

Final Independent External Peer Review Report New Haven Harbor Navigation Improvement Study, New Haven, Connecticut

Prepared by
Battelle Memorial Institute

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

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The United States Army Corps of Engineers (USACE) conducted a study to determine the feasibility of navigation improvements to the existing Federal Navigation Project at New Haven Harbor, Connecticut. New Haven Harbor is Connecticut's largest port, centrally located on the north shore of Long Island Sound mid-way between the cities of New York and Providence. The study area includes New Haven Harbor, Long Island Sound, and the Port service area. The Port of New Haven serves the greater New Haven region, the state of Connecticut, and much of the American Northeast. The port is a crucial import location for refined petroleum products for the region. The Northeast maintains a large refinery production/demand deficit and must rely heavily on imported volumes of petroleum products to meet demand.

The Project Area is New Haven Harbor. Three detached breakwaters protect the entrance of New Haven Harbor from Long Island Sound. The deep-water entrance of the main ship channel to New Haven Harbor lies between the Ludington Rock Breakwater and the East Breakwater, and the ship channel extends from deep water in the Sound to the head of the harbor. New Haven Harbor has an authorized depth to -35 feet Mean Lower Low Water (MLLW). The existing project (with 35-foot main channel and basin) was completed in May 1950.

Navigation transportation delays and inefficiencies occur due to inadequate project depth in the main channel and turning basin. Large ships delay transit to use high tide to transit the channel, take on light loads (referred to as "light loading") at their ports of origin, and/or offload cargo (referred to as "lightering") outside the harbor. Lightering operations can be adversely affected by the weather, causing additional delays. Lightering of liquid petroleum products carries a risk of spills and environmental impacts in Long Island Sound. The project purpose is to improve navigation efficiency, safety, and maneuverability while considering potential project benefits of habitat creation and coastal resiliency.

The problems and opportunities identified for New Haven Harbor led to the specific planning objectives stated below. These objectives provide focus for the formulation of alternatives and reflect desired positive changes in comparison to the without-project conditions. Planning objectives for the 50-year period of analysis for the New Haven Harbor project are as follows:

- Reduce existing tidal delays and lightering, and reduce reliance on light loading
- Improve the efficiency of operation for tankers, bulk carriers, and general cargo ships over the 50-year period of analysis
- Accommodate any identified growth in bulk and liquid cargo
- Provide navigation conditions that support a shift to large ships

- Improve the safety and maneuverability of deep draft navigation at New Haven Harbor
- Consider beneficial use of dredged material

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an independent external peer review (IEPR) of the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut (hereinafter: New Haven Harbor IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2018). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2018) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: Civil Works planning/economics, environmental resources, coastal hydraulic engineering, and geotechnical engineer/geology. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of all the final candidates to independently confirm that they had no COIs, and Battelle made the final selection of the four-person Panel from this list.

The Panel received electronic versions of the decision documents (599 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

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

IEPR panel members reviewed the decision documents individually and produced individual comments in response to the charge questions. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, 12 Final Panel Comments were identified and documented. Of these, three were identified as having medium/high significance, one had medium significance, four had medium/low significance, and four had low significance.

Battelle received public comments from USACE on the New Haven Harbor Draft Integrated Feasibility Report/Environmental Impact Statement (IFR/EIS) (approximately 12 verbal transcripts and 29 letters

totaling 76 pages of comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the New Haven Harbor review documents. After completing its review, the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments.

Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2018) in the New Haven Harbor 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 very thorough and reader-friendly. The analyses appear to comply with all of the most recent technical and policy requirements. The treatment of alternatives considered in formulating the Tentatively Selected Plan (TSP) is very well done and provides solid support for the proposed design. Also, established guidelines were used in the conceptual design to provide a sound basis for channel geometry; furthermore, in the evaluation of risk, it is clear how the contingency was developed. The various report appendices provide a high level of detail that supports the presentation of existing and anticipated environmental conditions in the project area. The Panel, however, identified some elements of the project where additional analyses, data, or information are recommended to provide clarification or to support project findings.

Engineering: The Panel generally finds that the quality and quantity of the surveys, investigations, and engineering are sufficient for the conceptual design of the alternative plans. One of the Panel’s most significant findings is that future dredging frequency might be underestimated based on analyses and assumptions related to project flow velocity estimates. Other related findings are that analyses based on a 1988 Numerical Model Study may not reflect current shoaling rates, and that the risk associated with uncertainty in estimated shoaling rates and dredging is not presented. The Panel recommends that additional data and analyses be presented to support assumptions regarding dredging frequencies, and that risk related to uncertainty regarding shoaling and dredging be presented. Another significant Panel finding is that the dredged materials proposed for salt marsh creation may not adequately drain in a timely manner to enable plantings and achieve mitigation goals. The Panel also notes that the proposed salt marsh fill material elevations are below water levels that have occurred during previous storms. Panel recommendations regarding the marsh include the presentation of additional information on organic silt permeability and horizontal drainage, and modeling of storm surge and wave actions on the marsh. The Panel also believes that the proposed rock excavation by blasting could impact the breakwaters, the lighthouse, and cable transmissions and, therefore, recommends additional impact analyses and an assessment of alternatives to blasting.

Plan Formulation/Economics: The review documents provide an evaluation that strongly supports the need for and intent of the project, and economic inefficiencies are described in clear detail. One of the most significant Panel findings, however, is that the analysis of petroleum product shipments and the potential impacts on expected future harbor traffic is based on a single source of petroleum shipment forecasts. The Panel suggests explaining the use of this source and determining how future petroleum shipments through the harbor might be affected by a range of forecasts. The Panel also notes that because the proprietary HarborSym model was used, variability and uncertainty of modeling results could

not be assessed. Additionally, the Panel notes that assumptions regarding discount rates, price levels, and economic behavior are not clearly documented, and that it is unclear why some commodity tonnage is held constant even though information presented suggests a 2.5% growth across the study period. The Panel recommends that descriptive statistics for the HarborSym input variables be provided and that a brief discussion of variable influence on uncertainty be included. The Panel also recommends that explicit economic assumptions be provided and adjustments to some commodity demand, tonnage forecasts, and future with-project benefit streams be conducted and presented.

Environmental: Project documents provide an adequate description of the existing environmental resources in the harbor area as well as the need for a full evaluation of the potential impacts of the project on those resources. The Panel notes, however, that the assessment of the Shellfish Creation Site's susceptibility to contaminants relies on the 1988 Numerical Model Study. Therefore, the Panel recommends sampling and chemical analysis of dredged materials in areas that have not been tested, and sediment and suspended solids transport modeling to identify transport pathways and possible contaminant loading areas within the Shellfish Creation Site. The Panel also notes that the risk register does not take into account the potential presence of a shipwreck in the area and therefore recommends modifying the risk register to include the potential for project delays and additional costs if the channel widening encounters eligible historic resources.

Table ES-1. Overview of 12 Final Panel Comments Identified by the New Haven Harbor IEPR Panel

No.	Final Panel Comment
Significance – Medium/High	
1	The 10% to 20% reduction in flow velocities at portions of the turning basin and between the Middle and East Breakwaters under future with-project conditions could result in more frequent maintenance dredging.
2	The dredged materials proposed for salt marsh creation may not adequately drain in an appropriate time period to allow for plantings and achieve mitigation goals.
3	Information regarding petroleum product shipments through New Haven Harbor, and the potential impact on expected future traffic, is limited to a single source of petroleum shipment forecasts.
Significance – Medium	
4	The Draft IFR/EIS may not reflect current shoaling rates due to changes in future with-project flow velocities and sediment transport.
Significance – Medium/Low	
5	The finding that the created salt marsh on Sandy Point would not be impacted significantly by storms does not appear to be adequately supported because the proposed elevations of the fill materials are below water levels that have occurred during previous storms.
6	Proposed rock excavation by blasting could result in impacts such as induced settlement on breakwaters, structural effects on the lighthouse, and effects on cable transmissions.
7	Descriptive statistics for each HarborSym model input are not available, preventing an assessment of the potential variability and uncertainty of the model results.
8	Assessment of the susceptibility of the Shellfish Creation Site to contaminants potentially transported from the confined aquatic disposal (CAD) cell relies on sediment transport studies from 1988 which may not accurately reflect current or future sediment transport into the area.
Significance – Low	
9	The risk and risk mitigation associated with uncertainty in estimating shoaling rates, dredging volumes, and dredging frequencies are not presented.

Table ES-1. Overview of 12 Final Panel Comments Identified by the New Haven Harbor IEPR Panel (continued)

No.	Final Panel Comment
10	Assumptions regarding the analysis base year, Federal discount rates, price levels, and future economic behavior of shippers, consumers, or public officials are not clearly documented.
11	It is unclear why miscellaneous commodity group tonnage is held constant through the study period while the report supports an estimated 2.5% annual growth in this commodity.
12	The risk register does not take into account the potential presence of a shipwreck in the proposed channel expansion area that could increase costs and delay project implementation.

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LIST OF ACRONYMS

ADM	Agency Decision Milestone
ATR	Agency Technical Review
CAD	Confined Aquatic Disposal
COI	Conflict of Interest
DrChecks	Design Review and Checking System
EA	Environmental Assessment
EC	Engineer Circular
EFDC	Environmental Fluid Dynamics Code
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
fps	Feet per Second
GDP	Gross Domestic Product
HEC-RAS	Hydrologic Engineering Center River Analysis System
HEP	Habitat Evaluation Procedure
IEPR	Independent External Peer Review
IFR/EIS	Integrated Feasibility Report/Environmental Impact Statement
IWR	Institute for Water Resources
MLLW	Mean Lower Low Water
NED	National Economic Development
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
OPSEC	Operations Security
PCX	Planning Center of Expertise
PDT	Project Delivery Team
PE	Professional Engineer

QA/QC	Quality Assurance/Quality Control
RECONS	Regional Economic System
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish & Wildlife Service

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1. INTRODUCTION

The United States Army Corps of Engineers (USACE) conducted a study to determine the feasibility of navigation improvements to the existing Federal Navigation Project at New Haven Harbor, Connecticut. New Haven Harbor is Connecticut's largest port, centrally located on the north shore of Long Island Sound mid-way between the cities of New York and Providence. The study area includes New Haven Harbor, Long Island Sound, and the Port service area. The Port of New Haven serves the greater New Haven region, the state of Connecticut, and much of the American Northeast. The port is a crucial import location for refined petroleum products for the region. The Northeast maintains a large refinery production/demand deficit and must rely heavily on imported volumes of petroleum products to meet demand.

The Project Area is New Haven Harbor. Three detached breakwaters protect the entrance of New Haven Harbor from Long Island Sound. The deep-water entrance of the main ship channel to New Haven Harbor lies between the Ludington Rock Breakwater and the East Breakwater, and the ship channel extends from deep water in the Sound to the head of the harbor. New Haven Harbor has an authorized depth to -35 feet Mean Lower Low Water (MLLW). The existing project (with 35-foot main channel and basin) was completed in May 1950. Navigation features of the existing Federal Navigation Project include a main ship channel, a turning basin, two anchorages west of the main channel, three river channels, a pile and stone T-dike, and three offshore stone breakwaters.

Navigation transportation delays and inefficiencies occur due to inadequate project depth in the main channel and turning basin. Large ships delay transit to use high tide to transit the channel, take on light loads (referred to as "light loading") at their ports of origin, and/or offload cargo (referred to as "lightering") outside the harbor. Lightering operations can be adversely affected by the weather, causing additional delays. Lightering of liquid petroleum products carries a risk of spills and environmental impacts in Long Island Sound. The project purpose is to improve navigation efficiency, safety, and maneuverability while considering potential project benefits of habitat creation and coastal resiliency.

The problems and opportunities identified for New Haven Harbor led to the specific planning objectives stated below. These objectives provide focus for the formulation of alternatives and reflect desired positive changes in comparison to the without-project conditions. Planning objectives for the 50-year period of analysis for the New Haven Harbor project are as follows:

- Reduce existing tidal delays and lightering, and reduce reliance on light loading
- Improve the efficiency of operation for tankers, bulk carriers, and general cargo ships over the 50-year period of analysis
- Accommodate any identified growth in bulk and liquid cargo
- Provide navigation conditions that support a shift to large ships
- Improve the safety and maneuverability of deep draft navigation at New Haven Harbor
- Consider beneficial use of dredged material

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 New Haven Harbor Navigation Improvement Study, New Haven, Connecticut (hereinafter: New Haven Harbor IEPR) in accordance with procedures described in the Department of the Army's USACE Engineer Circular (EC) *Review Policy for Civil Works* (EC 1165-2-217) (USACE, 2018) and the

Office of Management and Budget's (OMB) *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, plan formulation, economic, and environmental analyses contained in the New Haven Harbor IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the schedule followed in executing the IEPR. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE in the final Work Plan according to the schedule listed in Table A-1. Appendix D presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the New Haven Harbor IEPR.

2. PURPOSE OF THE IEPR

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

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the engineering, plan formulation, economic, and environmental analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the New Haven Harbor was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-217). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. The IEPR was completed in accordance with established due dates for milestones and deliverables as part of the final Work Plan; the due dates are based on the award/effective date and the receipt of review documents.

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: coastal hydraulic engineering, geotechnical engineering or geologist, Civil Works planning/economics (dual role), and environmental resources. The Panel reviewed the New Haven Harbor documents and produced 12 Final Panel Comments in response to 13 charge questions provided by USACE for the review. This charge included two overview questions added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)

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

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-217), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

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

4.1 Summary of Final Panel Comments

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2018) in the New Haven Harbor IEPR review documents. The following summarizes the Panel's findings.

Based on the Panel's review, the report is very thorough and reader-friendly. The analyses appear to comply with all of the most recent technical and policy requirements. The treatment of alternatives considered in formulating the Tentatively Selected Plan (TSP) is very well done and provides solid support for the proposed design. Also, established guidelines were used in the conceptual design to provide a sound basis for channel geometry; furthermore, in the evaluation of risk, it is clear how the contingency was developed. The various report appendices provide a high level of detail that supports the presentation of existing and anticipated environmental conditions in the project area. The Panel, however, identified some elements of the project where additional analyses, data, or information are recommended to provide clarification or to support project findings.

Engineering: The Panel generally finds that the quality and quantity of the surveys, investigations, and engineering are sufficient for the conceptual design of the alternative plans. One of the Panel's most significant findings is that future dredging frequency might be underestimated based on analyses and assumptions related to project flow velocity estimates. Other related findings are that analyses based on a 1988 Numerical Model Study may not reflect current shoaling rates, and that the risk associated with uncertainty in estimated shoaling rates and dredging is not presented. The Panel recommends that additional data and analyses be presented to support assumptions regarding dredging frequencies, and that risk related to uncertainty regarding shoaling and dredging be presented. Another significant Panel finding is that the dredged materials proposed for salt marsh creation may not adequately drain in a timely manner to enable plantings and achieve mitigation goals. The Panel also notes that the proposed salt marsh fill material elevations are below water levels that have occurred during previous storms. Panel recommendations regarding the marsh include the presentation of additional information on organic silt permeability and horizontal drainage, and modeling of storm surge and wave actions on the marsh. The Panel also believes that the proposed rock excavation by blasting could impact the breakwaters, the

lighthouse, and cable transmissions and, therefore, recommends additional impact analyses and an assessment of alternatives to blasting.

Plan Formulation/Economics: The review documents provide an evaluation that strongly supports the need for and intent of the project, and economic inefficiencies are described in clear detail. One of the most significant Panel findings, however, is that the analysis of petroleum product shipments and the potential impacts on expected future harbor traffic is based on a single source of petroleum shipment forecasts. The Panel suggests explaining the use of this source and determining how future petroleum shipments through the harbor might be affected by a range of forecasts. The Panel also notes that because the proprietary HarborSym model was used, variability and uncertainty of modeling results could not be assessed. Additionally, the Panel notes that assumptions regarding discount rates, price levels, and economic behavior are not clearly documented, and that it is unclear why some commodity tonnage is held constant even though information presented suggests a 2.5% growth across the study period. The Panel recommends that descriptive statistics for the HarborSym input variables be provided and that a brief discussion of variable influence on uncertainty be included. The Panel also recommends that explicit economic assumptions be provided and adjustments to some commodity demand, tonnage forecasts, and future with-project benefit streams be conducted and presented.

Environmental: Project documents provide an adequate description of the existing environmental resources in the harbor area as well as the need for a full evaluation of the potential impacts of the project on those resources. The Panel notes, however, that the assessment of the Shellfish Creation Site's susceptibility to contaminants relies on the 1988 Numerical Model Study. Therefore, the Panel recommends sampling and chemical analysis of dredged materials in areas that have not been tested, and sediment and suspended solids transport modeling to identify transport pathways and possible contaminant loading areas within the Shellfish Creation Site. The Panel also notes that the risk register does not take into account the potential presence of a shipwreck in the area and therefore recommends modifying the risk register to include the potential for project delays and additional costs if the channel widening encounters eligible historic resources.

[4.2 Final Panel Comments](#)

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

Final Panel Comment 1

The 10% to 20% reduction in flow velocities at portions of the turning basin and between the Middle and East Breakwaters under future with-project conditions could result in more frequent maintenance dredging.

Basis for Comment

In Appendix E, Coastal Engineering (Section 2.5, p. 18) of the Draft Integrated Feasibility Report/ Environmental Impact Statement (IFR/EIS), the assumption that future with-project maintenance dredging will continue at a frequency of once every 10 years (as under future without-project conditions) may not be supported by sufficient data or analysis. Plates 29 – 42 in the 1988 *New Haven Harbor Numerical Model Study* (Richards, 1988) show likely 0.1 to 0.2 foot-per-second (fps) reductions in future with-project flow velocities at the turning basin and also north and south of the area between the Middle and East Breakwaters. Notably, field measurements of flow velocities in the harbor show velocity ranges of 0.0 to 1.0 fps at flood and ebb. Thus, a 0.1- to 0.2-fps reduction in flow velocity could alter sedimentation patterns and volumes.

Further, estimating flow velocity reductions from future without-project to future with-project flow conditions may not provide a reliable method of estimating future with-project shoaling rates and dredging frequencies. The Panel did not find any analysis relating project sediment properties at various locations with estimated future with-project flow velocities to determine, with confidence, whether shoaling rates will indeed remain unchanged with the reduced flow velocities under the future with-project condition. The Panel also did not find any sediment transport modeling or sediment transport analysis for the TSP that relates existing sediment properties with predicted future with-project flow velocities to verify if sedimentation at the turning basin and between the Middle and East Breakwaters under future with-project conditions will remain the same as future without-project conditions. The available hydraulic data and related analysis do not adequately support the presented opinion regarding flow velocities, shoaling rates, dredge volumes, and, ultimately, the assumption that the frequency of future with-project maintenance dredging will continue to be once every 10 years.

Significance – Medium/High

More frequent future with-project maintenance dredging could change estimated project costs and benefits.

Recommendations for Resolution

1. Provide data or analysis to support the assumption that future with-project maintenance dredging will continue at a frequency of once every 10 years.
2. Relate settling sediment size to estimated future flow velocities and verify if smaller sediments will settle (i.e., more sediment volume will settle) because of the 0.1- to 0.2-fps reduction in flow velocities.

Literature Cited

Richards, D. R. (1988). New Haven Harbor Numerical Model Study, *Technical Report HL-88-24*. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

Final Panel Comment 2

The dredged materials proposed for salt marsh creation may not adequately drain in an appropriate time period to allow for plantings and achieve mitigation goals.

Basis for Comment

Appendix D, Engineering, of the Draft IFR/EIS proposes that dredged material consisting of soft or loose organic silts be placed by hydraulic methods for salt marsh creation. These fine-grained soils have a low permeability and are subject to capillary action. The proposed geotube perimeter containment may inhibit horizontal drainage from the fill materials. Subtidal berms that are most effective in retaining dredged material in marsh restoration sites have been found to inhibit dewatering necessary to create a surface that is suitable for transplanting marsh grasses.

Appendix D of the Draft IFR/EIS (p. D-34) describes the soft, black, organic silt: “Material of this type is not suitable for beach replenishment or for use in landfills since it is slow draining and will remain soft for years after placement.” If this material is slow draining in land placement, placing it in a wetland environment would be more problematic for drainage. Complete salt marsh vegetative cover and habitat creation may not be achievable.

Significance – Medium/High

If the proposed dredged material is too unconsolidated, or if the organic silts do not drain in a reasonable amount of time to permit plantings to take root, mitigation may not be successful.

Recommendations for Resolution

1. Conduct laboratory testing of the organic silts to determine permeability and capillary action impacts.
2. Review available information on other projects where silts have been used to create marshes.
3. Determine whether the organic silts can be used for salt marsh creation, or whether the silts may have to be supplemented with more permeable soils.
4. Ensure adequate horizontal drainage through the containment structure.

Final Panel Comment 3

Information regarding petroleum product shipments through New Haven Harbor, and the potential impact on expected future traffic, is limited to a single source of petroleum shipment forecasts.

Basis for Comment

The forecasts for petroleum products in the Draft IFR/EIS come from a single source, IHS Global Insight, and the reliability of those forecasts is not discussed. There is no discussion of other sources of information on petroleum product shipments, how those forecasts might impact expected future traffic, or why IHS Global Insight data were judged to be the most reliable.

The markets for crude oil and refined petroleum products are very closely and widely watched, with every developed and developing economy relying on confidence in both short- and long-run forecasts of pricing and availability. Variability in these forecasts introduces considerable uncertainty in the number and frequency of petroleum products moving through the Port of New Haven.

Petroleum shipments represent more than half of all shipments, and about 60% of imports, moving through the Port of New Haven. Any significant variation in expected future petroleum shipments is likely to have a significant impact on future without-project conditions, plan formulation, and justification of the selected plan.

Ardent supporters of the New Haven Harbor project could argue for an even deeper channel based on much rosier forecasts on the market for petroleum shipments. Conversely, steadfast opponents of any deepening in the harbor could use much slower-growth forecasts to advocate for selection of the No Action alternative.

Significance – Medium/High

The use of a single source of forecasts for petroleum shipments moving through the harbor introduces uncertainty about the economic basis for TSP selection.

Recommendations for Resolution

1. Recognize and discuss the range of forecasts available for petroleum shipments and their potential for affecting shipments through the port.
2. Provide a discussion of IHS Global Insight data, including an assessment of their reasonableness.
3. Explain why IHS Global Insight data were deemed the most reliable and most reasonable for use in the study.

Final Panel Comment 4

The Draft IFR/EIS may not reflect current shoaling rates due to changes in future with-project flow velocities and sediment transport.

Basis for Comment

The Draft IFR/EIS relies on the results from the 1988 New Haven Harbor Numerical Model Study (Richards, 1988). Data, models, and methods from the 1988 study may not measure up to current best practices.

Further, the 1988 Numerical Model Study applied model domain grid spacing greater than 500 feet along the north-south direction. This large grid spacing may not be adequate to resolve potential changes in eddy formations between breakwaters and at channel bends when the channel is deepened and widened. Thus, the 1988 study may not have identified areas where more future with-project shoaling would occur. If model results do not reflect current and future hydraulics at select locations, future with-project dredging shoaling rates and dredging volumes could be greater than those presented in the Draft IFR/EIS.

Significance – Medium

Model results that do not accurately estimate future with-project shoaling rates and dredging requirements could result in increased project costs.

Recommendations for Resolution

1. Verify the results of the 1988 study with available contemporary modeling tools.
2. Given the range of sediment sizes in the proposed dredging template and proposed depths in the navigation channel, find, from literature or other sources, the flow velocity that will cause erosion or resuspension.
3. Relate the flow velocity that will cause erosion or resuspension (found in Recommendation #2) to the 1988 modeled future with-project flow velocities in the navigation channel. Determine whether future with-project sedimentation will likely increase, decrease, or remain the same compared to future without-project conditions.

Literature Cited

Richards, D. R. (1988). New Haven Harbor Numerical Model Study, *Technical Report HL-88-24*. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

Final Panel Comment 5

The finding that the created salt marsh on Sandy Point would not be impacted significantly by storms does not appear to be adequately supported because the proposed elevations of the fill materials are below water levels that have occurred during previous storms.

Basis for Comment

The proposed fill for the salt marsh is to be placed up to Elevation 8.1 feet MLLW. Previous storm surges and wave action have resulted in water surface elevations that exceeded Elevation 12 feet MLLW. The fill material will be a fine-grained organic silt that may be susceptible to erosion. The Draft IFR/EIS (Section 5.2.8, p. 81, and Appendix D, p. D-28) states that the proposed salt marsh is in a protected area (“...in the lee of a spit of land known as Sandy Point...”). However, during the early stages of a storm, as water levels begin to exceed the top elevation of the marsh, storm surge and wave action could result in erosion of dredged fill materials. The proposed salt marsh perimeter consists of a geotube containment. The Draft IFR/EIS (p. 81) states: “...the containment will need to resist wave forces to ensure that the material stays within the marsh, and does not wash away.” Wave action was recognized as a factor for the containment design.

Furthermore, Appendix D, Section IV, Paragraph e (p. D-31) states: “The salt marsh creation would restore a portion of the historical area of salt marsh to that section of shoreline.” The Draft IFR/EIS (Section 5.2.8, p. 81) states: “The concept of this disposal alternative is to beneficially reuse dredged sediment for the purpose of creating new tidal wetland (salt marsh) and shoreline erosion mitigation at Sandy Point.” This statement indicates that shoreline erosion occurred at the proposed salt marsh location in the past.

Significance –Medium/Low

Incomplete technical information regarding the potential storm and wave effects on the proposed salt water marsh could affect the ability to prevent erosion of the marsh.

Recommendations for Resolution

1. Review the geomorphology of the salt marsh to investigate whether previous storms resulted in erosion of the historical marsh.
2. Conduct storm surge and wave action modeling of the proposed salt marsh for various storm events, including variations in storm direction, to evaluate marsh shoreline response.

Final Panel Comment 6

Proposed rock excavation by blasting could result in impacts such as induced settlement on breakwaters, structural effects on the lighthouse, and effects on cable transmissions.

Basis for Comment

Rock excavation is planned in order to widen and deepen the channel in the vicinity of the bend in close proximity to the East and Middle Breakwaters. The only method of rock excavation described in the Draft IFR/EIS is blasting. A lighthouse is located on the East Breakwater. The Cross Sound Cable is located within the channel footprint.

Appendix D describes the sediments in the vicinity of the breakwaters as soft silts with organics. The rock in the breakwaters may be founded on these silts, and blasting could potentially induce settlement. In addition to the potential structural effects on the lighthouse and the cable, cable transmissions could be impacted by blasting.

The intent in the specifications is to limit the peak particle velocity and require the contractor to conduct vibration monitoring; however, impacts from blasting have not been considered in the schedule and costs in Appendix F. Rock excavation is scheduled to occur over a six-month period. Another method of rock excavation may be required for all or part of the rock to be removed.

Significance – Medium/Low

If an alternative to blasting is necessary, schedule and cost will be impacted.

Recommendations for Resolution

1. Analyze blasting effects on existing infrastructure, including cable transmissions.
2. Investigate methods other than blasting for rock excavation.
3. Revise schedule and cost data if necessary.

Final Panel Comment 7

Descriptive statistics for each HarborSym model input are not available, preventing an assessment of the potential variability and uncertainty of the model results.

Basis for Comment

Appendix C, Economics, recognizes the need for conducting a sensitivity analysis to address the inherent uncertainties associated with deep draft navigation studies. However, since some data required by HarborSym are proprietary to USACE, it is difficult to reproduce or simulate the evaluation of the economic future without-project and future with-project conditions and account for uncertainty in key inputs. For example, it may be difficult for private-sector analysts to obtain the same data sets used by USACE in a given deep draft navigation improvement study and successfully perform an independent HarborSym analysis. Also, without knowing the inputs subject to variability and the descriptive statistics for them, it is difficult for non-USACE analysts to develop and use data-driven tools to test the reasonableness of the USACE study conclusions.

Significance – Medium/Low

While not a fundamental issue with the Draft IFR/EIS, the proprietary nature of data that, if available, would allow for identification of important model inputs and the descriptive statistics for those inputs affects the clarity, completeness, and credibility of the study results.

Recommendations for Resolution

1. Identify the HarborSym data subject to variability.
2. Provide statistics for the variables' distribution types, measures of central tendency, and ranges.
3. Briefly discuss the variables having the greatest influence on uncertainty in model results.

Final Panel Comment 8

Assessment of the susceptibility of the Shellfish Creation Site to contaminants potentially transported from the confined aquatic disposal (CAD) cell relies on sediment transport studies from 1988 which may not accurately reflect current or future sediment transport into the area.

Basis for Comment

The Shellfish Creation Site is about 1.25 miles down-bay from the CAD cell, the proposed disposal site for contaminated dredged material. This site is described as containing fine sediments, suggesting that it occurs in a deposition area for suspended solids. No studies have been performed of circulation and current velocities around the CAD cell to determine the potential for transport of contaminants into the Shellfish Creation Site. Deposition and accumulation of contaminants in that area could bioaccumulate in fishery resources for which the site is designated, with adverse implications for people in the area who may consume the fish. These issues have been evaluated only through review of studies performed in other areas in 1988 (Richards, 1988), and some conclusory statements concerning project impacts on fisheries could be unsupported. This concern is magnified by the need for sampling and chemical analysis of about 13% of the sediments proposed to be dredged; without these data, the ability to recognize adverse environmental effects of the TSP is diminished.

Significance – Medium/Low

Without an analysis of sediment and suspended solids transport in the area around the Shellfish Creation Site and the CAD cell, and access to data for all material to be dredged, the discussion of the project's potential impacts on fishery resources is incomplete.

Recommendations for Resolution

1. Sample and conduct a chemical analysis of dredged material from the areas which have not yet been tested.
2. Conduct sediment and suspended solids transport modeling to identify transport pathways and possible contaminant loadings within the Shellfish Creation Site.

Literature Cited

Richards, D. R. (1988). New Haven Harbor Numerical Model Study, *Technical Report HL-88-24*. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

Final Panel Comment 9

The risk and risk mitigation associated with uncertainty in estimating shoaling rates, dredging volumes, and dredging frequencies are not presented.

Basis for Comment

The interpretation of model results in the Draft IFR/EIS suggests that future with-project maintenance dredging frequency will remain the same as future without-project maintenance dredging frequency (i.e., once every 10 years). The Panel believes that future with-project shoaling rates at portions of the turning basin and between the Middle and East Breakwaters might be greater and might require more frequent maintenance dredging. Neither the Draft IFR/EIS nor the risk register documents the risk associated with the estimation of shoaling rates.

Significance – Low

There is considerable but undocumented risk that future with-project dredging volumes and/or maintenance dredging frequency might be greater than those presented in the Draft IFR/EIS.

Recommendations for Resolution

1. Provide in the Draft IFR/EIS or the risk register the risk and risk mitigation associated with uncertainty in estimating shoaling rates, dredging volumes, and dredging frequencies under the future with-project conditions.

Final Panel Comment 10

Assumptions regarding the analysis base year, Federal discount rates, price levels, and future economic behavior of shippers, consumers, or public officials are not clearly documented.

Basis for Comment

Appendix C, Economics (p. C-6), contains only one key assumption that pertains only to the regions of the world served by the Port of New Haven. Ideally, an economics analysis of this type describes the full range of assumptions that affect how the analyses were conducted so that independent investigations can be conducted under the same or similar conditions to determine whether the same or similar results are reached. This neutral process reduces the likelihood that bias on the part of other analysts, who may or may not share or accept the need for or purpose of the project, will be introduced.

The base year is the year that cash flows from a substantially completed project begin to accrue. The more distant the base year is in the future, the greater the discount of the future cash flows.

The discount rate used to discount future cash flows has a significant role in comparing expected annual costs and expected annual benefits. While the discount rate may be identified in other sections of the Economics Appendix, the Key Assumptions section should contain the information needed to determine how discounting is treated.

Economics analyses must address uncertainty in expected future prices for the commodities shipped through a port, because an extended increase or decrease in future price levels could have significant impact on the quantities of the commodities in the mix over time.

Economists assume rational economic behavior unless there are cultural, religious, social, or other reasons that explain potentially irrational behavior. Irrational behavior can introduce uncertainty in how actors behave in response to changing economic conditions. The purpose of a Key Assumptions section is to address analysts' understanding of the factors that may affect rationality and to discuss the impact on the analyses.

Significance – Low

Without a discussion of the assumptions underlying the economic analysis, the Key Assumptions section of Appendix C is incomplete.

Recommendations for Resolution

1. Make explicit assumptions underlying the analysis.
2. Expand the section on assumptions in Appendix C to include analysis base year, discount rate, price levels, and rationality of economic behavior.

Final Panel Comment 11

It is unclear why miscellaneous commodity group tonnage is held constant through the study period while the report supports an estimated 2.5% annual growth in this commodity.

Basis for Comment

The Future With-Project Conditions section of Appendix C makes a strong case for continued 2% to 3% growth in scrap metal tonnage shipped through the port, using a correlation between global gross domestic product (GDP) and scrap metal demand. This approach is convincing because scrap metal is a byproduct of production and consumption of physical goods. As economic activity grows, it is reasonable to expect growth in the commodity to closely track GDP.

A similar case can be made for expected growth in miscellaneous tonnage, since the demand for both scrap metal and miscellaneous commodities is complementary to the levels of production and consumption in the economy. Miscellaneous commodity shipments represent a small fraction of the overall commodity mix, so even a significant change is unlikely to affect project feasibility or the ranking of alternatives. However, tying any annual growth of this commodity to miscellaneous commodity group tonnage through the harbor can be justified.

Significance –Low

Any level of expected growth in miscellaneous tonnage, even if small, could positively affect net benefits and the benefit-cost ratio.

Recommendations for Resolution

1. Tie miscellaneous commodity demand to economic growth.
2. Prepare tonnage forecasts reflecting 2% to 3% growth in miscellaneous tonnage shipments.
3. Adjust future with-project condition benefit streams to reflect the additional benefits from improved efficiency of moving miscellaneous goods through the port.

Final Panel Comment 12

The risk register does not take into account the potential presence of a shipwreck in the proposed channel expansion area that could increase costs and delay project implementation.

Basis for Comment

An underwater cultural resources survey of the proposed channel expansion area detected a large anomaly near the edge of the existing channel. This object was described as a possible shipwreck which would be buffered to prevent damaging the object by channel dredging. However, the final construction limits of the widened channel have not been determined, and it is possible that the potential shipwreck could not be avoided during dredging. In that case, a field study would be necessary to determine the nature of the object; such studies can be time-consuming, especially if the object were found to be a potentially significant historic artifact. In addition to the cost of such a study, changes could be required to the channel alignment to avoid the site (and to avoid a Phase III data recovery study), causing time delays in the project. This scenario is not included in the risk register, despite the potential for impacts to the final design of the project.

Significance – Low

Because the risk register does not address the possible presence of a shipwreck in the channel expansion area, it appears that this issue was not given full consideration in assessing project schedule or cost.

Recommendations for Resolution

1. Modify the risk register to include the potential for project delays and additional cost due to the potential for channel-widening impacts on potentially eligible historic resources.

5. REFERENCES

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

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

Richards, D. R. (1988). New Haven Harbor Numerical Model Study, *Technical Report HL-88-24*. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

USACE (2018). Water Resources Policies and Authorities: Review Policy for Civil Works. Engineer Circular (EC) 1165-2-217. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. February 20, 2018.

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

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APPENDIX A

IEPR Process for the New Haven Harbor Project

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

Table A-1 presents the major milestones and deliverables of the New Haven Harbor IEPR. Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on October 2, 2018. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on February 13, 2019. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table A-1. Major Milestones and Deliverables of the New Haven Harbor IEPR

Task	Action	Due Date
1	Award/Effective Date	7/31/2018
	Review documents available	10/2/2018
	Public comments available	11/23/2018
	Battelle submits draft Work Plan ^a	8/9/2018
	USACE provides comments on draft Work Plan	9/6/2018
	Battelle submits final Work Plan ^a	9/18/2018
2	Battelle submits list of selected panel members ^a	8/14/2018
	USACE confirms the panel members have no COI	8/17/2018
3	Battelle convenes kick-off meeting with USACE	8/15/2018
	Battelle convenes kick-off meeting with panel members	10/3/2018
	Battelle convenes kick-off meeting with USACE and panel members	10/4/2018
4	Panel members complete their individual reviews	11/1/2018
	Panel members provide draft Final Panel Comments to Battelle	11/13/2018
	Battelle sends public comments to panel members for review	11/26/2018
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	11/28/2018
	Panel finalizes Final Panel Comments	11/28/2018
5	Battelle submits Final IEPR Report to USACE ^a	12/10/2018
6 ^b	Battelle convenes Comment Response Teleconference with panel members and USACE	12/20/2018
	Battelle submits pdf printout of DrChecks project file ^a	2/13/2019
	Agency Decision Milestone (ADM) meeting ^c (estimated)	1/9/2019
	Contract End/Delivery Date	10/30/2019

^a Deliverable.

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

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

At the beginning of the Period of Performance for the New Haven Harbor IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 13 charge questions provided by USACE, two overview questions added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

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

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

Review Documents	No. of Review Pages
Integrated Feasibility Report/EIS	180
Appendix A: Public Involvement and Pertinent Correspondence; Appendix A1: Public Comments ^a	100
Appendix B: Project Authorization and Work History	10
Appendix C: Economics	60
Appendix D: Engineering Appendix	60
Appendix E: Coastal Engineering	35
Appendix F: Cost Engineering	30
Appendix G: Real Estate Plan	15
Appendix H: Essential Fish Habitat Assessment	25
Appendix I: Environmental Sampling and Survey in Support of Beneficial Use Site Characterization	20
Appendix K: Air Quality Analyses	10
Doc. #1: 404(b)(1) Evaluation	10
Doc. #4: CZM Compliance	44
Total Number of Review Pages	599

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

Review Documents	No. of Review Pages
Supplemental Information^b	
Appendix J: Suitability Determination Provided for Reference Only - Approved by EPA and CTDEEP	60
Doc. # 2 Final Report for Dredged Material Suitability Testing and Evaluation in the New Haven Harbor FNP (summary report only)	50
Doc. # 3 Data Report – Hydroacoustic and Underwater Video Survey in Support of Project Feasibility Design	135
Doc. #5: New Haven Harbor Feasibility Level Ship Simulations Study Report	75
Risk Register	5
Total Number of Reference Pages	325

^a Page count for public comments is approximate. USACE will submit public comments to Battelle upon their availability according to the schedule in Table A-1. Battelle will in turn submit the comments to the IEPR Panel for review.

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

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

- USACE guidance, *Review Policy for Civil Works* (EC 1165-2-217), February 20, 2018
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, December 16, 2004.

About halfway through the review, a teleconference was held with USACE, Battelle, and the Panel so that USACE could answer questions the Panel had concerning the review documents and the project. Prior to this teleconference, Battelle submitted 13 panel member questions to USACE. USACE was able to provide responses to all the questions during or shortly after the teleconference, provided a copy of the 1988 New Haven Numerical Model Study to the Panel, and provided written responses to all of the questions prior to the end of the review.

A.2 Review of Individual Comments

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

A.3 IEPR Panel Teleconference

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

A.4 Preparation of Final Panel Comments

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

- **Lead Responsibility:** For each Final Panel Comment, one panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with the other panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Panel Comments:** Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see descriptions below)
 4. Recommendation(s) for Resolution (see description below).
- **Criteria for Significance:** The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.
 5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.
- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 12 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received four PDF files containing 76 pages of public comments on the New Haven Harbor (approximately 12 verbal transcripts and 29 written comments) from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

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

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

A.6 Final IEPR Report

After concluding the review and preparation of the Final Panel Comments, Battelle prepared a final IEPR report (this document) on the overall IEPR process and the IEPR panel members' findings. Each panel

member and Battelle technical and editorial reviewers reviewed the IEPR report prior to submission to USACE for acceptance.

A.7 Comment Response Process

As part of Task 6, Battelle will enter the 12 Final Panel Comments developed by the Panel into USACE's DrChecks, a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

APPENDIX B

Identification and Selection of IEPR Panel Members for the New Haven Harbor Project

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B.1 Panel Identification

The candidates for the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut (hereinafter: New Haven Harbor IEPR) Panel were evaluated based on their technical expertise in the following key technical areas: Civil Works planning/economics, environmental resources, coastal hydraulic engineering, and geotechnical engineer/geology. These areas correspond to the technical content of the review documents and overall scope of the New Haven Harbor 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 COIs. Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected four experts for the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed conflicts of interest (COIs), or lack of the precise technical expertise required.

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

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

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the New Haven Harbor	
1.	Previous and/or current involvement by you or your firm in the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut, and related projects.
2.	Previous and/or current involvement by you or your firm in deep draft navigation and New Haven, Connecticut.
3.	Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&M) of any projects in the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut, or related projects.
4.	Current employment by the U.S. Army Corps of Engineers (USACE).
5.	Previous and/or current involvement with paid or unpaid expert testimony related to the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the New Haven Harbor

6. Previous and/or current employment or affiliation with members of the non-Federal sponsors or any of the following cooperating Federal, state, county, local and regional agencies, environmental organizations, and interested groups (*for pay or pro bono*):
New Haven Port Authority.
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to New Haven, Connecticut.
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the New England District.
9. Previous or current involvement with the development or testing of models that will be used for, or in support of the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut.
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the New England District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the New England District. Please explain.
11. Any previous employment by USACE as a direct employee, notably if employment was with the New England District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
12. Any previous employment by USACE as a contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the New England District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning deep draft navigation. Include the client/agency and duration of review (approximate dates).
14. Pending, current, or future financial interests in contracts/awards from USACE related to the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut.
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.
16. Significant portion of your personal or office's revenues within the last three years came from New Haven Port Authority contracts.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the New Haven Harbor

17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut.
18. Participation in relevant prior and/or current Federal studies related to the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut.
19. Previous and/or current participation in prior non-Federal studies related to the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut.
20. Has your research or analysis been evaluated as part of the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut?
21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.

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

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member’s affiliation, location, education, and overall years of experience. One panel member held a dual role serving as both the Civil Works planning and economics expert. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. New Haven Harbor IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Civil Works Planning / Economics (Dual Role)					
David Luckie	Independent consultant	Mobile, AL	B.S., Economics and Finance	N/A	30
Environmental Resources					
Barry Vittor	Barry A. Vittor & Associates, Inc.	Mobile, AL	Ph.D., Ecology	No	40+
Coastal Hydraulic Engineering					
Michael Kabiling	Taylor Engineering, Inc.	Jacksonville, FL	Ph.D., Hydraulics and Coastal Engineering	Yes	25+
Geotechnical Engineering or Geologist					
Andrew Blystra	GENTERRA Consultants, Inc.	Harrisburg, PA	M.S., Geotechnical Engineering	Yes	40+

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

Table B-2. New Haven Harbor IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Luckie	Vittor	Kabiling	Blystra
Civil Works Planner / Economist (Dual Role)				
Minimum 10 years of demonstrated experience in public works planning	X			
Must be familiar with USACE plan formulation processes, procedures, and standards with demonstrated experience in plan formulation process with respect to large, complex Civil Works project with high public and interagency interests	X			
Must be familiar with plan formulation process, procedures, and standards as they relate to the development and evaluation of alternative plans for deep draft navigation improvement studies	X			
Minimum M.S. degree or higher	W ¹			
Extensive knowledge of cost/benefit analysis for USACE deep draft navigation improvement projects	X			
Experience in performing deep draft economic evaluations	X			

Table B-2. New Haven Harbor IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Luckie	Vittor	Kabiling	Blystra
Environmental Resources				
At least 10 years of experience directly related to environmental evaluation or review		X		
Minimum M.S. degree or higher in a related field		X		
Must be familiar with the ecology of Marine systems and an expert in benthic biology		X		
Experience with Federal environmental compliance processes and analyses and other regulatory requirements		X		
Familiarity with impact assessment, include cumulative effects analysis for complex tidal areas and dredge material placement projects with competing trade-offs		X		
Coastal Hydraulic Engineer				
Minimum 10 years of experiences			X	
Experience with all aspects of hydrology and hydraulic engineering			X	
Thorough understanding of coastal systems			X	
Extensive experience designing navigation improvement project including channel deepening projects			X	
Familiarity with USACE coastal engineering requirements for civil works projects and feasibility studies			X	
Familiarity with Hydrologic Engineering Center (HEC) modeling computer software or equivalent commercial software including HEC River Analysis System (HEC-RAS)			X	
Registered Professional Engineer			X	
Geotechnical Engineer or Geologist				
Minimum of 10 years of experience in geotechnical engineering or coastal geology				X
Minimum M.S degree or higher				X
Demonstrated experience in sediment characterization, channel slope stability and characterization of the sub-surface conditions				X
Registered Professional Engineer or Geologist				X

¹ Waiver granted.

B.3 Panel Member Qualifications

Detailed biographical information on each panel member’s credentials, qualifications, and areas of technical expertise is summarized in the following paragraphs.

Name	David Luckie, B.S.
Role	Civil Works Planner / Economist
Affiliation	Independent Consultant

Mr. Luckie is an independent consultant with nearly 30 years of professional experience in water resource economics, planning, plan formulation, benefit-cost analysis, and risk-based analysis. His public works experience encompasses decades of work with Federal and non-Federal agencies, as well as local and state organizations. He earned his B.S. in economics and finance from the University of South Alabama in 1986. His professional experience includes working with multidisciplinary teams to provide or review complex planning studies for dam safety, flood risk management, ecosystem restoration, coastal storm risk management, deep draft navigation, inland navigation, and water supply and water quality studies. He is intimately familiar with Engineer Regulation (ER) 1105-2-100 (USACE, 2000) and the 6-Step Planning Process and has prepared, supervised, or reviewed numerous planning studies in his career.

Mr. Luckie is familiar with the evaluation of alternative plans for deep draft navigation studies, and has conducted, supervised, or reviewed several water resource studies. These studies featured numerous alternative plans constructed from an array of different management measures. Over the last three decades, Mr. Luckie has been involved in numerous deep draft navigation studies. Recent examples are studies at Bayous Boeuf, Chene, and Black in Louisiana and technical reviews for the Port of Texas City. For private-sector clients, he has also participated in, consulted for, or reviewed studies along the Atlantic coast. with study efforts including Jacksonville, Savannah, and Norfolk.

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

Mr. Luckie is very familiar with USACE standards and procedures. He has extensive experience in performing National Economic Development (NED) analyses, specifically as they relate to deep draft navigation. For more than 25 years, he has performed, supervised, or reviewed NED procedures for technical accuracy and compliance with policy, guidance, and accepted planning principles, and conducted economic analyses for Federal, non-Federal, and private sector clients. In addition, he has mentored interns and junior economists in USACE methodologies for the full range of USACE Civil Works missions, often requiring them to calculate without- and with-project condition damages either by hand or with a Microsoft Excel spreadsheet, before allowing them to use one of the many computer models USACE employs in its evaluations. He is also very familiar with the USACE Regional Economic System (RECONS) model and the estimation of Regional Economic Development benefits, and has used it for both Federal and non-Federal project proponents since its inception.

Mr. Luckie is very familiar with the Continuing Authorities Program, particularly Section 205 of the Flood Control Act of 1948. He has performed in both economic analysis and plan formulation roles on numerous Section 205 efforts throughout the Southeast. He has also reviewed Section 205 products produced by others in other regions of the country. He mentored four protégés in developing effective 205 reports, coaching them and reviewing their work. Finally, Mr. Luckie wrote the Continuing Authorities Customer Guide for the Mobile District, which helped non-Federal sponsors and their consultants understand the Continuing Authorities Program Study process from cradle to closeout. The guide appeared in print and on the Mobile District website from 1998 until 2006.

Name	Barry Vittor, Ph.D.
Role	Environmental Resources
Affiliation	Barry A. Vittor & Associates, Inc.

Dr. Vittor is President and Senior Scientist at Vittor & Associates, with more than 40 years of experience in water resource planning and projects, including port development, beach renourishment, and dune and barrier island reconstruction. He earned his Ph.D. in ecology from the University of Oregon. As Director of the Alabama Coastal Foundation and a member of the Mobile Bay National Estuary Program Management Committee, he has been very active in coastal resource management.

For more than 40 years, Dr. Vittor has conducted National Environmental Policy Act (NEPA) impact assessments for USACE, the U.S. Environmental Protection Agency (USEPA), and other public sector and private clients. He has conducted wetlands delineation, restoration and management, and threatened/endangered species evaluations, and has assisted in regulatory agency permitting of hundreds of public and private projects throughout the Southeast. He has prepared environmental impact statements (EISs) and environmental assessments (EAs) for government agency and private clients for port developments, beach renourishment, utility installations, aquatic weed control programs, and hurricane-related debris clean-up. Examples include the Peckman River Basin (New Jersey) flood control and ecosystem restoration feasibility study and the programmatic EIS for New York District navigation projects in Port of New York/New Jersey.

Dr. Vittor is experienced in coastal storm risk management projects, particularly in urbanized coastal areas. He has been involved in EAs related to barrier island reconstruction after Hurricane Katrina; studies of port development impacts on wave run-up during major storm events; and USACE IEPRs for Hereford Inlet to Cape May Inlet, New Jersey Hurricane and Coastal Storm Damage Risk Reduction Project Draft Feasibility Report and Environmental Assessment Statement, and the Surf City and North Topsail Beach Integrated Feasibility Report and Environmental Impact Statement. He is familiar with the habitat and fish and wildlife species that may be affected by project alternatives in a study area. He has studied ecosystems along the entire U.S. Atlantic coast regarding fisheries, benthic and demersal fauna, avifauna, and other biological resources, in association with assessments of beach renourishment/sand borrow projects and port and navigation development projects.

Dr. Vittor has extensive experience in most aspects of the Clean Water Act of 1972, including Section 404 wetlands and streams, National Pollutant Discharge Elimination System (NPDES) discharge permit monitoring, ocean disposal of dredged material, and Section 408 Federal projects coordination. Section 404 permitting often triggers comments from the U.S. Fish & Wildlife Service (USFWS); the Fish and Wildlife Coordination Act provides the Service with comment authority on wetland/stream permit applications, under Section 7. Dr. Vittor has handled hundreds of such projects, as well as Section 10

coordination with the Service where Federal permits are not involved. He has also prepared Habitat Conservation Plans for a number of protected species. Dr. Vittor is familiar with the Habitat Evaluation Procedure (HEP) of the USFWS, and has applied HEP and several other habitat functional value indices (e.g., Cover Type, HGM, WET, WRAP) to field assessments of port development projects along the Gulf Coast, navigation channel maintenance dredging/disposal in riverine and embayment projects in the New York District, and numerous private development projects. He has conducted numerous studies and surveys of plants and animal species listed under the Endangered Species Act, for a wide variety of public and private client projects, in the Gulf of Mexico and along the Eastern Seaboard. He has prepared biological assessments for terrestrial and aquatic species in accordance with USFWS guidelines and has addressed protected species of plants and animals in reviews of coastal beach and dune reconstruction projects on the U.S. Atlantic coast. He has assessed essential fish habitat (EFH) impacts related to beach renourishment, sand borrow operations, petroleum development, and port/navigation projects along the U.S. Atlantic and Gulf coasts and has evaluated EFH impacts of storm debris removal operations in the northern Gulf of Mexico.

Dr. Vittor is familiar with the Marine Mammals Protection Act and has assessed potential impacts of offshore oil and gas developments on marine mammals in the Gulf of Mexico, including noise effects, ship collisions, and seismic surveys. He has also participated in peer reviews of impacts of coastal dune and beach reconstruction on marine mammals along the U.S. Atlantic coast and has coordinated with the National Marine Fisheries Service regarding potential impacts of storm debris clean-up operations on marine mammals (especially bottlenose dolphin) in the northern Gulf.

Dr. Vittor has served on several USACE IEPR panels as a biology, ecology, and NEPA specialist for coastal storm damage reduction, flood risk management, deep draft navigation, and ecosystem restoration studies.

Name	Michael Kabling, Ph.D., P.E., C.F.M.
Role	Coastal Hydraulic Engineer
Affiliation	Taylor Engineering, Inc.

Dr. Kabling 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 25 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) licensed in Florida, Georgia, South Carolina, and Washington. 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 Dredged Material Particle Tracking Modeling for the Port Everglades Harbor Navigation Channel Deepening and Widening Project, Broward County, Florida (2016 – 2018); IEPR Charleston Harbor Post 45 Phase II, Charleston, South Carolina, Feasibility Report and Environmental Impact Statement (2014-2015); 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 Port Everglades Sediment Transport Modeling, Broward County, Florida, demonstrates Dr. Kabiling's extensive understanding and experience of coastal systems. As coastal and hydraulic engineer, his sediment transport modeling work supported USACE and Port Everglades planning for navigation channel deepening and widening. In this project, Dr. Kabiling designed a field measurement program of tides, currents, and waves to support model setup and validation; developed and applied state-of-the-art modeling with integrated three-dimensional MIKE hydrodynamic, wave, and particle tracking models; applied the model to determine the fate of the dredged material plume and deposition pattern for normal and extreme tides, waves, Florida currents, and 25 dredging scenarios; and determined the best dredging method with the least deposition and suspended sediment impact. The IEPR Charleston Harbor Post 45 Phase II, Charleston, South Carolina, Feasibility Report and Environmental Impact Statement demonstrates Dr. Kabiling's professional experience in evaluating the application of various modeling systems for sediment transport and morphology evaluation in navigation channel dredging projects. The Jacksonville Harbor Project demonstrates Dr. Kabiling's extensive experience in deep draft navigation and channel modification. For that project, he provided project management, supervised Environmental Fluid Dynamics Code (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, as well as the cumulative impacts of other projects. Dr. Kabiling's coastal and hydraulic engineering works on the three projects—Port Everglades Sediment Transport Modeling for Port Everglades, IEPR Charleston Harbor Post 45 Phase II, and Jacksonville Harbor Project—demonstrate Dr. Kabiling's familiarity with USACE coastal engineering requirements for Civil Works projects and feasibility studies. For the Pasig River Rehabilitation Project, he supervised the implementation of field monitoring programs and conducted periodic numerical modeling of water levels, flow, and water 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, 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 projects: 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 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 and deposition). 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, 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.

Name	Andrew Blystra, CPESC, P.E.
Role	Geotechnical Engineer or Geologist
Affiliation	GENTERRA Consultants, Inc.

Mr. Blystra is an Associate Engineer with GENTERRA Consultants, Inc. with more than 40 years of experience in civil and geotechnical engineering. He has a M.S. in geotechnical engineering from the University of Illinois at Chicago with continued doctoral work in geotechnical engineering and engineering geology. Mr. Blystra is a PE in Pennsylvania, Michigan, Illinois, Indiana, Wisconsin, and Georgia, and is a Certified Professional in Erosion and Sedimentation Control.

Mr. Blystra has characterized sediment to be dredged by USACE at New Buffalo Harbor, Michigan, and for two private dredging contracts at inland lakes in Michigan. He characterized sediment upstream of existing hydroelectric projects at Norway Point, Four Mile, and Ninth Street on Thunder Bay River, Michigan. His experience includes characterizing sediment upstream and downstream of proposed hydroelectric projects in Pennsylvania at existing USACE projects at Allegheny Lock and Dam 2, Emsworth Locks and Dam, Emsworth Back Channel Dam, Montgomery Locks and Dam, Monongahela Locks and Dam 4, Maxwell Locks and Dam, Grays Landing Lock and Dam, and Point Marion and in West Virginia at the proposed hydroelectric projects at Morgantown and Opekiska Locks and Dams. Mr. Blystra has characterized sediment upstream and downstream of six proposed hydroelectric projects on the Muskingum River in Ohio, the Williams Dam in Indiana, the Kentucky River Lock and Dam 11 in Kentucky, and the USACE Overton Lock and Dam on the Red River in Louisiana. He also investigated the liquefaction susceptibility of the sediment in the reservoir of the Gilboa Dam in New York.

Mr. Blystra’s experience in channel slope stability includes physical model testing of proposed hydroelectric projects on the Ohio River at the USACE Cannelton and Meldahl Locks and Dam. He also

has experience with evaluating channel slope stability and designing erosion reduction measures downstream from existing hydroelectric projects on the Thunder Bay River, Michigan, where over 40 erosion sites existed. He also evaluated the channel slope stability as a result of adding proposed powerhouse discharges at ten projects on the Allegheny, Ohio, and Monongahela Rivers in Pennsylvania and West Virginia.

Mr. Blystra has also been responsible for drilling programs requiring the identification of soils and rock at eight existing Consumers Energy hydroelectric projects in Michigan, the Norway Point and Four Mile hydroelectric projects in Michigan, and the Hatfield power canal in Wisconsin. Mr. Blystra also was responsible for several geotechnical investigations in Georgia and Alabama. His experience includes using geophysical methods for investigating subsurface conditions. Projects include using ground-penetrating radar at the upper reservoir of the Ludington Pumped Storage Project, the area upstream of the Elkhart Hydroelectric Project, the Prairie Du Sac spillway and powerhouse, and the Hardy Hydroelectric Project Spillway. He also has extensive experience using the pressure meter in investigations

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APPENDIX C

Final Charge for the New Haven Harbor IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut

This is the final Charge to the Panel for the New Haven Harbor IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on September 18, 2018. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

New Haven Harbor is Connecticut's largest port, centrally located on the north shore of Long Island Sound about mid-way between the cities of New York and Providence, Rhode Island. The study area includes New Haven Harbor, Long Island Sound, and the Port service area. The Port of New Haven serves the greater New Haven region, the state of Connecticut, and much of the American Northeast. The port is a crucial import location for refined petroleum products for the region. The Northeast maintains a large refinery production/demand deficit and must rely heavily on imported volumes of petroleum products in order to meet demand. The Project Area is New Haven Harbor. Three detached breakwaters protect the entrance of New Haven Harbor from Long Island Sound. The deep-water entrance of the main ship channel to New Haven Harbor lies between the Ludington Rock Breakwater and the East Breakwater and the ship channel extends from deep water in the Sound to the head of the harbor.

Problems

Navigation transportation delays and inefficiencies occur due to inadequate Federal project depth (main channel and turning basin). Large ships delay transit to use high tide to transit the channel, light load at their ports of origin, and/or lighter outside the harbor. Lightering operations can be adversely affected by the weather and this causes additional delays. Lightering of liquid petroleum products also carries a risk of spills and environmental impacts in Long Island Sound.

Problem #1: Transportation Inefficiency

- Large ships experience transit delays or have to lighter due to existing depth of channel
- Existing channel depths limit ship cargo capacity and thus terminals cannot take advantage of economies of scale

Problem #2: Safety/Maneuverability Concerns

- Existing channel dimensions are not optimal for large ships, increasing the risk of an accident

Opportunities

An opportunity provides a chance to create a future desirable condition and potential ways to address the specific problems within the study area.

Opportunity #1: Navigation Efficiency

- Eliminate or reduce navigational restrictions and inefficiencies (i.e., channel depth)

Opportunity #2: Navigation Safety/Maneuverability

- Increase maneuverability for large ships (i.e., bend easing)

Opportunity #3: Beneficial Use

- Work with non-Federal interests for beneficial use of dredged material, including habitat creation and coastal resiliency

Objectives

The problems and opportunities identified for New Haven Harbor led to the specific planning objectives stated below. These objectives provide focus for the formulation of alternatives and reflect desired positive changes in comparison to the without-project conditions. Planning objectives for the 50-year period of analysis are:

- Reduce existing tidal delays and lightering, and reduce reliance on light loading
- Improve the efficiency of operation for tankers, bulk carriers, and general cargo ships over the 50-year period of analysis
- Accommodate any identified growth in bulk and liquid cargo
- Provide navigation conditions that support a shift to large ships
- Improve safety/maneuverability of deep draft navigation at New Haven Harbor
- Consider beneficial use of dredged material.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut (hereinafter: New Haven Harbor IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Review Policy for Civil Works* (Engineer Circular [EC] 1165-2-217, dated February 20, 2018), and the Office of Management and Budget's (OMB's) *Final Information Quality Bulletin for Peer Review* (December 16, 2004). Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to “assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in evaluation of economic or environmental impacts, and any biological opinions” (EC 1165-2-217; p. 39) for the decision documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) who meet the technical criteria and areas of expertise required for and relevant to the project.

The Panel will be “charged” with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-217 (p.41), review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

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

Review Documents	No. of Review Pages	Subject Matter Experts			
		Civil Works Planner/Economist	Environmental Resources	Coastal Hydraulic Engineer	Geotechnical Engineer or Geologist
Integrated Feasibility Report/EIS	180	180	180	180	180
Appendix A: Public Involvement and Pertinent Correspondence; Appendix A1: Public Comments *	100	100	100	100	100
Appendix B: Project Authorization and Work History	10	10	10	10	10
Appendix C: Economics	60	60			
Appendix D: Engineering Appendix	60			60	60
Appendix E: Coastal Engineering	35			35	35
Appendix F: Cost Engineering	30			30	30
Appendix G: Real Estate Plan	15	15	15		
Appendix H: Essential Fish Habitat Assessment	25		25		
Appendix I: Environmental Sampling and Survey in Support of Beneficial Use Site Characterization	20		20		
Appendix K: Air Quality Analyses	10		10		
Doc. #1: 404(b)(1) Evaluation	10		10		
Doc. #4: CZM Compliance	44		44		
Total Number of Review Pages	599	365	414	415	415

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

Review Documents	No. of Review Pages	Subject Matter Experts			
		Civil Works Planner/Economist	Environmental Resources	Coastal Hydraulic Engineer	Geotechnical Engineer or Geologist
Supplemental Information*					
Appendix J: Suitability Determination Provided for Reference Only- Approved by EPA and CTDEEP	60		60		
Doc. # 2 Final Report for Dredged Material Suitability Testing and Evaluation in the New Haven Harbor FNP (summary report only)	50		50		
Doc. # 3 Data Report – Hydroacoustic and Underwater Video Survey in Support of Project Feasibility Design	135	135	135	135	135
Doc. #5: New Haven Harbor Feasibility Level Ship Simulations Study Report	75	75	75	75	75
Risk Register	5	5	5	5	5
Total Number of Reference Pages	325	215	325	215	215

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

Documents for Reference

- USACE guidance *Review Policy for Civil Works* (EC 1165-2-217, February 20, 2018)
- Office of Management and Budget’s *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- Foundations of SMART Planning
- Feasibility Study Milestones (PB 2017-01)
- SMART – Planning Overview
- Planning Modernization Fact Sheet.

SCHEDULE & DELIVERABLES

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

Task	Action	Due Date
Attend Meetings and Begin Peer Review	Subcontractors complete mandatory Operations Security (OPSEC) training	10/29/2018
	Battelle sends review documents to panel members	10/2/2018
	Battelle convenes kick-off meeting with panel members	10/3/2018
	Battelle convenes kick-off meeting with USACE and panel members	10/4/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	10/16/2018
Prepare Final Panel Comments	Panel members complete their individual reviews	11/1/2018
	Battelle provides talking points for Panel Review Teleconference to panel members	11/5/2018
	Battelle convenes Panel Review Teleconference	11/6/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	11/7/2018
	Panel members provide draft Final Panel Comments to Battelle	11/13/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	11/14/2018 - 11/20/2018
	Panel finalizes Final Panel Comments	11/21/2018
Review Public Comments	Battelle receives public comments from USACE	11/16/2018
	**Battelle sends public comments to Panel	11/19/2018
	Panel completes its review of public comments	11/26/2018
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	11/27/2018
	Panel drafts Final Panel Comment for public comments, if necessary	11/29/2018
	Panel finalizes Final Panel Comment regarding public comments, if necessary	12/3/2018
Review Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	12/5/2018
	Panel members provide comments on Final IEPR Report	12/7/2018
	*Battelle submits Final IEPR Report to USACE	12/11/2018
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	12/18/2018
Comment/Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	12/20/2018

Task	Action	Due Date
	Battelle convenes teleconference with USACE to review the Comment Response process	12/20/2018
	Battelle convenes teleconference with Panel to review the Comment Response process	12/20/2018
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	1/10/2019
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	1/16/2019
	USACE PCX provides draft PDT Evaluator Responses to Battelle	1/17/2019
	Battelle provides draft PDT Evaluator Responses to panel members	1/22/2019
	Panel members provide draft BackCheck Responses to Battelle	1/25/2019
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	1/28/2019
	Battelle convenes Comment Response Teleconference with panel members and USACE	1/29/2019
	USACE inputs final PDT Evaluator Responses to DrChecks	2/5/2019
	Battelle provides final PDT Evaluator Responses to panel members	2/6/2019
	Panel members provide final BackCheck Responses to Battelle	2/11/2019
	Battelle inputs panel members' final BackCheck Responses to DrChecks	2/12/2019
	*Battelle submits pdf printout of DrChecks project file	2/13/2019
ADM	Agency Decision Milestone (ADM) Meeting	1/9/2019
	Contract End/Delivery Date	10/30/2019

* Deliverables

** Battelle will provide public comments to panel members after they have completed their individual reviews of the project documents to ensure that the public comment review does not bias the Panel's review of the project documents.

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the decision documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and properly documented; satisfies established quality requirements; and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the decision documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Some sections have no questions associated with them; however, you may still comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-217).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
7. Please focus the review on assumptions, data, methods, and models.

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

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

2. Please contact the Battelle Project Manager and Program Manager (Lynn McLeod; mcleod@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Lynn McLeod (mcleod@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to the Project Manager, no later than 10 pm ET by the date listed in the schedule above.

Independent External Peer Review of the New Haven Harbor Navigation Improvement Study, New Haven, Connecticut

Charge Questions and Relevant Sections as Supplied by USACE

The following Review Charge to Reviewers outlines the objectives of the Independent External Peer Review (IEPR) for the subject study and identifies specific items for consideration for the IEPR Review Panel.

The objective of the IEPR is to obtain an independent evaluation of whether the interpretations of analysis and conclusions based on analysis are reasonable for the subject study. The IEPR Review Panel is requested to offer a broad evaluation of the overall study decision document in addition to addressing the specific technical and scientific questions included in the Review Charge. The Review Panel has the flexibility to bring important issues to the attention of decision makers, including positive feedback or issues outside those specific areas outlined in the Review Charge. The Review Panel can use all available information to determine what scientific and technical issues related to the decision document may be important to raise to decision makers. This includes comments received from agencies and the public as part of the public review process.

The Panel review is to focus on scientific and technical matters, leaving policy determinations for USACE and the Army. The Panel should not make recommendations on whether a particular alternative should be implemented or present findings that become “directives” in that they call for modifications or additional studies or suggest new conclusions and recommendations. In such circumstances the Review Panel would have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review.

Panel review comments are to be structured to fully communicate the Panel’s intent by including the comment, why it is important, any potential consequences of failure to address, and suggestions on how to address the comment.

The Review Panel is asked to consider the following items as part of its review of the decision document and supporting materials.

Broad Evaluation Review Charge Questions

1. Is the need for and intent of the decision document clear?
2. Does the decision document adequately address the stated need and intent relative to scientific and technical issues?

Given the need for and intent of the decision document, assess the adequacy and acceptability of the following:

3. Project evaluation data used in the study analyses
4. Economic, environmental, and engineering assumptions that underlie the study analyses
5. Economic, environmental, and engineering methodologies, analyses, and projections
6. Models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives

7. Methods for integrating risk and uncertainty
8. Formulation of alternative plans and the range of alternative plans considered
9. Quality and quantity of the surveys, investigations, and engineering sufficient for conceptual design of alternative plans
10. Overall assessment of significant environmental impacts and any biological analyses.

Further:

11. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
12. Assess the considered and tentatively selected alternatives from the perspective of systems, including systemic aspects being considered from a temporal perspective, including the potential effects of climate change.
13. Does information or do concerns provided in the public comments raise any additional discipline-specific technical concerns with regard to the overall report?

Battelle Summary Charge Questions to the Panel Members

These questions are provided for Battelle's use in identifying the Panel's key technical issues.

Summary Questions

14. Please identify the most critical concerns (up to five) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.
15. Please provide positive feedback on the project and/or review documents.

APPENDIX D

Conflict of Interest Form

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David Kaplan
USACE, Institute for Water Resources
July 9, 2018
C-2

Conflicts of Interest Questionnaire
Independent External Peer Review

New Haven Harbor Navigation Improvement Study, New Haven, Connecticut

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

NAME OF FIRM: **Battelle Memorial Institute Corporate Operations**
REPRESENTATIVE'S NAME: **Jason Jenkins**
TELEPHONE: **614-424-4873**
ADDRESS: **505 King Avenue, Columbus, Ohio 43201**
EMAIL ADDRESS: **jenkinsj@battelle.org**

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

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

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

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

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

No additional information to report.



Jason Jenkins

7/9/2018

Date

BATTELLE

It can be done