

# Final Independent External Peer Review Report Charleston Harbor Post 45, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement

Prepared by  
Battelle Memorial Institute

Prepared for  
Department of the Army  
U.S. Army Corps of Engineers  
Deep Draft Navigation Planning Center of Expertise  
Mobile District

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Columbus, Ohio 43201

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## Executive Summary

### PROJECT BACKGROUND AND PURPOSE

The Charleston Harbor Post 45, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement (FR/EIS) presents the results of a feasibility study undertaken to determine the optimal harbor depth for post-Panamax ships that supports the National Economic Development (NED) plan and South Carolina State Ports Authority goals with the least environmental impact. Charleston Harbor is situated at the confluence of the Ashley, Wando, and Cooper Rivers. It is 14 square miles in area and lies approximately at the midpoint along the South Carolina coast. Adjacent municipalities include the cities of Charleston, North Charleston, and Mount Pleasant, as well as Sullivan's, James, and Morris Islands. The Harbor entrance is protected by two jetties constructed in 1878. Since the 1890s, the Harbor has undergone periodic expansion; the most recent modification of the Federal channel – a deepening to 45 feet – was the result of a 1996 feasibility report. The evolution of the global maritime fleet, however, is toward larger ships that require greater drafts than the Harbor can currently efficiently support. Many of the larger ships calling on the port of Charleston are limited by tide stages and, as a result, are incurring additional costs of time and money. The feasibility study looks at a combination of widening and deepening measures that may be undertaken to increase the efficiency of the port in response to changes in the maritime fleet.

### Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the Charleston Harbor Post 45 Draft Integrated Feasibility Report and Environmental Impact Statement (hereinafter Charleston Harbor Post 45 FR/EIS IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the Charleston Harbor Post 45 FR/EIS. 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 Charleston Harbor Post 45 FR/EIS review documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key

technical areas: hydraulic engineering, geotechnical engineering, economics, environmental, and plan formulation. 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 five-person Panel.

The Panel received electronic versions of the Charleston Harbor Post 45 FR/EIS IEPR review documents (3,691 pages total), along with a charge that solicited comments on specific sections of the documents to be reviewed. USACE prepared the charge questions following guidance provided in USACE (2012) and OMB (2004), which were included in the draft and final Work Plans.

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

IEPR panel members reviewed the Charleston Harbor Post 45 FR/EIS 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, one was identified as having high significance, six were identified as having medium/high significance, six had medium significance, and four had medium/low significance.

## Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the Charleston Harbor Post 45 FR/EIS 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 clearly written and organized. The Panel did identify several elements of the project that should be clarified or revised.

**Geotechnical Engineering:** The FR/EIS provides a good level of detail on the FR/EIS geotechnical analyses, and the Panel believes that the geotechnical engineering-related assumptions are sound and consistent. However, from a geotechnical perspective, the Panel is most concerned that the sediment in the entrance channel and the Lower and Upper Harbors has not been fully characterized below the pay depth; approximately 30 percent of the Standard Penetration Tests (SPTs) conducted in those areas do not extend deep enough to determine the nature of the sediment. This could have an impact on the project cost, because if the sediment below pay depth is not understood, the production rate might be overestimated, the type of equipment misassigned, and the required disposal site capacity underestimated. In addition, the Panel believes that the hydraulic modeling completed in the entrance channel did not appear to consider shoaling scenarios, even though a number of other deep-draft dredged harbors have experienced impacts from shoaling. It seems that because shoaling was not factored in, the need for advanced maintenance was not included for the entrance channel, which may

affect the determination of project impacts as well as the benefit-cost ratio. Finally, the Panel notes that a pipeline dredge with cutterhead and discharge pipe may not be the best choice for the Ocean Dredged Material Disposal Site (ODMDS) berm construction, given that the pipeline dredge can be unstable in open water where waves are present and the discharge pipe can be relatively imprecise in sediment placement.

**Hydraulic Engineering:** Appendix A is very comprehensive and generally provides very detailed descriptions of the hydraulic numerical modeling and discussion of results. However, the Panel would like to have seen more information on the Environmental Fluid Dynamics Code (EFDC) grid, including whether the EFDC grid fully contained the offshore entrainment area of the Charleston Harbor entrance; more documentation could be provided on the model grid to demonstrate that the water/salinity mixing at the Harbor entrance was accurately simulated. In addition, the Panel noted that the iterative adjustments of offshore boundary conditions during model calibration may have introduced errors into the EFDC model results, and the Panel suggests that a sensitivity analysis be conducted to determine how the Tentatively Selected Plan (TSP) impacts would change with those offshore boundary condition adjustments. Finally, the Panel strongly believes that a storm surge analysis would be important to the project but could not find any documentation that such an analysis was conducted.

**Economics:** The FR/EIS did a very good job of comprehensively covering the main economic issues. With the completion of improvements to the Panama Canal, post-Panamax size vessels will transit between the Far East and U.S. East Coast ports through the Panama Canal. The recommended navigation improvements to Charleston Harbor will result in significant national economic benefits by allowing the unconstrained navigation of the post-Panamax vessels. The FR/EIS indicates that ship simulation modeling performed during the preconstruction engineering and design (PED) phase of the project will verify channel and turning basin dimensions currently included in the TSP based on professional judgment. While the Panel recognizes that the ship simulation modeling will be conducted during the PED phase of the project, it nevertheless believes that more documentation of the navigational challenges should be provided at the feasibility stage to support the recommendation to Congress for authorization. Relatedly, the Panel was not able to determine the incremental justification of each channel and turning basin improvement and, therefore, could not confirm that the NED plan and locally preferred plan (LPP) have been correctly identified. This will need confirmation during PED studies. In addition, the Panel noted that a sensitivity analysis was not performed for the projected fleet composition. The Panel believes that a sensitivity analysis would improve the understanding of uncertainties associated with the future fleet projections.

**Environmental:** The Panel compliments the PDT on assembling a large volume of data and information on the project site and on a very thorough technical analysis of the environmental data. The Panel is very concerned, however, that the Section 401 Water Quality Certification was obtained in 1995 and has not been reissued. The FR/EIS does not provide evidence that the certification is still valid, and, in fact, there appears to be some indication that it may not be valid anymore, particularly given the growth in port operations and waterfront changes over the past 19 years. Additional data could be collected to demonstrate the certification's continued validity, and the FR/EIS would be improved by documentation of existing data compiled since 1995 that show sediment toxicity has not increased. Another serious Panel concern is the high degree of uncertainty in the proposed wetland mitigation plan and the lack of details provided to determine whether the proposed plan can meet the criteria of 2008 USACE Mitigation Rule, Part 332.2(h). The mitigation plan could be improved by indicating how success will be determined and the inclusion of details on real estate acquisition, such as a priority list of parcels, an acquisition timeline,

the approach for addressing problems, and a contingency plan. Finally, the Panel believes that the FR/EIS should commit to using suitable dredged material for the restoration and enhancement of Crab Bank and Shutes Folly and also notes that the potential presence of hardbottom resources adjacent to the ODMDS could affect the site’s capacity.

**Plan Formulation:** From a plan formulation standpoint, most of the tables were very well organized and contribute helpfully to explaining the plan formulation process. In addition, the analysis of sea level rise is among the most thorough and most proficient the Panel has seen. A major concern is that a contingency plan has not been presented in the event that the ODMDS expansion is not approved. The current capacity of the ODMDS could not hold even the initial construction volume of dredged material, not to mention the future maintenance dredging amounts. While the Risk Register identifies the risk of the FR/EIS not being approved because of these ODMDS issues as ‘low’, the Panel could not find any supporting information in the FR/EIS as to why USACE assigned a low risk. The Panel believes that the future of the project is contingent on the ODMDS being expanded and a contingency plan (with detailed costs) should be prepared to show that the project can continue even if the ODMDS expansion is not approved. The Panel also strongly believes that the alternative formulation process of reducing the alternatives from 294 to 6 could have been better documented. A clearly described plan formulation process is important to the validity of the FR/EIS and, therefore, to the project being approved. The FR/EIS should be revised to describe the alternative screening process in far more detail and to include the benefits and costs for some of the alternatives. Finally, the Panel notes that the FR/EIS does not describe which entity or entities would fund the adaptive management activities, which can be costly.

**Table ES-1. Overview of 17 Final Panel Comments Identified by the Charleston Harbor Post 45 FR/EIS IEPR Panel**

No.	Final Panel Comment
<b>Significance – High</b>	
1	The FR/EIS does not describe a contingency plan if the ODMDS expansion is not approved.
<b>Significance – Medium/High</b>	
2	The use of the 1995 Section 401 Water Quality Certification for disposal of dredged material effluent from the existing disposal areas in the project area may not be appropriate.
3	The alternative formulation process, which reduced the early alternatives from 294 to 6, is not sufficiently described.
4	The proposed wetland mitigation plan includes a high degree of uncertainty and does not provide enough information to determine whether the plan is appropriate and/or can be successfully completed.
5	A significant number of SPTs do not extend to the probable dredge depth in some areas, which may have implications for the types of dredging equipment used, predicted production rates, and disposal site capacity.

No.	Final Panel Comment
6	The need for advanced maintenance in the channel to compensate for high shoaling volumes was not included in the hydraulic modeling and, therefore, was not factored into the evaluation of project impacts.
7	The Charleston Harbor Post 45 FR/EIS does not evaluate the effect of storm surge on the TSP.
<b>Significance – Medium</b>	
8	The navigation problems that support the need to widen the channel and turning basin are not documented.
9	Incremental analysis of each channel and turning basin improvement has not been performed to demonstrate the feasibility of the improvements and support the identification of the NED plan and the LPP.
10	The TSP does not commit to using dredged material to restore Crab Bank and/or enhance Shutes Folly, even though the FR/EIS acknowledges Federal emphasis on such beneficial uses and suitable dredged material appears to be available.
11	The possible presence of hardbottom resources adjacent to the proposed expanded ODMDS may affect the ability of the ODMDS to provide sufficient capacity for the construction and maintenance dredging events.
12	A pipeline dredge with cutterhead may not be the most appropriate equipment for the construction of the berm adjacent to the ODMDS.
13	The project schedule and cost estimate has not considered the need for an additional 15-20% of New Work dredging volume.
<b>Significance – Medium/Low</b>	
14	The extent of the Charleston Harbor entrance entrainment area is not described in sufficient detail to determine whether the hydraulic model grid extends far enough into the ocean to account for the mixing of water and salinity at the Harbor connection.
15	The iterative adjustments of the offshore water level, salinity, and temperature to match inshore station data during EFDC model calibration could result in a less robust hydraulic model validation.
16	Funding for the proposed adaptive management activities is not described.
17	The sensitivity analysis of economic data projections does not take into account economic benefit uncertainties related to traffic and fleet projections.

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## LIST OF ACRONYMS

<b>ASCE</b>	American Society of Civil Engineers
<b>ATR</b>	Agency Technical Review
<b>CEP</b>	Certified Environmental Professional
<b>CERP</b>	Comprehensive Everglades Restoration Program
<b>COI</b>	Conflict of Interest
<b>COPRI</b>	Coasts, Oceans, Ports and Rivers Institute
<b>CWRB</b>	Civil Works Review Board
<b>DHEC</b>	Department of Health and Environmental Control
<b>DrChecks</b>	Design Review and Checking System
<b>EA</b>	Environmental Assessment
<b>EC</b>	Engineer Circular
<b>EFDC</b>	Environmental Fluid Dynamics Code
<b>EIS</b>	Environmental Impact Statement
<b>EPA</b>	U.S. Environmental Protection Agency
<b>ER</b>	Engineer Regulation
<b>ERDC</b>	Engineer Research and Development Center
<b>FR/EIS</b>	Feasibility Report and Environmental Impact Statement
<b>HEC-RAS</b>	Hydrologic Engineering Center-River Analysis System
<b>HQUSACE</b>	USACE Headquarters
<b>IEPR</b>	Independent External Peer Review
<b>LPP</b>	Locally Preferred Plan
<b>NED</b>	National Economic Development
<b>NEPA</b>	National Environmental Policy Act
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NPS</b>	National Park Service
<b>O&amp;M</b>	Operation and Maintenance
<b>ODMDS</b>	Ocean Dredged Material Disposal Site
<b>OEO</b>	Outside Eligible Organization
<b>OMB</b>	Office of Management and Budget
<b>P&amp;G</b>	Principles and Guidelines

<b>PDT</b>	Project Delivery Team
<b>PE</b>	Professional Engineer
<b>PED</b>	Preconstruction Engineering and Design
<b>PIANC</b>	International Navigation Association
<b>PIR</b>	Project Implementation Report
<b>QA/QC</b>	Quality Assurance/Quality Control
<b>SPT</b>	Standard Penetration Test
<b>TSP</b>	Tentatively Selected Plan
<b>USACE</b>	U.S. Army Corps of Engineers
<b>USFS</b>	U.S. Forest Service
<b>USFWS</b>	United States Fish and Wildlife Service
<b>USGS</b>	U.S. Geological Survey

## 1. INTRODUCTION

The Charleston Harbor Post 45, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement (FR/EIS) presents the results of a feasibility study undertaken to determine the optimal harbor depth for post-Panamax ships that supports the National Economic Development (NED) plan and South Carolina State Ports Authority goals with the least environmental impact. Charleston Harbor is situated at the confluence of the Ashley, Wando, and Cooper Rivers. It is 14 square miles in area and lies approximately at the midpoint along the South Carolina coast. Adjacent municipalities include the cities of Charleston, North Charleston, and Mount Pleasant, as well as Sullivan's, James, and Morris Islands. The Harbor entrance is protected by two jetties constructed in 1878. Since the 1890s, the Harbor has undergone periodic expansion; the most recent modification of the Federal channel – a deepening to 45 feet – was the result of a 1996 feasibility report. The evolution of the global maritime fleet, however, is toward larger ships that require greater drafts than the Harbor can currently efficiently support. Many of the larger ships calling on the port of Charleston are limited by tide stages and, as a result, are incurring additional costs of time and money. The feasibility study looks at a combination of widening and deepening measures that may be undertaken to increase the efficiency of the port in response to changes in the maritime fleet.

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 Charleston Harbor Post 45, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement (hereinafter Charleston Harbor Post 45 FR/EIS 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) bulletin *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 Charleston Harbor Post 45 FR/EIS IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE on October 10, 2014.

## 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 Charleston Harbor Post 45 FR/EIS 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 Charleston Harbor Post 45 FR/EIS IEPR. Due dates for milestones and deliverables are based on the award/effective date of September 3, 2014. Note that the work items listed under Task 6 occur after the submission of this report. Battelle anticipates submitting a pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on February 24, 2015. The actual date for contract end will depend on the date that all activities for this IEPR are conducted, including Civil Works Review Board (CWRB) preparation and participation.

**Table 1. Major Milestones and Deliverables of the Charleston Harbor Post 45 FR/EIS IEPR**

Task	Action	Due Date
1	Award/Effective Date	9/3/2014
	Review documents available	10/10/2014
2	Battelle submits list of selected panel members	9/26/2014
	USACE confirms the panel members have no COI	9/30/2014
3	Battelle convenes kick-off meeting with USACE	9/12/2014
	Battelle convenes kick-off meeting with USACE and panel members	10/21/2014
4	Panel members complete their individual reviews	11/17/2014
	Panel members provide draft Final Panel Comments to Battelle	12/5/2014
5	Battelle submits Final IEPR Report to USACE	1/7/2015
6 <sup>a</sup>	Battelle convenes Comment-Response Teleconference with panel members and USACE	2/10/2015
	Battelle submits pdf printout of DrChecks project file to USACE	2/27/2015
	CWRB Meeting (Estimated Date) <sup>b</sup>	June 2015 <sup>c</sup>
	Contract End/Delivery Date	5/11/2015

<sup>a</sup> Task 6 occurs after the submission of this report.

<sup>b</sup> The CWRB meeting was listed in the Performance Work Statement under Task 3 but was relocated in this schedule to reflect the chronological order of activities.

<sup>c</sup> The Contract End date will need to be extended without cost to allow participation in the CWRB meeting.

Battelle identified, screened, and selected five panel members to participate in the IEPR based on their expertise in the following disciplines: hydraulic engineering, geotechnical engineering, economics, environmental, and plan formulation. The Panel reviewed the Charleston Harbor Post 45 FR/EIS document and produced 17 Final Panel Comments in response to 32 charge questions provided by USACE for the review. This charge included two questions added by Battelle that sought summary information from the IEPR Panel. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

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

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

## 4. RESULTS OF THE IEPR

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

### 4.1 Summary of Final Panel Comments

The panel members agreed 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 Charleston Harbor Post 45 FR/EIS 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 clearly written and organized. The Panel did identify several elements of the project that should be clarified or revised.

**Geotechnical Engineering:** The FR/EIS provides a good level of detail on the FR/EIS geotechnical analyses, and the Panel believes that the geotechnical engineering-related assumptions are sound and consistent. However, from a geotechnical perspective, the Panel is most concerned that the sediment in the entrance channel and the Lower and Upper Harbors has not been fully characterized below the pay depth; approximately 30 percent of the Standard Penetration Tests (SPTs) conducted in those areas do not extend deep enough to determine the nature of the sediment. This could have an impact on the project cost, because if the sediment below pay depth is not understood, the production rate might be overestimated, the type of equipment misassigned, and the required disposal site capacity underestimated. In addition, the Panel believes that the hydraulic modeling completed in the entrance channel did not appear to consider shoaling scenarios, even though a number of other deep-draft dredged harbors have experienced impacts from shoaling. It seems that because shoaling was not

factored in, the need for advanced maintenance was not included for the entrance channel, which may affect the determination of project impacts as well as the benefit-cost ratio. Finally, the Panel notes that a pipeline dredge with cutterhead and discharge pipe may not be the best choice for the Ocean Dredged Material Disposal Site (ODMDS) berm construction, given that the pipeline dredge can be unstable in open water where waves are present and the discharge pipe can be relatively imprecise in sediment placement.

**Hydraulic Engineering:** Appendix A is very comprehensive and generally provides very detailed descriptions of the hydraulic numerical modeling and discussion of results. However, the Panel would like to have seen more information on the Environmental Fluid Dynamics Code (EFDC) grid, including whether the EFDC grid fully contained the offshore entrainment area of the Charleston Harbor entrance; more documentation could be provided on the model grid to demonstrate that the water/salinity mixing at the Harbor entrance was accurately simulated. In addition, the Panel noted that the iterative adjustments of offshore boundary conditions during model calibration may have introduced errors into the EFDC model results, and the Panel suggests that a sensitivity analysis be conducted to determine how the Tentatively Selected Plan (TSP) impacts would change with those offshore boundary condition adjustments. Finally, the Panel strongly believes that a storm surge analysis would be important to the project but could not find any documentation that such an analysis was conducted.

**Economics:** The FR/EIS did a very good job of comprehensively covering the main economic issues. With the completion of improvements to the Panama Canal, post-Panamax size vessels will transit between the Far East and U.S. East Coast ports through the Panama Canal. The recommended navigation improvements to Charleston Harbor will result in significant national economic benefits by allowing the unconstrained navigation of the post-Panamax vessels. The FR/EIS indicates that ship simulation modeling performed during the preconstruction engineering and design (PED) phase of the project will verify channel and turning basin dimensions currently included in the TSP plan based on professional judgment. While the Panel recognizes that the ship simulation modeling will be conducted during the PED phase of the project, it nevertheless believes that more documentation of the navigational challenges should be provided at the feasibility stage to support the recommendation to Congress for authorization. Relatedly, the Panel was not able to determine the incremental justification of each channel and turning basin improvement and, therefore, could not confirm that the NED plan and locally preferred plan (LPP) have been correctly identified. This will need confirmation during PED studies. In addition, the Panel noted that a sensitivity analysis was not performed for the projected fleet composition. The Panel believes that a sensitivity analysis would improve the understanding of uncertainties associated with the future fleet projections.

**Environmental:** The Panel compliments the PDT on assembling a large volume of data and information on the project site and on a very thorough technical analysis of the environmental data. The Panel is very concerned, however, that the Section 401 Water Quality Certification was obtained in 1995 and has not been reissued. The FR/EIS does not provide evidence that the certification is still valid, and, in fact, there appears to be some indication that it may not be valid anymore, particularly given the growth in port operations and waterfront changes over the past 19 years. Additional data could be collected to demonstrate the certification's continued validity, and the FR/EIS would be improved by documentation of existing data compiled since 1995 that show sediment toxicity has not increased. Another serious Panel concern is the high degree of uncertainty in the proposed wetland mitigation plan and the lack of details provided to determine whether the proposed plan can meet the criteria of 2008 USACE Mitigation Rule, Part 332.2(h). The mitigation plan could be improved by indicating how success will be determined and

the inclusion of details on real estate acquisition, such as a priority list of parcels, an acquisition timeline, the approach for addressing problems, and a contingency plan. Finally, the Panel believes that the FR/EIS should commit to using suitable dredged material for the restoration and enhancement of Crab Bank and Shutes Folly and also notes that the potential presence of hardbottom resources adjacent to the ODMDS could affect the site's capacity.

**Plan Formulation:** From a plan formulation standpoint, most of the tables were very well organized and contribute helpfully to explaining the plan formulation process. In addition, the analysis of sea level rise is among the most thorough and most proficient the Panel has seen. A major concern is that a contingency plan has not been presented in the event that the ODMDS expansion is not approved. The current capacity of the ODMDS could not hold even the initial construction volume of dredged material, not to mention the future maintenance dredging amounts. While the Risk Register identifies the risk of the FR/EIS not being approved because of these ODMDS issues as 'low', the Panel could not find any supporting information in the FR/EIS as to why USACE assigned a low risk. The Panel believes that the future of the project is contingent on the ODMDS being expanded and a contingency plan (with detailed costs) should be prepared to show that the project can continue even if the ODMDS expansion is not approved. The Panel also strongly believes that the alternative formulation process of reducing the alternatives from 294 to 6 could have been better documented. A clearly described plan formulation process is important to the validity of the FR/EIS and, therefore, to the project being approved. The FR/EIS should be revised to describe the alternative screening process in far more detail and to include the benefits and costs for some of the alternatives. Finally, the Panel notes that the FR/EIS does not describe which entity or entities would fund the adaptive management activities, which can be costly.

## [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/EIS does not describe a contingency plan if the ODMDS expansion is not approved.**

### Basis for Comment

A contingency plan has not been presented for the disposal of material from initial construction and from the 50-year operation and maintenance (O&M) period if the proposed Ocean Dredged Material Disposal Site (ODMDS) expansion is not successful. Disposal of dredged material into ocean waters is governed by the Marine Protection, Research, and Sanctuaries Act. The criteria and procedures for ocean dumping permits for dredged material are covered by the U.S. Environmental Protection Agency's (EPA's) ocean dumping regulations (40 CFR Parts 220 to 229).

As stated in Section 2.3.4.3, in 2009, the remaining capacity at the ODMDS was projected as 32 percent, or 24.8 million cubic yards. If this is accurate, the ODMDS cannot handle the initial construction quantity of 29 million cubic yards or the O&M material for a 50-year project life. Despite this risk, this issue is not mentioned as one of the four major items in the first sentence of Section 4.5.7 (Risk and Uncertainty) and there was no supporting information in the FR/EIS on why this issue was assigned as "Low" risk in the risk register.

### Significance – High

Project construction and future maintenance are contingent on EPA approval to increase the ODMDS.

### Recommendation for Resolution

1. Present a contingency plan with detailed costs to demonstrate that the project can move forward if the change to the ODMDS limit is not allowed.

## Final Panel Comment 2

**The use of the 1995 Section 401 Water Quality certification for disposal of dredged material effluent from the existing disposal areas in the project area may not be appropriate.**

### Basis for Comment

Given the growth of the port operations and waterfront changes in Charleston Harbor over the past 19 years, water quality in the project area may have deteriorated, resulting in the effluent from the proposed disposal areas no longer able to meet the 1995 Section 401 Water Quality Certification. Section 2.4.7 of the FR/EIS (page 2-51) states that because dredging and disposal methods have not changed since the 1995 Section 401 Water Quality Certification was issued, the USACE considers the 1995 Certification still to be valid. It does not account for the possibility that there could be elevated contaminants in the water and sediments of the proposed areas to be dredged, which would increase the contaminant levels in the effluent discharge from the disposal areas.

Appendix M1, Section 3, page 15, contains a list of studies on which USACE bases the continued validation of the 1995 Certification. Appendix M lists Tier I, II, and III existing information that indicates environmental acceptability of dredging and dredged material disposal. With the exception of one lower harbor and entrance channel study in 2010 and four site-specific studies, other studies on which this conclusion is based are dated 1979 -1999. Thus, the conclusion that the 1995 Certification is valid is based, in part, on data collected up to 35 years ago.

Appendix M1 also discusses Tier II analyses and results from the 2012 Charleston Harbor sediment study. The results indicate that values for several parameters exceed the Threshold Effects Level and/or the Effects Low-Range (Table 6, page 20) for metals in the sediment. This includes exceedances for arsenic, chromium, and nickel, and exceedances for dioxin at all sediment sampling sites. No data are presented indicating that the effluent from the existing dredge disposal sites can meet current water quality standards and thus be eligible for Section 401 Certification.

Section 2.4.5.5 of the FR/EIS (pages 2-44 and 2-45 and Figure 2-20) note that the most recent South Carolina Estuarine and Coastal Assessment Program report shows multiple areas in the Cooper River that have either a Poor or Fair sediment quality score. The document states that “sediments that have accumulated on the bottom of the Cooper River may contain contaminants that could negatively affect aquatic life.” If these contaminants are resuspended during dredging and are in the discharge water from the existing disposal areas, the water may not meet the current water quality standards, and thus the project would not be eligible for Section 401 Certification.

### Significance – Medium/High

For the project to proceed, there must be a valid Section 401 Water Quality Certification or the FR/EIS needs to provide sufficient data to conclude that it is still valid.

### Recommendation for Resolution

1. Provide a summary of the existing data justifying the finding that the 1995 Certification is valid,

including (but not limited to) evidence that the amounts of toxic materials in the sediment have not increased in the past 19 years.

2. Collect additional data to support the validity of the 1995 permit.
3. Demonstrate that when sediments in the Cooper River are dredged and deposited in the enhanced disposal areas, the discharge will meet current water quality standards.
4. Describe the special protocols that are in place to manage effluent, and demonstrate that they are sufficient to ensure that the discharge is not in violation of the 1995 Section 401 permit.

### Final Panel Comment 3

**The alternative formulation process, which reduced the early alternatives from 294 to 6, is not sufficiently described.**

#### Basis for Comment

Clearly describing the plan formulation process, from identifying problems and opportunities, to formulating and evaluating alternative plans, to ultimately selecting the TSP, is critical to the validity of the FR/EIS. It is the basis upon which Federal action is taken.

The FR/EIS discusses the reduction from 294 initial alternatives to 6 alternatives in only two places: the last paragraph on page 3-26 and in Table 3-2. Page 3-26 states that a decision to analyze alternative depths at 2-foot increments instead of 1-foot increments decreased the number of alternatives to 147, and the next sentence very broadly describes how the alternatives were further reduced to 6. In Table 3.2, a rationale is presented to reduce the 294 initial alternatives to 54, then 44, and finally 6, without explaining the reduction from 294 to 147. The table indicates that USACE computed benefits and costs for the 54 alternatives in September 2012 and then the 44 alternatives in November 2012, but these analyses are not included in the FR/EIS. While the elimination of Segments 4 and 5 and the air draft limitations are clear reasons for the reduction from 54 alternatives to 44, the Panel was unable to follow the logic of reducing the alternatives from 44 to 6. In addition, the 6 final alternatives were analyzed at a different level of detail than the other alternatives; therefore, the description of that rationale warrants a separate table. It is also not clear how the decision was made to assume maximum widening measures (discussed in Appendix P) for the final round of alternatives.

Once the alternatives are reduced to 6, the logic behind selecting the National Economic Development (NED) plan and the Locally Preferred Plan (LPP) is clearly articulated. However, having the South Carolina State Ports Authority deciding to proceed with a LPP is a major decision, and documentation of the Ports Authority's letter of support should be included in the report. While page 3-47 says the letter is included, page 4-27 says it is available upon request. The Panel could not locate it.

#### Significance – Medium/High

The plan formulation process must be clearly described in order to inform the reasoning behind the NED and LPP plan selection.

#### Recommendation for Resolution

1. Modify Table 3.2 to include, at a minimum, a row showing the 147 alternatives to lead the reader through the plan formulation process.
2. Include a detailed table showing the computed benefits and costs for all 54 and 44 alternatives, based on the September and November 2012 analyses.
3. Separate the final array of 6 alternatives into a separate table, since the level of detailed analysis is significantly different from the earlier processes to reduce the alternatives to 54, then 44.
4. Include information from Appendix P (page 3) to provide the reasoning behind the assumption of maximum widening for the alternatives. Clarify details in callout boxes on Figures 3-7, 3-8, and 3-9 with regard to the "widening" level of detail when the text says "all of the alternatives

assumed maximum widening measures.”

5. Include the South Carolina State Ports Authority letter of support of the LPP in Appendix Q.

## Final Panel Comment 4

**The proposed wetland mitigation plan includes a high degree of uncertainty and does not provide enough information to determine whether the plan is appropriate and/or can be successfully completed.**

### Basis for Comment

The FR/EIS (page 4-18) states, “Presently, there is sufficient acreage available to cover [the] need for compensatory mitigation.” However, the mitigation plan lacks the details necessary to assess whether the proposed plan can meet the project’s mitigation requirements. For example, the mitigation plan does not discuss how success will be determined or include essential details on real estate acquisition, such as a priority list of parcels, an acquisition timeline, how problems will be addressed, and a contingency plan.

The FR/EIS and Appendix P (p. 18) state that 484.55 acres of wetlands are required for preservation based on the Uniform Mitigation Assessment Method calculation and that an additional 70 percent contingency is applied, increasing the potential necessary acquisition to approximately 831 acres. The 70 percent contingency is high because it is based on a hypothetical mitigation site that Appendix P, page 19, says may not be available. The question as to whether this mitigation site is available implies a high degree of uncertainty, and therefore adds to the concern about the mitigation plan success.

The FR/EIS and Appendix P do not provide sufficient documentation to demonstrate that the proposed mitigation plan meets the preservation option criteria of the 2008 USACE Mitigation Rule, Part 332.2(h). The preservation option of Part 332 is allowable if the proposed mitigation meets the criteria in 332.2(h)(i – v); however, the FR/EIS does not explain how these criteria have been met. In addition, none of the parcels to be preserved are specifically identified. While the Panel is aware of USACE’s concerns about divulging information that may jeopardize future acquisition negotiations, the resulting lack of information creates considerable uncertainty about the mitigation plan.

Appendix P states that the preservation option “best meets the compensatory mitigation requirements based on cost effectiveness and incremental cost analysis” (page 16). However, this conclusion is based on information presented in Table 4 of Appendix P, which includes a footnote stating that USACE is “not confident” in the \$4,500 cost/acre for the purchase of U.S. Forest Service (USFS) tracts. If the \$4,500/acre cost of acquisition is not a realistic number, other mitigation options could be preferable. Further, the comparison of mitigation site options in Table 4 shows there are unknown costs for restoration at some sites and, for other sites, states that additional restoration is ‘N/A’. These table entries only increase the uncertainty of the acquisition costs for future additions to the USFS land.

A potential solution to the mitigation issue is presented in Section 3.4 of the FR/EIS (Study-Specific Assumption G), which states that discharge from the Pinopolis Dam will remain relatively constant due to contractual agreements. Based on an understanding of how freshwater discharges from dams can alter the salinity regime of downstream waters, the Panel believes that increased discharges from the dam would help offset the shift in the salinity gradient described in the Tentatively Selected Plan (TSP) and thus reduce the amount of wetlands that must be preserved. However, without access to the contractual agreements keeping the discharge constant, the Panel cannot determine if this is a viable

option to reduce the mitigation requirements.

Finally, Section 4.1.2 of the FR/EIS (page 4-5), states:

“The TSP would indirectly impact about 281 acres of freshwater wetlands (emergent and forested) through changes in salinity, **which could require** compensatory mitigation in the form of preservation and conveyance of an estimated 831 acres to the US Forest Service (See Appendix P).”

However, on page 4-16, it states:

“Mitigation for wetland impacts **includes preservation of** approximately 831 acres of wetlands (See Appendix P).” [Emphasis added by the Panel.]

The conflicting message should be corrected so that the mitigation plan message is clearly conveyed.

If it is determined that the mitigation plan’s goals cannot be attained, an Adaptive Management plan will need to be developed to match whatever new goals are set

### Significance – Medium/High

For the project to move forward, the wetland mitigation plan must be described in sufficient detail to evaluate whether it will meet the mitigation requirements for the project and whether the preservation of wetlands option meets the criteria of the 2008 USACE Mitigation Rule, Part 332.2(h).

### Recommendation for Resolution

1. Provide the information needed to assess whether the proposed acquisition of up to 831 acres is appropriate and attainable.
2. Provide information needed to demonstrate that the proposed preservation of wetlands option meets the criteria of Part 332.2(h).
3. Investigate the possibility that Pinopolis Dam discharges could decrease the required mitigation amounts.
4. Prepare an Adaptive Management plan to address the changes that will be needed if the goals of the original plan cannot be attained.

## Final Panel Comment 5

**A significant number of SPTs do not extend below pay depth, which may have implications for the types of dredging equipment used, predicted production rates, and disposal site capacity.**

### Basis for Comment

Charleston Harbor is a New Work project (i.e., the first time in history it has been dredged) and the sediment to be dredged has been in place for a long time. The New Work project design and bid requires borehole information such as sediment characteristics and sediment penetration test (SPT) data for all sediment that is anticipated to be dredged. This includes sediment deeper than the proposed pay depth<sup>1</sup>, or the maximum depth of sediment removal that will be paid for at the bid unit price. The proposed New Work pay depth is 58 feet for the Harbor entrance, 56 feet for the Lower Harbor and 56/52 for the Upper Harbor.

For the purpose of the project's New Work cost estimate and the design of disposal site capacity, the conservative assumption should be made that 100 percent of the pay depth will be dredged, and that a non-pay depth of at least 4 additional feet will be dredged and disposed in the upland and in-water disposal sites. This assumption is necessary to avoid differing site condition claims, such as different sediment density or different grain size, and to ensure that there will be adequate disposal site volume available for New Work dredging and future maintenance dredging. However, based on the data reviewed by the Panel, approximately 30 percent of the SPTs do not extend to the 62-foot depth or greater for the Harbor entrance, and to the 60-foot depth or greater in the Lower and Upper Harbors.

In short, the nature of the sediment to be dredged below pay depth is not fully characterized. If the sediment below the pay depth plus total excavation depth is not fully characterized, the contractor could overestimate the production rate and underestimate the equipment and the disposal site capacity required. If all of these aspects of the project are estimated incorrectly, the project cost could be significantly higher than the current estimate.

### Significance – Medium/High

The estimated New Work project cost must consider the potential and reasonable highest cost for project completion.

### Recommendation for Resolution

1. Prepare a map marking which SPT locations do, and which do not, have data for depths that are 4 feet deeper than the proposed pay depth. Use the map to determine where additional borings or borings of greater depth are required.
2. Prepare a dredge and disposal plan and cost estimate based on dredging 4 feet deeper than maximum pay depth.

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<sup>1</sup> Pay depth includes the required dredging depth, plus the advance maintenance depth as well as the allowable overdepth.

## Final Panel Comment 6

**The need for advanced maintenance in the channel to compensate for high shoaling volumes was not included in the hydraulic modeling and, therefore, was not factored into the evaluation of project impacts and cost estimation.**

### Basis for Comment

Shoaling caused by severe storm or sedimentation conditions can create a significantly shallower channel than the authorized depth. Ideally, the concept of advanced maintenance dredging is to ensure that fully authorized channel depths exist at all (or most) times during the year, regardless of major storm/sedimentation events. Hydraulic modeling can help determine channel shoaling, and subsequently maximum channel dredging needs to ensure that the authorized channel depth (or greater) exists for deep-draft vessel passage. Advanced maintenance has been proven successful at other deep draft ports in the past (e.g., Portland, Oregon; New York, New York; San Francisco, California; Boston, Massachusetts; Seattle, Washington; Galveston, Texas). The information provided in Figure 4-1 of the Charleston Harbor Post 45 FR/EIS indicates that “no advanced maintenance dredging” was required in Segment 2 of the entrance channel because it has “no historic shoaling” within the depths of the existing navigation channel.

The Panel believes that USACE should consider the potential for navigation channel shoaling after the New Work dredging, particularly in both Segments 1 and 2 of the entrance channel. Other New Work dredging projects for deep-draft channels (e.g., Columbia River, Oregon; Port of Oakland, California; Port of Everett, Washington) have experienced higher sedimentation and shoaling conditions for the first several years after deepening. After the New Work dredging at these other deep-draft ports, the annual shoaling demonstrated a gradual return (over one to three decades) to approximately the channel deposition volume of the previous shallower channel dimensions. Without an evaluation of shoaling scenarios, the Panel is concerned that the full impacts of the Charleston Harbor project will not have been assessed, resulting in possible implications for the project’s benefit-cost ratio.

### Significance – Medium/High

Advanced maintenance must be evaluated for the Charleston project to ensure that all project impacts are evaluated and maximum benefit versus cost is realized.

### Recommendation for Resolution

1. Conduct additional hydraulic modeling to evaluate how advanced maintenance could compensate for high shoaling events.
2. Evaluate the possibility of slope failure and channel shoaling along the man-made and maintained future width and depth of the navigation channel.

## Final Panel Comment 7

**The Charleston Harbor Post 45 FR/EIS does not evaluate the effect of storm surge on the TSP.**

### Basis for Comment

The Panel did not find any evidence that the effects of storm surge after construction of the TSP were evaluated. Section 4.5.9 of the FR/EIS states that storm surge and coastal erosion analysis will be done at the preconstruction engineering and design (PED) phase. However, by deferring the storm surge analysis to PED, the feasibility report may not have information on how the proposed dredging will affect storm-surge-generated sediment erosion and deposition. The Panel believes that a storm surge analysis is important for project consideration, especially because the results could have implications on the potential benefits of the project and mitigation needs and, therefore, the cost of the TSP.

### Significance – Medium/High

A storm surge analysis could reveal significant impacts of the TSP that would warrant re-estimation of cost, benefits, and mitigation.

### Recommendation for Resolution

1. Provide in the FR/EIS empirical evidence of the impacts of storm surge on dredged Charleston Harbor waterways.
2. Provide documentation during the PED phase that the TSP will not likely generate significant impacts during storm surge conditions. Otherwise, compare the pre- and post-TSP surge impacts.
3. Re-evaluate the TSP cost, benefits, and/or mitigations at the PED phase if the TSP has significant impacts during surge events.

## Final Panel Comment 8

**The documentation of the navigation problems that support the need to widen the channel and turning basin has not been provided.**

### Basis for Comment

The FR/EIS indicates that ship simulation modeling will be performed during PED to verify what project channel and turning basin dimensions are necessary to accrue the LPP benefits. Without a completed ship simulation, the channel and turning basin widenings in the FR/EIS were based on a set of “maximum” widening measures identified using experience and professional judgment. While that is a reasonable starting point, the FR/EIS contains limited documentation of what navigational problems are present, which would provide support for improvements in those site-specific areas. The Panel believes that a reasonable level of documentation should be provided at the feasibility stage to support the recommendation to Congress for authorization.

Post-Panamax Generation I and Generation II vessels are currently navigating Charleston Harbor either by light loading or through using tidal advantage. With the improvements proposed in the FR/EIS, vessels of this size will be able to navigate unrestricted at low tide. Therefore, there should be some empirical data available related to the navigational problems or delays of post-Panamax vessels to support the need for Harbor improvements, until necessary measures can be further verified during PED studies. Some general discussion is provided in the FR/EIS to include U.S. Coast Guard-documented locations of groundings and collisions, but no information is provided on the actual damages incurred or the significance of the actual incidents.

### Significance – Medium

Without additional documentation to support the navigation problems, the project need has not been fully demonstrated.

### Recommendation for Resolution

1. Provide a detailed discussion of the navigation difficulties, safety considerations, and/or delays (including documentation of actual incidents and associated damages) in support of each area identified for channel and turning basin widening.

## Final Panel Comment 9

**Incremental analysis of each channel and turning basin improvement has not been performed to demonstrate the feasibility of the improvements and support the identification of the NED plan and the LPP.**

### Basis for Comment

Currently, the channel and turning basin widenings have not been incrementally analyzed from an economic or navigation safety standpoint, and the cost of these improvements has not been identified. Without providing and supporting the incremental cost and benefits for these improvements, the Panel is unable to determine even the preliminary incremental feasibility of all these improvements.

Given the present status of the FR/EIS, the Panel agrees with the decision to defer the ship simulation analysis until PED. However, since the incremental analysis of each improvement is dependent upon the results from the ship simulation analysis, the incremental analysis must also be deferred to PED. Therefore, recommendations have been made in the FR/EIS, and will be made in the Chief's report for Congressional authorization, that cannot be completely supported at this time. While the Panel was unable to verify that all Harbor improvements are incrementally feasible, it emphasizes that the planning requirement for incremental justification must be met in the future to verify that the NED plan and the LPP have been accurately identified.

The Panel also notes that accurate identification of the NED plan is also important because the costs for the NED plan serve as a basis for determining the incremental costs for the LPP, which must be cost-shared at 100 percent non-Federal cost.

### Significance – Medium

The incremental cost and benefit of the channel and turning basin widenings need to be stated to support the NED plan and LPP.

### Recommendation for Resolution

1. Perform in PED (upon completion of the ship simulation analysis) an incremental analysis of each channel and turning basin widening and, if appropriate, modify the NED and LPP plans based on the results of the incremental analyses.

## Final Panel Comment 10

**The TSP does not commit to using dredged material to restore Crab Bank and/or enhance Shutes Folly, even though the FR/EIS acknowledges Federal emphasis on such beneficial uses and suitable dredged material appears to be available.**

### Basis for Comment

As stated in the FR/EIS (Section 4.2.6):

“Statutes such as the Water Resources Development Acts of 1992, 1996, 2000, and 2007 demonstrate that beneficial use has been a Congressional priority. The USACE has emphasized the use of dredged material for beneficial use through such regulations as 33 CFR Part 335, [Engineer Regulation] 1105-2-100, and ER 1130-2-520 and by Policy Guidance Letter No. 56. ER 1105-2-100 at E-69 states that ‘all dredged material management studies include an assessment of potential beneficial uses for environmental purposes including fish and wildlife habitat creation, ecosystem restoration and enhancement and/or hurricane and storm damage reduction.’”

Information provided in the FR/EIS (see the bullet list below) suggests that sufficient information is available on the need for and suitability of dredged material to restore Crab Bank (an Important Bird Area) and enhance Shutes Folly (a critical colonial seabird nesting habitat):

- Section 3.6.3.1 of the FR/EIS (page 3-43) states that the proposed project contemplates the use of materials for beneficial uses, including placement of material at Crab Bank and Shutes Folly. Table 3-5 states, “beneficial use options may possibly affect bird nesting/roosting/foraging habitat.”
- Section 4.2.6 of the FR/EIS (page 4-11) notes that beneficial use of dredged material is a Congressional priority. However, the decision regarding whether to proceed with placement of dredged material at either site will not be determined until the PED phase.
- Section 4.2.6.3 states that Crab Bank has been reduced in size from 17.94 acres in 1994 to 5.01 acres in 2011. This section notes that beneficial use could enlarge Crab Bank to about 58 acres; it also notes that this was not studied during this project and that the size and scope of any enlargement is dependent on a source of suitable material.
- Section 4.2.6.4 states that placing dredge material around Shutes Folly may prevent erosion and also discusses the importance of the area as a seabird nesting site. A proposed beneficial use area is identified in Figure 4-6 (page 4-15).
- Given the amount of historic information from previous dredging events (Section 2.3.4.1), there should be a substantial database on the sediment parameters from past events. Further, Appendix J, page 10, Exhibit 2-3 indicates that sediment samples have been collected in the areas proposed for dredging. The sediment consists of fine-grained sand that appears to be suitable material for restoration and enhancement.

Based on the information presented above, there is a clear directive for the beneficial use of dredged material and evidence exists that suitable material is available to restore Crab Bank and enhance Shutes Folly.

### Significance – Medium

To comply with USACE's emphasis on the beneficial use of dredged material, a commitment to restore Crab Bank and enhance Shutes Folly is needed in the TSP rather than delaying the decision to the PED.

#### **Recommendation for Resolution**

1. Evaluate existing and historic sediment data that are available and develop plans to restore Crab Bank and enhance Shutes Folly.

## Final Panel Comment 11

**The possible presence of hardbottom resources adjacent to the proposed expanded ODMDS may affect the ability of the ODMDS to provide sufficient capacity for the construction and maintenance dredging events.**

### Basis for Comment

A definitive determination of the presence or absence of hardbottom near the northeast boundary of the proposed expanded ODMDS is not provided in the FR/EIS; therefore, the Panel could not determine whether the ODMDS can function as intended or whether any hardbottom resources will be impacted when disposing of dredge material. If hardbottom resources are present in the area adjacent to the northeast boundary of the proposed expanded ODMDS, an adjustment in the boundary of the ODMDS may be required. There is no information to assess whether a modified ODMDS will have the capacity to handle the expected volume of dredge material and/or if EPA is willing to allow impacts to any hardbottom resources.

Figure 4-3 of the FR/EIS (page 4-11<sup>2</sup>), Figure 8 on page 21 of Appendix P, and Figure 5 on page 15 of Appendix H show an area labeled as probable hardbottom in close proximity to the proposed boundary of the ODMDS. The FR/EIS describes how a berm will be constructed along the northwest and southwest boundaries of the expanded ODMDS to reduce impacts to the known hardbottom resources to the southwest of the proposed ODMDS but does not describe any protective measures for the probable hardbottom to the northeast of the ODMDS. Without knowing if there are hardbottom resources in the vicinity of the northeast section boundary, the Panel cannot determine if a berm is necessary or whether the ODMDS boundary should be modified.

### Significance – Medium

Due to a lack of documentation, the presence/absence of hardbottom areas adjacent to the ODMDS is uncertain, and potential impacts to the proposed ODMDS boundary if hardbottom is present in this area cannot be determined.

### Recommendation for Resolution

1. Confirm the presence/absence of hardbottom in the area identified as “probable hardbottom.”
2. Adjust the ODMDS boundary to ensure that impacts to the hardbottom resources are avoided and that the ODMDS retains the capacity to meet the project requirements.

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<sup>2</sup> There are two pages labeled 4-11 in the FR/EIS. This is referring to the second page labeled as 4-11.

## Final Panel Comment 12

**A pipeline dredge with cutterhead may not be the most appropriate equipment for the construction of the berm adjacent to the ODMDS because it does not perform effectively in open waters with large wave conditions.**

### Basis for Comment

The FR/EIS (Figure 4.1) identifies a berm to be constructed adjacent to the ODMDS at approximate channel mile 7, which is an open-water area subject to waves and high winds. The dredge plan proposes the use of a pipeline dredge with cutterhead to dredge material from the New Work entrance channel and discharge it into the ODMDS. However, the typical pipeline dredge operation does not work effectively in open waters with potentially large wave conditions. Pipeline dredging is more suited to rivers or lakes that have calm water because the dredge hull is afloat, with the cutterhead in constant contact with the bed. Under moderate wave conditions, a cutterhead will continually lift up from, and then drop onto, the channel being dredged. A pipeline dredge could utilize a cable anchor system with a larger hull size and draft to reduce or eliminate the lifting and dropping caused by waves. However, the Charleston Harbor Post 45 FR/EIS does not describe such a system for the ODMDS berm construction.

An alternative would be to use a mechanical dredge with haul barge, which would eliminate the need for constant contact with the bed and would allow dredging to be conducted in wave conditions for which a pipeline dredge is not well suited. In addition, mechanically dredged sediment can be placed more precisely than sediment placed with a discharge pipe. Mechanically dredged sediment is typically placed by using a split-hull dump haul barge or a scow with sediment placed by mechanical excavator. Either of these two placement methods would be more precise than using a discharge pipe, which would have to be continuously repositioned along the alignment of the containment berm.

### Significance – Medium

If unsuitable dredge equipment is chosen for the ODMDS berm construction, a variety of cost implications could result, including schedule delays, production rate inaccuracies, and the cost of securing new equipment.

### Recommendation for Resolution

1. Re-evaluate the use of a pipeline dredge for the berm construction project, based on the open-water conditions at the ODMDS.
2. If a pipeline dredge is determined not to be the best equipment, recalculate the costs of using another dredging and disposal system.

### Final Panel Comment 13

**The project schedule and cost estimate has not considered the need for an additional 15-20% of New Work dredging volume.**

#### Basis for Comment

Being a New Work project and not a maintenance dredging project, the construction schedule proposes to complete New Work sediment dredging of approximately 20 million cubic yards from the entrance channel, and 23 million cubic yards from the estuary channels. This dredging pay volume is based on dredging the entire project to the allowable over depth. Dredging pay volume is the amount of sediment when the project is dredged to the required depth, plus advanced maintenance dredging (i.e., 2 feet) and plus allowable over depth (i.e., an additional 2 feet). Because dredging is a relatively inaccurate activity, an additional 15-20% of the dredging pay volume should be dredged below the allowable over depth (Bray et al. 1996; Herbich 2000). This is a non-pay volume that must be considered when designing and bidding the project and determining disposal capacity. The project information reviewed by the Panel does not estimate non-pay project volume nor the cost and schedule implications caused by the non-pay volume.

#### Significance – Medium

If the dredge volume is underestimated, there will be cost, construction, and schedule consequences for the project.

#### Recommendation for Resolution

1. Prepare a disposal site design and contract estimate based on the fact that New Work dredging requires considerations for significant non-pay dredging volume and subsequent greater disposal volumes.

Bray, R.N., A.D. Bates, and J.M. Land. (1996). Dredging: A Handbook for Engineers, 2<sup>nd</sup> ed. Butterworth-Heinemann. 448 pp.

Herbich, J.B. (2000). Handbook of Dredging Engineering, 2<sup>nd</sup> ed. McGraw-Hill. 992 pp.

## Final Panel Comment 14

**The extent of the Charleston Harbor entrance entrainment area is not described in sufficient detail to determine whether the hydraulic model grid extends far enough into the ocean to account for the mixing of water and salinity at the Harbor connection.**

### Basis for Comment

Appendix A (Engineering), Section 3.3.1, Figure 3.3.1 shows the Environmental Fluid Dynamics Code (EFDC) model grid encompassing an ocean area that extends about 18 miles offshore, but only about 6 miles (southwest) and 10 miles (northeast) alongshore from the Charleston Harbor entrance. The extent of the entrainment area (in which the mixing of water and salinity between the ocean and harbor entrance occurs) varies along the coastline with meteorological conditions and inshore freshwater flows. Not enough information has been provided in Appendix A to determine if this EFDC model grid extent includes the entire entrainment area. The impact of the project on inshore salinity was evaluated based on the modeled salinity output from the EFDC model. Thus, it is essential for the model to include the whole entrainment area to simulate accurately the mixing process at the Harbor entrance and the modeled salinity at inshore areas. The Panel cannot confirm that the ocean model grid area is adequate because panel members did not find a discussion on the extent of the entrainment area outside of the harbor entrance.

### Significance – Medium/Low

The impact of the project on salinity in inshore areas may not be accurately described if the model grid does not cover enough of the entrainment area.

### Recommendation for Resolution

1. Compare the ocean area in the EFDC model grid with the Charleston Harbor entrance entrainment area, and confirm whether the model ocean area encompasses the largest extent of the entrainment area.
2. Provide documentation that the EFDC model domain, as shown in Figure 3.3.1, provides sufficient ocean area to simulate accurately water and salinity mixing at the Charleston Harbor entrance.

## Final Panel Comment 15

**The iterative adjustments of the offshore water level, salinity, and temperature to match inshore station data during EFDC model calibration could result in a less robust hydraulic model validation.**

### Basis for Comment

Appendix A (Engineering), Section 3.3.5.3, discusses the model validation (calibration and verification) and includes a description of the iterative adjustments of the offshore water surface elevation, temperature, and salinity to achieve a better fit of the model results with measurements at inshore stations. Although the EFDC hydraulic model that was validated with iterative adjustments of offshore boundary conditions can evaluate the relative performance of each alternative, the model results that specify absolute quantity of impacts (e.g., change in water level, salinity, temperature, etc.) could have some degree of errors associated with the iterative adjustments of offshore boundary conditions. The effect that such errors may have had on results does not appear to be evaluated in the study. The Panel cannot confirm that the calibrated and verified EFDC model does not introduce large errors in the analyses.

### Significance – Medium/Low

Errors introduced by the iterative adjustment procedure applied to better define offshore water level, salinity, and temperature could be larger than the errors inherent in the measurements of these variables.

### Recommendation for Resolution

1. Provide documentation that the errors introduced by iterative adjustments of the offshore boundary are smaller than the errors associated with the water level, salinity, and temperature measurements.
2. Conduct a sensitivity analysis to determine how the TSP impacts will change with changes in offshore water level, salinity, and temperature.

## Final Panel Comment 16

### **Funding for the proposed adaptive management activities is not described.**

#### **Basis for Comment**

While the scope of the proposed monitoring and adaptive management is well-defined in Appendix P, there needs to be an explanation of how these adaptive management efforts would be funded. The cost to implement adaptive management can be high, given the need for repeated iterations of management actions, collection of field data on site conditions, and reanalysis of approaches required to provide the necessary mitigation. In an era of increasingly tight agency budgets, the costs for implementation need to be determined and appropriate sources of funding identified.

#### **Significance – Medium/Low**

The lack of adaptive management funding information affects the completeness of the FR/EIS and the total project cost.

#### **Recommendation for Resolution**

1. Include funding for adaptive management in the “Total Project Costs” and a description of the adaptive management implementation process. Add language authorizing adaptive management if needed in the authorizing language for the project.

## Final Panel Comment 17

**The sensitivity analysis of economic data projections does not take into account economic benefit uncertainties related to traffic and fleet projections.**

### Basis for Comment

In analyzing risk and uncertainty in the benefit estimates, only the traffic projections (projected tonnages) were addressed in a sensitivity analysis (pages 83-87 of Appendix C). Of equal importance are the future fleet projections; however, a sensitivity analysis was not performed for scenarios using more or fewer post-Panamax vessels than currently projected. By expanding the sensitivity analysis to include more and fewer post-Panamax vessels in the projected future fleet composition, the sensitivity of the benefits associated with the uncertainty of future fleet composition can be bracketed.

The sensitivity analysis of the traffic projections in the FR/EIS included an extreme case no-growth projection that allowed traffic to increase for 12 years from 2011 through 2022, then no growth beyond 2022. Labeling this as a no-growth scenario is misleading given the inclusion of traffic increases. In addition, actual tonnages now available for 2011 and 2012 exceed the projections for those years and should be included in the report to provide further support for the TSP. A no-growth scenario that utilizes these two additional years of historic traffic data and then projects no growth beyond actual 2012 tonnages would more properly represent a no-growth scenario. While this sensitivity analysis would not demonstrate economic feasibility, it would document that, even with no increase in traffic, the resolution of the depth and width constraints alone would provide significant benefits and justify a large portion of the construction costs.

### Significance – Medium/Low

Additional sensitivity analyses for future traffic and fleet composition would improve the understanding of the economic uncertainties in the projections and their impacts on economic benefits and project feasibility.

### Recommendation for Resolution

1. Perform sensitivity analyses for future fleet compositions that reflect lesser and greater use of post-Panamax vessels compared to the current fleet composition projections.
2. Include historical general cargo tonnages for 2011 and 2012 to provide increased support for the TSP.
3. Rename the current extreme case no-growth traffic projection scenario to better represent that the scenario includes traffic increases through the base year of the project.
4. Perform an additional no-growth sensitivity analysis that includes historical tonnages for 2011 and 2012 with no-growth in traffic from 2013 to the end of the period of analysis.

## 5. REFERENCES

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# APPENDIX A

IEPR Process for the Charleston Harbor Post 45 FR/EIS 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 Charleston Harbor Post 45 Phase II, Charleston, South Carolina, Feasibility Report and Environmental Impact Statement Independent External Peer Review (hereinafter: Charleston Harbor Post 45 FR/EIS IEPR). Due dates for milestones and deliverables are based on the award/effective date of September 3, 2014. The review documents were provided by U.S. Army Corps of Engineers (USACE) on October 10, 2014. Note that the work items listed under Task 6 occur after the submission of this report. 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.

**Table A-1. Charleston Harbor Post 45 FR/EIS Complete IEPR Schedule**

Task	Action	Due Date
1	Award/Effective Date	9/3/2014
	Review documents available	10/10/2014
	Battelle submits draft Work Plan <sup>a</sup>	9/29/2014
	USACE provides comments on draft Work Plan	10/3/2014
	Battelle submits final Work Plan <sup>a</sup>	10/10/2014
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	9/10/2014
	USACE provides comments on COI questionnaire	9/12/2014
	Battelle submits list of selected panel members <sup>a</sup>	9/26/2014
	USACE confirms the panel members have no COI	9/30/2014
	Battelle completes subcontracts for panel members	10/17/2014
3	Battelle convenes kick-off meeting with USACE	9/12/2014
	Battelle sends review documents to panel members	10/20/2014
	Battelle convenes kick-off meeting with panel members	10/21/2014
	Battelle convenes kick-off meeting with USACE and panel members	10/21/2014
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	11/6/2014
	Civil Works Review Board (CWRB) Meeting <sup>c</sup>	June 2015

**Table A-1. Charleston Harbor Post 45 FR/EIS Complete IEPR Schedule (continued)**

Task	Action	Due Date
4	Panel members complete their individual reviews	11/17/2014
	Battelle provides panel members with talking points for Panel Review Teleconference	11/21/2014
	Battelle convenes Panel Review Teleconference	11/24/2014
	Battelle provides Final Panel Comment templates and instructions to panel members	11/25/2014
	Panel members provide draft Final Panel Comments to Battelle	12/5/2014
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	12/8/2014-12/15/2014
	Panel finalizes Final Panel Comments	12/19/2014
5	Battelle provides Final IEPR Report to panel members for review	12/23/2014
	Panel members provide comments on Final IEPR Report	1/5/2015
	<b>Battelle submits Final IEPR Report to USACE<sup>a</sup></b>	<b>1/7/2015</b>
6 <sup>b</sup>	Battelle inputs Final Panel Comments to the Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	1/8/2015
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	1/6/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	1/13/2015
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses to Battelle	1/21/2015
	Battelle provides the panel members the draft PDT Evaluator Responses	1/23/2015
	Panel members provide Battelle with draft BackCheck Responses	1/28/2015
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	2/3/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	2/10/2015
	USACE inputs final PDT Evaluator Responses to DrChecks	2/18/2015
	Battelle provides final PDT Evaluator Responses to panel members	2/19/2015
	Panel members provide Battelle with final BackCheck Responses	2/24/2015
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	2/26/2015
	Battelle submits pdf printout of DrChecks project file <sup>a</sup>	2/27/2015
	Contract End/Delivery Date	5/11/2015

<sup>a</sup> Deliverable.

<sup>b</sup> Task 6 occurs after the submission of this report

<sup>c</sup> The CWRB meeting was listed in the Performance Work Statement under Task 3 but was relocated in this schedule to reflect the chronological order of activities.

At the beginning of the Period of Performance for the Charleston Harbor Post 45 FR/EIS IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan. In addition, 32 charge questions were provided by USACE and included in the draft and final Work Plans. Battelle added two questions that sought summary information from the IEPR Panel. The final charge also included general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and within four days of their subcontracts being finalized, all 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 Charleston Harbor Post 45 FR/EIS review documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- **Charleston Harbor Post 45 Phase II, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement (FR/EIS) (272 pages)**
  - **Appendix A: EFDC Modeling (300 pages)**
  - **Appendix B: Groundwater and Geotechnical Considerations (135 pages)**
  - **Appendix E: Dredged Material Management Plan (50 pages)**
  - **Appendix F: Biological Assessment of Threatened and Endangered Species (130 pages)**
  - **Appendix G: Essential Fish Habitat Assessment (80 pages)**
  - **Appendix H: 404(b)(1) Assessment (75 pages)**
  - **Appendix I: US Fish and Wildlife Coordination Act Report (87 pages)**
  - **Appendix J: Coastal Zone Consistency Determination (10 pages)**
  - **Appendix K: Sediment Report (1,000 pages)**
  - **Appendix L: 103 Evaluation (86 pages)**
  - **Appendix M: Cultural and Hardbottom Resources Report Phase 1 (448 pages)**
  - **Appendix N: Cultural Report Phase 2 (79 pages)**
  - **Appendix O: Wetlands Characterization (58 pages)**
  - **Appendix P: Fisheries Models (85 pages)**
  - **Appendix Q: Wetlands Impacts Assessment (30 pages)**
  - **Appendix R: Air Quality Analysis (90 pages)**
  - **Appendix S: Benthic Resources Report (104 pages)**
  - **Appendix T: Hardbottom Resources Impact Assessment (40 pages)**
  - **Appendix U: Noise Impacts Analysis (13 pages)**
  - **Appendix V: Mitigation Report (40 pages)**
  - **Appendix X: NEPA Scoping (124 pages)**

- **Appendix Y: Coordination (20 pages)**
- **Appendix AA: Cost Effective Incremental Cost Analysis for Mitigation (20 pages)**
- **Appendix AB: Monitoring and Adaptive Management (40 pages)**
- **Appendix AC: Cumulative Impacts (45 pages)**
- **Appendix AD: Economics Appendix (130 pages)**
- **Appendix AE: Cost Engineering Appendix (100 pages)**
- Compiled Risk Register Summary
- Appendix A- Engineering Attachments
  - Attachment A-1 2012 Hydrodynamic Model Calibration Plots
  - Attachment A-2 2004 Hydrodynamic Model Validation Plots
  - Attachment A-3 Suspended Sediment Concentration Plots
  - Attachment A-4 Water Quality Validation Plots
- Appendix B- Geotechnical Attachments
  - Attachment B-1 Boring Logs Upper and Lower Harbor
  - Attachment B-2 Borings Logs Entrance Channel
  - Attachment B-3 Entrance Channel Soils Gradation Data
  - Attachment B-4 Entrance Channel Rock Strength Data
  - Attachment B-5 Entrance Channel Top of Rock Surface Data
- South Carolina Department of Natural Resources Benthic Survey of Charleston Harbor
- USACE Engineer Research and Development Center - Wetland Classification Study
- U.S. Fish and Wildlife Service Coordination Act Report
- Sediment Sampling Final Report
- Geophysical Investigation, Hardbottom Resources and Cultural Resources (Phase 1)
  - Appendix 1 USACE Survey Areas
  - Appendix 2 Habitat
  - Appendix 3 Sediment
  - Appendix 4 Coastal Carolina University Post 45 Field Notes
- Cultural Resource Investigation Phase 2
- USACE guidance Civil Works Review, (EC 1165-2-214) dated 15 December 2012
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

About halfway through the review of the Charleston Harbor Post 45 FR/EIS IEPR documents, a teleconference was held with USACE, the Panel, and Battelle so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 12 panel member questions to USACE. USACE was able to provide responses to all of the questions during the teleconference or later that day via email.

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

- Charleston Harbor Expansion and Widening Project – Multiport Analysis (31 pages)
- Port of Charleston Container Forecast (Excel spreadsheet)

## **A.2 Review of Individual Comments**

The Panel was instructed to address the charge questions/discussion points within a charge question response table provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments in a preliminary list of 19 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

## **A.3 IEPR Panel Teleconference**

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

At the end of these discussions, the Panel identified 17 comments and discussion points that should be brought forward as Final Panel Comments.

## **A.4 Preparation of Final Panel Comments**

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Charleston Harbor Post 45 FR/EIS IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
  1. Comment Statement (succinct summary statement of concern)
  2. Basis for Comment (details regarding the concern)
  3. Significance (high, medium/high, medium, medium/low, and low; see description below)
  4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
  1. **High:** Describes a fundamental issue with the project that affects the current recommendation or justification of the project, and which will affect its future success, if the project moves forward without the issue being addressed. Comments rated as high indicate that the Panel determined that the current methods, models, and/or analyses contain a “showstopper” issue.
  2. **Medium/High:** Describes a potential fundamental issue with the project, which has not been evaluated at a level appropriate to this stage in the 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 were 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, 17 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in the main report.

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# APPENDIX B

Identification and Selection of IEPR Panel Members  
for the Charleston Harbor Post 45 FR/EIS Project

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## B.1 Panel Identification

The candidates for the Charleston Harbor Post 45, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement (hereinafter: Charleston Harbor Post 45 FR/EIS IEPR) Panel were evaluated based on their technical expertise in the following key areas: hydraulic engineering, geotechnical engineering, economics, environmental, and plan formulation. These areas correspond to the technical content of the Charleston Harbor Post 45 FR/EIS IEPR review documents and overall scope of the Charleston Harbor Post 45 FR/EIS project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected five experts for the final Panel.

The five selected reviewers constituted the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

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

- Previous and/or current involvement by you or your firm<sup>2</sup> in the Charleston Harbor Post 45 Phase II, Charleston, South Carolina, Feasibility Report and Environmental Impact Statement (hereinafter: Charleston Harbor Post 45 FR and EIS).
- Previous and/or current involvement by you or your firm<sup>2</sup> in deep draft navigation studies in the south Atlantic geographic region.
- Previous and/or current involvement by you or your firm<sup>2</sup> in Charleston Harbor Post 45 FR and EIS-related projects.

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

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

- Previous and/or current involvement by you or your firm<sup>2</sup> in the conceptual or actual design, construction, or operation and maintenance (O&M) in the Charleston Harbor Post 45 FR and EIS project or related projects.
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Previous and/or current involvement with paid or unpaid expert testimony related to Charleston Harbor Post 45 FR and EIS.
- Previous and/or current employment or affiliation with the non-Federal sponsor (South Carolina State Ports Authority (SCSPA)) or any of the following cooperating Federal, State, County, local and regional agencies, environmental organizations, and interested groups: U.S. Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration (NOAA), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS), South Carolina Department of Health and Environmental Control (DHEC), and/or the South Carolina Department of Natural Resources (for pay or pro bono).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to Charleston, SC.
- 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, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Charleston District.
- Previous or current involvement with the development or testing of models that will be used for, or in support of the Charleston Harbor Post 45 FR and EIS project, including IMPLAN, HarborSym, MPFATE, STFATE, LTFATE, ADCIRC, STWAVE, Environmental Fluid Dynamics Code (EFDC), and/or ERDC Ship/Tow Simulator.
- Current firm<sup>2</sup> involvement with other USACE projects, specifically those projects/contracts that are with the Charleston 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 Charleston District. Please explain.
- Any previous employment by USACE as a direct employee, notably if employment was with the Charleston District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by USACE as a contractor (either as an individual or through your firm<sup>2</sup>) within the last 10 years, notably if those projects/contracts are with the Charleston District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning deep draft navigation studies, and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in Charleston Harbor Post 45 FR and EIS-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm<sup>2</sup> revenues within the last 3 years came from USACE contracts.

- A significant portion (i.e., greater than 50%) of personal or firm<sup>2</sup> revenues within the last 3 years from contracts with the non-federal sponsor (South Carolina State Ports Authority (SCSPA)).
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Charleston Harbor Post 45 FR and EIS project.
- Participation in relevant prior and/or current Federal studies relevant to the Charleston Harbor Post 45 FR and EIS.
- Previous and/or current participation in prior non-Federal studies relevant to the Charleston Harbor Post 45 FR and EIS.
- Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe:

Other considerations:

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

## **B.2 Panel Selection**

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Four of the five final reviewers are affiliated with consulting companies; the fifth is an independent consultant. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

An overview of the credentials of the final five members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table B-1. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in Section B.3.

**Table B-1. Charleston Harbor Post 45 FR/EIS IEPR Panel: Technical Criteria and Areas of Expertise**

Technical Criterion	Kabiling	Hartman	Shoudy	Thoenke	Ulrich
<b>Hydraulic Engineering</b>					
Minimum 10 years of experience in hydraulic engineering	X				
Registered Professional Engineer	X				
Demonstrated experience in:					
deep draft navigation channels	X				
dredged material disposal	X				
erosion	X				
coastal currents	X				
channel modifications	X				
Active participation in related professional societies	X				
M.S. degree or higher in civil, hydraulic, or related engineering field	X				
<b>Geotechnical Engineering</b>					
Minimum 10 years of experience in geotechnical design analysis involving confined and open water dredged material disposal sites		X			
Active participation in related professional societies		X			
M.S./M.A./M.B.A. degree or higher		X			
<b>Economics</b>					
Minimum 10 years of experience in deep draft navigation economic analysis			X		
Experience evaluating and comparing alternative plans for USACE			X		
Experience evaluating and conducting National Economic Development (NED) analyses of deep draft navigation or inland navigation transportation-related projects			X		
Experience directly working for or with USACE in applying Principles and Guidelines (P&G) to civil works project evaluations			X		
Active participation in related professional societies			X		
M.S./M.A./M.B.A. degree or higher			X		
<b>Environmental</b>					
Minimum 10 years of experience in environmental, estuarine, and coastal processes				X	
Understanding of environmental laws, regulations, and impacts associated with dredging				X	
Understanding of the requirements for preparation of NEPA compliance documents and coordination.				X	
Active participation in related professional societies				X	
M.S. degree of higher in an appropriate field of study				X	

**Table B-1. Charleston Harbor Post 45 FR/EIS IEPR Panel: Technical Criteria and Areas of Expertise, continued.**

Technical Criterion	Kabiling	Hartman	Shoudy	Thoenke	Ulrich
<b>Plan Formulation</b>					
Minimum 10 years of experience in deep draft navigation analysis					X
Experience evaluating and comparing alternative plans for USACE					X
Experience evaluating and conducting NED analyses of deep draft navigation project studies					X
Experience directly working for or with USACE in applying P&Gs to civil works project evaluations					X
Active participation in related professional societies					X
M.S./M.A. degree or higher					X

### B.3 Panel Member Qualifications

#### *Michael Kabiling, P.E., Ph.D.*

**Role:** This panel member was chosen primarily for his hydraulic engineering experience and expertise.

**Affiliation:** Taylor Engineering, Inc.

**Dr. Kabiling** is a senior engineer with Taylor Engineering Inc. in Jacksonville, Florida, an engineering consulting firm that specializes in hydrology, hydraulic, and coastal engineering. He has more than 21 years of experience in water resources; hydrologic, hydraulic, and coastal engineering; and numerical modeling. He earned his Ph.D. in hydraulic and coastal engineering from Yokohama National University, Japan, in 1994 and is a professional engineer (PE) in Florida, Georgia, and South Carolina. In his early career, he served as a hydraulic engineer and numerical modeler in hydrodynamics, water quality, and pollution transport for river rehabilitation projects. He also completed flood studies and sediment engineering works. Among the numerous projects that demonstrate his hydraulic engineering experience are the Jacksonville Harbor Deepening Project Impact Assessment (2009 – 2014); Pasig River Rehabilitation, Manila, Philippines (1995 – 2001); Diagnostic Modeling System, Phase II, Duval County, Florida (2001); East Pass Vicinity Borrow Area Excavation, Okaloosa County, Florida (2002 – 2003); South Carolina Coastal Storm Surge Modeling (2009); and South Carolina SC-171 Bridge Replacements over Folly River and Sol Legare Creek, Charleston County (2008 – 2011).

The Jacksonville Harbor Project demonstrates Dr. Kabiling's extensive experience in deep draft navigation and channel modification. For that project, Dr. Kabiling provided project management; supervised EFDC model validation and application for various harbor dredging scenarios; and performed quality assurance/quality control (QA/QC) model reviews. The EFDC modeling of the St. Johns River provided the means to evaluate the effect on river hydraulics, salinity, ecology, and water quality of the channel deepening, channel widening at select locations, and construction of new turning basins; and the cumulative impacts of other projects. For the Pasig River Rehabilitation Project, he supervised the implementation of field monitoring programs and conducted periodic numerical modeling of water levels, flow, and quality in rivers and channels. He also prepared technical reports to assess probable scenarios due to various river rehabilitation programs, water quality prognoses, and pollution loads. In addition, he

taught training courses on the operation and application of hydrological, hydrodynamic, advection-dispersion, and water quality numerical models.

In 2011, Dr. Kabiling worked on the Ft. Pierce Inlet Sand Bypassing Feasibility Study, Florida, where he provided project management, evaluated the fate of dredged material, designed a field measurement program, supervised and performed data evaluation and numerical modeling, supervised the estimation of potential shoaling rates at proposed deposition basins near the deep-draft Ft. Pierce Inlet Navigation Channel, prepared technical reports, and recommended future tasks for engineering design and permitting of the deposition basins. This project involved expertise in deep draft navigation, dredged material disposal, and coastal currents. Additional experience with dredged material disposal includes work on two ongoing projects: 1) the Feasibility Study of Sediment Basins near Cut 1 of Okeechobee Waterway, Martin County, Florida (an effort that also required experience in channel modification), and 2) the Assessment of Canal and Embankment Impacts on Hydraulics and Sediment Transport in the Atchafalaya Basin, Louisiana (an effort that also required experience in erosion). Other erosion-related projects include the South Carolina Bridge Replacements Project mentioned above and a 2011-2012 beach erosion project called Florida Power and Light Engineering and Permitting Services, St. Lucie County, Florida. For the South Carolina Bridge Replacements Project, Dr. Kabiling designed and supervised tide and flow velocity measurements; supervised the application of the one-dimensional HEC-RAS model of the Stono River – North Edisto River System; supervised the development and application of two-dimensional surge models at the proposed bridge locations; and supervised erosion depth estimation. For the Florida Power and Light Project, scenarios were analyzed that included a seawall to minimize shoreline erosion and submerged breakwaters to dissipate erosive wave action in the nearshore area. An integrated hydrodynamic, wave, and sediment transport model provided the means to evaluate the impact of the seawall and breakwater along the beach. As the lead modeler, Dr. Kabiling set up an integrated MIKE21 hydrodynamic, wave, and sediment transport model; calibrated and verified the performance of the hydrodynamic and wave models using available hindcasted data; and evaluated the short- and long-term performances of various submerged breakwater layouts and geometries to reduce shoreline erosion.

Dr. Kabiling's expertise in coastal currents includes the following projects: Estimation of Waves, Coastal Currents, and Erosion at the Barrier Island, Peninsulas, and Ring Levee in Lakeshore Estates Project in St. Tammany Parish, Louisiana (2006) (managing efforts to estimate waves, coastal currents, and concomitant erosion), the Atlantic Intracoastal Waterway, Sebastian Inlet (Pelican Island), Indian River County, Florida (2006) (performing hydrodynamic and wave modeling); and the Acadiana Bays Modeling Study, Louisiana (2004) (modeling currents generated by various forces [tides, waves, and winds] and advection-dispersion of saltwater).

Dr. Kabiling is an active member of the American Society of Civil Engineers (ASCE), the Association of State Floodplain Managers, the American Water Resources Association, the National Society of Professional Engineers, the Florida Engineering Society, and the International Association of Hydraulic Engineering and Research.

### **Gregory Hartman, P.E.**

**Role:** This panel member was chosen primarily for his geotechnical engineering experience and expertise.

**Affiliation:** Hartman Associates, LLC.

Mr. Hartman is currently the president and senior consultant for Hartman Associates and has over 40 years of experience in waterway engineering and development. He earned his M.S. in civil engineering from Oregon State University in 1976 and is a registered professional engineer in Washington and Oregon. His career has emphasized river and coastal engineering, and contaminated sediment remediation and his technical expertise includes open channel hydraulics; sediment transport; coastal hydrodynamics, sediment classification and navigation channel and remediation project design and contract technical provisions, and waterway construction and dredging equipment capabilities. He has assisted contractors, project owners, potentially responsible parties, and public agencies in equipment selection, budget estimates, project layout, hydraulic and hydrologic concerns, environmental suitability, dredging and disposal, capping design and oversight for clean and contaminated waterways throughout the United States and internationally.

Mr. Hartman was employed by the Corps of Engineers for 11 years and was Chief of the Dredging Operations for the Navigation Division, Portland District. Subsequent to leaving the Portland District, he has worked on navigation and sediment projects for the USACE, for Port Authorities, and for private owners. He has extensive overseas experience completing projects on all continents except Antarctica. He has prepared dredging, disposal, and cap designs and provided construction oversight.

His specific experience with confined and open water dredge material disposal includes serving as the principal engineer for a study and design of confined aquatic dredge disposal sites in the Port of New York/New Jersey harbor channel area. The sites have been used for initial development and continuing maintenance of Marine Terminal facilities. The work was completed for the Port Authority of New York/New Jersey to help in the design, permitting and construction of new terminal facilities for container cargo. Mr. Hartman was also the project manager for the development of remediation alternatives to remove coal tar and NAPL from the Mohawk River and the Utica Harbor. Work included sediment characterization, river hydrodynamic analysis, disposal site design, and cost estimates. The alternatives include natural recovery, dredging and disposal of contaminated sediment, environmental consideration for shoreline revetment. He also assisted in completion of engineering feasibility and alternatives analysis for sediment remediation on the Hylebos Waterway Superfund Site. The project involves assisting in the evaluation of the nature and extent of contaminated sediments, determining historical sedimentation in-fill, developing the preliminary dredging plan, preparing dredging disposal siting engineering analysis, evaluating upland, nearshore, and Confined Aquatic Disposal (capping) sites, and preparation of all baseline maps.

Mr. Hartman provided technical assistance to the Washington State Department of Ecology for the development of equipment standards, mitigation requirements, site criteria, and cost estimates for the confined disposal of contaminated marine sediments. He was a primary author for the document titled "Standards for Confinement of Contaminated Dredged Sediments."

From 1982 through 2010, Mr. Hartman developed curriculum and instructed USACE and Navy personnel from throughout the United States in four separate courses: Dredge Inspectors, Dredging for Engineers and Estimators, Dredge Contract Administration, and Dredging Fundamentals. Subject matter

encompasses pipeline, hopper and mechanical dredge techniques, plan and specifications, environmental consideration for dredging, shoreline stabilization, and disposal, project layout, channel design, hydrosurveys, and application of USACE Dredge Material Research Program to project planning, environmental impacts, and disposal area design.

Mr. Hartman is a member of the American Society of Civil Engineers (ASCE), the Coasts, Oceans, Ports and Rivers Institute (COPRI), and the International Navigation Association (PIANC). He is a past president (1996-1999) and board chairman (1999-2002) of the Western Dredging Association.

### **Harry Shoudy**

**Role:** This panel member was chosen primarily for his economics experience and expertise.

**Affiliation:** Independent Consultant

**Mr. Shoudy** is Chief Executive Officer of a consulting firm specializing in water resources planning and economics. He has 44 years of economics, water resource planning and policy, and plan formulation experience, including more than 33 years with USACE. He earned an M.S. in water resources planning from Colorado State University in 1980 and a B.S. in economics from Central University of Iowa in 1968. Before forming his consulting firm in 2003, he served as Chief Economist and Senior Policy Advisor for USACE. During his career, he also served as Senior Economic and Policy Advisor for the Board of Engineers for Rivers and Harbors; Chief of Economics in USACE's South Atlantic Division; Chief of Economics in USACE's Buffalo District; and an economist with the New York State Environmental Conservation Department.

Mr. Shoudy has more than 40 years of experience in the economic analysis and formulation of deep draft navigation projects. He has participated in the evaluation and comparison of alternative plans for USACE and has reviewed numerous navigation projects for consistency with the formulation process, standards, and procedures as both a division-level and a Washington-level reviewer. He also participated in the development of navigation policy as a Senior Policy Advisor, USACE Headquarters (HQUSACE), and has represented HQUSACE on many planning task forces.

As Chief of Economics for USACE's Buffalo District, Mr. Shoudy conducted National Economic Development (NED) analyses of deep draft navigation and inland navigation transportation-related projects. He served as the economist and study manager for the Cleveland Harbor navigation feasibility study and also participated in the economic analysis of the Lake Erie/Lake Ontario Waterway feasibility study. As a senior division economist and the Division Chief of Economics, Mr. Shoudy evaluated numerous deep draft and inland navigation feasibility studies for five districts of USACE's South Atlantic Division. He represented the U.S. Government as a navigation planning and economics expert and traveled to Panama on numerous occasions at the request of the State Department to provide expert planning and economic advice to delegates from Japan, Panama, and the United States on a \$20 million international study. Mr. Shoudy's USACE experience also includes more than 33 years applying Principles and Guidelines to all planning and economic evaluations of Civil Works projects. He was selected for a White House task force to review and recommend national flood control policy consistent with Principles and Guidelines after the 1993 flooding on the Mississippi River. More recently, as a consultant he has applied NED principles and USACE Principles and Guidelines in economic- and planning-related IEPRs.

Mr. Shoudy is active in professional engineering and scientific organizations and has participated in a professional capacity with the American Shore and Beach Preservation Association prior to and after his retirement from USACE.

### ***Kris Thoemke, Ph.D.***

**Role:** This panel member was chosen primarily for his environmental experience and expertise.

**Affiliation:** Coastal Engineering Consultants Inc.

**Dr. Thoemke** is the senior scientist for Coastal Engineering Consultants Inc. He received his Ph.D. in biology from the University of South Florida in 1979 and is a certified environmental professional (CEP). During his 34-year career as a professional ecologist in South Florida, he has been a researcher and land manager for the State of Florida, private ecological consultant, environmental and outdoor communicator, and Everglades project manager for a non-profit organization.

As an environmental consultant, Dr. Thoemke has conducted marine and estuarine environmental assessments (EAs), environmental permitting studies, and listed species surveys along the Atlantic and Gulf coasts in Florida. His earlier experience with wetlands and estuarine ecosystems includes his Ph.D. work on estuarine invertebrates; 11 years as manager of the Rookery Bay National Estuarine Research Reserve in Naples, Florida; four years as a wetlands ecologist conducting Everglades restoration work; and seven years as a wetlands and estuarine consultant.

Dr. Thoemke has extensive hands-on experience with environmental laws, regulations, and impacts associated with dredging. He has served as the lead environmental scientist on several teams responsible for designing, permitting, and monitoring dredging projects. These projects include the Charlotte County, Florida, erosion control project (an inlet management and beach nourishment program); the Blind Pass, Florida, dredging project (monitoring changes in the structure and composition of seagrasses in response to dredging); and the EA for the Port Everglades Offshore Dredged Materials Disposal Site (ODMDS) (project manager).

Dr. Thoemke is proficient in understanding NEPA requirements and in preparing and reviewing NEPA documents. In addition to his experience on the ODMDS project, he has prepared Environmental Impact Statements (EISs) and EAs for coastal restoration projects in the Mississippi Delta. He also was a member of the IEPR panel that reviewed the Walton County, Florida, Hurricane and Storm Reduction Feasibility Report and Draft EA; the Central Everglades Planning Project (CEPP) Draft Project Implementation Report and EIS; and the Bogue Banks, North Carolina, Integrated Feasibility Report and EIS.

In addition to his consulting work, he is the former Program Chair of the Masters in Environmental Management program at Hodges University and is currently an adjunct professor at American Public University where he teaches undergraduate and graduate-level classes in Environmental Management, Environmental Impact Analysis, Fisheries Management, Conservation Biology, Senior Seminar in Environmental Studies and Fish and Wildlife Policies, Programs and Issues.

Dr. Thoemke is a member of the National Association of Environmental Professionals and the Florida Association of Environmental Professionals. He is chairman of the Certification Review Board of the Academy of Board Certified Environmental Professionals and a Member of the Board of Trustees.

### ***Cheryl Ulrich, P.E.***

**Role:** This panel member was chosen primarily for her plan formulation experience and expertise.

**Affiliation:** Dewberry

**Ms. Ulrich** is a senior civil engineer at Dewberry with 30 years of experience in coastal system restoration, including more than 20 years of USACE experience on complex Civil Works ecosystem restoration, shore protection, and deep draft navigation projects in the southeast United States and 10 years of senior leadership program management experience on the South Florida Everglades Ecosystem Restoration Program. She earned her M.S. in civil engineering, with an emphasis on coastal and hydraulics engineering, from the University of California at Berkeley in 1987. She is a registered professional engineer (P.E.) in Florida, Texas, Mississippi, Louisiana, and Alabama.

Ms. Ulrich's Civil Works career includes eight years as a plan formulator, eight years as a project manager, and five years as a program manager. She has direct project experience in every Civil Works mission area, including flood damage reduction, hurricane and storm damage reduction, shoreline and stream bank protection, deep draft navigation, hydropower, and ecosystem restoration. She has conducted many comprehensive watershed evaluations and has managed large-scale multi-purpose water resources projects. She also has direct experience in every phase of a Civil Works project, from the reconnaissance phase (including 905(b) evaluations and feasibility cost-sharing agreements), through feasibility and design phases, to the execution of a project cooperation agreement and construction. From May 1990 through October 1997, Ms. Ulrich was the Planning Technical Lead and Project Manager for the Panama City Harbor Deep Draft Navigation Project. In addition she was the planning lead for the year-long effort associated with the Mobile Harbor Turning Basin General Design Memorandum. Both of these efforts involved evaluating alternatives and conducting NED analyses. Through her work on the Panama City General Reevaluation Reports (GRRs), she was responsible for evaluating and conducting National Economic Development (NED) analyses for a large, complex effort, which presented unique challenges arising from emerging coastal technologies, changing design criteria, and complex cost-sharing calculations for placement of dredged material from the harbor deepening project.

In 2010-2011, Ms. Ulrich was the primary instructor for "The Journey Towards Becoming a Planner Extraordinaire" which was a USACE Civil Works plan formulation and leadership development course specifically geared towards entry level plan formulators, environmentalists and economists. The course topics included the Importance of Civil Works Planning in Your Career Journey, USACE Six Step Planning and the NEPA Process, Team Building, Authorization Process, Collaborating with Your Non-Federal Sponsor, Meeting Management, Active Listening, Facilitation, Negotiations and Managing Change. Finally Ms. Ulrich recently performed an IEPR on Lake Worth Inlet, Palm Beach Harbor Feasibility Study/NEPA in 2013-2014. Ms. Ulrich has also demonstrated her planning expertise related to the application of Principles and Guidelines (P&Gs) to USACE Civil Works project evaluations. She led the development of two major revisions to the Civil Works planning process for the multi-decade, \$10.5-billion Comprehensive Everglades Restoration Program (CERP). Both of these efforts involved team coordination with the South Atlantic Division, HQUSACE, the Assistant Secretary of the Army for Civil Works, the U.S. Fish and Wildlife Service, and the non-Federal sponsor, the South Florida Water Management District. For the first effort, programmatic regulations required that project implementation reports (PIRs) be prepared as the decision document for Federal project authorization. The PIR was to bridge the gap from the CERP comprehensive review feasibility phase study to detailed plans and specifications. Ms. Ulrich led the team to define the economic justification methodology for system-wide benefits as well as project-specific benefits for each CERP project.

From 1997 through 2007, Ms. Ulrich worked for USACE's Jacksonville District, first as a senior project manager leading project delivery teams for the South Dade-Florida Bay-Florida Keys region, then as a program manager for Civil Works projects in South Florida. In that capacity, she exercised supervisory control over all South Florida project managers. In her final role, as Strategic Execution Branch Chief, she was responsible for overseeing the execution of the South Florida Ecosystem Restoration Program, which included the multi-decade, \$10.5-billion Comprehensive Everglades Restoration Program (CERP). In all of these roles, Ms. Ulrich was intimately involved with plan formulation, from the project level to the programmatic system level. During her tenure at USACE Jacksonville, she was also involved with the Withlacoochee Basin and Hillsborough Basin watershed initiatives and the C111 South Dade and 8.5 Square mile area flood mitigation projects which required extensive alternative plan formulation and NED analysis.

Ms. Ulrich is co-chair of the Integrated Water Resources Management Technical Committee and a member of the Policy Committee for the American Water Resources Association. In addition, she is on the Board of Directors for the Society for Ecological Restoration, serving as chair of its Science and Policy Committee and as pro-tem President of its newly created large-scale ecosystem restoration section.

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# APPENDIX C

Final Charge to the IEPR Submitted  
to USACE on October 10, 2014 for  
the Charleston Harbor Post 45  
FR/EIS Project

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# Charge Questions and Guidance to the Panel Members for the Independent External Peer Review of the Charleston Harbor Post 45, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement

## BACKGROUND

The Charleston Harbor Post 45, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement presents the results of a feasibility study undertaken to determine the optimal harbor depth for Post-Panamax ships that supports the National Economic Plan and South Carolina State Ports Authority goals with the least environmental impact. Charleston Harbor is situated at the confluence of the Ashley, Wando, and Cooper Rivers. It is 14 square miles in area and lies approximately at the midpoint along the South Carolina coast. Adjacent municipalities include the cities of Charleston, North Charleston, and Mount Pleasant, as well as Sullivan's, James, and Morris Islands. The harbor entrance is protected by two jetties constructed in 1878. Since the 1890s, the harbor has undergone periodic expansion, with the most recent modification of the federal channel – a deepening to 45 feet – the result of a 1996 feasibility report. The evolution of the global maritime fleet, however, is towards larger ships that require greater drafts than the Harbor can currently efficiently support. Many of the larger ships calling on the port of Charleston are limited by tide stages and, as a result, are incurring additional costs of time and money. This feasibility study will look at a combination of widening and deepening measures that may be undertaken to increase efficiency of the port throughout in response to changes in the maritime fleet.

## OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Charleston Harbor Post 45 Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement (hereinafter: Charleston Harbor Post 45 FR/EIS 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 Charleston Harbor Post 45 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 hydraulic engineering, geotechnical engineering, environmental, economic, and plan formulation issues relevant to the project. They will also have experience applying their subject matter expertise to deep draft navigation.

The Panel will be “charged” with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

## DOCUMENTS PROVIDED

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

### Documents for Review

The following documents are to be reviewed by designated discipline:

Title	Approx. No. of Pages	Required Disciplines
Charleston Harbor Post 45 Phase II, Charleston, South Carolina, General Investigations (GI) Feasibility Report	272	All disciplines
<b>Appendices</b>		
A. EFDC Modeling	300	Hydraulic engineering; environmental
B. Groundwater and Geotechnical Considerations	135	Geotechnical engineering
E. Dredged Material Management Plan	50	Hydraulic engineering; geotechnical engineering; environmental; plan formulation
F. Biological Assessment of T&E Species	130	Environmental
G. Essential Fish Habitat Assessment	80	Environmental
H. 404(b)(1) Assessment	75	Environmental
I. US Fish and Wildlife Coordination Act Report	87	Environmental
J. Coastal Zone Consistency Determination	10	Environmental
K. Sediment Report	1,000	Environmental
L. 103 Evaluation	86	Environmental
M. Cultural and Hardbottom Resources Report Phase 1	448	Environmental
N. Cultural Report Phase 2	79	Environmental
O. Wetlands Characterization	58	Environmental
P. Fisheries Models	85	Environmental

Title	Approx. No. of Pages	Required Disciplines
Q. Wetlands Impacts Assessment	30	Environmental; plan formulation
R. Air Quality Analysis	90	Environmental
S. Benthic Resources Report	104	Environmental
T. Hardbottom Resources Impact Assessment	40	Environmental
U. Noise Impacts Analysis	13	Environmental
V. Mitigation Report	40	Environmental
X. NEPA Scoping	124	Environmental; plan formulation
Y. Coordination	20	Environmental; plan formulation
AA. Cost Effective Incremental Cost Analysis (CEICA) for Mitigation	20	Environmental; plan formulation
AB. Monitoring and Adaptive Management	40	Environmental; plan formulation
AC. Cumulative Impacts	45	Environmental
AD. Economics Appendix	130	Economics
AE. Cost Engineering Appendix	100	Hydraulic engineering; geotechnical engineering; economics; plan formulation
<b>Total Page Count</b>	<b>3,691</b>	

## Documents for Reference

- USACE guidance *Civil Works Review*, (EC 1165-2-214, December 15, 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).
- Foundations of SMART Planning
- SMART Planning Bulletin (PB 2013-03)
- SMART – Planning Overview
- USACE Planning Modernization Summary

## SCHEDULE

This final schedule is based on the October 10, 2014 receipt of the final review documents.

Task	Action	Due Date
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Task	Action	Due Date
<b>Conduct Peer Review</b>	Battelle sends review documents to panel members	10/20/2014
	Battelle convenes kick-off meeting with panel members	10/21/2014
	Battelle convenes kick-off meeting with USACE and panel members	10/21/2014
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	11/6/2014
	Panel members complete their individual reviews	11/17/2014
<b>Prepare Final Panel Comments and Final IEPR Report</b>	Battelle provides panel members with talking points for Panel Review Teleconference	11/21/2014
	Battelle convenes Panel Review Teleconference	11/24/2014
	Battelle provides Final Panel Comment templates and instructions to panel members	11/25/2014
	Panel members provide draft Final Panel Comments to Battelle	12/5/2014
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	12/8/2014-12/15/2014
	Panel finalizes Final Panel Comments	12/19/2014
	Battelle provides Final IEPR Report to panel members for review	12/23/2014
	Panel members provide comments on Final IEPR Report	1/5/2015
	Battelle submits Final IEPR Report to USACE	1/7/2015
<b>Comment/Response Process</b>	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	1/8/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	1/6/2015
	USACE provides draft PDT Evaluator Responses to Battelle	1/21/2015
	Battelle provides the panel members the draft PDT Evaluator Responses	1/23/2015
	Panel members provide Battelle with draft BackCheck Responses	1/28/2015
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	2/3/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	2/10/2015
	USACE inputs final PDT Evaluator Responses to DrChecks	2/18/2015
	Battelle provides PDT Evaluator Responses to panel members	2/19/2015
	Panel members provide Battelle with final BackCheck Responses	2/24/2015
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	2/26/2015
Battelle submits pdf printout of DrChecks project file	2/27/2015	

## CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Charleston Harbor Post 45 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 Charleston Harbor Post 45 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](mailto:wisneskic@battelle.org)) or Program Manager (Karen Johnson-Young ([johnson-youngk@battelle.org](mailto:johnson-youngk@battelle.org)) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young ([johnson-youngk@battelle.org](mailto:johnson-youngk@battelle.org)) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Corey Wisneski, [wisneskic@battelle.org](mailto:wisneskic@battelle.org), no later than November 17, 2014 10 pm ET.

# IEPR of the Charleston Harbor Post 45, Charleston, South Carolina, Draft Integrated Feasibility Report and Environmental Impact Statement

## CHARGE QUESTIONS AND RELEVANT SECTIONS AS SUPPLIED BY USACE

### General Questions:

If an adequate description relating to any of the subjects in the questions below has not been provided, what, if any, additional information needs to be included and why?

1. Are the assumptions that underlie the economic, engineering, and environmental analyses sound?
2. Are the economic, engineering, and environmental methods, models and analyses used adequate and acceptable for analyzing alternatives within the context of an integrated feasibility study and environmental impact statement?
3. In general terms, are the planning methods suitable for use in a feasibility study and environmental impact statement?
4. Are the interpretations of the analyses reasonable and conclusions based on the analyses sound?
5. Is the discussion of the project's purpose and scope adequate for a feasibility report and an environmental impact statement?
6. Has sufficient information about the existing navigation project been included to fully understand the present existing conditions at the project site?
7. Is the evaluation of the proposed future without project conditions, including the problems associated with the existing navigation channels, adequate in terms of data quality, timeliness of the data, and breadth of information covered?
8. Have the relevant prior studies, reports, and existing projects been adequately described?
9. Is the set of project-specific criteria used in the evaluation of alternatives complete?
10. Are the descriptions of the components of the recommended plan sufficient for a feasibility study analysis and an environmental impact statement?
11. Are the measures proposed in the recommended plan sufficient to address the identified problems?
12. Are the features of the alternative plans adequately described?

13. Are the existing environmental conditions adequately described?
14. Have the water resources in the project area been adequately described?
15. Is description of the marine and estuarine resource information presented adequate?
16. Are the special status species and resources in the project area adequately described?
17. Are the environmental impacts to air quality, water quality and other important resources documented adequately?
18. Are the nature and magnitude of the uncertainties in the biological responses to changes in the physical environment adequately described?
19. Are the aquatic habitat impacts anticipated for each of the alternatives reasonable and adequately described?
20. Have the cumulative effects been adequately described?
21. Have unavoidable impacts been properly accounted for?
22. Are the scope and level of detail presented in the proposed monitoring and adaptive management plan adequate?
23. Is the information presented regarding vessel sizes sufficient for evaluating the requirements for this project?
24. Is the information used to determine the without-project condition tonnage projections sufficient and accurate, including the assumptions?
25. Is the information on tidal advantage and the associated effects on vessels appropriately considered when evaluating the fleet's utilization of the harbor?
26. Does the information presented on the economic analysis adequately address the problems identified under the without-project condition?
27. Are the delays associated with tidal influence adequately evaluated?
28. Is the benefits discussion adequate?
29. Does the information in the economic analysis adequately support the identified NED Plan?
30. Is the construction schedule adequate for completion of the recommended activities?
31. Is the information related to the development of new work dredging volumes and anticipated future operations and maintenance dredging for each of the final alternatives adequate?

32. Are the assumptions used in - and the conclusions of - the risk and uncertainty analysis adequate?

### **Overview Questions as Supplied by Battelle**

33. Please identify the most critical concerns (up to five) you have with the project and/or review documents.
34. Please provide positive feedback on the project and/or review documents

