Final Independent External Peer Review Report
Raritan Bay and Sandy Hook Bay, Highlands, New Jersey, Feasibility Study

Prepared by
Battelle Memorial Institute

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

Contract No. W912HQ-10-D-0002
Task Order: 0076
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Task Order: 0004

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The Raritan and Sandy Hook Bays, Highlands, New Jersey, Feasibility Study (hereinafter: Highlands Feasibility Study) is a risk management study to address flooding, both tidal and interior, as well as potential erosion during coastal storms. Traditionally, the level of approval for the feasibility study is the Chief of Engineers, and requires Congressional authorization for construction. However, the Highlands study was included in Interim Report 2 in response to Public Law (P.L.) 113-2 as an ongoing study. Consequently, a Director's Report, rather than a Chief's Report, will be the final product, and Congressional authorization for project construction, assuming a favorable report, has already been secured. The National Environmental Policy Act (NEPA) documentation will be an environmental impact statement (EIS), which will be prepared along with the document.

The Highlands study area, about 0.7 square miles in extent, is located at the eastern limit of the overall Raritan Bay and Sandy Hook Bay area and is bordered to the north by Sandy Hook Bay, to the west by the corporate limits of Atlantic Highlands, and to the east by the Shrewsbury River and Route 36 bridge. The Borough of Highlands is located in Monmouth County, New Jersey. The borough of Highlands is a fully developed community with most year-round residences and commercial establishments located on the low-lying area along the bay.

Highlands has a history of devastating flood damages. Residential, trailer home, apartment, and commercial structures are subject to severe flooding. Many low-lying roadways are flooded during severe storm events, cutting off access to large portions of Highlands. An existing Federal navigation project provides access for the Leonardo State Marina to deep water in Raritan Bay. Low-lying residential and commercial structures in the area experience flooding caused by coastal storm inundation. The feasibility study investigates flood risk management opportunities in this area.

Measures and strategies considered for Highlands included non-structural approaches, hard structures (raising bulkheads and building floodwalls), soft structures (dunes), and off-shore barriers. Prior to Superstorm Sandy, the Tentatively Selected Plan (TSP) was Alternative 5E, which includes a combination of bulkhead elevation, ground raising, and floodwalls. The estimated first cost was $54 million. Post-Sandy, the study team has coordinated with non-Federal interests to confirm local interest in Alternative 5E as the TSP.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the Raritan Bay and Sandy Hook Bay, Highlands, New Jersey, Feasibility Study

(hereinafter: Highlands 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 (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the Highlands project. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012) 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.

Battelle was initially contracted to conduct an IEPR of the Highlands project under contract W912HQ-10-D-0002, Task Order 0076. Battelle initiated IEPR activities including, submitting the draft Work Plan (Task 1) and identifying, screening, and submitting panel members (Task 2) in January and February 2015. However, the period of performance for Task Order 0076 ended prior to receipt of the review documents. Battelle was contracted to continue the IEPR of the Highlands project under contract W912HQ-15-D-0001, Task 0004 under which the remainder of the IEPR tasks/activities were conducted, including preparation of this IEPR Final Report.

Battelle rescreened the panel members to ensure that no COIs had developed between the submission of the panel to USACE under Task 0076 and the award of Task 0004.

The Panel received electronic versions of the Highlands IEPR review documents (504 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2012) and OMB (2014), 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 prior to 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. The Panel produced individual comments in response to the charge questions.

IEPR panel members reviewed the Highlands documents individually. 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 Highlands project (approximately 35 verbal transcripts and written comments totaling 10 pages of comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the Highlands review documents. After completing its review, the Panel identified one new issue and subsequently generated one Final Panel Comment that summarized the concern.

Overall, 11 Final Panel Comments were identified and documented. Of these, one was identified as having high significance, three had medium significance, four had medium/low significance, and three had low significance.

Results of the Independent External Peer Review

The panel members agreed among one another on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Draft Integrated Feasibility Report and Environmental Impact Statement. 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.

While the Panel deemed the report to be written well to meet Specific, Measurable, Attainable, Risk Informed, Timely (SMART) Planning objectives, it identified areas of inconsistencies and missing details within the report. In addition, the Panel, identified elements of the project that require further analysis and evaluation, and sections of the report and appendices that should be clarified or revised.

Economics and Civil Works Planning – The most significant issue the Panel raised is associated with the optimization phase of the study. The TSP was identified based on a comparison of alternatives designed for a 50-year level of protection; however, an upcoming study phase referred to as optimization could reveal the need for substantial design modifications. The Panel suggests that the optimization be undertaken before identifying the TSP to ensure that the National Economic Development (NED) plan has been correctly identified.

Another important issue the Panel raised involves the description of the economic analysis, which does not address the magnitude of the flood damage or the discrepancy in number of structures following Superstorm Sandy. The apparent discrepancy between the references to damageable property following Superstorm Sandy raises a concern that the flood damage reduction benefits for the alternative plans may be overstated. The Panel recommends that the report clearly outline the number of damageable structures and explain why the flood damages are expected to be high in the future given that such a large number of structures have been, or will be, raised to 1 foot (ft) above the base flood elevation and would not be damaged by a 100-year event or higher in the future.

Engineering – The Panel had two main concerns regarding the coastal engineering aspects of the report. The first is related to the physical impacts under the with-project conditions. The damage from flooding to the project area under the TSP could exceed predicted "with-project" levels as a result of the TSP's effect during less statistically likely, but physically possible, conditions that exceed the design event. The Panel recommends expanding the discussion of potential damage in the project area under the TSP, clarifying the purpose of the proposed pumps, and identifying proactive options for dealing with post-storm trapped flood waters.

The second concern pertains to how wave height was treated in the study. It is not clear what physical conditions would lead to 1) the presence of sufficient local water depth (~2.8+ ft) leeward of the protective structures to support wave action; or 2) the source of the waves at the study location. This concern is true under both the without-project and with-project scenarios. Inconsistent treatment of incident and/or transformed waves could lead to damage characterizations due to wave action that do not support the stated benefit-cost ratio (BCR) or conceptual TSP design. The Panel suggests that the report clarify how

waves were treated in the analysis and include a simple “cross-section” graphic in Appendix B2 showing assumed water levels waterward and leeward of the proposed protective structures.

Environmental – Overall, the environmental technical documents were well written with the following two minor exceptions. The first issue relates to references to quantify impacts and support conclusions in the impacts sections which are missing or incomplete. Because the environmental and cumulative impacts sections do not cite appropriate references, there is not sufficient information to analyze or assess the impacts in the environmental assessment (EA). The Panel suggests adding citations of scientific literature, modeling, monitoring, or other applicable references to document and quantify impacts of the above-referenced sections.

The second concern is that the status and results of consultations with agencies that regulate the Economic Exclusive Zone (EEZ), as required by Federal legislation, are not described or documented. Appendix A addresses only terrestrial species and does not address the protected marine species that occur in the EEZ. The Panel recommends discussing coordination and consultation with the National Marine Fisheries Service (NMFS) in Appendix A and describing the status and results of the consultation in the EA. Also, the Panel suggests addressing the protected marine species that occur in the project area and quantifying the impacts (or lack of impacts) in the environmental consequences and cumulative impacts sections using scientific literature, monitoring data, or agency reports or communication.

Table ES-1. Overview of 11 Final Panel Comments Identified by the Highlands IEPR Panel

No.	Final Panel Comment
Significance – High	
1	The TSP has been identified without taking into account potential design changes that could occur as a result of the upcoming optimization phase of the study.
Significance – Medium	
2	Predicted physical impacts (i.e., flooding) to the project area, and the potential for resulting greater proportional damage under the with-project condition, are not addressed.
3	It is unclear how the wave height was calculated and input into the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA) modeling software when analyzing the with-project conditions.
4	The description of the economic analysis does not address the magnitude of the flood damages or the discrepancy in number of structures damaged by Superstorm Sandy that would be raised to safe elevation.
Significance – Medium/Low	
5	It is not clear why raising the seaside deck of the WindandSea Restaurant would be a Federal cost.
6	The residual risk of flood damage and possible loss of life are not presented in sufficient detail to document how the proposed alternative is appropriate and adequate in terms of property and life safety.
7	References to quantify impacts and support conclusions in the impacts sections are missing or incomplete.
8	The status and results of consultations with agencies that regulate the EEZ, as required by Federal legislation, are not described or documented.
Significance – Low	
9	Shoreline erosion is noted to be a non-significant issue but is included as a planning opportunity and objective.
10	Environmental justice concerns are not fully addressed for the No Action Alternative.
11	A public concern that the project would not address flooding from the Shrewsbury River is not addressed in the report.

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LIST OF ACRONYMS

ADCIRC	Advanced Circulation (model)
ALICE	Asset Limited, Income Constrained, Employed
ATR	Agency Technical Review
BCR	Benefit-Cost Ratio
CERC	Coastal Engineering Research Center
COI	Conflict of Interest
CWA	Clean Water Act
DrChecks	Design Review and Checking System
EA	Environmental Assessment
EC	Engineer Circular
EDUNE	Dune Erosion (model)
EEZ	Economic Exclusive Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
ESA	Endangered Species Act
ft	Foot
GENESIS	GENEralized Model for Simulating Shoreline Change (model)
GRR	General Reevaluation Report
HEC-FDA	Hydrologic Engineering Center Flood Damage Reduction Analysis (model)
HEC-RAS	Hydrologic Engineering Center River Analysis System (model)
HEP	Habitat Evaluation Procedure
IEPR	Independent External Peer Review
IHNC	Inner Harbor Navigation Canal
IWR	Institute for Water Resources
LNG	Liquefied Natural Gas
MMPA	Marine Mammal Protection Act
NAVD88	North American Vertical Datum of 1988
NED	National Economic Development

NEPA	National Environmental Policy Act
NJDEP	New Jersey Department of Environmental Protection
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PDT	Project Delivery Team
P.E.	Professional Engineer
P.L.	Public Law
PCX	Planning Center of Expertise
RED	Regional Economic Development
SBEACH	Storm-induced BEAch CHange (model)
SLR	Sea Level Rise
SMART	Specific, Measurable, Attainable, Risk Informed, Timely
SPP	Shore Protection Project
STWave	STeady State Spectral WAVE (model)
SWAN	Simulating Waves Nearshore (model)
SWL	Still Water Level
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers

1. INTRODUCTION

The Raritan and Sandy Hook Bays, Highlands, New Jersey, Feasibility Study (hereinafter: Highlands Feasibility Study) is a risk management study to address flooding, both tidal and interior, as well as potential erosion during coastal storms. Traditionally, the level of approval for the feasibility study is the Chief of Engineers, and requires Congressional authorization for construction. However, the Highlands study was included in Interim Report 2 in response to Public Law (P.L.) 113-2 as an ongoing study. Consequently, a Director's Report, rather than a Chief's Report, will be the final product, and Congressional authorization for project construction, assuming a favorable report, has already been secured. The National Environmental Policy Act (NEPA) documentation will be an environmental impact statement (EIS), which will be prepared along with the document.

The Highlands study area, about 0.7 square miles in extent, is located at the eastern limit of the overall Raritan Bay and Sandy Hook Bay area and is bordered to the north by Sandy Hook Bay, to the west by the corporate limits of Atlantic Highlands, and to the east by the Shrewsbury River and Route 36 bridge. The Borough of Highlands is located in Monmouth County, New Jersey. The borough of Highlands is a fully developed community with most year-round residences and commercial establishments located on the low-lying area along the bay.

Highlands has a history of devastating flood damages. Residential, trailer home, apartment, and commercial structures are subject to severe flooding. Many low-lying roadways are flooded during severe storm events, cutting off access to large portions of Highlands. An existing Federal navigation project provides access for the Leonardo State Marina to deep water in Raritan Bay. Low-lying residential and commercial structures in the area experience flooding caused by coastal storm inundation. The feasibility study investigates flood risk management opportunities in this area.

Measures and strategies considered for Highlands included non-structural approaches, hard structures (raising bulkheads and building floodwalls), soft structures (dunes), and off-shore barriers. Prior to Superstorm Sandy, the Tentatively Selected Plan (TSP) was Alternative 5E, which includes a combination of bulkhead elevation, ground raising, and floodwalls. The estimated first cost was $54 million. Post-Sandy, the study team has coordinated with non-Federal interests to confirm local interest in Alternative 5E as the TSP.

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 Raritan Bay and Sandy Hook Bay, Highlands, New Jersey, Feasibility Study (hereinafter: Highlands IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) 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, and environmental analyses contained in the Highlands IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted. 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 on August 5, 2015. Appendix D presents the organizational conflict of interest form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Highlands 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 (ATR), as described in USACE (2012).

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, and environmental 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 Highlands was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-214). 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. Table 1 presents the major milestones and deliverables of the Highlands IEPR. The Highlands IEPR project was conducted initiated under contract W912HQ-10-D-0002, Task 0076 and completed under W912HQ-15-D-0001, Task 0004 (details are presented in Appendices A and B). Due dates for milestones and deliverables are based on the award/effective dates of August 13, 2014 (Task 0076) and July 24, 2015 (Task 0004). Note that the work items 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 December 18, 2015. The actual date for contract end will depend on the date that all activities for this IEPR are completed.

Table 1. Major Milestones and Deliverables of the Highlands IEPR

Task	Action	Due Date
1	Award/Effective Date (Task 0076)	8/13/2014
	Award/Effective Date (Task 0004)	7/24/2015
	Review documents available	7/28/2015
2[a]	Battelle submits list of selected panel members	2/3/2015
	USACE confirms the panel members have no COI	3/10/2015
3	Battelle convenes kick-off meeting with USACE	7/31/2015
	Battelle convenes kick-off meeting with USACE and panel members	8/11/2015

Table 2. Major Milestones and Deliverables of the Highlands IEPR (continued)

Task	Action	Due Date
4	Panel members complete their individual reviews	9/8/2015
	Panel members provide draft Final Panel Comments to Battelle	9/23/2015
	Battelle provides Public Comments to the Panel	10/2/2015
	Panel completes review of the Public Comments	10/9/2015
5	Battelle submits Final IEPR Report to USACE	10/15/2015
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	10/22/2015
6[b]	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/2/2015
	Battelle submits pdf printout of DrChecks project file to USACE	12/28/2015
	Contract End/Delivery Date	7/30/2016

[a] *Work completed on previous contract (W912HQ-10-D-0002, Task Order 0076)*

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

Battelle identified, screened, and selected three panel members to participate in the IEPR based on their expertise in the following disciplines: economics/Civil Works planning, biological resources and environmental law compliance, and coastal engineering. The Panel reviewed the Highlands document and produced 10 Final Panel Comments in response to 30 charge questions provided by USACE for the review. The Panel added one additional Final Panel Comment after reviewing the Public Comments brining the total Final Panel Comments to 11. 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 1165-2-214, Appendix D), 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 among one another on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Draft Integrated Feasibility Report and Environmental Impact Statement. The following summarizes the Panel's findings.

While the Panel deemed the report to be written well to meet Specific, Measurable, Attainable, Risk Informed, Timely (SMART) Planning objectives, it identified areas of inconsistencies and missing details within the report. In addition, the Panel, identified elements of the project that require further analysis and evaluation, and sections of the report and appendices that should be clarified or revised.

Economics and Civil Works Planning – The most significant issue the Panel raised is associated with the optimization phase of the study. The TSP was identified based on a comparison of alternatives designed for a 50-year level of protection; however, an upcoming study phase referred to as optimization could reveal the need for substantial design modifications. The Panel suggests that the optimization be undertaken before identifying the TSP to ensure that the National Economic Development (NED) plan has been correctly identified.

Another important issue the Panel raised involves the description of the economic analysis, which does not address the magnitude of the flood damage or the discrepancy in number of structures following Superstorm Sandy. The apparent discrepancy between the references to damageable property following Superstorm Sandy raises a concern that the flood damage reduction benefits for the alternative plans may be overstated. The Panel recommends that the report clearly outline the number of damageable structures and explain why the flood damages are expected to be high in the future given that such a large number of structures have been, or will be, raised to 1 foot (ft) above the base flood elevation and would not be damaged by a 100-year event or higher in the future.

Engineering – The Panel had two main concerns regarding the coastal engineering aspects of the report. The first is related to the physical impacts under the with-project conditions. The damage from flooding to the project area under the TSP could exceed predicted "with-project" levels as a result of the TSP's effect during less statistically likely, but physically possible, conditions that exceed the design event. The Panel recommends expanding the discussion of potential damage in the project area under the TSP, clarifying the purpose of the proposed pumps, and identifying proactive options for dealing with post-storm trapped flood waters.

The second concern pertains to how wave height was treated in the study. It is not clear what physical conditions would lead to 1) the presence of sufficient local water depth (~2.8+ ft) leeward of the protective structures to support wave action; or 2) the source of the waves at the study location. This concern is true under both the without-project and with-project scenarios. Inconsistent treatment of incident and/or transformed waves could lead to damage characterizations due to wave action that do not support the stated benefit-cost ratio (BCR) or conceptual TSP design. The Panel suggests that the report clarify how waves were treated in the analysis and include a simple "cross-section" graphic in Appendix B2 showing assumed water levels waterward and leeward of the proposed protective structures.

Environmental – Overall, the environmental technical documents were well written with the following two minor exceptions. The first issue relates to references to quantify impacts and support conclusions in the impacts sections which are missing or incomplete. Because the environmental and cumulative impacts sections do not cite appropriate references, there is not sufficient information to analyze or assess the

impacts in the environmental assessment (EA). The Panel suggests adding citations of scientific literature, modeling, monitoring, or other applicable references to document and quantify impacts of the above-referenced sections.

The second concern is that the status and results of consultations with agencies that regulate the Economic Exclusive Zone (EEZ), as required by Federal legislation, are not described or documented. Appendix A addresses only terrestrial species and does not address the protected marine species that occur in the EEZ. The Panel recommends discussing coordination and consultation with the National Marine Fisheries Service (NMFS) in Appendix A and describing the status and results of the consultation in the EA. Also, the Panel suggests addressing the protected marine species that occur in the project area and quantifying the impacts (or lack of impacts) in the environmental consequences and cumulative impacts sections using scientific literature, monitoring data, or agency reports or communication.

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 TSP has been identified without taking into account potential design changes that could occur as a result of the upcoming optimization phase of the study.

Basis for Comment

The TSP was identified based on a comparison of alternatives designed for a 50-year level of protection; however, an upcoming study phase referred to as optimization could reveal the need for substantial design modifications. The Main Report (Section 3.10, p. 41) states:

> "For comparison purposes, the alternatives were developed for a still water level (SWL) for a 2% flood (50-year return period) storm surge of elevation +8.1 ft NAVD88, plus an anticipated sea level rise of +0.7 ft (over the 50-year period of analysis), or a design storm surge elevation of +8.8 ft NAVD88."

Alternative plans were formulated for this level of protection and compared to provide the basis for identifying the TSP.

The Executive Summary (p. iii) states that

> "The exact height of the project, which could be as high as +14 ft NAVD88, will be determined during the optimization phase of the study…".

The report states that a storm event with an annual exceedance probability of 1% (100-year storm) with a peak stage of 11.2 ft NAVD88 would flood Highlands to a depth of 5 ft for 1,500 ft inland (Main Report, Section 2.1.1, p. 11). Assuming a ground elevation of 5 to 6 ft, providing a protection elevation of 8.8 ft NAVD88 for the 2% annual exceedance probability storm will require a structure that extends only about 3 to 4 ft above natural ground. However, providing protection up to a 14 ft NAVD88 elevation would require a structure that would extend between 8 and 9 ft above natural ground—about twice the height of a structure for the 2% storm event. It is likely that such a large increase in protection elevation would require a substantially different set of management measures and footprint. A substantially different set of management measures could result in substantially different costs, benefits, and environmental impacts.

Significance – High

Without undertaking optimization before selecting the TSP, identification of the NED plan cannot be supported.

Recommendation for Resolution

1. Undertake optimization prior to identification of the TSP to ensure that the NED plan has been correctly identified.

Final Panel Comment 2

Predicted physical impacts (i.e., flooding) to the project area, and the potential for resulting greater proportional damage under the with-project condition, are not addressed.

Basis for Comment

The TSP may function as intended and as analyzed up to the level of impact of the design event; however, the project documents, especially Appendix C, envision that the lands in the lee of the protective structures may be flooded to some significant degree even under the "with-project" condition. The Draft Integrated Feasibility Report and Environmental Assessment (p. 35) notes that, as a general principle:

> "Once water levels exceed the crest of the bulkheads…they are trapped within the study area by these same bulkheads, prolonging the duration of the inundation and exacerbating flood damages."

The proposed protective structures in the TSP will tie to existing ground elevations on each end. When a storm event which exceeds the 50-year design criteria impacts the area, an unintended consequence of the project structures could be to exacerbate flood damage from that storm.

Report sections describe the idea of providing "three pumps" to deal with interior flooding, but this idea is not fully developed, nor is it clear if this is intended to address the issue raised.

Significance – Medium

The damage from flooding to the project area under the TSP could exceed predicted "with-project" levels as a result of the TSP's effect during less statistically likely, but physically possible, conditions that exceed the design event.

Recommendation for Resolution

1. Expand the discussion of potential damage in the project area under the TSP to address the issue raised.
2. Clarify the purpose of the proposed pumps.
3. Identify proactive options for dealing with post-storm trapped flood waters.

Final Panel Comment 3

It is unclear how the wave height was calculated and input into the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA) modeling software when analyzing the with-project conditions.

Basis for Comment

Appendix B2, Coastal Engineering (e.g., p. B2-1; B2-10-11; revision 9/15), describes the development of a wave climate for the study area generally based on the Advanced Circulation and Simulating Waves Nearshore (ADCIRC-SWAN) models. This effort appears to have resulted in Table B2-1, which is further described as "… exactly what was input into the economics model." It can be seen that although the significant wave heights in Table B2-1 do vary, for the 50-year event they are more typically 1 ft or less.

In contrast, Appendix C, Economics, describes a wave calculation in HEC-FDA based on the Linear Wave Theory approximation of Hs ~ 0.78 Ds; the local water depth, Ds, is stated as the water depth in the lee of the project protective structures (paragraph 67: "…wave height transmission beyond manmade structures were assumed limited by the water depth leeward of protective structures." (Also see paragraph 68). Paragraph 72 extends this discussion to conclude that when water depths (Ds) are 2.8 ft or greater above existing ground elevations, the resulting waves reach ~2.2 ft in height and cause 100% structure failure.

The above two discussions of how waves are treated in the study are at best confusing and are potentially in conflict.

In addition, it is not clear what physical conditions would lead to 1) the presence of sufficient local water depth (~2.8+ ft) leeward of the protective structures to support wave action; or, 2) the source of the waves at this location. This concern is true for both the without-project and with-project scenarios, but certainly is more relevant to the with-project condition. The TSP assumes minimum protective structure crest elevations sufficient to intercept the 50-year storm surge, including non-breaking wave setup (and sea level rise [SLR] for 'future' conditions). Although some overtopping of these protective structures might be assumed, if the profile is flooded in front of, and behind, the structures to the extent that offshore waves can pass to the interior and [only then] be broken by the local water depth, that situation would demonstrate that the TSP is not designed to address the project goals. An interior width of ~1,000 to 1,200 ft is not likely a sufficient fetch for waves to be regenerated only by local wind shear in the lee of the protective structures.

Significance – Medium

Inconsistent treatment of incident and/or transformed waves could lead to damage characterizations due to wave action that do not support the conceptual TSP design.

Recommendation for Resolution

1. Clarify how waves were treated in the analyses, specifically ensuring that the language is consistent in Appendices C and B.
2. Add a simple "cross-section" graphic in Appendix B2 showing assumed water levels waterward and leeward of the proposed protective structures and draw/label how a typical wave is transformed (in the study analysis) from offshore, over the protection, and to the interior building.

Final Panel Comment 4

The description of the economic analysis does not address the magnitude of the flood damages or the discrepancy in number of structures damaged by Superstorm Sandy that would be raised to safe elevation.

Basis for Comment

The Economics Appendix (p. 15) states that 800 of the 1,200 structures damaged by Hurricane Sandy will need to be reconstructed at elevations 1 ft above the base flood elevation. The economic analysis accounts for the fact that these structures will be constructed at an elevation sufficient to avoid damages from a storm up to a 100-year storm event and probably higher. As a result, there are 400 structures remaining that could be susceptible to flood damages associated with a storm event comparable to Superstorm Sandy (~190-year event). However, Table 10 of the Economics Appendix (p. 21) shows that 924 structures would be damaged by a 200-year event.

Significance – Medium

The apparent discrepancy between the references to damageable property following Superstorm Sandy raises a concern that the flood damage reduction benefits for the alternative plans may be overstated.

Recommendation for Resolution

1. Clearly explain the discrepancy in the Economics Appendix between the 400 damageable structures indicated on p. 15 and the 924 structures shown in Table 10.
2. Clearly explain why the flood damages are expected to be high in the future given that such a large number of structures have been, or will be, raised to 1 ft above the base flood elevation and would not be damaged by a 100-year event or higher in the future.

Final Panel Comment 5

It is not clear why raising the seaside deck of the Windansea Restaurant would be a Federal cost.

Basis for Comment

The TSP includes the cost of raising the seaside deck of the Windansea Restaurant. It appears that this measure is not required to reduce flood damages. Rather, it is included in the plan to preserve the viewshed of the restaurant diners (Section 4.1, p. 61). A clear explanation of why this is a Federal cost is not provided.

Significance – Medium/Low

The cost of raising the seaside deck of the Windansea Restaurant may need to be removed from the TSP.

Recommendation for Resolution

1. Either provide the rationale for including the cost of raising the seaside deck or remove the cost from the TSP.

Final Panel Comment 6

The residual risk of flood damage and possible loss of life are not presented in sufficient detail to document how the proposed alternative is appropriate and adequate in terms of property and life safety.

Basis for Comment

If the TSP is constructed at a 50-year level of protection, there will be significant residual risk. The residents and businesses in the protected area should be made aware of the potential for flood damages and the risk of loss of life. With a misconception regarding the level of protection, residents may disregard evacuation orders, which could increase the risk to life.

A requirement of local cooperation to be implemented by the non-Federal sponsor for a flood risk management project is to provide ongoing public information to the residents of the project area regarding residual risk. This requirement and a description of the residual risk that will exist under the TSP should be described in the report.

Significance – Medium/Low

Informing the non-Federal sponsor and the public of residual risk will help minimize future flood damages and the risk of loss of life.

Recommendation for Resolution

1. Add a description of residual risk to the Main Report.
2. Describe the non-Federal sponsor's requirement to keep the public informed of residual risk following project implementation.

Final Panel Comment 7

References to quantify impacts and support conclusions in the impacts sections are missing or incomplete.

Basis for Comment

The environmental impacts and cumulative impacts sections lack references to support document conclusions, specifically the topography, geology, and soils; water resources; tidal influences; coastal processes; vegetation; reptiles; birds; mammals; federal listed species; and state listed species sections. The finding of no impact must be determined using data, and impacts must be quantified. If a scale of low/ medium/ high or comparable is used, the thresholds for determining each category must be clearly defined and referenced to explain why these thresholds are meaningful.

Significance – Medium/Low

Because the environmental and cumulative impacts sections do not cite appropriate references, there is not sufficient information to analyze or assess the impacts in the environmental assessment (EA).

Recommendation for Resolution

1. Add citations of scientific literature, modeling, monitoring, or other applicable references to the above-referenced sections to document and quantify impacts.
2. If adequate data are not available, identify data gaps and, when warranted, recommend additional studies.

Final Panel Comment 8

The status and results of consultations with agencies that regulate the EEZ, as required by Federal legislation, are not described or documented.

Basis for Comment

According to Section 7 of the Endangered Species Act (ESA), Federal agencies are required to consult with the National Oceanic and Atmospheric Administration's (NOAA) NMFS (and/or the U.S. Fish and Wildlife Service) when actions they fund, authorize, or carry out may affect an ESA-listed species. Appendix A addresses only terrestrial species and disregards marine species that occur in the EEZ.

According to the Greater Atlantic Regional Fisheries Management Service, humpback, right, and fin whales; sea turtles; and Atlantic sturgeon (accessible waterways, presence documented) occur in the project vicinity and should be addressed due to the marine nature of the project. The information provided here was obtained from NOAA's Greater Atlantic Region protected species webpage (NOAA, 2015).

The NMFS also has a cooperative agreement with the New Jersey Department of Environmental Protection's (NJDEP) Division of Fish and Wildlife for the Conservation of Endangered and Threatened Species, which may be pertinent to this project requiring consultation with the state agency as well.

In addition, the Marine Mammal Protection Act (MMPA) prohibits the take of marine mammals in U.S. waters. Due to the marine nature of this project, compliance with this legislation should be documented in the EA.

Significance – Medium/Low

The Panel is unable to sufficiently evaluate and analyze the EA because results of consultations with agencies that regulate the Economic Exclusive Zone (EEZ), as required by Federal legislation, are not described or documented which affects the completeness of the report.

Recommendation for Resolution

1. If coordination and consultation with NMFS were conducted, discuss the process in Appendix A and describe the status and results of the consultation in the EA.
2. If consultation was not completed, explain why it was not required or initiate consultation with the Section 7 Coordinator.
3. Address protected marine species that occur in the project area and quantify the impacts (or lack of impacts) in the environmental consequences and cumulative impacts sections using scientific literature, monitoring data, or agency reports or communication.
4. Contact the NJDEP to determine whether coordination with the state is warranted regarding ESA species in the EEZ.

Literature Cited

NOAA (2015). NOAA Fisheries: Greater Atlantic Region. Available at http://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/maps/index.html. Accessed September 28, 2015.

Final Panel Comment 9

Shoreline erosion is noted to be a non-significant issue but is included as a planning opportunity and objective.

Basis for Comment

Erosion control is included as a project purpose in the authorizing legislation. Shoreline erosion is included in the problem statement of the Main Report (Section 3.1, p. 31). The planning opportunities and objectives described in the Main Report (Section 3.4, p. 36, and Section 3.7, p. 37, respectively) include "Reduce storm-induced shoreline erosion." However, there is no discussion of shoreline erosion in the description of the problems. Immediately following the list of planning objectives, the report states that, "No benefits from reducing shoreline erosion were included in the calculation of benefit-to-cost ratios." (Section 3.7, p. 37). The Project Delivery Team (PDT) indicated that erosion is not a problem during a mid-review teleconference between the PDT and the IEPR and facilitated by Battelle. Therefore, including it as a planning opportunity and objective may cause confusion.

Significance – Low

Including shoreline erosion in the problem statement and in the planning opportunities and objectives does not accurately represent existing conditions or the project's planning process.

Recommendation for Resolution

1. Eliminate reduction of shoreline erosion from the problem statement and from the planning opportunities and objectives.

Final Panel Comment 10

Environmental justice concerns are not fully addressed for the No Action Alternative.

Basis for Comment

The environmental justice analysis (to determine whether the project would result in disproportionate harmful impacts to minority or low-income populations) concluded that because only a small percentage of the Highlands population is minority, there would be no disproportionate harmful impacts (Section 2.1.10, p. 20, Main Report). However, in Section 3.1 of the Main Report (p. 33), Asset Limited, Income Constrained, Employed (ALICE) households are described as very susceptible to economic catastrophe. Section 3.1 states that, "Highlands was among the top 30 municipalities in the state for Sandy's impact on these households." As a result, it appears that the No Action alternative could produce a disproportionate negative impact on a low-income population in the study area that should be discussed in terms of environmental justice.

Significance – Low

Evaluation of the impacts of the No Action alternative on ALICE households would provide a more complete assessment of environmental justice.

Recommendation for Resolution

1. Describe the impacts of the No Action alternatives on ALICE households in the Environmental Justice section of the Main Report.

Final Panel Comment 11

A public concern that the project would not address flooding from the Shrewsbury River is not addressed in the report.

Basis for Comment

Ms. Julie Gordon (Highlands Pertinent Correspondence – Public Comments, p. 14) stated, “this seawall would not solve the flooding which occurs by having the Shrewsbury River rise in storms”. The report does not describe flooding in the study area caused by high flows in the Shrewsbury River or explain how the project would avoid exacerbating such conditions.

Significance – Low

Without a discussion of the relationship between flows in the Shrewsbury River and project operations, it is unclear how existing flood risk in the study area will be impacted.

Recommendation for Resolution

1. Describe how high flows in the Shrewsbury River impact the study area and how the project will be operated to avoid exacerbating existing problems.

5. REFERENCES

NOAA (2015). NOAA Fisheries: Greater Atlantic Region. Available at http://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/maps/index.html. Accessed September 28, 2015.

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

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

USACE (2012). Water Resources Policies and Authorities: Civil Works Review. Engineer Circular (EC) 1165-2-214. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. December 15.

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APPENDIX A

IEPR Process for the Highlands Project

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

Table A-1 presents the schedule followed in executing the Raritan Bay and Sandy Hook Bay, Highlands, New Jersey, Feasibility Study Independent External Peer Review (hereinafter: Highlands IEPR). Due dates for milestones and deliverables are based on the award/effective date of July 24, 2015. The review documents were provided by U.S. Army Corps of Engineers (USACE) on December 18, 2015. Note that the work items listed under Task 6 occur after the submission of this report.

Battelle was initially contracted to conduct an IEPR of the Highlands project under contract W912HQ-10-D-0002, Task Order 0076. Battelle initiated IEPR activities including, submitting the draft Work Plan (Task 1) and identifying, screening, and submitting panel members (Task 2) in January and February 2015. However, the period of performance for Task Order 0076 ended prior to receipt of the review documents. Battelle was contracted to continue the IEPR of the Highlands project under contract W912HQ-15-D-0001, Task 0004 under which the remainder of the IEPR tasks/activities were conducted, including preparation of this IEPR Final Report.

Under contract W912HQ-10-D-0002, Task 0076, Battelle identified potential candidates for the Panel in the following key technical areas based on the overall scope of the project: economics/Civil Works planning, biological resources and environmental law compliance, and coastal engineering. Battelle screened the candidates to assure they met the selection criteria and evaluated them for COIs and availability. USACE was given the list of final candidates to confirm that they had no COIs, but Battelle made the final selection of the three-person Panel. Battelle rescreened the panel members to ensure that no COIs had developed between the submission of the panel to USACE under Task 0076 and the award of Task 0004.

Battelle will enter the 11 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE 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.

Table A-1. Highlands Complete IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date (Task 0076)	8/13/2014
	Award/Effective Date (Task 0004)	7/24/2015
	Review documents available	7/28/2015
	Battelle submits draft Work Plan[ab]	1/21/2015
	USACE provides comments on draft Work Plan[b]	1/26/2015
	Battelle submits final Work Plan[a]	8/5/2015
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire[b]	1/22/2015

Table A-1. Highlands Complete IEPR Schedule (continued)

Task	Action	Due Date
	USACE provides comments on COI questionnaire[b]	3/10/2015
	Battelle submits list of selected panel members[ab]	2/3/2015
	USACE confirms the panel members have no COI[b]	2/5/2015
	Battelle completes subcontracts for panel members[b]	2/17/2015
3	Battelle convenes kick-off meeting with USACE	7/31/2015
	Battelle sends review documents to panel members	8/7/2015
	Battelle convenes kick-off meeting with panel members	8/10/2015
	Battelle convenes kick-off meeting with USACE and panel members	8/11/2015
	Battelle convenes Mid-Review Teleconference for panel members to ask clarifying questions of USACE	8/21/2015
4 – review documents	Panel members complete their individual reviews	9/8/2015
	Battelle provides panel members with talking points for Panel Review Teleconference	9/15/2015
	Battelle convenes Panel Review Teleconference	9/15/2015
	Battelle provides Final Panel Comment templates and instructions to panel members	9/16/2015
	Panel members provide draft Final Panel Comments to Battelle	9/23/2015
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	9/24/2015 - 10/01/2015
4- public comments	Panel finalizes Final Panel Comments	10/2/2015
	Battelle receives the public comments from USACE	10/2/2015
	Battelle sends public comments to Panel	10/2/2015
	Panel completes its review of the public comments	10/6/2015
	Battelle and Panel review Panel's responses to public comments	10/7/2015
	Panel drafts Final Panel Comment, if necessary	10/8/2015
	Panel finalizes Final Panel Comment regarding public comments	10/9/2015
5	Battelle provides Final IEPR Report to panel members for review	10/6/2015
	Panel members provide comments on Final IEPR Report	10/8/2015
	Battelle submits Final IEPR Report to USACE[a]	10/15/2015
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	10/22/2015

Table A-1. Highlands Complete IEPR Schedule (continued)

Task	Action	Due Date
6[c]	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	10/23/2015
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	10/23/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	10/23/2015
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses to Battelle	11/16/2015
	Battelle provides the panel members the draft PDT Evaluator Responses	11/18/2015
	Panel members provide Battelle with draft BackCheck Responses	11/23/2015
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/24/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/2/2015
	USACE inputs final PDT Evaluator Responses to DrChecks	12/9/2015
	Battelle provides final PDT Evaluator Responses to panel members	12/11/2015
	Panel members provide Battelle with final BackCheck Responses	12/16/2015
6[c]	Battelle inputs the Panel's final BackCheck Responses in DrChecks	12/23/2015
	Battelle submits pdf printout of DrChecks project file[a]	12/28/2015
	Contract End/Delivery Date	7/30/2016

a Deliverable.

b. Work completed on previous contract (W912HQ-10-D-0002, Task Order 0076)

c. Task 6 occurs after the submission of this report.

At the beginning of the Period of Performance for Task 0004 for the Highlands 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., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 30 charge questions provided by USACE (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 within 2 days of their subcontracts being 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 Highlands review documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- **Highlands Draft Feasibility Report and Environmental Assessment Main Report (120 pages)**
- **Appendix A - Environmental Documentation (103 pages)**
- **Appendix B - Engineering (113 pages)**
- **Appendix C - Economics (40 pages)**
- **Appendix D - Cost Engineering (53 pages)**
- **Appendix E -Real Estate Plan (25 pages)**
- **Appendix F - Pertinent Correspondence (50 pages)**
- Risk Register
- Decision Log
- USACE guidance, *Civil Works Review* (EC 1165-2-214), December 15, 2012
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review,* December 16, 2004.

About halfway through the review of the Highlands IEPR documents, a teleconference was held with USACE, the Panel, and Battelle 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 all the questions during the teleconference or later that day via email.

In addition, throughout the review period, USACE provided documents at the request of panel members. These documents were provided to Battelle and then sent to the Panel as additional information only and were not part of the official review. A list of these additional documents requested by the Panel is provided below.

- Attachment B2-1 Highland Storm Surge Information by Structure.pdf
- Attachment B2-2 PLOT AT 22x17 inch SCALE.pdf
- Highlands TSP Report Appendix B2 - Coastal Hydraulics 20150901.pdf

A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response table 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 in a preliminary list of nine overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

A.3 IEPR Panel Teleconference

Battelle facilitated a three-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member 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.

At the end of these discussions, the Panel identified 11 comments and discussion points that should be brought forward as Final Panel Comments.

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Highlands 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 the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.

- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:

    1. Comment Statement (succinct summary statement of concern)
    2. Basis for Comment (details regarding the concern)
    3. Significance (high, medium/high, medium, medium/low, and low; see description below)
    4. Recommendation(s) for Resolution (see description below).

- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:

1. **High:** Describes a fundamental issue with the project that affects the current recommendation or justification of the project, and which will affect its future success, if the project moves forward without the issue being addressed. Comments rated as high indicate that the Panel determined that the current methods, models, and/or analyses contain a "showstopper" issue.

2. **Medium/High:** Describes a potential fundamental issue with the project, which has not been evaluated at a level appropriate to this stage in the Specific, Measurable, Attainable, Risk Informed, Timely (SMART) Planning process. Comments rated as medium/high indicate that the Panel analyzed or assessed the methods, models, and/or analyses available at this stage in the SMART Planning process and has determined that if the issue is not addressed, it could lead to a "showstopper" issue.

3. **Medium:** Describes an issue with the project, which does not align with the currently assessed level of risk assigned at this stage in the SMART Planning process. Comments rated as medium indicate that, based on the information provided, the Panel identified an issue that would raise the risk level if the issue is not appropriately addressed.

4. **Medium/Low:** Affects the completeness of the report at this time in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium/low indicate that the Panel does not currently have sufficient information to analyze or assess the methods, models, or analyses.

5. **Low:** Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information that was mislabeled or incorrect or that certain data or report section(s) were not clearly described or presented.

- 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. During the Final Panel Comment development process, the Panel determined that one of the Final Panel Comments could be either merged into other Final Panel Comments; therefore, the total Final Panel Comment count was reduced to 10. After review of the Public Comments, an additional FPC was developed to address one issue highlighted in the public comments. At the end of this process, 11 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 Final Panel Comments are presented in the main report.

A.5 Conduct of the Public Comment Review

Battelle received public comments from USACE on the Highlands project (approximately 35 verbal transcripts and written comments totaling 10 pages of comments) and provided them to the IEPR panel members. Battelle then sent the public comments to the panel members on October 2, 2015, along with the following charge question:

1. **Does information or do concerns raised in the public comments raise any additional discipline-specific technical concerns with regard to the overall report?**

Near the end of the review period, the Panel produced individual comments in response to the charge question. Each panel member's individual comments were shared with the full Panel via email. 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 the 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 a four-part structure following guidance previously described in the Final IEPR Report.

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.

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APPENDIX B

Identification and Selection of IEPR Panel Members for the Highlands Project

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B.1 Panel Identification

The candidates for the Raritan Bay and Sandy Hook Bay, Highlands, New Jersey, Feasibility Study Independent External Peer Review (hereinafter: Highlands IEPR) Panel were evaluated based on their technical expertise in the following key areas: economics/Civil Works planning, biological resources and environmental law compliance, and coastal engineering. These areas correspond to the technical content of the Highlands IEPR review documents and overall scope of the Highlands 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 three 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.

The candidates were screened during both contracts Task Order 0076 and Task Order 004 for the following potential exclusion criteria or COIs.[1] These COI questions served as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm[2] in in the Raritan and Sandy Hook Bays, Highlands, New Jersey, Feasibility Study and technical appendices (hereinafter: Highlands Feasibility Study).
- Previous and/or current involvement by you or your firm[2] in coastal storm risk management studies in the Raritan and Sandy Hook Bays area.
- Previous and/or current involvement by you or your firm[2] in the Highlands Feasibility Study-related projects.
- Previous and/or current involvement by you or your firm[2] in the conceptual or actual design, construction, or operation and maintenance of any projects related to the Highlands Feasibility Study.
- Current employment by the U.S. Army Corps of Engineers (USACE).

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

[2] Includes any joint ventures in which a panel member's firm is involved and if the firm serves as a prime or as a subcontractor to a prime.

- Previous and/or current involvement in paid or unpaid expert testimony related to the Highlands Feasibility Study.
- Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors (for pay or pro bono).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Raritan and Sandy Hook Bays area.
- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the New York District.
- Previous or current involvement with the development or testing of models that will be used for, or in support of the Highlands Feasibility Study, including Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA), STeady State Spectral WAVE (STWave), and Dune Erosion (EDUNE).
- Current firm[2] involvement with other USACE projects, specifically those projects/contracts that are with the New York District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the New York District. Please explain.
- Any previous employment by USACE as a direct employee, notably if employment was with the New York District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by USACE as a contractor (either as an individual or through your firm[2]) within the last 10 years, notably if those projects/contracts are with the New York District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning coastal storm risk management, and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in Highlands Feasibility Study-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last 3 years came from USACE contracts.
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last 3 years from contracts with the non-Federal sponsor.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Highlands Feasibility Study.
- Participation in relevant prior and/or current Federal studies relevant to the Highlands Feasibility Study.
- Previous and/or current participation in prior non-Federal studies relevant to the Highlands Feasibility Study.

- 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.

Other considerations:

- Participation in previous USACE technical review panels
- Other technical review panel experience.

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. Two of the three reviewers are affiliated with a consulting company; the other is an independent consultant. 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 presents an overview of the credentials of the final three members of the Panel and their qualifications in relation to the technical evaluation criteria. More detailed biographical information regarding each panel member and his or her area of technical expertise is given in Section B.3.

Table B-1. Highlands IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Truitt	Hornung	Weber
Coastal Engineering			
Minimum of 10 years' experience in coastal and hydraulic engineering with an emphasis on large public works projects, or a professor from academia with extensive background in coastal processes and hydraulic theory and practice	X		
Familiar with the USACE application of risk and uncertainty analyses in coastal storm risk management projects, particularly projects in urbanized coastal areas	X		
Demonstrable experience in design of stabilizing dunes and beach berms	X		
Familiarity with standard USACE coastal, hydrologic and hydraulic computer models (please list those you have experience with along with example projects)	X		
Familiarity with geotechnical engineering principles including sediment characterization (desirable)	X		
Capable of addressing the USACE safety assurance review aspects of all projects	X		
Registered Professional Engineer	X		
MS degree or higher in engineering	X		
Economics/Civil Works Planning			
From academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm with a minimum of 15 years' demonstrated experience in public works planning		X	
Direct experience working for or with USACE (highly preferred but not required)		X	
Minimum of five years' experience directly dealing with the USACE six-step planning process, which is governed by ER 1105-2-100, Planning Guidance Notebook		X	
Familiar with USACE plan formulation process, procedures, and standards as it relates to hurricane and coastal storm damage risk reduction		X	
Familiar with USACE coastal storm risk management projects and a minimum of 10 years' experience in coastal economics evaluation and coastal flood risk evaluation		X	
Experience related to regional economic development		X	
Experience related to traditional Corps national economic development		X	
Five or more years' experience working with Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA)		X	
Capable of evaluating traditional National Economic Development plan benefits associated with hurricane and coastal storm risk management projects		X	

Table B-1. Highlands IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Truitt	Hornung	Weber
Master's Degree in relevant field		W[1]	
Biological Resources and Environmental Law Compliance			
Scientist from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm with at least 15 years' experience directly related to water resource environmental evaluation or review and National Environmental Policy Act (NEPA) compliance			X
Experience in coastal storm risk management projects, particularly projects in urbanized coastal areas			X
Familiar with the habitat, and fish and wildlife species that may be affected by the project alternatives in the study area			X
Familiar and have experience with United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP)			X
Familiar and have experience with Endangered Species Act (ESA).			X
Familiar and have experience with essential fish habitat (EFH)			X
Familiar and have experience with Marine Mammals Protection Act (MMPA)			X
Minimum MS degree or higher in a related field			X

1 Waiver submitted to USACE in the Selected Panel Document on February 3, 2015 and approved by USACE on March 10, 2015.

B.3 Panel Member Qualifications

Clifford Truitt, P.E., D.Eng., D.CE.

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

Dr. Truitt was a senior engineer and principal quality assurance officer at Coastal Technology Corporation in Sarasota, Florida when initially contacted about the IEPR. During the subsequent contracting process, Dr. Truitt retired from Coastal Technology Corporation and is performing the review independently. He earned his Doctorate in coastal and ocean engineering from Texas A&M University and has more than 40 years of professional experience in coastal processes, coastal structure design, hydraulic engineering, and related research. He is a licensed professional engineer (P.E.) in the states of Florida, Alabama, and Louisiana and a certified Diplomate in Coastal Engineering by the American Society of Civil Engineers' Academy of Coastal, Ocean, Port and Navigation Engineers. He was the former Bureau Chief of the Florida Department of Natural Resources (now Florida Department of Environmental Protection), the senior technical head of Florida's statewide coastal regulatory program, and a Principal Investigator and Research Hydraulic Engineer at USACE's Coastal Engineering Research Center (CERC) in the Coastal Structures and Evaluation Branch. He has also authored or coauthored more than 30 publications and presentations related to coastal engineering and design.

Dr. Truitt is familiar with the USACE application of risk and uncertainty analyses in coastal storm risk management projects, particularly projects in urbanized coastal areas. His expertise includes the coauthoring of TR CERC-89-15 Criteria for Evaluating Coastal Flood-Protection Structures under interagency contract for the Federal Emergency Management Agency while at the Engineer Research and Development Center (ERDC)/CERC. He routinely performs modeling and other characterizations of storm damage reduction benefits for Local Sponsors of USACE Shore Protection Projects (SPPs) in order to apportion local costs for Municipal Service Benefit Units, state funding, and similar needs; all of these analyses are developed using USACE risk/uncertainty analyses. Dr. Truitt is capable of addressing the USACE safety assurance review aspects of all projects using Engineer Circular (EC) 1165-2-214 and other applicable guidance. He is able to assess project hazards and determine if the consequences associated with the potential for loss of life for this type of project adequately address uncertainty and residual risk.

Dr. Truitt is experienced with standard USACE coastal, hydrologic and hydraulic computer models. While at ERDC/CERC, he oversaw the Evaluation of Navigation and Shore Protection research work unit, which utilized monitoring and performance data on USACE District projects and compared the results with original design methods, computer models (GENEralized Model for Simulating Shoreline Change [GENESIS], Storm-induced BEAch CHange [SBEACH]) and performance predictions; the research was used to develop and suggest revisions and updates to USACE structure design guidance. As practicing engineer, he has reviewed/used applicable guidance (including models such as GENESIS, SBEACH, STWAVE, and others) as part of vulnerability studies and coastal risk assessment. A relevant study is the St. Lucie County SPP, in which he was responsible for the analysis and assessment of the effect on nearby shorelines of excavating offshore shoal features for borrow sediment; using USACE/Wave Information Study data, he verified modeling results versus local gauge observations to develop a wave field, transformed those waves over the shoal for "before" and "after" conditions using STWAVE, took transformed waves at a reference line as input to both SBEACH and MIKE21 to estimate changes in wave energy reaching the shoreline and changes in potential sediment transport gradients.

Dr. Truitt has demonstrable experience in the design of stabilizing dunes and beach berms and has designed/incorporated dune/berm features to provide the vertical buffer against overtopping/inundation during specific episodic events. Example studies include the Santa Rosa County/Navarre Beach (Florida) fill project, which used an innovative 'tiered' design, and the West Galveston (Texas) CENTEX development with a wide dune 'field' with extensive vegetation to help control the effects of overtopping events. He is also familiar with geotechnical engineering principles, including sediment characterization, and has experience from his previous employment at a private geotechnical engineering firm (Ardaman & Associates). There, he worked with soil samples in the field, performed American Society for Testing and Materials laboratory classification tests on sediment and materials samples, and prepared engineering recommendations for foundation designs and pile loads based on soil characteristics. He also has more than 20 years of professional experience in design and research involving dredging and dredged material disposal, all of which rely extensively on an understanding of sediment characteristics and soil performance in different environments.

Lewis Hornung

Role: This panel member was chosen primarily for his Economics/Civil Works Planning experience and expertise.
Affiliation: DR Reed & Associates, Inc.

Mr. Hornung is a planning expert with DR Reed & Associates in Jupiter, Florida, specializing in the planning, economics, design phase, and operation of water resources and public works projects. He earned his B.S. in civil engineering from the University of Houston in 1977; his 36-year career includes 19 years with USACE, 6 years with the South Florida Water Management District, and the remainder with private architect/engineer consulting firms. He has played lead roles in a large number of planning projects, including studies for environmental restoration, coastal planning, flood damage reduction, and water supply. He also is familiar with USACE's 2011 Planning Modernization initiative, has served as project manager for the development of a planning modernization implementation plan for USACE Headquarters, and has taken part in previous IEPR panels for Battelle as an economist/Civil Works planning expert.

Mr. Hornung has direct experience in USACE plan formulation processes, procedures, and standards. His career at USACE included more than 12 years in the Planning Divisions of the Galveston and Jacksonville Districts. He has applied the USACE six-step planning process, governed by Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook, for reconnaissance studies, feasibility studies, limited reevaluation reports, general reevaluation reports (GRRs), major rehabilitation reports, and continuing authority studies. Relevant studies include the C-111 GRR, Jacksonville District (SAJ), the C-51 West GRR (SAJ), the Lake Okeechobee Watershed Feasibility Study (SAJ), Herbert Hoover Dike Major Rehabilitation Report (SAJ), and the Alexandria to the Gulf of Mexico Flood Control Feasibility Study, New Orleans District (MVN). He is also familiar with USACE plan formulation process, procedures, and standards as it relates to hurricane and coastal storm damage risk reduction. Following Hurricane Katrina, he spent two years in New Orleans supporting USACE recovery efforts as a member of the team for the Louisiana Area Coastal Protection and Restoration Study. This study developed a regional plan for providing protection against coastal flooding using a combination of wetland restoration and traditional structural and non-structural measures. He also managed two studies addressing coastal protection and wetland restoration as part of the Louisiana Coastal Area Project.

Mr. Hornung is expert in Regional Economic Development (RED) planning and understands the role that regional economic impacts play in decision making for many of the projects that he has worked on. For example, as part of the C-111 GRR recommended plan, restoration of the East Everglades rendered certain agricultural lands unusable in which shifted agricultural production to another part of the state. In this case, the National Economic Development (NED) impacts were small, but the RED impacts were an important consideration in decision making. RED impacts were carefully evaluated and fully disclosed in the decision document. Mr. Hornung also has more than 10 years of experience conducting traditional NED plan benefits associated with flood risk management projects, all of which required the evaluation of NED benefits. Relevant studies include the Comprehensive Everglades Restoration Plan Feasibility Study, Alexandria to the Gulf of Mexico, C-51 West General Reevaluation Study, Herbert Hoover Dike Major Rehabilitation, and C-111 General Reevaluation Study. In addition, he served on the IEPR Panel to evaluate the NED analysis that was performed using the HEC River Analysis System (HEC-RAS) model for the West Sacramento Flood Risk Management GRR by the Sacramento District. His extensive experience conducting NED and RED evaluations reflects his capability in evaluating traditional NED plan benefits associated with hurricane and coastal storm risk management projects.

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

Marisa Weber

Role: This panel member was chosen primarily for her biological resources and environmental law compliance experience and expertise.
Affiliation: Atkins North America, Inc.

Ms. Weber is a project manager/team leader with Atkins North America, Inc., with 15 years' experience including managing project teams, providing environmental consulting, and working for Federal agencies, with a comprehensive background in environmental policy. She is skilled at navigating the National Environmental Policy Act (NEPA), the Clean Water Act (CWA) (particularly CWA Section 404) and Rivers and Harbors Act Section 10 permits, as well as associated state and municipal permits. She is also experienced in leading and writing NEPA documents, including environmental impact statements (EISs). She earned her M.S. in biological sciences from the University of Southern Mississippi in 2004.

Ms. Weber has experience with coastal storm risk management projects, including those in urbanized coastal areas. Relevant experience includes her work as an aquatic biologist for the Hurricane Protection Office Inner Harbor Navigation Canal (IHNC) for USACE New Orleans District, the largest design-build Civil Works project in USACE history. The proposed action was the design of channels and water body structures to improve surge protection for the IHNC as part of the overall hurricane protection system. She played an integral role in evaluating the current conditions in the project area and comparing the

results of several modeling efforts to predict the impacts on salinity, velocity, dissolved oxygen, hydroperiod, tidal pulse, and fish passage. She used the predicted results of modeling to determine impacts to aquatic resources, fisheries, and essential fish habitat (EFH) for the proposed action and various alternatives. Ms.Weber is familiar with the habitat and the fish and wildlife species that may be affected by the project alternatives in the project region and is experienced in the assessment of coastal and harbor regions of biologically diverse and productive areas for environmental impact studies and navigation projects throughout the Gulf of Mexico and coastal regions of the Atlantic Seaboard. In addition to conducting literature reviews, performing personal research, and having an in-depth knowledge of coastal and marine ecosystems, she was project biologist for numerous studies such as the Navy Base Intermodal Container Transfer Facility Environmental Impact Statement, Charleston, South Carolina.

Ms. Weber is familiar with the United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP), with relevant experience working with Harris County Flood Control District and USACE doing inland and coastal HEP analyses projects. She is also familiar and has experience with the Endangered Species Act (ESA) and is managing the environmental permits required for the proposed Vopak Terminal along the Houston Ship Channel. There, she has assisted the client with an aggressive schedule to submit an Individual Permit and navigate the Section 404/10 of the CWA. She was responsible for coordinating with state and Federal agencies to obtain the necessary permits for the proposed project, including the USACE Individual Permit, USACE real estate outgrant permit, Texas Commission on Environmental Quality Tier II Water Quality Certification, Coastal Zone Management Permit, Port of Houston Authority dredging permit, and Port of Houston Authority construction permit. Included in the permit are numerous technical reports to comply with the Magnuson Stevens Fisheries Conservation and Management Act, ESA, and Migratory Bird Treaty Act.

Ms. Weber has additional experience with EFH, serving as the lead marine biologist on the Sabine Pass and Creole Trail liquefied natural gas (LNG) pipeline project for Cheniere Energy, Inc. She supported ecological and archaeological field surveys; prepared environmental reports; consulted with environmental permitting and resource agencies; and prepared an aquatic resources mitigation plan that would reduce impacts to wetlands, water bodies, and EFHs. She was also the primary author of the Oyster Assessment and Substrate Characterization for the Proposed Cheniere Creole Trail Pipeline, which was conducted and written according to Louisiana Department of Wildlife and Fisheries protocol. She was also the primary author for the Aquatic Threatened and Endangered Species and EFH technical reports. She has experience with the Marine Mammals Protection Act (MMPA) and has worked with USACE developing EISs with MMPA components for such projects as Port of Pascagoula Bayou Casotte Harbor, Port of Gulf Port Expansion Project, Matagorda Ship Channel Expansion Project, and Sabine Pass and Creole Trail LNG Pipeline and Terminal Projects.

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APPENDIX C

Final Charge to the IEPR Submitted to USACE on August 5, 2015, for the Highlands Project

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Charge Questions and Guidance to the Panel Members for the IEPR of the Independent External Peer Review of the Raritan Bay and Sandy Hook Bay, Highlands, New Jersey Feasibility Study

BACKGROUND

The Raritan and Sandy Hook Bays, Highlands, New Jersey, Feasibility Study (hereinafter: Highlands Feasibility Study) is a risk management study to address flooding, both tidal and interior, as well as erosion during coastal storms. Traditionally, the level of approval for the feasibility study is the Chief of Engineers, and requires Congressional authorization for construction. However, the Highlands study was included in Interim Report 2 in response to Public Law (P.L.) 113-2 as an ongoing study. Consequently, a Director's Report, rather than a Chief's Report, will be the final product, and Congressional authorization for project construction, assuming a favorable report, has already been secured. The National Environmental Policy Act (NEPA) documentation will be an environmental impact statement (EIS), which will be prepared along with the document.

The Highlands study area, about 0.7 square miles in extent, is located at the eastern limit of the overall Raritan Bay and Sandy Hook Bay area and is bordered to the north by Sandy Hook Bay, to the west by the corporate limits of Atlantic Highlands, and to the east by the Shrewsbury River and Route 36 bridge. The Borough of Highlands is located in Monmouth County, New Jersey. The borough of Highlands is a fully developed community with most year-round residences and commercial establishments located on the low-lying area along the bay.

Highlands has a history of devastating flood damages. Approximately 880 residential, trailer home, apartment, and commercial structures are subject to severe flooding. Many low-lying roadways are flooded during severe storm events, cutting off access to large portions of Highlands. An existing Federal navigation project provides access for the Leonardo State Marina to deep water in Raritan Bay. Low-lying residential and commercial structures in the area experience flooding caused by coastal storm inundation. The feasibility study investigates flood risk management opportunities in this area.

Measures and strategies considered for Highlands included non-structural approaches, hard structures (raising bulkheads and building floodwalls), soft structures (dunes), and off-shore barriers. Prior to Superstorm Sandy, the Tentatively Selected Plan (TSP) was Alternative 5E, which includes a combination of bulkhead elevation, ground raising, and floodwalls. The estimated first cost was $54 million. Post-Sandy, the study team has coordinated with non-Federal interests to confirm local interest in Alternative 5E as the TSP.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Raritan Bay and Sandy Hook Bay, Highlands, New Jersey, Feasibility Study (hereinafter: Highlands IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214; December 15, 2012),

and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

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

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4) for the Highlands IEPR documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in coastal engineering, Civil Works planning, environment/biology, and economic issues relevant to the project. They will also have experience applying their subject matter expertise to coastal storm damage.

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 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

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

Documents for Review

The following documents are to be reviewed by designated discipline:

Title	No. of Pages	Required Disciplines
Highlands Draft Feasibility Report and Environmental Assessment Main Report	120	All Disciplines
Appendix A - Environmental Documentation	103	All Disciplines
Appendix B - Engineering	113	Coastal Engineering
Appendix C - Economics	40	Economics/Civil Works Planning
Appendix D - Cost Engineering	53	All Disciplines

Title	No. of Pages	Required Disciplines
Appendix E - Real Estate Plan	25	Economics/Civil Works Planning
Appendix F - Pertinent Correspondence[a]	50	All Disciplines
Total Page Count	**504**	

[a] USACE will submit to Battelle all comments as they were received up to approximately 50 pages. If USACE receives more than approximately 50 pages of public comments, then USACE will submit to the Contractor a collated list of public comments according to the comments' subject or topic.

Supporting Information

- Risk Register (10 pages)
- Decision Log (5 pages)
- Decision Management plan (10 pages)
- Report Synopsis (50 pages)
- Project Issue Checklist (10 pages)
- Foundations of SMART Planning
    - SMART Planning Bulletin (PB 2013-03)
    - SMART – Planning Overview
    - Planning Modernization Fact Sheet.

Documents for Reference

USACE guidance *Civil Works Review,* (EC 1165-2-214, December 15, 2012) (http://www.publications.usace.army.mil/Portals/76/Publications/EngineerCirculars/EC_1165-2-214.pdf)

Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004) (http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf)

SCHEDULE

This schedule is based on the notice to proceed date of July 24, 2015, and the anticipated review document receipt date of July 28, 2015. The schedule will be revised upon receipt of final review documents. Note that dates presented in the schedule below could change due to panel member and USACE availability.

Task	Action	Due Date
Conduct Peer Review	Battelle sends review documents to panel members	8/7/2015
	Battelle convenes kick-off meeting with panel members	8/10/2015
	Battelle convenes kick-off meeting with USACE and panel members	8/11/2015
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	8/21/2015
	Panel members complete their individual reviews	9/8/2015

Task	Action	Due Date
Prepare Final Panel Comments and Review Public Comments	Battelle provides panel members with talking points for Panel Review Teleconference	9/14/2015
	Battelle convenes Panel Review Teleconference	9/15/2015
	Battelle provides Final Panel Comment templates and instructions to panel members	9/16/2015
	Panel members provide draft Final Panel Comments to Battelle	9/23/2015
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	9/24/2015 - 10/01/2015
Prepare Final Panel Comments and Review Public Comments	Battelle finalizes Final Panel Comments	10/2/2015
	Battelle receives the public comments from USACE	8/28/2015
	Battelle sends public comments to Panel	9/9/2015
	Panel completes its review of the public comments	9/14/2015
	Battelle and Panel review Panel's responses to public comments	9/15/2015
	Panel drafts Final Panel Comment for public comments, if necessary	9/25/2015
	Panel finalizes Final Panel Comment regarding public comments	9/29/2015
Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	10/6/2015
	Panel members provide comments on Final IEPR Report	10/8/2015
	*Battelle submits Final IEPR Report to USACE	**10/15/2015**
	USACE PCX Provides Decision on Final IEPR Report Acceptance	10/22/2015
Comment/ Response Process	Battelle inputs Final Panel Comments to the Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	10/23/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	10/23//2015
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE Planning Center of Expertise (PCX) for review	10/23//2015
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	11/6/2015
	USACE PCX provides draft PDT Evaluator Responses to Battelle	11/13/2015
	Battelle provides the panel members the draft PDT Evaluator Responses	11/16/2015
	Panel members provide Battelle with draft BackCheck Responses	11/18/2015
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/23/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	12/2/2015

Task	Action	Due Date
Comment/ Response Process	USACE inputs final PDT Evaluator Responses to DrChecks	12/9/2015
	Battelle provides final PDT Evaluator Responses to panel members	12/11/2015
	Panel members provide Battelle with final BackCheck Responses	12/16/2015
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	12/23/2015
	*Battelle submits pdf printout of DrChecks project file	12/28/2015

* Deliverables

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Highlands IEPR 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 Highlands IEPR documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

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

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

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

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

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

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

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

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

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

2. Please contact the Battelle Project Manager (Jessica Tenzar, tenzarj@battelle.org) or Program Manager (Karen Johnson-Young (johnson-youngk@battelle.org) for requests or additional information.

3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.

4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Jessica Tenzar, tenzarj@battelle.org, no later than September 3, 2015, 10 pm ET.

Independent External Peer Review

of the

RARITAN BAY AND SANDY HOOK BAYS HIGHLANDS, NEW JERSEY FEASIBILITY STUDY

Charge Questions and Relevant Sections as Supplied by USACE

Safety Assurance

1. Are the quality and quantity of the surveys, investigations, and engineering sufficient for a concept design and to support the models and assumptions made for determining the hazards?
2. Are the models used to assess hazards appropriate?
3. Are the assumptions made for the hazards appropriate?
4. Does the analysis adequately address the uncertainty and residual risk, given the consequences associated with the potential for loss of life for this type of project?
5. Are the quality and quantity of the surveys, investigations, and engineering sufficient for a concept design?
6. Are potential life safety issues accurately and adequately described under existing, future without-project, and future with-project conditions?
7. Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?
8. From a public safety perspective, is the proposed alternative reasonably appropriate or are there other alternatives that should be considered?

General

9. Does the decision document(s) adequately address the stated need and meet the intent?
10. Are the need for and intent of the decision document(s) clearly described?
11. Is the environmental documentation reasonably comprehensive or are there significant environmental impacts that should be considered?
12. Were all models used in the analyses used in an appropriate manner?

13. Are the models used in a manner that supports the conclusions drawn from them (i.e., identify meaningful differences between alternatives)?

14. Evaluate the soundness of models, surveys, investigations, and methods.

15. Assess if the adequacy and acceptability of the economic environmental and engineering assumptions, projections, analyses, and interpretations of analyses (i.e., conclusions) are reasonable.
16. Assess the adequacy and acceptability of the methods for integrating risk and uncertainty.

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

18. Was the coastal engineering modeling performed technically sound?

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

20. Were the geotechnical analyses adequate and appropriate for the current level of design as presented in the report documentation?

Plan Formulation

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

22. Was a reasonably complete array of possible measures and alternatives considered?

23. Assess the adequacy and acceptability of the formulation, evaluation, and comparison of alternative plans.

24. Are the changes between the without- and with-project conditions adequately described for each alternative?

25. Please comment on the conclusion of the most probable future without-project condition. Do you envision other potential probable outcomes?

26. Are the uncertainties inherent in our evaluation of benefits, costs, and impacts, and any risk associated with those uncertainties, adequately addressed and described for each alternative?

27. Are estimated costs reasonable for each alternative?

Recommended Plan

28. Please comment on the likelihood that the recommended plan achieves the expected outputs.

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

Summary Questions

30. 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.

Battelle Public Comment Charge Questions to the Panel Members[3]

Public Comment Questions

31. Does information or do concerns raised by the public raise any additional discipline-specific technical concerns with regard to the overall report?

[3] Questions 31 is a Battelle supplied questions and should not be construed or considered part of the list of USACE-supplied questions.

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APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire

[Independent External Peer Review]

[Raritan Bay and Sandy Hook Bay Highlands]

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
REPRESENTATIVE'S NAME: Ladonna James
TELEPHONE: 614-424-5097
ADDRESS: 505 King Avenue, Columbus, OH 43201
EMAIL ADDRESS: jamesl@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 X (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 X 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 X (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 X 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.**

LaDonna F. James

Digitally signed by LaDonna F. James
DN: cn=LaDonna F. James, o=Government Contracts, ou=SAS, email=jamesl@battelle.org, c=US
Date: 2015.07.17 15:19:28 -04'00'

Ladonna James, Battelle DATE

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