal regions		X		
Hydraulics, Hydrology, and Coastal Engineer				
Registered Professional Engineer			X	
Minimum experience of 15 years in civil engineering and design			X	
Minimum B.S. degree or higher in engineering			X	
Expert in the field of coastal hydrology and hydraulics and a thorough understanding of wave dynamics and experience in CSRM projects			X	
Familiar with computing modeling tools such as Hydrologic Engineering Center–River Analysis System (HEC-RAS) and Hydrologic Engineering Center–Hydrologic Modeling System (HEC-HMS)			X	
Safety Assurance Review (SAR)			X	
Civil/Geotechnical Engineer				
Registered Professional Engineer				X
Minimum B.S. degree or higher in engineering				X
15 years of experience in geo-civil design and geotechnical evaluation of CSRM projects				X
Experience related to USACE geotechnical practices for design and construction of structural storm surge and flood mitigation measures				X
Experience in geotechnical risk analysis				X
Active participation in related professional engineering and scientific societies				X

W[1] – USACE accepted a waiver of this criterion for this panel member.

B.3 Panel Member Qualifications

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

Name	**David Luckie**
Role	**Planning Formulator / Economist**
Affiliation	**Independent Consultant**

Mr. Luckie is an independent consultant with 32 years of professional experience in water resource economics, planning, plan formulation, benefit-cost analysis, and risk-based analysis. His public works experience encompasses decades of work with Federal and non-Federal agencies, as well as local and state organizations. He earned his B.S. in economics and finance from the University of South Alabama in 1986. His professional experience includes working with multidisciplinary teams to provide or review complex planning studies for CSRM, dam safety, flood risk management (FRM), ecosystem restoration, and water supply and water quality studies. He is intimately familiar with Engineer Regulation (ER) 1105-2-100 and the 6-Step Planning Process and has prepared, supervised, or reviewed numerous planning studies in his career.

Mr. Luckie is familiar with the evaluation of alternative plans for both CSRM and FRM studies and has conducted, supervised, or reviewed several water resource studies featuring numerous alternative plans constructed from an array of different management measures. Over the last three decades, Mr. Luckie has been involved in numerous FRM studies. Two examples are the Hunting Bayou General Reevaluation Report for Houston, Texas, a multipurpose project that included structural, non-structural, and recreation outputs, and the Mississippi Coastal Improvements Program following Hurricanes Katrina and Rita. He has also served as a panel member on the IEPRs of the Staten Island CSRM Study in New York and the Encinitas-Solana Beaches CSRM in California. He applied his knowledge of ER-1105-2-100 and the 6-Step Planning Process in each of these high-profile efforts.

Least cost analysis, also known as cost-effectiveness analysis, has been an important aspect of Mr. Luckie's work over the decades. He is familiar with the evaluation of alternative plans. As a Regional Economist with the USACE Mobile District (1988-2006), Mr. Luckie conducted, supervised, or reviewed benefit-cost analyses for a variety of single-purpose and multi-purpose water resource projects covering the full range of USACE missions. Relevant studies include the Apalachicola-Chattahoochee-Flint River and the Alabama-Coosa-Tallapoosa Comprehensive Studies; the draft Programmatic Environmental Impact Statements covering the states of Alabama, Florida, and Georgia; and the Hunting Bayou General Reevaluation Report in Houston, Texas.

Mr. Luckie is very familiar with USACE standards and procedures. He has extensive experience in performing National Economic Development (NED) analyses, specifically as they relate to flood and coastal risk management. For more than 25 years, he has performed, supervised, or reviewed NED procedures for technical accuracy and for compliance with policy, guidance, and accepted planning principles. Such studies as Panama City Beaches and Mississippi Coastal Improvements reflect this expertise.

Mr. Luckie has been using the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA) software since its inception in the 1990s. He has also performed, reviewed, or trouble-shot scores

of HEC-FDA analyses for Federal, non-Federal, and private sector clients. In addition, he has mentored interns and junior economists in USACE methodologies for CSRM, requiring them to calculate without- and with-project condition damages, either by hand or with a Microsoft® Excel spreadsheet, before allowing them to use HEC-FDA. He is also very familiar with the USACE Regional Economic System model and the estimation of Regional Economic Development benefits and has used the model for both Federal and non-Federal project proponents since its inception.

Name	Greg Crouch
Role	Environmental Law Compliance Specialist
Affiliation	Independent Consultant

Mr. Crouch is an independent consultant specializing in National Environmental Policy Act (NEPA) analysis and document preparation, permitting and mitigation, environmental site assessment, and public involvement for projects with high public and interagency interests. He earned his M.S. in biology/ecology in 1977 from Stephen F. Austin State University and has received additional academic training in the NEPA process from the Duke University Nichols School of Environmental and Earth Sciences (2004-05). He has over 42 years of nationwide experience in environmental site assessment and inventories, permitting, and evaluation and in conducting NEPA impact assessments for complex multi-objective public works projects with competing trade-offs. His NEPA-related experience includes development of the Environmental Impact Statement (EIS) for the Bayport Container Terminal and NEPA documentation for evaluation and effects analysis for offshore platforms, pipelines and Federal leases, nuclear power plants, coal-fired power plants, parks, highways, pipelines, transmission lines, dredged material placement areas, and liquefied natural gas facilities. He is experienced with the U.S. Fish and Wildlife Service (USFWS) Habitat Evaluation Procedures (HEP) Handbook, Clean Water Act, and Endangered Species Act, having procured over 100 404/401 permits for a variety of infrastructure projects as well as for private developers, performed more than 100 endangered species surveys (as well as USFWS Section 7 consultations), and performed dozens of quantitative habitat surveys using HEP, hydrogeomorphic, and other survey methods. Mr. Crouch has completed over 200 Phase I environmental site assessments nationwide for a variety of private and public clients and has experience evaluating and creating sensitive habitats, including streams and wetlands. He is most well-known for his creation of the Baytown Nature Center in Baytown, Texas. This nature center was developed as mitigation for a Superfund site. The initial project created over 60 acres of new salt marsh habitat as well as some forested and brackish water wetlands. Since the initial creation of the Superfund mitigation site, Mr. Crouch has built hundreds of additional acres of both forested and non-forested wetlands habitats within its surrounding area. Mr. Crouch has also created more than 30 other sensitive habitats, primarily as mitigation for wetland losses and for endangered species. Habitat types include upland forest, native prairie, freshwater wetlands, salt and brackish water wetlands, sea grass beds, bottomland forest, and open water habitat.

Mr. Crouch routinely performs cumulative effects analyses on public works projects with high public and interagency interests as part of his extensive NEPA practice and has substantial experience working with USACE on flood damage reduction projects (including dam safety). Specific projects include the Clear Creek Flood Damage Reduction Project, the Sims Bayou Hike and Bike Trail, Greens Bayou Flood Damage Reduction Project, Addicks and Barker Dam Safety Public Involvement, compliance audits, and the Jacintoport Dredged Material Placement Area. Recently, Mr. Crouch worked on the biological sections of an EIS for a major container terminal on Galveston Bay (Texas) and managed the

environmental investigations and permitting for 43,000 acres of planned development on the Texas coast. He has also served as a peer reviewer on several projects under Battelle's direction.

Name	**Brian Bledsoe, Ph.D., P.E.**
Role	**Hydraulics, Hydrology and Coastal Engineer**
Affiliation	**Ecological Engineering International, LLC**

Dr. Bledsoe is Georgia Athletic Association Distinguished Professor in the College of Engineering at the University of Georgia. He has over 30 years of experience as a civil engineer in the private and public sectors. He holds degrees from Georgia Tech, North Carolina State University, and Colorado State University (CSU). Dr. Bledsoe is a registered Professional Civil Engineer in Colorado and North Carolina. Before moving to the University of Georgia, he was a tenured full professor at CSU, where he conducted hydrology and hydraulics (H&H) research in the CSU Hydraulics Laboratory from 1997-2015.

Before entering the professoriate, Dr. Bledsoe worked as a consulting engineer and surveyor and, for the State of North Carolina Divisions of Coastal Management and Water Quality, as a watershed restoration engineer and coastal hydrologist. Over the last two decades, his research has focused on environmental hydraulics, flood hazards, stormwater, infrastructure, water quality, and restoration of riverine, wetland, and coastal ecosystems. He is experienced in all aspects of H&H engineering and has authored more than 70 peer-reviewed publications related to H&H, geomorphology, ecosystem restoration, statistical hydrology, and flood hazards. He currently leads the urban flooding research group for the National Science Foundation's Urban Water Innovation Network (UWIN). The research he leads through UWIN is focused on compound flooding (pluvial, fluvial, and coastal) and probabilistic flood hazard mapping under changing land cover and climate.

Dr. Bledsoe is well-versed in the application of many USACE H&H models, including HEC-RAS (1-D, 2-D, and hydraulic design modules), HEC-GeoRAS, HEC-HMS, HEC-GeoHMS, HEC-FDA, and SAM. He has taught engineering hydrology and hydraulics at the college level for over 20 years and has a strong understanding of wave dynamics. He is familiar with CSRM, coastal flood modeling with ADCIRC, floodplain mapping and flood management projects, risk and uncertainty analysis, and safety assurance reviews (SARs).

Dr. Bledsoe has served as an expert peer reviewer for several flood mitigation and ecosystem restoration projects, including the Southwest Coastal Louisiana Feasibility Study; Orestimba Creek-West Stanislaus County, California, Feasibility Study; Louisiana Coastal Area Barataria Basin Barrier Shoreline Restoration Project; Biscayne Bay Coastal Wetlands Project; and Louisiana Coastal Area Amite River Diversion Canal Modification Project Feasibility Study and Supplemental Environmental Impact Statement.

Dr. Bledsoe received a National Science Foundation CAREER Award in 2006, served as a Fulbright Scholar in Chile with a focus on hydraulic engineering research in 2008, is past president of the American Ecological Engineering Society, and was elected a Fellow of the American Society of Civil Engineers in 2017.

Name	**Rune Storesund, D.Eng., P.E., G.E.**
Role	**Civil/Geotechnical Engineer**
Affiliation	**Storesund Consulting, LLC**

Dr. Storesund is the Principal Engineer at Storesund Consulting and the Executive Director of the University of California (UC) Berkeley Center for Catastrophic Risk Management. He earned his doctorate (D. Eng) in civil engineering from UC Berkeley; is a registered civil engineer in California, Louisiana, Hawaii, and Washington; and is a registered G.E. in California. He has 20 years of experience in planning, design, operation and maintenance (O&M), construction, and decommissioning of Civil Works structures and has worked on a variety of projects throughout the United States and internationally. Dr. Storesund is licensed as a Professional Engineer (P.E.) in California, Louisiana, Hawaii, and Washington. He is licensed as a Geotechnical Engineer (G.E.) in the state of California and serves as an on-call expert G.E. to the California Department of Consumer Affairs for its annual examination.

Dr. Storesund has participated in numerous projects related to USACE geotechnical practices. For more than 10 years, he directly participated in engineering design, specification development, Design Review and Checking System (DrChecks) collaboration, and Micro-Computer Aided Cost Estimating System (MCACES/MII) cost evaluations. He has demonstrated experience performing geotechnical evaluations and geo-civil design for USACE FRM projects with dredged material disposal sites and using dredged material for ecosystem restoration. Most recently, he served as a G.E. of record for the final shaping of the Hamilton Wetland Restoration project in Novato, California (the entire project spanned 2004 through 2014). The project involved deepening the Port of Oakland, transporting the material via barge to an off-coast pumping station, then pumping the dredged materials into a former Army airbase to create constructed beneficial wetland and upland habitats. He performed site characterization, engineering analyses (e.g., settlement, static/dynamic slope stability, seepage, wave runup), construction oversight, and post-project monitoring (terrestrial light detection and ranging [LiDAR]). Other USACE flood protection projects he has worked on include the West Sacramento Flood Control Project, the Las Gallinas Coastal Inundation Study, the Upper Penitencia Creek Flood Improvement Project, the San Lorenzo Flood Control Project, and the USACE Upper Napa River Flood Protection Project.

Dr. Storesund has experience related to the design of FRM projects associated with the design and construction of levee and FRM structures, including static and dynamic slope stability, seepage through earthen embankments, and underseepage. He has been an active participant in American Society of Civil Engineers (ASCE) committees on the local and national level since 1998.

Dr. Storesund is familiar with large, complex Civil Works projects with high public and interagency interests. Following Hurricane Katrina, he participated in a review of the performance of the Hurricane Defense System for the greater New Orleans area, the largest and most complex flood protection project in the United States. He completed a study evaluating the improved Hurricane Protection System from a holistic systems-based perspective, using the modeling tool Systems Modeling Language to synthesize and integrate disparate system elements. He has also worked on the Louisiana Coastal Restoration Initiative (with the Environmental Defense Fund) and the National Science Foundation-sponsored Resilient and Sustainable Infrastructures project, evaluating interconnected, interrelated, interactive critical infrastructures in the California Delta.

Dr. Storesund has extensive experience with SARs, having recently participated in the SAR for the USACE Princeville IEPR. In addition, in the aftermath of Hurricane Katrina, he participated in an ASCE

assessment that served as the basis for the guiding principles for conducting USACE SARs. He has been active in advancing risk-informed decision-making for critical infrastructure identification and management of uncertainties. His 'systems' synthesis perspective is unique among his peers, and he has routinely evaluated the application of redundancy, resiliency, and robustness.

APPENDIX C

Final Charge for the Miami-Dade Back Bay CSRM Study IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida

This is the final Charge to the Panel for the Miami-Dade Back Bay CSRM Study IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on February 6, 2020. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

The study area is Miami-Dade County which is located on the southeast coast of Florida. The county includes the City of Miami and has a population of approximately 2.8 million people, making it the most populous county in Florida and the seventh most populous in the United Sates. The average elevation of the county is 6 feet above sea level. Based on its low lying topography and dense population, the Miami-Dade County area is recognized for risks associated with sea level rise and coastal storms.

There are four primary problems occurring in Miami-Dade County with relation to coastal flooding:

- The geographic location, low elevation, and high population of Miami-Dade County make it vulnerable to storm surge from hurricanes and tropical storms
- Increasing high tides and king tides resulting from sea level rise result in recurrent flooding to roads and properties
- Increasing groundwater elevations from sea level rise result in flood risks to inland areas
- Increasing flooding from rain events due to the higher groundwater elevations and higher tail water elevations from seal level rise threaten properties and infrastructure.

Miami-Dade County is an important asset to the economic development of the United States both as an economic hub to international business but also because of its large/ dense coastal population. There is Federal interest in addressing high levels of risk and vulnerability to coastal storms which are expected to be compounded by the combined effects of sea level change and climate change. Analysis completed during the scoping phase indicates the potential for a variety of structural and non-structural solutions to have marked effects on resiliency and be economically justified, environmentally acceptable, and consistent with USACE policy.

This interest is also echoed across the region in the South Atlantic Coastal Study and the 13 other CSRM studies that are currently being conducted within the state of Florida.

The study area will continue to be at risk of the effects of coastal storms in the future. In addition to damages to structures and critical infrastructure, there is a significant life safety component that should be considered due to the vulnerability of the population and study area to flooding impacts as well as potential vulnerability of evacuation routes. Study risks include the accurate projection of sea level rise over the period of analysis and the potential limited ability to use existing models to analyze conditions in the study area due to unique geologic and hydrodynamic conditions.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida (hereinafter: Miami-Dade Back Bay CSRM Study IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (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	Hydrology, Hydraulic, and Coastal Engineer	Civil / Geotechnical Engineer
Draft Integrated Feasibility Report and EIS	500	500	500	500	500
Appendix A – Plan Formulation	100	100	100	100	100
Appendix B - Engineering	1000			1000	1000
Appendix C - Economics	150	150			

Review Documents	No. of Review Pages	Subject Matter Experts			
		Planning Formulator/ Economist	Environmental Law Compliance Specialist	Hydrology, Hydraulic, and Coastal Engineer	Civil / Geotechnical Engineer
Appendix D – Environmental	600		600		
Appendix E – Real Estate Plan	50		50		
Appendix F - Correspondence	15	15	15		
Appendix G – Review Certifications	10	10	10		
Total Number of Review Pages	**2,425**	**775**	**1,275**	**1,600**	**1,600**
Public Comments[ab]	**200**	**200**	**200**	**200**	**200**

[a] USACE will submit public comments to Battelle which will in turn submit to the IEPR Panel.
[b] The Public Comment page count was not included in the overall Review Pages page count due to the hours being considered separately and Options 1 or 3 being implemented if they increase.

Documents for Reference

- 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; PB 2018-01(S), June 20, 2019)
- SMART – Planning Overview
- Planning Modernization Fact Sheet
- USACE Climate Change Adaptation Plan (2015)
- ETL 1100-2-1 – Procedures to Evaluate SLR Change Impacts Responses Adaptation
- ER 1100-2-8162 – Incorporating SLR Change in CW Programs.

SCHEDULE & DELIVERABLES

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

Task	Action	Due Date
Meetings	Subcontractors complete mandatory Operations Security (OPSEC) training	3/19/2020
	Battelle sends review documents to panel members	4/13/2020

Task	Action	Due Date
	Battelle convenes kick-off meeting with panel members	4/14/2020
	Battelle convenes kick-off meeting with USACE and panel members	4/15/2020
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	4/24/2020
Review	Panel members complete their individual reviews	5/11/2020
	Battelle provides talking points for Panel Review Teleconference to panel members	5/13/2020
	Battelle convenes Panel Review Teleconference	5/14/2020
	Battelle provides Final Panel Comment templates and instructions to panel members	5/15/2020
	Panel members provide draft Final Panel Comments to Battelle	5/22/2020
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	5/23/2020 - 6/1/2020
	Panel finalizes Final Panel Comments	6/2/2020
Public Comment Review**	Battelle receives public comments from USACE	5/22/2020
	Battelle sends public comments to Panel	5/26/2020
	Panel completes its review of public comments	5/29/2020
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	6/1/2020
	Panel drafts Final Panel Comment for public comments, if necessary	6/3/2020
	Panel finalizes Final Panel Comment regarding public comments, if necessary	6/5/2020
Final Report	Battelle provides Final IEPR Report to panel members for review	6/9/2020
	Panel members provide comments on Final IEPR Report	6/11/2020
	*Battelle submits Final IEPR Report to USACE	6/15/2020
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	6/22/2020
Comment Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	6/24/2020
	Battelle convenes teleconference with Panel to review the Comment Response process	6/24/2020
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	7/16/2020
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	7/22/2020

Task	Action	Due Date
	USACE PCX provides draft PDT Evaluator Responses to Battelle	7/23/2020
	Battelle provides draft PDT Evaluator Responses to panel members	7/27/2020
	Panel members provide draft BackCheck Responses to Battelle	7/30/2020
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	7/31/2020
	Battelle convenes Comment Response Teleconference with panel members and USACE	8/3/2020
	USACE inputs final PDT Evaluator Responses to DrChecks	8/10/2020
	Battelle provides final PDT Evaluator Responses to panel members	8/11/2020
	Panel members provide final BackCheck Responses to Battelle	8/14/2020
	Battelle inputs panel members' final BackCheck Responses to DrChecks	8/17/2020
	*Battelle submits pdf printout of DrChecks project file	8/18/2020
ADM	Agency Decision Milestone (ADM) Meeting	8/13/2020
	Contract End/Delivery Date	1/29/2021

* 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, 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 Miami-Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida

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 Review 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 Review 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 Review 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 Review 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 Review 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 Review 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 conducted were sufficient for the 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 of analysis and the conclusions based on analysis are reasonable.

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

13. For the tentatively selected plan, assess whether the models used to assess life safety hazards are appropriate.

14. For the tentatively selected plan, assess whether the assumptions made for the life safety hazards are appropriate.

15. For the tentatively selected plan, assess whether 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. For the tentatively selected plan, assess whether 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
January 8, 2020
C-2

Conflicts of Interest Questionnaire

Independent External Peer Review

Miami–Dade Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Impact Statement (EIS), Miami-Dade County, Florida

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 — January 8, 2020
Courtney Brooks — 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