

Final Independent External Peer Review Report Hudson-Raritan Estuary (HRE) Ecosystem Restoration Feasibility Report and Environmental Assessment, New York and New Jersey

Prepared by
Battelle Memorial Institute

Prepared for
U.S. Army Corps of Engineers
Ecosystem Restoration Planning Center of Expertise
Mississippi Valley Division

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The Hudson-Raritan Estuary (HRE) is within the boundaries of the Port District of New York and New Jersey, situated within a 25-mile radius of the Statue of Liberty. The HRE study area includes the following eight Planning Regions: 1) Jamaica Bay; 2) Lower Bay; 3) Lower Raritan River; 4) Arthur Kill/Kill Van Kull; 5) Newark Bay, Hackensack River and Passaic River; 6) Lower Hudson River; 7) Harlem River, East River, and Western Long Island Sound; and 8) Upper Bay.

The HRE is in one of the most urbanized regions in the United States. The waters and nearshore habitats of the HRE once supported a diverse mosaic of ecological communities, but centuries of industrialization and urbanization have resulted in severe habitat loss and degradation, poor water quality, pervasive sediment contamination, and lack of public access to the estuary. These actions have significantly impacted the ecological integrity, health, and public perception of the estuary and its resources.

Planning objectives for the HRE study include the following:

- Restore the structure, function, and connectivity, and increase the extent, of estuarine habitat in the HRE.
- Restore the structure and function, and increase the extent, of freshwater riverine habitat in the HRE.
- Restore the structure and function, and increase the extent, of marsh island habitat in Jamaica Bay.
- Increase the extent of oyster reefs in the HRE.

In support of the HRE Study, the U.S. Army Corps of Engineers (USACE) New York District and its partners released the Draft Comprehensive Restoration Plan (CRP) in 2009. The CRP is the foundation for the HRE Feasibility Report/Environmental Assessment (FR/EA), outlining the water resource problems, goals, targets (Target Ecosystem Characteristics [TECs]), restoration opportunities, and implementation strategies. More than 400 restoration opportunities have been reviewed, including the original 287 CRP sites as well as new sites. To date, there are 296 CRP Restoration Sites within the eight Planning Regions of the HRE. These sites were evaluated and screened, resulting in a subset of sites to be recommended for near-term construction.

A total of 33 restoration opportunities/sites will be recommended for construction (31 sites for near-term construction and 2 sites “Deferred” following U.S. Environmental Protection Agency [EPA] remedial actions) in the following Planning Regions:

Jamaica Bay Planning Region

- 6 perimeter sites: Fresh Creek, Hawtree Point, Dubos Point, Brant Point, Bayswater State Park, Dead Horse Bay
- Marsh Islands: Elders Center, Duck Point, Stoney Point, Pumpkin Patch [East and West]; and
- Small-scale Oyster Restoration

East River, Harlem River, Western Long Island Sound Planning Region

- Flushing Creek (1 site)
- Bronx River (9 sites): Stone Mill Dam, Bronx Zoo and Dam, Shoelace Park, Muskrat Cove, River Park/West Farm Rapids Park, Westchester County Center, Bronxville Lake, Crestwood Lake, Garth Woods/Harney Road; and
- Small-scale Oyster Restoration at Soundview Park

Newark Bay, Hackensack River, and Passaic River Planning Region

- Hackensack River (2 sites): Meadowlark Tract and Metromedia Marshes
- Lower Passaic River (3 sites): Essex County Branch Brook Park, Dundee Island Park, and Clifton Dundee Canal Green Acres; and
- Lower Passaic River (2 “Deferred” sites): Kearny Point and Oak Island Yards recommended for construction following EPA remedial actions

Upper Bay

- Small-scale Oyster Restoration at Bush Terminal and Governors Island

Lower Bay Planning Region

- Small-scale Oyster Restoration at Naval Weapons Station Earle

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an Independent External Peer Review (IEPR) of the Hudson-Raritan Estuary (HRE) Ecosystem Restoration Feasibility Report and Environmental Assessment, New York and New Jersey (hereinafter: Hudson-Raritan Estuary 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 this IEPR. 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.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: economics, Civil Works planning, civil/hydraulic engineering, and environmental/National Environmental Policy Act (NEPA). Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of final candidates to confirm that they had no COIs, but Battelle made the final selection of the three-person Panel.

The Panel received electronic versions of the decision documents (1,759 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 (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference at the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced individual comments in response to the charge questions.

IEPR panel members reviewed the decision 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. Overall, 17 Final Panel Comments were identified and documented. Of these, two were identified as having medium/high significance, seven had a medium significance, one had medium/low significance, and seven had low significance.

Battelle received public comments from USACE on the HRE review documents (letters and public information meeting attendance sheets, totaling 63 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 Hudson-Raritan Estuary IEPR review documents. After completing its review, the Panel identified one new issue and subsequently generated one Final Panel Comment that summarized the concern.

Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the HRE review documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel’s findings.

Based on the Panel’s review, the report is well-written, is concise, and provides adequate supporting documentation on engineering, environmental, economic, and plan formulation issues. The report provides a balanced assessment of the economic, engineering, and environmental issues of the overall project; however, the Panel identified some elements of the project where additional analyses are warranted and places where clarification of project findings and objectives need to be documented in the Feasibility Report/Environmental Assessment (FR/EA).

Economics/Civil Works Planning: The Panel notes that the report does a good job integrating the disparate sites and explaining the comprehensive and uniform evaluation criteria. However, one of the Panel's primary concerns is that the long-term operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) commitments of the non-Federal sponsor are not thoroughly analyzed in the FR/EA. If restoration sites need maintenance to maintain marsh elevations to keep up with sea level rise, or if a future major storm event ever affected any of the restoration sites so intensely that the site needed to be completely rebuilt, the non-Federal sponsor would be responsible for 100% of those costs. The FR/EA would benefit from assurances that the non-Federal sponsor has the financial capability to bear long-term OMRR&R costs. Another concern of the Panel's is that the adaptive management costs and the OMRR&R costs are combined, making cost-sharing allocation, ecosystem outputs, and monitoring timeframes difficult to distinguish. The Panel recommends revising the FR/EA to separate the costs of those two post-construction activities and to clearly distinguish between the different monitoring and adaptive management timeframes. The Panel also observed that storm event and surge modeling has not been used to better inform OMRR&R costs and that it was not clear how all-terrain vehicles (ATVs) would be prevented from entering the Hawtree Point site. With regard to the latter finding, the Panel believes that confidence in the ATV prohibition at Hawtree Point would be improved with maps and specific details on how the vehicles would be barred from entry.

Engineering: From an engineering standpoint, the Panel believes that the design development constraints were appropriate and well thought out and appreciated the way USACE developed a standardized method to develop alternative concepts. However, the Panel observed that the FR/EA did not take into account the possible discovery of sediment contamination at a restoration site as a risk to achieving project objectives. If a restoration project were removed from consideration based on contamination issues, the level of ecological improvement resulting from the HRE project would be diminished. The Panel also believes that the uncertainty and limitations associated with using the Evaluation of Planned Wetlands (EPW) model to quantify benefits should be documented in the FR/EA to make the project documentation more complete. The FR/EA also does not explain why eelgrass bed restoration is not being considered even though it is listed as a TEC; the understanding of the project would be improved if the FR/EA explained why no eelgrass bed restoration projects were proposed. Finally, the Panel notes that the alternative selection process could more clearly describe why dam removal was not considered as an alternative at the Bronx River sites.

Environmental: The Panel believes that USACE has done an excellent job working with stakeholders, finding local sponsors, and screening and evaluating all the potential restoration sites. One of the primary concerns of the Panel, however, was that there was no analysis of the impacts from sea level rise (SLR) to the restoration projects, with one passage of the FR/EA implying that some of the habitat restored or created would only be lost under "worst case scenarios" of SLR and that this would happen "at the end of the next century". The Panel believes USACE should not only assess the impacts of SLR on the restoration projects, but also analyze the costs involved to maintain the project elevations as the sea level rises. In addition, the Panel believes that the environmental significance of the HRE program as a whole (and, accordingly, the benefits of the program) could be better explained in the FR/EA. The assumption that restoration of the habitats in the 33 projects will improve the overall condition of the HRE as a system is not supported in the FR/EA; by demonstrating how the projects would contribute to the overall ecosystem health and not simply be isolated shelters and microhabitats, estimates of project benefits would be improved. With regard to the Jamaica Bay island creation sites, the Panel agrees that the availability and suitability of dredged material, the dredged material delivery methods, and the cost basis for beneficial use are not well-explained in the FR/EA. Including a discussion of the coordination between

federal dredging projects and the Jamaica Bay projects to ensure an adequate supply of compatible and uncontaminated dredged material as well as the costs associated with acquiring that material would improve the FR/EA and better inform the project schedule and cost. The Panel also observed that the FR/EA did not include information on whether the Federal Aviation Administration (FAA) had tentatively approved the four sites within the five-mile perimeter of JFK Airport with regard to bird-aircraft strike potential; a description of the FAA coordination process as well as an explanation of why the four sites within the five-mile perimeter are not expected to increase the likelihood of strikes would improve the FR/EA. Based on technical reports that *Phragmites* stands can have habitat and shoreline stabilization benefit in some locations, the Panel recommends that USACE evaluate keeping *Phragmites* stands in some locations, rather than replacing them with *Spartina*, based on the restoration goals of the specific site. Other environmental recommendations include describing the measure implementation techniques in the FR/EA; clearly describing the indicators, criteria, and management actions that will guide the adaptive management process; discussing monitoring activities during project construction; and evaluating the project objective risk and uncertainty associated with potential impacts to cultural resources.

Table ES-1. Overview of 17 Final Panel Comments Identified by the Hudson-Raritan Estuary IEPR Panel

No.	Final Panel Comment
Significance – Medium/High	
1	The FR/EA does not analyze the impacts of future climate change, including the impacts of SLR, on the restoration projects.
2	The long-term commitment requirements for the non-Federal sponsor associated with the OMRR&R are not described in the FR/EA.
Significance – Medium	
3	Combining adaptive management costs with OMRR&R costs make the cost-sharing allocation, ecosystem outputs, and monitoring timeframes difficult to distinguish.
4	The FR/EA does not present the environmental significance of the habitat restoration projects in terms of overall benefits to the HRE.
5	Assumptions regarding dredged material availability, delivery methods to the restoration projects, and the basis for additional costs associated with its beneficial use are not supported in enough detail.
6	The potential for site contamination being discovered has not been considered as a risk to project objectives, even though contamination could lead to eliminating a site from restoration consideration.
7	The FR/EA does not consider the specific habitat and shoreline protection benefits of the grass species <i>Phragmites</i> as compared to <i>Spartina</i> .
8	Potential impacts to cultural resources at all HRE project sites could lead to rejection of specific restoration projects or increased costs to address public comment concerns.
9	Potential bird-aircraft strikes in the vicinity of JFK Airport could lead to specific projects not being approved or incurring increased costs to mitigate impacts.
Significance – Medium/Low	
10	The adaptive management activities described in the FR/EA do not fully consider the indicators, criteria, and performance standards for each element of the restoration projects that will guide the adaptive management process.

No.	Final Panel Comment
Significance – Low	
11	There is significant uncertainty associated with quantifying benefits using the EPW model.
12	It is not clear whether the FR/EA has deployed recent advancements in modeling to analyze surge elevation and frequencies and the potential impacts of future storm events to inform OMRR&R costs.
13	The FR/EA does not describe why eelgrass bed restoration is not being considered, even though it is a TEC.
14	While the implementation techniques of the various measures are described in Appendix E, the specific techniques that will be used to achieve each management measure and the TECs are not described in the main FR/EA report.
15	Specific details regarding how ATVs would be prevented from entering the Hawtree Point restoration site are not provided.
16	The FR/EA does not discuss construction monitoring or any efforts necessary to minimize local environmental impacts during construction.
17	The FR/EA does not explain why fish ladder construction and not dam removal was selected as the preferred measure to provide fish passage at the Bronx River project sites.

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LIST OF ACRONYMS

AAFCU	Annual Average Functional Capacity Unit
ADM	Agency Decision Milestone
ASCE	American Society of Civil Engineers
ATR	Agency Technical Review
ATV	All-terrain Vehicle
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COI	Conflict of Interest
CRP	Comprehensive Restoration Plan
CWRB	Civil Works Review Board
DrChecks	Design Review and Checking System
EC	Engineer Circular
EPA	U.S. Environmental Protection Agency
EPW	Evaluation of Planned Wetlands
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
FR/EA	Feasibility Report/Environmental Assessment
HER	Harbor and Estuary Program
HRE	Hudson-Raritan Estuary
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
NED	National Economic Development
NEP	National Estuary Program
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
OCPD	Oceans & Coastal Protection Division
OEO	Outside Eligible Organization
OMB	Office of Management and Budget

OMRR&R	Operation, Maintenance, Repair, Replacement, and Rehabilitation
PA	Programmatic Agreement
PCX	Planning Center of Expertise
PDT	Project Delivery Team
SLR	Sea Level Rise
TEC	Target Ecosystem Characteristic
USACE	United States Army Corps of Engineers
WEDA	Western Dredging Association

1. INTRODUCTION

The Hudson-Raritan Estuary (HRE) is within the boundaries of the Port District of New York and New Jersey, situated within a 25-mile radius of the Statue of Liberty. The HRE study area includes the following eight Planning Regions: 1) Jamaica Bay; 2) Lower Bay; 3) Lower Raritan River; 4) Arthur Kill/Kill Van Kull; 5) Newark Bay, Hackensack River and Passaic River; 6) Lower Hudson River; 7) Harlem River, East River, and Western Long Island Sound; and 8) Upper Bay.

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Upper Bay

- Small-scale Oyster Restoration at Bush Terminal and Governors Island

Lower Bay Planning Region

- Small-scale Oyster Restoration at Naval Weapons Station Earle

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 Hudson-Raritan Estuary (HRE) Ecosystem Restoration Feasibility Report and Environmental Assessment, New York and New Jersey (hereinafter: Hudson-Raritan Estuary 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, environmental, and plan formulation analyses contained in the Hudson-Raritan Estuary review documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the complete schedule followed in executing the IEPR. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE in the final Work Plan according to the schedule listed in Table 1. 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 Hudson-Raritan Estuary 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, environmental, and plan formulation analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Hudson-Raritan Estuary 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 Hudson-Raritan Estuary IEPR. Due dates for milestones and deliverables are based on the award/effective date listed in Table 1. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on August 1, 2017. The actual date for contract end will depend on the date that all activities for this IEPR, including Civil Works Review Board (CWRB) preparation and participation, are conducted and subsequently completed.

Table 1. Major Milestones and Deliverables of the Hudson-Raritan Estuary IEPR

Task	Action	Due Date
1	Award/Effective Date	12/1/2016
	Review documents available	3/2/2017
	Public comments received from USACE	5/5/2017
	Battelle submits draft Work Plan*	12/12/2016
	Battelle submits final Work Plan*	3/3/2017
2	Battelle submits list of selected panel members	2/21/2017
	USACE confirms the panel members have no COI	2/22/2017
3	Battelle convenes kick-off meeting with USACE	3/2/2017
	Battelle convenes kick-off meeting with USACE and panel members	3/14/2017
4	Panel members complete their individual reviews	4/11/2017
	Panel members provide draft Final Panel Comments to Battelle	4/21/2017
	Panel members complete their review of the public comments	5/11/2017
	Panel develops additional Final Panel Comment(s) with regard to the public comments	5/15/2017

Table 1. Major Milestones and Deliverables of the Hudson-Raritan Estuary IEPR (continued)

Task	Action	Due Date
5	Battelle submits Final IEPR Report to USACE	5/26/2017
6 ^a	Battelle convenes Comment Response Teleconference with panel members and USACE	7/10/2017
	Battelle submits pdf printout of DrChecks project file to USACE	8/1/2017
	Agency Decision Milestone (ADM) meeting ^b	July 2017
	CWRB Meeting (estimated date) ^b	May 2018
	Contract End/Delivery Date	

^a Task 6 occurs after the submission of this report.

^b The ADM and CWRB meetings were listed in the Performance Work Statement under Task 3 but were relocated in this schedule to reflect the chronological order of activities.

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, civil/hydraulic engineering, and environmental/National Environmental Policy Act (NEPA). The Panel reviewed the HRE documents and produced 17 Final Panel Comments in response to 34 charge questions provided by USACE for the review. In addition, the charge included one public comment question. 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

Based on the Panel's review, the report is well-written, is concise, and provides adequate supporting documentation on engineering, environmental, economic, and plan formulation issues. The report provides a balanced assessment of the economic, engineering, and environmental issues of the overall

project; however, the Panel identified some elements of the project where additional analyses are warranted and places where clarification of project findings and objectives need to be documented in the FR/EA.

Economics/Civil Works Planning: The Panel notes that the report does a good job integrating the disparate sites and explaining the comprehensive and uniform evaluation criteria. However, one of the Panel's primary concerns is that the long-term operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) commitments of the non-Federal sponsor are not thoroughly analyzed in the FR/EA. If restoration sites need maintenance to maintain marsh elevations to keep up with sea level rise, or if a future major storm event ever affected any of the restoration sites so intensely that the site needed to be completely rebuilt, the non-Federal sponsor would be responsible for 100% of those costs. The FR/EA would benefit from assurances that the non-Federal sponsor has the financial capability to bear long-term OMRR&R costs. Another concern of the Panel's is that the adaptive management costs and the OMRR&R costs are combined, making cost-sharing allocation, ecosystem outputs, and monitoring timeframes difficult to distinguish. The Panel recommends revising the FR/EA to separate the costs of those two post-construction activities and to clearly distinguish between the different monitoring and adaptive management timeframes. The Panel also observed that storm event and surge modeling has not been used to better inform OMRR&R costs and that it was not clear how all-terrain vehicles (ATVs) would be prevented from entering the Hawtree Point site. With regard to the latter finding, the Panel believes that confidence in the ATV prohibition at Hawtree Point would be improved with maps and specific details on how the vehicles would be barred from entry.

Engineering: From an engineering standpoint, the Panel believes that the design development constraints were appropriate and well thought out and appreciated the way USACE developed a standardized method to develop alternative concepts. However, the Panel observed that the FR/EA did not take into account the possible discovery of sediment contamination at a restoration site as a risk to achieving project objectives. If a restoration project were removed from consideration based on contamination issues, the level of ecological improvement resulting from the HRE project would be diminished. The Panel also believed that the uncertainty and limitations associated with using the Evaluation of Planned Wetlands (EPW) model to quantify benefits should be documented in the FR/EA to make the project documentation more complete. The FR/EA also does not explain why eelgrass bed restoration is not being considered even though it is listed as a TEC; the understanding of the project would be improved if the FR/EA explained why no eelgrass bed restoration projects were proposed. Finally, the Panel notes that the alternative selection process could more clearly describe why dam removal was not considered as an alternative at the Bronx River sites.

Environmental: The Panel believes that USACE has done an excellent job working with stakeholders, finding local sponsors, and screening and evaluating all the potential restoration sites. One of the primary concerns of the Panel, however, was that there was no analysis of the impacts from sea level rise (SLR) to the restoration projects, with one passage of the FR/EA implying that some of the habitat restored or created would only be lost under "worst case scenarios" of SLR and that this would happen "at the end of the next century". The Panel believes USACE should not only assess the impacts of SLR on the restoration projects, but also analyze the costs involved to maintain the project elevations as the sea level rises. In addition, the Panel believes that the environmental significance of the HRE program as a whole (and, accordingly, the benefits of the program) could be better explained in the FR/EA. The assumption that restoration of the habitats in the 33 projects will improve the overall condition of the HRE as a system is not supported in the FR/EA; by demonstrating how the projects would contribute to the overall ecosystem health and not simply be isolated shelters and microhabitats, estimates of project benefits

would be improved. With regard to the Jamaica Bay island creation sites, the Panel agrees that the availability and suitability of dredged material, the dredged material delivery methods, and the cost basis for beneficial use are not well-explained in the FR/EA. Including a discussion of the coordination between federal dredging projects and the Jamaica Bay projects to ensure an adequate supply of compatible and uncontaminated dredged material as well as the costs associated with acquiring that material would improve the FR/EA and better inform the project schedule and cost. The Panel also observed that the FR/EA did not include information on whether the Federal Aviation Administration (FAA) had tentatively approved the four sites within the five-mile perimeter of JFK Airport with regard to bird-aircraft strike potential; a description of the FAA coordination process as well as an explanation of why the four sites within the five-mile perimeter are not expected to increase the likelihood of strikes would improve the FR/EA. Based on technical reports that Phragmites stands can have habitat and shoreline stabilization benefit in some locations, the Panel recommends that USACE evaluate keeping Phragmites stands in some locations, rather than replacing them with Spartina, based on the restoration goals of the specific site. Other environmental recommendations include describing the measure implementation techniques in the FR/EA; clearly describing the indicators, criteria, and management actions that will guide the adaptive management process; discussing monitoring activities during project construction; and evaluating the project objective risk and uncertainty associated with potential impacts to cultural resources.

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 FR/EA does not analyze the impacts of future climate change, including the impacts of SLR, on the restoration projects.

Basis for Comment

The FR/EA states that by 2050 (p. 4-47), SLR could be 11 inches to 3 feet above current elevations. However, the FR/EA does not address this issue directly, concluding (p. 4-48):

Indeed, under worst case scenarios certain restoration actions that occur under as part of [sic] the HRE (e.g., tidal wetlands) may be lost at the end of next century if there is a landward advance of the sea and a permanent submergence of current intertidal habitats. Future generations would need to possibly save these habitats through future actions. While the future may look perilous for these habitats, the benefit they will provide over the next few decades would be immeasurable and would attenuate the habitat loss that would occur if the project is not implemented.

The above statement is misleading. The “worst-case” scenario is a 3-foot rise by 2050, while the “best-case” scenario is an 11-inch rise by 2050. Both best- and worst-case levels could mean loss of marshes and wetlands restored under the Tentatively Selected Plan and the associated benefits of these projects. The statement above implies that one need only worry about the loss of tidal wetlands at the end the current century.

Recognizing that the restoration projects will indeed provide immeasurable benefits over the next few decades, the FR/EA nevertheless does not provide a deeper analysis of the impacts of SLR to the estuarine restoration projects. The FR/EA does not provide the elevations of restored islands, marshlands, or wetlands, and the estimated elevations in the future. If SLR is 11 inches to 3 feet by 2050 and more by 2070, the impacts to the 11 projects in Jamaica Bay and to the other wetlands restoration projects (such as Flushing Point, Kearny Point, Oak Island Yards, and Meadowlark Marsh) are not clearly described. More specifically, the FR/EA does not discuss whether the decreasing benefits of the restoration projects due to SLR impacts are taken into account in the calculation of the 50-year annual average functional capacity unit (AAFCU) used in the selection of alternatives in Appendix M. Building the islands or wetlands to the optimum elevation for benefits, only to have them be inundated and causing the elevations to essentially be lower in the water column, means plants would not grow, or intertidal habitat would become submerged.

Other issues not addressed in the FR/EA include 1) whether the non-Federal sponsors will maintain the original design elevations of the wetlands restoration projects so that benefits are maintained as the levels of Jamaica Bay rise due to SLR and 2) whether the cost to maintain the original elevations of the restoration projects are included in project costs for non-Federal sponsors.

Significance – Medium/High

The extent and cost of the impacts of SLR have a direct effect on the benefits and costs used to justify the restoration projects.

Recommendation for Resolution

1. Assess the impact of SLR on the estuarine restoration projects.
2. Assess the extent of costs and the non-Federal sponsors' commitment to maintain the estuarine restoration projects at elevations sufficient to realize design benefits, or revise the alternatives analysis to recognize that the calculated 50-year AAFCU will not be achieved due to SLR.
3. Ensure that the non-Federal sponsors are aware of the costs to maintain estuarine restoration projects.

Final Panel Comment 2

The long-term commitment requirements for the non-Federal sponsor associated with the OMRR&R are not described in the FR/EA.

Basis for Comment

OMRR&R activities are 100% the responsibility of the non-Federal sponsor (ER 1105-2-100, paragraph E-31.a). However, the FR/EA does not discuss OMRR&R costs or the long-term commitments of the non-Federal sponsor. Construction costs for many components of the Hudson-Raritan Estuary mosaic are relatively high (FR/EA table ES-3). For example, in areas like Jamaica Bay where major storms (e.g., 100-year or greater) could destroy the created islands and wetlands, the replacement cost would be similar to the original construction cost (approximately \$140 million) because the islands would likely need to be completely reconstructed, but then would be 100% the responsibility of the non-Federal sponsor. In addition, many areas are subject to “sculpturing” due to tidal and estuarine hydrodynamics and inundation due to SLR, leading to significant OMRR&R costs, including channel work. The FR/EA includes a very general statement (p. 4-61) that the non-Federal sponsor is committed to pay their share of the total project costs, but provides no further information on what those costs might be nor how the non-Federal sponsor will cover those costs.

Significance – Medium/High

Without a clear analysis and discussion of the OMRR&R costs and the non-Federal sponsor's responsibility for them, the accuracy of the project costs is less certain.

Recommendation for Resolution

1. Discuss the potential for project repair, replacement, and rehabilitation and provide cost estimates.
2. Provide assurance that the non-Federal sponsor has the financial capability to bear long-term OMRR&R costs, when those costs could be similar to original construction costs due to major storm damage, yet would be 100% the responsibility of the non-Federal sponsor (ER 1105-2-100, p. D-22).

Literature Cited:

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

Final Panel Comment 3

Combining adaptive management costs with OMRR&R costs make the cost-sharing allocation, ecosystem outputs, and monitoring timeframes difficult to distinguish.

Basis for Comment

Page 3-47 of the FR/EA states, “Operations, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R) costs were included in the Adaptive Management Costs.” This statement prompts three concerns from the Panel. First, p. 4-25 indicates that a restriction of 3% of the project cost is being allocated to adaptive management. However, adaptive management and OMRR&R have different cost-sharing percentages as prescribed in Appendix E of ER 1105-2-100 (USACE, 2000). Without clearly distinguishing adaptive management from OMRR&R, the non-Federal sponsor’s share may be misinterpreted based on an assumption that the total for both is 3% or less.

Second, with respect to ecosystem outputs of the Jamaica Bay island creation, if adaptive management and OMRR&R are considered to be one and the same in the FR/EA, the elevation and area of the Federal project (and the project benefits) are not clear unless the islands were raised and their defined areas fixed over the economic period of analysis. Page 4-60 states that the entire project footprint is part of OMRR&R but does not specify what that includes in Jamaica Bay.

Finally, if the adaptive management and OMRR&R costs are being combined, ER 1105-2-100 (USACE, 2000; p. E-49) states “If cost shared postimplementation monitoring is being considered, it must be clearly defined, justified and the period of cost shared monitoring shall not exceed five years following completion of construction.” However, the FR/EA does not discuss monitoring in this detail. The First Level Costs described in the FR/EA (p. 4-25) allow for monitoring up to 10 years, and the discussion on p. 4-45 is less quantitative, stating, “To mitigate these risks, planting over several years, overplanting and/or adaptive management and monitoring may be incorporated into the overall plan.”

Significance – Medium

By distinguishing adaptive management from OMRR&R, the non-Federal sponsor’s share of costs and ecosystem outputs from island creation in Jamaica Bay will be clearly defined.

Recommendation for Resolution

1. Revise the report to clearly indicate that adaptive management and OMRR&R are separate items with different cost-sharing requirements.
2. Specify whether adaptive management of Jamaica Bay islands would modify the Federal project in terms of elevation and size and what role OMRR&R would play if there were changes.
3. Determine the differences in monitoring and adaptive management timeframes with the ecosystem management restrictions specified in ER 1105-2-100.

Literature Cited:

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

Final Panel Comment 4

The FR/EA does not present the environmental significance of the habitat restoration projects in terms of overall benefits to the HRE.

Basis for Comment

The HRE is a large area with a great diversity of estuarine and fresh water habitats and with varied ecological connections. The fundamental assumption in the FR/EA is that restoration of the habitats in the 33 projects will improve the overall condition of the HRE. However, the FR/EA does not demonstrate the connectivity of the projects and the significance to the health of the HRE. Page xix of the FR/EA provides the following statement, but no scientific justifications to support it:

The expected environmental effects of implementing the TSP would be overwhelmingly beneficial to the flora, fauna, and people in the study area. Implementation of the TSP would restore ecosystem function while recognizing the urban nature of the existing environment. It would provide the ability for anadromous and catadromous species to access the full length of the Bronx River for first time in centuries. Eleven marsh islands in Jamaica Bay would be restored. Creation of eastern oyster (*Crassostrea virginica*) reefs in the estuary would reintroduce the once-omnipresent keystone species.

It is unclear whether 33 small and isolated areas comprising about 400 acres total within a large overall study area (in which 296 potential sites were considered) contribute to the overall health of an ecological system or simply provide isolated shelters/improved microhabitats.

Page 3-24 of ER 1105-2-100 (USACE, 2000) provides the applicable criteria for ecosystem restoration projects: “Ecosystem restoration projects should be formulated in a systems context to improve the potential for long-term survival of aquatic, wetland, and terrestrial complexes as self-regulating, functioning systems.” In addition, ER 1105-2-100 Appendix E states “the concept of significance of outputs plays an important role in ecosystem restoration evaluation. Along with information from cost effectiveness and incremental cost analyses, as well as information about acceptability, completeness, and effectiveness, information on the significance of ecosystem outputs will help determine whether the proposed environmental investment is worth its cost...”

Page 4-32 of the FR/EA (“Systems/Watershed Context”) states that the selected projects were “high priorities for the region” and were “coordinated and integrated with ongoing efforts”; however, aside from the mention of “activities at each site recommended within Jamaica Bay work in concert with each other”, there is no mention or assessment of ecosystem benefits beyond site-specific provision of habitat. The goal to provide “a mosaic of habitats” (p. 1-16 of the FR/EA) implies interaction between the habitats to provide cumulative or synergistic benefits that exceed the localized benefits realized at the sites as isolated locations. It can be argued that the five oyster projects contribute to the overall health of HRE, and that Jamaica Bay is a system as well as the Bronx River is a system; however, the FR/EA does not address how those individual systems and the other planning areas contribute to the HRE system. Language on p. E-1-5 states: “The six (6) Jamaica Bay perimeter restoration sites....represent a set of actions that would work collectively to restore the Jamaica Bay ecosystem.” However, the FR/EA treats each project site as an individual isolated habitat patch within the urbanized matrix. These cumulative benefits are not described, nor are they captured within the benefits calculations.

Landscape ecological analysis considers that habitat areas that are close enough together to interact (“exchange”) are often able to support higher diversities of species due to factors such as the provision of varied habitat types, refugia, and opportunities for dispersal. Likewise, larger sites can provide benefits that are disproportional to their added area due to two influences: an increased proportion of “interior” area within the site which can lead to reduced stresses from adjacent areas, and an increase in the size of minimum habitat patch sizes (Forman and Gordon, 1986). These types of considerations are assessed and described for a somewhat different application by Schweiger et al. (2002). For the HRE, the model used to determine project benefits (Evaluation of Planned Wetland) seems to assume a linear relationship between site area and habitat function and does not seem to take into account proximity or potential interaction between sites. For this reason, a significant portion of the cumulative benefit to biodiversity (p. 6-8 of the FR/EA) is not directly considered in the quantification of benefits.

One consequence of this potential underestimation of benefits is that restoration measures may be dropped from consideration on project sites and that, given the limited number of sites available for restoration activities, the opportunity for systemic improvement will decrease. An underrepresentation of the expected benefits could result in missed opportunities for restoration as projects are dismissed or are undertaken at reduced levels due to lack of justification to funding authorities.

On p. 5-18, benefits to the study area are generally described:

At the scale of the HRE study area, improvements to the environment, notably cleaner water and greater abundance and diversity of desirable terrestrial wildlife, fish, and vegetation, potentially would stimulate the local economy by increasing activities such as fishing, hiking, boating, and bird watching, and tourism in general. Improved quality of life would strengthen the desirability of living in the region and maintain, if not increase, property values. Increased shoreline stabilization may reduce municipal expenditures, including those for emergency services. Ongoing restoration and monitoring activities would give local community groups and educational institutions opportunities to participate, providing valuable educational experiences. □

The Panel believes that some quantification of the ecological and, especially, economic benefits listed in these examples would be challenging but could be indispensable to the success of the HRE habitat restoration program.

Significance – Medium

Without a clear assessment and discussion of the environmental significance of the HRE restoration program as a whole (and specifically how it would improve the overall HRE ecosystem), the benefits of the program may be underestimated, individual project implementation may be delayed, and/or the resources committed to implement restoration on individual project sites may be reduced.

Recommendation for Resolution

1. Develop the basis that the HRE is a system and that the projects contribute to that system. For example,
 - a. Consider quantifying and/or describing expected synergistic benefits from developing projects that are in close proximity.

- b. Consider quantifying and/or describing expected additional benefits from developing projects with larger habitat patch size.
 - c. In Section 4.6 of the FR/EA, add a description of the functional improvement within the system above and beyond the provision of site-specific habitat which would be expected from constructing the set of proposed projects.
 2. Prepare and present the scientific and technical basis for the benefits claimed in the FR/EA that the projects will be “overwhelmingly beneficial” and that the restoration program is “worth its cost”. To address this, the
 - a) Significance of ecosystem outputs should be presented.
 - b) Economic benefits that the report says are being stimulated should be presented, including impacts to local economies of fishing, hiking, boating, bird watching, and tourism.

Literature Cited:

Forman, R.T.T., and M. Gordon (1986). *Landscape Ecology*. John Wiley & Sons, Inc., New York NY.

Schweiger, E.W., S. Leibowitz, J. Hyman, W.E. Foster, and M.C. Downing (2002). Synoptic assessment of wetland function: a planning tool for protection of wetland species diversity. *Biodivers Conserv* 11: 379-406.

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

Final Panel Comment 5

Assumptions regarding dredged material availability, delivery methods to the restoration projects, and the basis for additional costs associated with its beneficial use are not supported in enough detail.

Basis for Comment

The FR/EA provides no supporting discussion for the assumption that an adequate supply of clean and compatible dredged material from Federal dredging projects will be available. The Panel understands that coordination is ongoing with Division and District Operations. However, this issue and the coordination activity should be discussed in the FR/EA. Specific issues that should be addressed include 1) coordinating the timing of maintenance dredging of the Federal projects with each project site's readiness for delivery of dredged material, and 2) verifying the expected quality of material in terms of grain size, contaminants, and compatibility with the needed sediments for wetlands and island restoration. Because past dredging of the NY/NJ Harbor channels has encountered contaminated sediments, the FR/EA should recognize this fact and include assurances that Jamaica Bay will not receive contaminated dredged material. In addition, the projects that use dredged material from Federal dredging should be identified as part of the USACE Regional Sediment Management Program.

In addition to the availability of sediment for wetland and island restoration, the FR/EA should discuss the dredged material delivery method to the wetlands and island restoration projects. A statement on p. E-2-7 notes that: "Limiting depths in the channels of Jamaica Bay render some sites inaccessible to the hopper dredges used to bring material to the site, which greatly impacts the cost of a restoration." This appears to be the only statement on delivery techniques of sediments to the Jamaica Bay projects. Past island building in Jamaica Bay used thin layer placement; if that method is planned again, it should be presented in the FR/EA (NY Times, 2007).

The TSP Summary Sheet for the Jamaica Bay Marsh Islands (Appendix K) states that the total project cost for the creation of the five islands is about \$140 million. A notation of "beneficial use" was included in the table, which implies the beneficial use of dredged material. The placement of dredged material to create the islands is the major cost component. As was explained to the Panel in the PDT's response to mid-review clarifying questions (provided by Battelle to the Panel), if island creation uses material from a nearby navigation project (i.e., beneficial use), there would be a cost difference between providing the material for island creation and offshore disposal. The non-Federal sponsor would be responsible for a portion of that cost difference. However, the FR/EA does not provide the basis for the cost estimate, nor does it describe how the cost could vary. This information would be meaningful to the non-Federal sponsor and its cost responsibility. Finally, on a tangential note, it is not clear in the FR/EA that the dredging costs were estimated using the CEDEP cost model, as required in Engineer Regulation (ER) 1110-2-1302 (USACE, 2016).

Significance – Medium

The project schedule may be affected as a result of additional coordination of an adequate supply of clean and compatible dredged material, and the project costs may be affected based on the cost estimate associated with beneficial use.

Recommendation for Resolution

1. In the FR/EA, include a discussion of the ongoing coordination with USACE to ensure that (1) an adequate supply of clean and compatible dredged material from Federal dredging projects will be available 2) the dredging operations and delivery of dredged material will occur consistent with the project construction schedule.
2. Clarify in Appendix E-2 the dredged material delivery method for the Jamaica Bay sites.
3. Provide the basis for the cost of material to be used for constructing the islands.
4. Indicate whether CEDEP was used to estimate dredging costs and, if so, provide the results.

Literature Cited:

NY Times (2007). An Update on the Disappearing Salt Marshes of Jamaica Bay, New York, August 2, 2007. http://www.nytimes.com/packages/pdf/nyregion/city_room/20070802_FinalJamaicaBayReport.pdf

USACE (2016). Civil Works Cost Engineering. Engineer Regulation (ER) No. 1110-2-1302, Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. June 30.

Final Panel Comment 6

The potential for site contamination being discovered has not been considered as a risk to project objectives, even though contamination could lead to eliminating a site from restoration consideration.

Basis for Comment

Most urban brownfields hold a reasonable potential for the discovery of contamination during the site investigation process. The non-Federal sponsor is responsible “to undertake all necessary response and remediation for Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) contaminants required for the project, including providing lands free of soil contamination prior to construction of the project features on those lands and handling groundwater contamination during construction activities” (p. 4-61). For this reason, site contamination is not necessarily a Federal financial risk.

However, if contamination is discovered at a level above that which the non-federal sponsor is able or willing to address, as a practical matter the project will not proceed. For example, the projects at Kearny Point and Oat Island Yards are deferred sites until after the EPA Superfund cleanup is completed of the Lower Passaic River. There is no discussion of the potential for contaminated sediment issues at these sites, including what the contaminants of concern are and what the potential is for residual contamination in the river and how it might affect project design and implementation. The text assumes all contamination will be addressed prior to implementation of the projects, but does not address the level of risk that residual toxics pose to the design and implementation of the projects.

In a region where opportunities for ecosystem restoration are limited, the loss of specific sites due to sediment contamination issues would reduce the amount of restoration undertaken and thereby reduce the level of ecological improvement resulting from the project.

Significance – Medium

The likelihood of undiscovered sediment contamination on one or more of the project sites poses a risk to the viability of those sites and a reduction in the number of viable sites would reduce the attainment of project objectives.

Recommendation for Resolution

1. Within Section 4.14 of the FR/EA, discuss the risk that projects could be removed from consideration due to the discovery of site contamination, and that the loss of sites will reduce the level of project objective attainment.

Final Panel Comment 7

The FR/EA does not consider the specific habitat and shoreline protection benefits of the grass species *Phragmites* as compared to *Spartina*.

Basis for Comment

The FR/EA identifies *Phragmites* as an invasive species that should be removed because of its tendency to reduce marsh plant biodiversity; each of the proposed HRE restoration projects targets removal of *Phragmites*, if present. While enhancing the biodiversity of marsh plants is an ecosystem service known to be provided by *Spartina* grasses, *Phragmites* provides other ecosystem services that may be equivalent or superior to those provided by *Spartina*, depending on the goals and characteristics of the specific restoration project. For example, *Phragmites* is documented (Rooth and Stevenson, 2000) to raise marsh levels faster than *Spartina* and may help a project area respond to SLR. However, the ecosystem services provided by *Phragmites* are not acknowledged in the FR/EA. A project-by-project evaluation of the benefits of *Phragmites* versus *Spartina* would help clarify the protection benefits of the two grasses. Furthermore, the FR/EA does not recognize that the removal of *Phragmites* may not, in fact, help in achieving long-term ecological benefits. Martin and Blossey (2013) surveyed 425 U.S. counties in 40 states from 2005 to 2009 and found that few projects achieved their management objectives under *Phragmites* removal programs. The surveys considered the number and abundance of fauna, restoration of pre-invasion fauna, restoration of native plants, and short- and long-term control of *Phragmites*. Herbicides were the most frequent approach to removal, and continued use of herbicides was needed for control over time.

Significance – Medium

Without the FR/EA considering the costs and benefits of *Phragmites* removal, the targeted projects may not achieve optimum restoration conditions with regard to habitats and functions.

Recommendation for Resolution

1. For each project where *Phragmites* removal is proposed, assess the ecosystem services provided by *Phragmites* versus those provided by *Spartina*, the potential need for long-term maintenance to ensure that *Phragmites* does not return, and other potential impacts of removal, such as the impacts of herbicides.
2. Assess the ecosystem services provided by *Phragmites* in view of the habitat restoration projects in the HRE. As part of that assessment, the public comment letter submitted by Judith S. Weis of Rutgers University provides an excellent list of references.

Literature Cited:

Martin, L., and B. Blossey (2013). The Runaway Weed: Costs and Failures of *Phragmites australis* Management in the USA. *Estuar Coast* 36:626-632.

Rooth, J., and C. Stevenson (2000). Sediment deposition patterns in *Phragmites australis* communities: Implications for coastal areas threatened by rising sea-level. *Wetl Ecol Manag* 8: 173–183.

Final Panel Comment 8

Potential impacts to cultural resources at all HRE project sites could lead to rejection of specific restoration projects or increased costs to address public comment concerns.

Basis for Comment

Impacts to cultural resources at the HRE sites are briefly addressed in the FR/EA, which states essentially that not enough information is available to determine the extent of impacts and that restoration-related construction activities are assumed to have the potential to adversely affect cultural resources. USACE drafted two programmatic agreements (PAs) covering the restoration sites within New York and New Jersey that stipulate the actions USACE will take with regard to cultural resources as the project proceeds. The draft PAs were provided to several stakeholder organizations, and a list of potentially interested parties is currently being developed.

This approach presents undue uncertainty for two reasons: potential impacts are not known, and a limited list of stakeholders has been provided the PAs, but no indication is given in the FR/EA of their response. Based upon the assumption noted above that restoration-related construction activities have the potential to adversely affect cultural resources, it is possible that impacts to cultural resources could result in either project rejection or increased costs to mitigate the impacts. While impacts to cultural resources are unlikely to be a significant issue, based on the current language in the FR/EA, there is a risk that cultural resource impacts could indeed be significant.

The issue of uncertainty regarding impacts to cultural resources should be addressed in the FR/EA, not at the design stage. If a number of projects were to be rejected, the primary goal of developing a “mosaic of habitats” may not be met.

Finally, these issues should be addressed before a Finding of No Significant Impact (FONSI) is issued.

Significance – Medium

If the issues surrounding the uncertainty of impacts to cultural resources are not addressed in the FR/EA, some site projects could be rejected and the primary goal of achieving a “mosaic of habitats” could be at risk.

Recommendation for Resolution

1. Clarify in the FR/EA whether cultural resource impacts could lead to rejection of restoration projects and estimate the costs of impact mitigation.
2. Include information on the responses, if any, from the stakeholders listed the PAs.

Final Panel Comment 9

Potential bird-aircraft strikes in the vicinity of JFK Airport could lead to specific projects not being approved or incurring increased costs to mitigate impacts.

Basis for Comment

The FR/EA addresses bird-aircraft strikes, specifically stating on p. E-2-7 that candidate restoration sites east of Cross Bay Boulevard were eliminated because of bird-aircraft strike concerns for aircraft using JFK Airport. However, four projects in Jamaica Bay remain within a five-mile perimeter of JFK Airport: Hawtree Point, Brant Point, Bayswater State Park, and Dubos Point. The FR/EA states that:

The proposed plans for these sites include habitats that were designed as feeding habitats only so as to not to [sic] introduce additional hazardous wildlife into the area. Coordination with the [Federal Aviation Administration] will occur during the comment period for concurrence in the design. □

As written, this is a major source of uncertainty that should be addressed before the design stage. The FR/EA should describe the habitat characteristics at these four sites that lead to the conclusion that “additional hazardous wildlife” (i.e., birds) will not be attracted there. No memo or letter is included in the FR/EA indicating that the Federal Aviation Administration (FAA) has given some measure of approval for these projects within the five-mile perimeter. The FR/EA should describe the habitat characteristics of these sites as well as explain the FAA coordination process and the status of that process.

Mitigation could include changes in airport operations, changes in flight patterns and operations, or wildlife control, which could include deterrence, active dispersal, or even lethal methods, all of which would incur some range of continuing costs.

This issue should be addressed before the draft Finding of No Significant Impact (FONSI) is published.

Significance – Medium

Because bird-aircraft strikes are a factor when decisions are made regarding whether projects will be approved or rejected or whether costs will increase to mitigate impacts, the rejection of a number of projects could put the primary goal of achieving a “mosaic of habitats” at risk.

Recommendation for Resolution

1. Describe how the habitat characteristics of the four Jamaica Bay projects within the five-mile perimeter of JFK Airport are designed to be just “feeding habitats,” and how those habitats will presumably not increase the potential for bird-aircraft strikes.
2. Describe and update the status of the coordination with the FAA with regard to those four projects.

Final Panel Comment 10

The adaptive management activities described in the FR/EA do not fully consider the indicators, criteria, and performance standards for each element of the restoration projects that will guide the adaptive management process.

Basis for Comment

The FR/EA states that 3% of the construction budget has been earmarked for adaptive management. Adaptive management is a careful analysis of “what if, then what” on multiple levels. It is a formal process conducted prior to initiation of a project. Page 4-60 of the FR/EA accurately states that “Adaptive Management requires monitoring the condition of the system using selected indicators, assessing progress using previously established goals and performance criteria, and making decisions when corrective actions are needed.” However the indicators, performance criteria, and management actions as presented in the FR/EA are not sufficiently robust to meet the guidance in the USACE Technical Note on The Application of Adaptive Management to Ecosystem Restoration Projects (Fischenich et al., 2012).

For the wetlands restoration projects, the only adaptive management indicators, goals, or performance criteria discussed are the 75% vegetative cover for wetlands and project failure. If the 75% criterion is not met, the management action is to plant additional native vegetation. If the project is declared a failure, the management action is to call in ecologists and redesign the project. While this information is a step in the right direction, it does not meet the guidance of Fischenich et al. (2012) for multiple levels of indicators, criteria, or performance criteria along with their associated management actions.

In addition, the Adaptive Management Plan does not explicitly address long-term issues associated with SLR. While the 75% vegetative cover criterion may be met in the first few years, the plan does not address impacts to wetlands from increased water levels and decreased elevations of wetlands and islands over decades. The FR/EA does not provide information on what indicators, goals, or performance criteria (other than vegetative growth) might apply to wetlands and island restoration, such as the elevation of marsh sediments.

The FR/EA also does not include information on which indicators, goals, or performance criteria apply to projects on the Bronx River (e.g., stream stabilization and invasive species removal); erosion control, or shoreline armoring; and oysters. Performance monitoring data in Appendix O could be leveraged to help clarify these issues. Finally, the FR/EA does not clearly explain why adaptive management for fish passage is to be included in a later document.

Significance – Medium/Low

A clear description of the indicators, criteria, and management actions that will guide the adaptive management process would ensure that the applicable guidance is followed and that the 3% budgeted for adaptive management is appropriate.

Recommendation for Resolution

1. Using USACE guidance titled The Application of Adaptive Management to Ecosystem Restoration Projects, develop indicators, criteria, and performance standards for each element of the restoration projects along with the associated management criteria.
2. Using the same guidance, develop a plan for the use of the 3% budgeted for adaptive management.
3. Consider using the performance monitoring data described in Appendix O to inform the setting of additional indicators, goals, or performance standards and associated management actions.

Literature Cited:

Fischenich, C, C. Vogt, et al. (2012). The Application of Adaptive Management to Ecosystem Restoration Projects, Technical Note ERDC TN-EMRRP-EBA-10. April.

Final Panel Comment 11

There is significant uncertainty associated with quantifying benefits using the EPW model.

Basis for Comment

The EPW model was used to quantify benefits attributable to restoring ecological function. However, in several cases (e.g., Appendix E-4 Table 7.1 [p. E-4-21] and Appendix E-5 Table 6 [p. E-5-28]), the EPW model results generated functional capacity indices at reference sites that were lower than those at the sites where restoration is being proposed, suggesting a lack of need for restoration. These results were not interpreted to suggest lack of degradation, but were explained as a limitation of the methodology. This limitation, however, was not acknowledged within the plan formulation discussion and may have an effect on project benefit calculations.

Significance – Low

The uncertainty in the project benefit calculations arising from the limitations of the EPW model should be described to make the project documentation more complete.

Recommendation for Resolution

1. Include a statement in Section 4.14 of the FR/EA about the uncertainty in benefits associated with the EPW model limitations.

Final Panel Comment 12

It is not clear whether the FR/EA has deployed recent advancements in modeling to analyze surge elevation and frequencies and the potential impacts of future storm events to inform OMRR&R costs.

Basis for Comment

Following Hurricanes Katrina and Sandy, there was considerable modeling advancement and application for assigning surge elevation frequencies and probabilities. While the FR/EA mentions general damages in the project area from Hurricane Sandy, there is no mention of the post-Sandy modeling in the project and surrounding areas performed by USACE's Engineer Research and Development Center (ERDC) and others (USACE, undated; Yin et al., 2016) that provide this information. It is not clear from the FR/EA whether the island design and its OMRR&R costs were informed by any post-Sandy modeling.

Significance – Low

Considering additional modeling associated with major storm frequencies and damages could inform the project designs and OMRR&R cost estimates as well as any habitat recovery times, all of which would have an effect on project costs and benefits.

Recommendation for Resolution

1. Indicate whether modeling was used to determine surge events by elevation and frequency and describe the potential impacts of modeling outputs on OMRR&R and costs and benefits.

Literature Cited:

USACE (undated). ERDC Support for Hurricane Sandy. Slide presentation:

http://www.iwr.usace.army.mil/Portals/70/docs/projects/2013Jan23/erdc_hurricane_sandy_2012_massey_v4_nomovies.pdf

Yin, J. N. Yin, and D. Yu (2016). Coupled modeling of storm surge and coastal inundation: A case study in New York City during Hurricane Sandy. *Water Resources Research*, 52 (11): 8685–8699. November. <http://onlinelibrary.wiley.com/doi/10.1002/2016WR019102/full>

Final Panel Comment 13

The FR/EA does not describe why eelgrass bed restoration is not being considered, even though it is a TEC.

Basis for Comment

Table 3-1 (p. 3-3) lists eelgrass beds as a TEC with the target statement “Establish eelgrass beds at several location in the HRE study area”. However, no planning objectives were assigned to eelgrass beds in Table 3-2, and no projects were brought forward which incorporate eelgrass bed restoration. The FR/EA does not include an explanation for why eelgrass bed projects were omitted, if/when they may be considered in the future, and what characteristics need to be met for such projects to earn future consideration.

Significance – Low

A clarification of the status of eelgrass restoration projects and the reasoning behind omitting them will improve the understanding of the report recommendations.

Recommendation for Resolution

1. Add a description to the FR/EA about why eelgrass restoration is not being proposed at this time and what would be considered the prerequisites for such projects to be recommended and undertaken.

Final Panel Comment 14

While the implementation techniques of the various measures are described in Appendix E, the specific techniques that will be used to achieve each management measure and the TECs are not described in the main FR/EA report.

Basis for Comment

The main document of the FR/EA describes the TECs and management measures in Table 3-4 (p. 3-34). However, the FR/EA does not describe how the management measures are accomplished (i.e., the restoration techniques). Table 9-1 (p. E-4-27) and Table 10 (p. E-5-33) describe the techniques to be used in the field to achieve each restoration measure and how the projects will be accomplished. The Panel believes the FR/EA would be improved if these techniques, as well as the techniques to be used in Jamaica Bay projects, were also described in the main FR/EA report. Appendix E (p. E-4-28) also provides a good detailed description of shore softening, shoreline stabilization, channel realignment, and bed restoration, which, if summarized and brought forward into the main FR/EA report, would help clarify the significant efforts to be undertaken at each restoration project, in view of the relatively high costs to be expended (i.e., a total of \$640 million for all 33 projects [p. v, FR/EA]).

Significance – Low

A greater understanding of the extent of the efforts and the specific field techniques that will be used for the restoration projects would provide clear justification for the significant costs for each project.

Recommendation for Resolution

1. Add a description to the main FR/EA report of the specific techniques that will be used to achieve each management measure and the TEC.
2. Add a description to the main FR/EA report of the shore softening, shoreline stabilization, channel realignment, and bed restoration activities.

Final Panel Comment 15

Specific details regarding how ATVs would be prevented from entering the Hawtree Point restoration site are not provided.

Basis for Comment

The proposed ecosystem restoration at the 1.7-acre Hawtree Point site could be unsustainable due to the difficulty of preventing ATV usage at the site. The FR/EA acknowledges (p. 4-9) a significant concern that the area “is continually disturbed by the use of all-terrain vehicles along the shoreline” but states that the TSP restoration of high marsh, coastal scrub/shrub habitat, and grassland habitat would be protected by boulders placed along the land-side boundary of the site as an ATV barrier. However, the FR/EA does not explain how ATV access to the shoreline would be controlled nor how the site would be protected along the rest of its perimeter.

The FR/EA, while acknowledging the potential for a problem and the necessity of some form of barrier, does not address any form of enforcement nor provides budget for such.

Significance – Low

Without clear documentation and maps showing how ATV access and usage would be precluded from entering the restoration site, the FR/EA is incomplete.

Recommendation for Resolution

1. Document how ATV usage would be prohibited within the project site after project implementation.
2. Provide a map of the area showing the ATV access and pathway and the area of restoration and proposed barrier(s).

Final Panel Comment 16

The FR/EA does not discuss construction monitoring or any efforts necessary to minimize local environmental impacts during construction.

Basis for Comment

The FR/EA and Appendix O describe performance monitoring; however, there is no description in the FR/EA or appendices on monitoring during project construction to ensure that construction activities follow established plans and minimize local impacts such as turbidity (localized impacts are described in Section 5 of the FR/EA). Construction monitoring may be individualized to meet the needs of each separate project; however, at least a general discussion of construction monitoring plans should be presented in the FR/EA.

Significance – Low

Monitoring during construction is essential to ensure that the project meets design specifications and to control local environmental impacts.

Recommendation for Resolution

1. Prepare a section on construction monitoring to ensure that the project is built as designed and that water quality and other localized environmental impacts are minimized.

Final Panel Comment 17

The FR/EA does not explain why fish ladder construction and not dam removal was selected as the preferred measure to provide fish passage at the Bronx River project sites.

Basis for Comment

Appendix E-4 lists dam removal to restore fish passage as a potential restoration measure at the Bronx River sites (p. E-4-4), yet this measure was not listed in any of the alternatives analyzed in Chapter 9 of that appendix. While there are numerous reasons why dam removal may not be selected, dam removal is generally considered a more effective means of providing fish passage and may be more cost-effective when undertaken on sites with severe constraints or high real estate costs.

Significance – Low

Dam removal was included in the initial array of possible measures and an explanation of why it was eliminated from consideration from all sites will improve the understanding of alternative selection.

Recommendation for Resolution

1. Describe in Appendix E-4 why dam removal was not considered as a measure to provide fish passage at the Bronx River project sites.

5. REFERENCES

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APPENDIX A

IEPR Process for the Hudson-Raritan Estuary 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 Hudson-Raritan Estuary (HRE) Ecosystem Restoration Feasibility Report and Environmental Assessment, New York and New Jersey Independent External Peer Review (hereinafter: Hudson-Raritan Estuary IEPR). Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on March 2, 2017. Note that the actions listed under Task 6 occur after the submission of this report and are described in more detail at the end of this Appendix.

Table A-1. Hudson-Raritan Estuary Complete IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	12/1/2016
	Review documents available	3/2/2017
	Public comments received from USACE	5/5/2017
	Battelle submits draft Work Plan ^a	12/12/2016
	USACE provides comments on draft Work Plan	12/21/2016
	Battelle submits final Work Plan ^a	3/3/2017
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	12/16/2016
	USACE provides comments on COI questionnaire	12/20/2016
	Battelle submits list of selected panel members ^a	2/21/2017
	USACE confirms the panel members have no COI	2/22/2017
	Battelle completes subcontracts for panel members	2/28/2017
3	Battelle convenes kick-off meeting with USACE	3/2/2017
	Battelle sends review documents to panel members	3/14/2017
	Battelle convenes kick-off meeting with panel members	3/14/2017
	Battelle convenes kick-off meeting with USACE and panel members	3/14/2017
	Battelle convenes Mid-Review Teleconference for panel members to ask clarifying questions of USACE	4/3/2017
4	Panel members complete their individual reviews	4/11/2017
	Battelle provides talking points for Panel Review Teleconference to panel members	4/12/2017
	Battelle convenes Panel Review Teleconference	4/13/2017
	Battelle provides Final Panel Comment templates and instructions to panel members	4/14/2017
	Panel members provide draft Final Panel Comments to Battelle	4/21/2017
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	4/22/2017 - 5/01/2017
	Panel finalizes Final Panel Comments	5/17/2017

Table A-1. Hudson-Raritan Estuary Complete IEPR Schedule (continued)

Task	Action	Due Date
4	Battelle receives public comments from USACE	5/5/2017
	Battelle sends public comments to Panel	5/8/2017
	Panel members complete their review of the public comments	5/11/2017
	Battelle and Panel review Panel's responses to public comments	5/12/2017
	Panel drafts Final Panel Comment on public comments	5/15/2017
	Panel finalizes Final Panel Comment regarding public comments	5/24/2017
5	Battelle provides Final IEPR Report to panel members for review	5/19/2017
	Panel members provide comments on Final IEPR Report	5/23/2017
	Battelle submits Final IEPR Report to USACE ^a	5/26/2017
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	6/5/2017
6 ^b	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	6/7/2017
	Battelle convenes teleconference with USACE to review the Comment Response process	6/7/2017
	Battelle convenes teleconference with Panel to review the Comment Response process	6/7/2017
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses to Battelle	6/28/2017
	Battelle provides draft PDT Evaluator Responses to panel members	6/30/2017
	Panel members provide draft BackCheck Responses to Battelle	7/6/2017
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	7/7/2017
	Battelle convenes Comment Response Teleconference with panel members and USACE	7/10/2017
	USACE inputs final PDT Evaluator Responses to DrChecks	7/17/2017
	Battelle provides final PDT Evaluator Responses to panel members	7/19/2017
	Panel members provide final BackCheck Responses to Battelle	7/24/2017
	Battelle inputs the Panel's final BackCheck Responses in DrChecks	7/31/2017
	Battelle submits pdf printout of DrChecks project file ^a	8/1/2017
	Agency Decision Milestone (ADM) meeting (estimated date) ^c	July 2017
CWRB meeting (estimated date) ^c	May 2018	
Contract End/Delivery Date	May 30, 2018	

^a Deliverable.

^b Task 6 occurs after the submission of this report

^c The ADM and CWRB meetings were listed in the Performance Work Statement under Task 3 but were relocated in this schedule to reflect the chronological order of activities.

At the beginning of the Period of Performance for the Hudson-Raritan Estuary IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 34 charge questions provided by USACE, including one public comment question (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

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

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

Title	No. of Pages
Integrated Draft Feasibility Report/Environmental Assessment	382
Appendix A: Local Sponsor Support Letters	17
Appendix B: Ongoing Efforts*	48
Appendix C: Fish Passage Opportunities	18
Appendix D: Engineering	148
Appendix E: Alternatives Development	28
Appendix E1: Jamaica Bay	99
Appendix E2: Jamaica Bay Marsh Islands	47
Appendix E3: Flushing Creek	77
Appendix E4: Bronx River	76
Appendix E5: Newark Bay Hackensack and Lower Passaic	71
Appendix E6: Small Scale Oyster Restoration	60
Appendix F: Essential Fish Habitat	47
Appendix G: Regulatory Agency Correspondence*	200
Appendix H: Hazardous, Toxic, and Radioactive Waste	117
Appendix I: Cultural Resources Coordination Documentation*	229
Appendix J: CZM	304
Appendix K: TSP Summary Sheets	60
Appendix L: Cost Engineering	112

Title	No. of Pages
Appendix M: Cost Effectiveness & Incremental Cost Analysis	32
Appendix N: Future Feasibility Spinoff Sites	25
Appendix O: Adaptive Management & Monitoring Plan	22
Appendix P: Real Estate Plan	TBD
Appendix Q: Section 404(b)(1)	13
Appendix R: Draft FONSI	4
Public Comments**	63
Total Page Count	2,236

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

** USACE will submit public comments to the Battelle project manager, who will in turn submit the comments to the IEPR Panel.

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

- 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, a teleconference was held with USACE, Battelle, and the Panel so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 42 panel member questions to USACE. USACE was able to provide responses to many of the questions during the teleconference, and provided written responses to all the questions prior to the end of the review.

A.2 Review of Individual Comments

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

A.3 IEPR Panel Teleconference

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

Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle distributed a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Hudson-Raritan Estuary IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with the other panel 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 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. At the end of this process, 16 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received a PDF file containing 63 pages of public comments on the HRE (including letters and public information meeting attendance sheets) from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

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

The Panel produced individual comments in response to the charge question. Each panel member's individual comments for the public comment review were shared with the full Panel. Battelle reviewed the comments to identify any new technical concerns that had not been previously identified during the initial IEPR. The panel members confirmed that one new Final Panel Comment (for a total of 17 Final Panel Comments) would be developed to summarize the additional issues 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 Section A.4.

Battelle reviewed and edited the Final Panel Comment for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that the comment did not make any observations regarding either the appropriateness of the selected alternative

or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comment.

A.6 Final IEPR Report

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

A.7 Comment Response Process

As part of Task 6, Battelle will enter the 17 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.

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APPENDIX B

Identification and Selection of IEPR Panel Members for the Hudson-Raritan Estuary IEPR

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B.1 Panel Identification

The candidates for the Hudson-Raritan Estuary (HRE) Ecosystem Restoration Feasibility Report and Environmental Assessment, New York and New Jersey (hereinafter: Hudson-Raritan Estuary IEPR) Panel were evaluated based on their technical expertise in the following key areas: economics, Civil Works planning, civil/hydraulic engineering, and environmental/National Environmental Policy Act (NEPA). These areas correspond to the technical content of the review documents and overall scope of the HRE 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.

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

“...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects.”

Panel Conflict of Interest (COI) Screening Statements for the Hudson-Raritan Estuary IEPR	
1. Previous and/or current involvement by you or your firm ¹ in the Hudson-Raritan Estuary (HRE) Integrated Draft Feasibility Report and Environmental Assessment	
2. Previous and/or current involvement by you or your firm ¹ in ecosystem restoration projects in the general HRE area, including but not limited to projects located in the following regions: western Long Island Sound, Jamaica Bay, Harlem River, East River, Newark Bay, Passaic River, Hackensack River, Arthur Kill/Kill Van Kull, Upper Raritan Bay, Lower Raritan Bay, and/or the Lower Raritan River.	

¹ Includes any joint ventures in which your firm is involved and if your firm serves as a prime or as a subcontractor to a prime. Please clarify which relationship exists in the rows above.

Panel Conflict of Interest (COI) Screening Statements for the Hudson-Raritan Estuary IEPR	
3. Previous and/or current involvement by you or your firm ¹ in U.S. Army Corps of Engineers (USACE) ecosystem restoration projects in the HRE study area.	
4. Current employment by the U.S. Army Corps of Engineers (USACE).	
5. Previous and/or current involvement with paid or unpaid expert testimony related to the HRE Integrated Draft Feasibility Report and Environmental Assessment.	
6. Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors: Port Authority of New York and New Jersey, National Oceanic and Atmospheric Administration (NOAA), National Park Service (NPS), U.S. Dept. of the Interior, U.S. Environmental Protection Agency, Interstate Environmental Commission, NJ Dept. of Environmental Protection, NJ Sports and Exposition Authority, NYC Dept. of Environmental Protection, NYC Dept. of Parks and Recreation, NYC Soil and Water Conservation District, NY State Dept. of Environmental Conservation, NY State Dept. of State, Hudson River Foundation, National Parks Conservation Association, NY/NJ Baykeeper, Waterfront Alliance, The Nature Conservancy, NYC Audubon, NJ Audubon, and/or The Trust for Public Land (<i>for pay or pro bono</i>).	
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the general HRE area (i.e., interests within river basins, tributaries, wetlands, or shoreline areas associated with the HRE study area), including but not limited to those regions listed in statement 2 above.	
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the New York District.	
9. Previous or current involvement with the development or testing of models that will be used for, or in support of, the project.	
10. Current firm ¹ 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.	
11. 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.	

Panel Conflict of Interest (COI) Screening Statements for the Hudson-Raritan Estuary IEPR

<p>12. Any previous employment by USACE as a contractor (either as an individual or through your firm¹) 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.</p>	
<p>13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning ecosystem restoration and include the client/agency and duration of review (approximate dates).</p>	
<p>14. Pending, current, or future financial interests in HRE Integrated Draft Feasibility Report and Environmental Assessment-related contracts/awards from USACE.</p>	
<p>15. Significant portion of your personal or office’s revenues within the last three years came from USACE contracts.</p>	
<p>16. Significant portion of your personal or office’s revenues within the last three years came from Port Authority of New York and New Jersey contracts as well as the New York City Department of Environmental Protection (NYCDEP), New Jersey Department of Environmental Protection (NJDEP), New Jersey Sports and Exposition Authority (NJSEA), Westchester County, or New Jersey Department of Transportation (NJDOT) contracts.</p>	
<p>17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the HRE Integrated Draft Feasibility Report and Environmental Assessment.</p>	
<p>18. Participation in relevant prior and/or current Federal studies relevant to this project and/or HRE Integrated Draft Feasibility Report and Environmental Assessment.</p>	
<p>19. Previous and/or current participation in prior non-Federal studies relevant to this project and/or HRE Integrated Draft Feasibility Report and Environmental Assessment.</p>	
<p>20. Has your research or analysis been evaluated as part of the HRE Integrated Draft Feasibility Report and Environmental Assessment?</p>	
<p>21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.</p>	

Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit. The term “firm” in a screening question referred to any joint venture in which a firm was involved. It applied to whether that firm serves as a prime or as a subcontractor to a prime. Candidates were asked to clarify the relationship in the screening questions.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member’s affiliation, location, education, and overall years of experience. One panel member held a dual role serving as both the economics and Civil Works planning expert. 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. Hudson-Raritan Estuary IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Economist / Civil Works Planner (Dual Role)					
David Bastian	Independent consultant	Annapolis, MD	M.S., River Engineering	Yes	36
Environmental / NEPA					
Craig Vogt	Independent consultant	Hacks Neck, VA	M.S., Environmental Engineering	N/A	42
Civil / Hydraulic Engineer					
Michael Schwar	Stony Point Hydrology, LLC	Mukwonago, WI	Ph.D., Civil and Environmental Engineering	Yes	27

Table B-2 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 area of technical expertise is given in Section B.3.

Table B-2. Hudson-Raritan Estuary IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Bastian	Vogt	Schwar
Economist / Civil Works Planner			
Minimum of 10 years of demonstrated experience or combined equivalent of education and experience in evaluation of ecosystem restoration projects	X		
Extensive experience with the IWR-Planning Suite model or in the strategy and principles in developing cost effectiveness and incremental cost analysis (CE/ICA)	X		
Able to evaluate the appropriateness of CE/ICA as applied to dollar costs and ecosystem restoration benefits	X		
Experience with National Ecosystem Restoration (NER) analysis procedures	X		
Minimum of 10 years demonstrated experience in public works planning	X		
Very familiar with USACE plan formulation process, procedures, and standards, and familiarity with USACE standards and procedures	X		
Familiar with evaluation of alternative plans for coastal and riverine ecosystem restoration	X		
Experience related to evaluating traditional NER plan benefits associated with ecosystem projects, to include experience or familiarity in USACE methodologies for performing CE/ICA analysis	X		
Experience in determining cost effectiveness of the restoration or creation of riverine and estuarine wetlands and oyster reefs, and the utilization of fish passage structures	X		
Environmental / NEPA			
At least 10 years of experience directly related to environmental evaluation or review, with a minimum M.S. degree or higher in a related field		X	
Knowledge of ecosystem restoration techniques typical for creation of wetlands, beaches, dunes, and oyster reefs (techniques include the use of streamline and/or channel creation, stabilization, or softening as well as invasive species removal, and dredging)		X	
Able to determine if the document is in compliance with all applicable NEPA and environmental compliance requirements		X	
Experience in freshwater and estuarine aquatic ecology of urban regions, preferably experience in the densely populated mid-Atlantic or Northeast regions		X	
Required experience related to wetland, riverine, fish, and oyster ecology		X	
Civil / Hydraulic Engineer			
Registered professional engineer having a minimum of 10 years of experience in civil engineering with a minimum MS degree in engineering			X
Demonstrated experience in aquatic ecosystem restoration, particularly techniques and practices used in wetland and riverine restoration, including the creation or restoration of			X

Technical Criterion	Bastian	Vogt	Schwar
freshwater estuarine wetlands including marshes, marsh atolls, maritime forests, riparian forests, beaches and dunes, oyster reefs, and fish passage structures. It also includes the use of streamline and/or channel creation, stabilization, or softening as well as invasive species removal and dredging.			
Thorough understanding of hydrologic transport models, including point source and surface area run-off inputs, for the analysis of sediment and pollutant movements within a river or tidal system			X
Experience with engineering analysis and design of wetland restoration or related projects in urban areas			X

B.3 Panel Member Qualifications

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

Name	David Bastian, P.E.
Role	Economist / Civil Works Planner
Affiliation	Independent consultant

Mr. Bastian is an independent consultant and P.E. for David Bastian Consulting in Annapolis, Maryland, specializing in USACE feasibility studies and their technical and policy compliance, adherence to plan formulation, and review of feasibility studies incorporating incremental cost analysis, ecosystem restoration, flood risk reduction, and hydraulic and river engineering. He earned his B.S. in civil engineering from the Georgia Institute of Technology and an M.S. in river engineering from Delft University, Holland.

Mr. Bastian has 36 years of experience with USACE and as contractor/consultant on USACE projects involving feasibility studies and public works planning, all based on the USACE six-step planning process. As a reviewer at USACE, Headquarters, he became familiar with and has direct experience with Engineer Regulation (ER) 1105-2-100 as well as other USACE engineering regulations, manuals, and pamphlets and continues to use and stay familiar with the “planning community toolbox.” He co-authored the USACE Planner’s Workshop Manual. His project history has resulted in his review of and collaboration on more than 100 USACE reports evaluating and comparing alternative plans.

Mr. Bastian has extensive experience with the IWR-Planning Suite model or the strategy and principles in developing cost effectiveness and incremental cost analysis (CE/ICA). He has evaluated the appropriateness of CE/ICA as applied to dollar costs and ecosystem restoration benefits on such studies as Picayune Strand and Puget Sound. Mr. Bastian has experience in

determining the cost effectiveness of the restoration or creation of riverine and estuarine wetlands and oyster reefs, and the use of fish passage structures.

Mr. Bastian has 20 years of experience in coastal and riverine economics evaluation and ecosystem restoration. He has direct experience in identifying and evaluating alternative plans for coastal and riverine systems, including nine years involved in the coastal economic evaluation for coastal Louisiana restoration, the greater New Orleans hurricane and storm damage risk reduction system, and four other study areas along the Louisiana and Texas coasts. He is familiar with large, complex Civil Works projects with high public and interagency interests through his extensive involvement with the Louisiana Coastal Study area pre- and post-Hurricane Katrina. Additionally, he has spent four years working for the greater New Orleans Hurricane and Storm Damage Risk Reduction System, planning and constructing the 133-mile levee, floodwall, and massive pumping system.

Mr. Bastian has experience related to evaluating traditional National Ecosystem Restoration (NER) plan benefits associated with ecosystem projects, including experience or familiarity with USACE methodologies for performing CE/ICA analysis in such studies as (1) the Puget Sound Nearshore Ecosystem Restoration Feasibility Study/Environmental Impact Statement – 2014, where he served on an IEPR panel to assess the National Economic Development (NED)/NER benefits and application of CE/ICA analysis to restore environmental degradation on numerous mini projects around Puget Sound, (2) the Picayune Strand project, where he was selected to participate in the IEPR to review the plan formulation and economics aspects of the Picayune Strand portion of the Everglades restoration project, and (3) the Boardman River, Michigan Ecosystem Restoration Study – 2011, where he provided the Project Delivery Team with quality control and report writing services to ensure that the study results were economically and environmentally compliant with USACE policy requirements.

Mr. Bastian is familiar with USACE coastal storm damage reduction projects and has evaluated and conducted NER analysis procedures, particularly as they relate to hurricane and coastal storm damage risk reduction, through his participation on the following related projects. He managed the hydrologic and hydraulic studies and contributed to the draft Donaldsonville to the Gulf hurricane risk reduction feasibility study report and the draft Larose to Golden Meadow hurricane risk reduction feasibility study report. He reviewed the Morganza to the Gulf hurricane risk reduction feasibility study report. He prepared and collaborated on many of the project description documents (mini-feasibility decision documents) required for the segments that make up the New Orleans Hurricane and Storm Damage Risk Reduction system. Additionally, he participated in and was recognized for his work on the Louisiana Coastal Protection and Restoration study, where he assisted in writing the report and managing the application of surge model studies applying, as appropriate, CE/ICA.

While employed at USACE, Mr. Bastian held positions as Deputy Chief of Staff for Support, Office Chief of Engineers; Assistant Director of Civil Works, Office Chief of Engineers; technical and policy compliance review expert, Washington Level Review Center; and navigation

research, USACE Institute for Water Resources. He has served as a USACE Washington-level technical and policy compliance review expert and managed interdisciplinary reviews of more than 70 feasibility reports. Mr. Bastian is a member of the American Society of Civil Engineers (ASCE), the American Association of Port Authorities, the Permanent International Association of Navigation Congresses, and the Western Dredging Association.

Name	Craig Vogt
Role	Environmental / NEPA
Affiliation	Independent consultant

Mr. Vogt is an independent ocean and coastal environmental consultant, focusing on such areas as ecosystem restoration techniques, NEPA and environmental compliance, dredging and dredged material management, and sediment management for wetlands, shorelines, and coastal restoration. He earned his M.S. in environmental engineering from Oregon State University in 1971.

From 1971 to 2008, Mr. Vogt worked for the U.S. Environmental Protection Agency (EPA), the last 20 years of which was in the Oceans & Coastal Protection Division (OCPD) at EPA HQ, initially as Director of the Marine Operations Division (1988-1991) and then as Deputy Director (1991-2008). His time at EPA provided him extensive experience in environmental, estuarine, and coastal processes, including being responsible for field monitoring in his early years in EPA's Region X Office to measure the environmental impacts of wastewater discharges to the coastal and fresh waters of the Pacific Northwest.

As Deputy Director of OCPD, Mr. Vogt was responsible for implementation of the National Estuary Program (NEP), the goal of which was, and still is, healthy and productive estuary habitats and ecosystems for the 28 separate NEP programs around the country. Each NEP, such as Barnegat Bay, Long Island Sound, Narragansett Bay, San Francisco Bay, or NY/NJ Harbor and Estuary Program (HEP), produced an overall comprehensive management plan for their estuary, as well as subplans for action on a particular issue. Much of the focus was on the restoration of aquatic resources, such as fish and eelgrass beds, and wetlands/marshes, recognizing the influence of point and nonpoint sources of contamination, invasive species, development (including dredging of channels), toxic chemicals, and climate change. Mr. Vogt's role was to work with each EPA Region to review and approve its comprehensive action plans and to conduct annual and monthly (if needed) meetings with each of the NEPs to understand progress and issues in implementation. Funding was also provided.

As Deputy Director of OCPD, Mr. Vogt was also responsible for the national implementation of the Ocean Dumping Act for dredged material, including environmental criteria, testing requirements, site designation, and coordination with USACE permitting. The requirements of NEPA for development of descriptions of the environmental impacts of a proposed project and

its alternatives form the basis for nearly all of the work Mr. Vogt has been involved in since the late 1980s, as a regulator and as a consultant. The required NEPA coordination process to involve the public and other interested parties was followed in all the EPA site designations, which included about 30 sites during his term as Deputy Director at EPA.

While Deputy Director, he also served as co-chair of the National Dredging Team, an interagency team established to bring together the Federal agencies involved in dredging and dredged material management. He was involved in facilitating and supporting the operations of the Regional Dredging Teams, which were established to bring state and local government agencies together to move dredging and restoration projects forward. In that role, great progress was made and EPA allowed placement of clean dredged material in the littoral drift along shorelines, with the objective of rebuilding beaches, mudflats, and coastal wetlands.

Mr. Vogt was EPA's representative to Coastal America from 1991 to 2008, an interagency partnership devoted to coastal ecosystem restoration. Projects included removal of invasive species such as *Spartina* or *Phragmites* in intertidal wetlands (depending upon which coast) and Brazilian peppers and Australian Pines in Florida to help improve habitats and ecosystems that had been overrun.

After his retirement from the EPA in 2008, Mr. Vogt has used his knowledge of ecosystem restoration techniques for creation of wetlands, beaches, dunes, and oyster reefs in a variety of projects. He provided (and is continuing) consulting services to USACE under the National Shoreline Management Study, the objective of which is to assess the impacts of accretion and erosion on shorelines and coastal environmental resources, such as the fresh water wetlands in the Great Lakes. In addition, he was an independent reviewer of the required NEPA documents for a coal transport project on the Columbia River and for the Redwood City proposed dredging project in San Francisco Bay. Mr. Vogt prepared and was co-author of the USACE Tech Note, *The Application of Adaptive Management to Ecosystem Restoration Projects* (ERDC TN-EMRRP-EBA-10 April 2012). The Tech Note provided overall guidance on management of ecosystem restoration projects, including conceptual ecological models, uncertainties in ecosystem restoration projects, ecosystem restoration goals, and the use of metrics in monitoring approaches to measure success. Mr. Vogt prepared a guidance manual for USACE-HQ on tracking the beneficial use of dredged material by USACE Districts. The manual categorized beneficial uses such as beach/dune restoration and wetlands/marsh restoration, with the objective of increasing shoreline and ecosystem restoration. Planting of eelgrass in Jamaica Bay was used as an example. The manual is being completed by USACE. Mr. Vogt participated as one of a few invited experts in a workshop at Texas A&M University on integrating ecosystem services into restoration decisions, the objective of which was to develop information for understanding the value of restoring fresh water and salt water ecosystems for use in natural resource restoration decision-making.

Mr. Vogt is an active member of the Western Dredging Association (WEDA) and its Board of Directors (and several committees), and is Chair of the WEDA Environmental Commission,

which he established in 1994 to address environmental issues associated with navigation projects as well as issues associated with environmental cleanup by dredging. In 2010, he established and manages the WEDA annual Environmental Excellence Award, which recognizes dredging projects that use dredged material for such actions as restoring (or creating) salt water and fresh water habitats and wetlands. In 2016, Mr. Vogt received an international award from IHS Maritime for his efforts to encourage ecosystem restoration and to recognize the industry for those projects.

Name	Michael Schwar, Ph.D., P.E.
Role	Civil / Hydraulic Engineer
Affiliation	Stony Point Hydrology, LLC

Dr. Schwar, Principal Water Resources Engineer with Stony Point Hydrology LLC in Mukwonago, Wisconsin, has more than 25 years of professional and academic experience focusing on the hydrology and hydraulics of surface water systems, with special emphasis on the restoration of streams, rivers, lakes, and wetlands. He earned an M.S. in environmental engineering and sciences from the University of Washington in 1991 and a Ph.D. in civil and environmental Engineering from the University of Wisconsin – Madison in 2002. He has worked on more than 140 surface water projects in 20 states, Canada, and Puerto Rico. He is a registered P.E. in six states (Washington, Wisconsin, North Dakota, Iowa, Arizona, and Illinois) and a Certified Floodplain Manager (CFM), and has been recognized as a Diplomate, Water Resources Engineer (D.WRE) by the American Academy of Water Resources Engineers. While a hydraulic engineer with the USACE Rock Island District, he worked on ecosystem restoration projects, specifically riverine, backwater and floodplain wetland, fish passage enhancement, and stream restoration projects.

He was one of the primary authors of the Illinois River Basin Restoration Comprehensive Plan, which received the Mississippi Valley Division’s “Outstanding Planning Achievement Award” in 2007.

Dr. Schwar’s graduate work focused on the restoration of freshwater ecosystems, first in lakes and then in rivers and wetlands. His background provides him with the basis to analyze both the physical drivers (such as flows, water levels, substrate) and the water quality aspects (such as nutrients and dissolved oxygen) that are key to supporting healthy ecosystems. Throughout his career, he has conducted planning and implementation of restoration projects, working at scales ranging from site-specific practices to watershed plans encompassing thousands of square miles.

Dr. Schwar has demonstrated experience in aquatic ecosystem restoration, particularly techniques and practices used in wetland and riverine restoration. Specifically, he has

experience in the creation or restoration of freshwater estuarine wetlands including marshes, marsh atolls, riparian forests, beaches and dunes, reefs, and fish passage structures. Among his relevant design projects are several backwater wetland restorations along the Illinois and Mississippi Rivers, island creation in Peoria Lake (Illinois River), Grand Isle dune rehabilitation (Louisiana), and restoration of the lower Kinnickinnic River/Milwaukee River Estuary. He has also designed channel creation, stabilization, and softening projects as well as invasive species removal and dredging projects. He has designed restoration measures focusing on habitat enhancement, channel reconstruction, restoration of sediment and geomorphic processes and/or improvement of fish passage for 17 rivers and streams in five states (Wisconsin, Illinois, Iowa, Missouri, and Arizona).

Dr. Schwar has a thorough understanding of hydrologic transport models, including point source and surface area runoff inputs, for the analysis of sediment and pollutant movements within river and tidal systems. He has used many different approaches, ranging from relatively simple spreadsheet-based models (e.g., RUSLE or other basis), GIS-based analyses (including WAM and SWAT), 1-D hydrologic (HSPF) or hydraulic (HEC-6/HEC-RAS) models, to sophisticated 3-D modeling. For example, for the Kinnickinnic River Feasibility Study, he developed a spreadsheet approach that incorporated data from an unsteady Hydrologic Engineering Center River Analysis System (HEC-RAS) simulation of the river as it enters the Milwaukee River Estuary to model dissolved oxygen and pollutant transport conditions, and compared the model predictions to the results of fully 3-D ECOMSED simulation runs.

Dr. Schwar is trained in the advanced analysis and design of open-channel systems. He has analyzed and designed channel modifications for flood risk reduction, stabilization, sediment transport, and ecosystem restoration. Projects include Boneyard Creek Restoration (Urbana, Illinois), Blue River Grade Control (USACE Kansas City), Menomonee River-Western Milwaukee (Milwaukee Metropolitan Sewerage District, Wisconsin), Tres Rios Phase 3A (USACE Los Angeles), and Ebner Coulee Creek (La Crosse, Wisconsin).

Dr. Schwar has experience in engineering analysis and design of wetland restoration or related projects in urban areas. He recently completed the Kinnickinnic River Feasibility Study, which analyzed restoration alternatives for a river corridor within the highly urbanized Milwaukee River Estuary. Some of his other projects in highly urban areas with restoration components include Turkey Creek (Kansas City, Missouri), Boneyard Creek Restoration (Urbana, Illinois), and Wilson Park Creek (Milwaukee, Wisconsin).

Dr. Schwar's professional affiliations include the ASCE, the Environmental and Water Resources Institute River Restoration Task Committee (past chair), the Association of State Floodplain Managers, the Water Environment Federation and its Watershed Management Committee, and the Society of American Military Engineers.

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APPENDIX C

Final Charge for the Hudson-Raritan Estuary IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Hudson-Raritan Estuary (HRE) Ecosystem Restoration Feasibility Report and Environmental Assessment, New York and New Jersey

This is the final Charge to the Panel for the Hudson-Raritan Estuary IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on March 3, 2017.

BACKGROUND

The Hudson-Raritan Estuary (HRE) is within the boundaries of the Port District of New York and New Jersey and is situated within a 25-mile radius of the Statue of Liberty. The HRE study area includes the following eight Planning Regions: 1) Jamaica Bay; 2) Lower Bay; 3) Lower Raritan River; 4) Arthur Kill/Kill Van Kull; 5) Newark Bay, Hackensack River, and Passaic River; 6) Lower Hudson River; 7) Harlem River, East River, and Western Long Island Sound; and 8) Upper Bay. The HRE is in one of the most urbanized regions in the United States. The waters and nearshore habitats of the HRE once supported a diverse mosaic of ecological communities, but centuries of industrialization and urbanization have resulted in severe habitat loss and degradation, poor water quality, pervasive sediment contamination, and lack of public access to the estuary. These actions have significantly impacted the ecological integrity, health, and public perception of the estuary and its resources.

Planning objectives for the HRE study include the following:

- Restore the structure, function, and connectivity, and increase the extent of, estuarine habitat in the HRE.
- Restore the structure and function, and increase the extent of, freshwater riverine habitat in the HRE.
- Restore the structure and function, and increase the extent of, marsh island habitat in Jamaica Bay.
- Increase the extent of oyster reefs in the HRE.

In support of the HRE Study, the USACE New York District and its partners released the Draft Comprehensive Restoration Plan (CRP) in 2009 and Version 1.0 in 2016. The CRP is the foundation for the HRE Feasibility Study, outlining the water resource problems, goals, targets (Target Ecosystem Characteristics [TECs]), restoration opportunities, and implementation strategies. More than 400 restoration opportunities have been reviewed, including the original 287 CRP sites as well as new sites. To date, there are 296 CRP Restoration Sites within the eight Planning Regions of the HRE. These sites were evaluated and screened, resulting in a subset of sites to be recommended for near-term construction.

A total of 33 restoration opportunities/sites will be recommended for construction (31 sites for near-term construction and 2 sites “Deferred” following U.S. Environmental Protection Agency [EPA] remedial actions) in the following Planning Regions:

Jamaica Bay Planning Region

- Perimeter sites (6 sites): Fresh Creek, Hawtree Point, Dubos Point, Brant Point, Bayswater State Park, Dead Horse Bay
- Marsh Islands (5 sites): Elders Center, Duck Point, Stoney Point, Pumpkin Patch [East and

West]); and

- Small-scale Oyster Restoration

East River, Harlem River, Western Long Island Sound Planning Region

- Flushing Creek (1 site)
- Bronx River (9 sites): Stone Mill Dam, Bronx Zoo and Dam, Shoelace Park, Muskrat Cove, River Park/West Farm Rapids Park, Westchester County Center, Bronxville Lake, Crestwood Lake, Garth Woods/Harney Road; and
- Small-scale Oyster Restoration at Soundview Park

Newark Bay, Hackensack River and Passaic River Planning Region

- Hackensack River (2 sites): Meadowlark Tract and Metromedia Marshes
- Lower Passaic River (3 sites): Essex County Branch Brook Park, Dundee Island Park and Clifton Dundee Canal Green Acres, and
- Lower Passaic River (2 “Deferred” sites): Kearny Point and Oak Island Yards recommended for construction following U.S. Environmental Protection Agency remedial actions.

Upper Bay

- Small-scale Oyster Restoration (2 sites): Bush Terminal and Governors Island

Lower Bay Planning Region

- Small-scale Oyster Restoration at Naval Weapons Station Earle

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Hudson-Raritan Estuary (HRE) Ecosystem Restoration Feasibility Report and Environmental Assessment, New York and New Jersey (hereinafter: Hudson-Raritan Estuary 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, dated 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 HRE 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 economics, environmental/National Environmental Policy Act (NEPA), civil/hydraulic engineering, and Civil Works planning issues relevant to the project. They will also have experience applying their subject matter expertise to ecosystem restoration.

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

Documents are to be reviewed by designated discipline:

Title	No. of Pages	Required Disciplines
Integrated Draft Feasibility Report/Environmental Assessment	382	All Disciplines
Appendix A: Local Sponsor Support Letters	17	All Disciplines
Appendix B: Ongoing Efforts*	48	All Disciplines
Appendix C: Fish Passage Opportunities	18	Environmental/NEPA
Appendix D: Engineering	148	Civil/Hydraulic Engineering
Appendix E: Alternatives Development	28	All Disciplines
Appendix E1: Jamaica Bay	99	All Disciplines
Appendix E2: Jamaica Bay Marsh Islands	47	All Disciplines
Appendix E3: Flushing Creek	77	All Disciplines
Appendix E4: Bronx River	76	All Disciplines
Appendix E5: Newark Bay Hackensack and Lower Passaic	71	All Disciplines
Appendix E6: Small Scale Oyster Restoration	60	All Disciplines
Appendix F: Essential Fish Habitat	47	Environmental/NEPA
Appendix G: Regulatory Agency Correspondence*	200	---
Appendix H: Hazardous, Toxic, and Radioactive Waste	117	Environmental/NEPA
Appendix I: Cultural Resources Coordination Documentation*	229	---
Appendix J: CZM	304	Environmental/NEPA
Appendix K: TSP Summary Sheets	60	All Disciplines
Appendix L: Cost Engineering	112	CWP/Economics
Appendix M: Cost Effectiveness & Incremental Cost Analysis	32	CWP/Economics

Title	No. of Pages	Required Disciplines
Appendix N: Future Feasibility Spinoff Sites	25	Environmental/NEPA
Appendix O: Adaptive Management & Monitoring Plan	22	Environmental/NEPA
Appendix P: Real Estate Plan	TBD	CWP/Economics
Appendix Q: Section 404(b)(1)	13	Environmental/NEPA
Appendix R: Draft FONSI	4	All Disciplines
Public Comments**	50	All Disciplines
Total Page Count	2,236	

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

** Page count for public comments is approximate. USACE will submit public comments to the Battelle project manager, who will in turn submit the comments to the IEPR Panel.

Documents for Reference

- EC 1165-2-214, Civil Works Review (15 December 2012)
- Office of Management and Budget’s Final Information Quality Bulletin for Peer Review (16 December 2004)
- Foundations of SMART Planning
- SMART Planning Bulletin (PB 2013-03)
- SMART – Planning Overview
- USACE Planning Modernization Summary
- USACE Climate Change Adaptation Plan (June 2014)
- ETL 1100-2-1 – Procedures to Evaluate SLR Change Impacts Responses Adaptation
- ER 1100-2-8162 – Incorporating SLR Change in CW Programs

SCHEDULE

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 Working Days
Conduct Peer Review	Subcontractors complete mandatory Operations Security (OPSEC) training	3/30/2017
	Battelle sends review documents to panel members	3/3/2017
	Battelle convenes kick-off meeting with panel members	3/8/2017
	Battelle convenes kick-off meeting with USACE and panel members	3/8/2017
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	3/22/2017
	Panel members complete their review of the documents	4/5/2017
Prepare Final Panel Comments	Battelle provides talking points to panel members for Panel Review Teleconference	4/11/2017

Task	Action	Due Date Working Days
and Final IEPR Report	Battelle convenes Panel Review Teleconference	4/12/2017
	Battelle provides Final Panel Comment templates and instructions to panel members	4/13/2017
	Panel members provide draft Final Panel Comments to Battelle	4/20/2017
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	4/21/2017 - 4/30/2017
	Panel finalizes Final Panel Comments	5/1/2017
	Battelle receives public comments from USACE	4/22/2017
	Battelle sends public comments to Panel	5/2/2017
	Panel members complete their review of the public comments	5/5/2017
	Battelle and Panel review Panel's responses to public comments	5/8/2017
	Panel drafts Final Panel Comment on public comments, if necessary	5/9/2017
	Panel finalizes Final Panel Comment regarding public comments, if necessary	5/11/2017
	Battelle provides Final IEPR Report to panel members for review	5/15/2017
	Panel members provide comments on Final IEPR Report	5/17/2017
	Battelle submits Final IEPR Report to USACE*	5/19/2017
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	5/26/2017
Comment/Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	5/31/2017
	Battelle convenes teleconference with Panel to review Comment Response process	5/31/2017
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	6/14/2017
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	6/20/2017
	USACE PCX provides draft PDT Evaluator Responses to Battelle	6/21/2017
	Battelle provides draft PDT Evaluator Responses to panel members	6/23/2017
	Panel members provide draft BackCheck Responses to Battelle	6/28/2017
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	6/29/2017
	Battelle convenes Comment Response Teleconference with panel members and USACE	6/30/2017

Task	Action	Due Date Working Days
	USACE inputs final PDT Evaluator Responses to DrChecks	7/10/2017
	Battelle provides final PDT Evaluator Responses to panel members	7/12/2017
	Panel members provide final BackCheck Responses to Battelle	7/17/2017
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	7/24/2017
	Battelle submits pdf printout of DrChecks project file*	7/25/2017
Agency Decision Milestone (ADM) Meeting	Panel prepares and/or reviews slides for ADM	TBD
	Battelle participates in the Agency Decision Milestone (ADM) Meeting	TBD
Civil Works Review Board (CWRB)	Panel prepares and/or reviews slides for CWRB	TBD
	Battelle participates in the Civil Works Review Board (CWRB) Meeting	May 2018

* Deliverables

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the HRE 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 HRE 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 (Corey Wisneski, wisneskic@battelle.org) or Program Manager (Rachel Sell; sellr@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Rachel Sell (sellr@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 Corey Wisneski, wisneskic@battelle.org, no later than April 5, 2017, 10 pm ET.

**Independent External Peer Review of the Hudson-Raritan Estuary (HRE)
Ecosystem Restoration Draft Integrated Feasibility Report and Environmental
Assessment, New York and New Jersey**

Charge Questions and Relevant Sections as Supplied by USACE

Broad Evaluation Review Charge Questions

1. Are the planning methods sound?
2. Are the assumptions that underlie the economic, engineering and environmental analyses sound?
3. Comment on the adequacy and acceptability of the economic, engineering, and environmental methods, models and analyses used.
4. Are the interpretations of analysis and conclusions based on the analysis reasonable?
5. Were risk and uncertainty sufficiently considered?
6. Are the risks associated with sediment contaminants and proposed restoration adequately characterized?
7. In your opinion, are there sufficient analyses upon which to base the recommendation?

Specific Technical and Scientific Review Charge Questions

Plan Formulation/NEPA Compliance under SMART Planning Level of Detail

Considering the level of detail and assumed risk prescribed under SMART Planning:

8. Comment on whether you agree or disagree with how the tentatively selected plan supports the HRE Program Goal, "to develop a mosaic of habitats that provides society with renewed and increased benefits from the estuary environment"? Comment on the plan formulation. Does it meet the study objectives and avoid violating the study constraints?
9. Do you agree with the general analyses of the existing social, financial, and natural resources within the study area?
10. Given your area of expertise, does the Draft Feasibility Report/Environmental Assessment (FR/EA) appropriately address the existing conditions of all resources pertinent to the study?
11. Was a reasonably complete array of possible measures considered in the development of alternatives?
12. Please comment on the screening of the proposed alternatives. Are the screening criteria appropriate? In your professional opinion, are the results of the screening acceptable?
13. Have the short- and long-term impacts associated with the alternatives been adequately discussed and evaluated?
14. Are the descriptions of projected impacts on aquatic resources, vegetated resources, water quality and salinity, fisheries, recreation, hydrology, socioeconomics, cultural resources, soils and bay bottom for each alternative reasonable?
15. Are cumulative impacts adequately described and discussed? If not, please explain.
16. Is it clear that the restored ecological resource quality will be sustainable over the long run?

17. Is the significance of the desired ecological resources clearly determined by institutionalized national goals (e.g., the Harbor Estuary Program)?
18. Is the scarcity of the desired ecological resources characterized in terms of national abundance and significance?
19. Are forecast changes in desired ecological resource quality quantified so as to indicate achievement of regional goals?
20. Were the potential effects of climate change on alternatives addressed?
21. Is adaptive management adequately addressed?
22. Are the required long-term commitments (both Federal and non-Federal) to sustaining the restored ecological resources adequately described and adequately demonstrated?

Engineering

23. Are the descriptions of the risk and uncertainties associated with the level of detail in the designs that comprise the preferred alternative sufficiently comprehensive?
24. Was the hydrology discussion sufficient to characterize current baseline conditions and to allow for evaluation of how forecasted conditions (with and without proposed actions) are likely to affect hydrologic conditions?
25. Were the technical assumptions outlined in the engineering appendix appropriate for a SMART Planning feasibility study, given the level of design detail?
26. Were appropriate engineering solutions (not engineered solutions) developed for achieving planning objectives related to ecosystem processes?
27. Are the key assumptions used to complete the cost estimating adequate?
28. Are future operation, maintenance, repair, replacement, and rehabilitation efforts adequately described, and are the estimated costs of those efforts reasonable for each alternative?

Economics

29. Was the methodology used to conduct the incremental cost analysis adequate and valid?
30. Was the Evaluation of Planned Wetlands (EPW) applied in an appropriate manner?

General/Summary

31. Was the best available science used to develop the alternatives and complete the impact analysis?
32. What is the most important concern you have with the document or its appendices that was not covered in your answers to the questions above?
33. 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.

Public Comment Questions

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

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APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire **Independent External Peer Review**

Hudson-Raritan Estuary Ecosystem Restoration, New York & New Jersey Feasibility Report and Environmental Assessment

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: **Courtney M. Brooks**
TELEPHONE: **614-424-5623**
ADDRESS: **505 King Avenue, Columbus, OH 43201**
EMAIL ADDRESS: **brooksc1@battelle.org**

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

The Battelle Norwell (formerly Duxbury) location has conducted work within the project area of this IEPR and without reviewing the review documents it is not possible to determine if any of these projects have been used in the USACE decision documents. To mitigate this, Battelle has firewalled project management staff in Norwell and Duxbury from working on this IEPR. It is highly unlikely that any staff working on USACE IEPRs has ever been involved in any of the work in the project area; however, the proposed project manager for this proposal has never worked in either office or that part of the country and has no conflict of interest and no knowledge of the work in this area.

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

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

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

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

No additional information to report.

Courtney M. Brooks

Courtney M. Brooks

11-8-2016

Date

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BATTELLE

It can be done