

Final Independent External Peer Review Report Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report

Prepared by
Battelle Memorial Institute

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

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

Norfolk Harbor (sometimes referred to as the Port of Hampton Roads) is a 25-square mile natural harbor serving port facilities in the cities of Norfolk, Newport News, Portsmouth, Chesapeake, and Hampton in southeastern Virginia. The Port is situated at the southern end of Chesapeake Bay, midway on the Atlantic Seaboard, approximately 170 miles south of Baltimore, Maryland, and 220 miles north of Wilmington, North Carolina. The harbor is formed by the confluence of the James, Nansemond, and Elizabeth Rivers. The Norfolk Harbor and Channels, Virginia, Project consists of a network of Federally improved channels extending from the Atlantic Ocean, through the Chesapeake Bay, and into the Port of Hampton Roads.

The Norfolk District completed a feasibility study of the Norfolk Harbor, the findings and recommendations of which were documented in a report entitled “Norfolk Harbor and Channels, Virginia, Feasibility Report and Final Environmental Impact Statement, July 1980,” and Final Environmental Impact Statement Addendum, December 1980 (all in House Document 99-85 dated 18 July 1985, 3 volumes). The report recommended deepening the major channels in Hampton Roads to a depth of -57 feet mean lower low water (MLLW), as well as lesser improvements on the Elizabeth River and its Southern Branch.

The project recommended in the feasibility study was authorized for construction in Section 201 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99- 662), as described in House Document 99-85, dated 18 July 1985, entitled “Norfolk Harbor and Channels, Virginia.” The authority states, as follows:

“The project for navigation, Norfolk Harbor and Channels, Virginia: Report of the Chief of Engineers, dated November 20, 1981, at a total cost of \$551,000,000, with an estimated first Federal cost of \$256,000,000 and an estimated first non-Federal cost of \$295,000,000, including such modifications as the Secretary determines to be necessary and appropriate for mitigation of any damage to fish and wildlife resources resulting from construction, operation, and maintenance of each segment of the proposed project. The Secretary, in conjunction with appropriate Federal, State, and local agencies, shall study the effects that construction, operation, and maintenance of each segment of the proposed project will have on fish and wildlife resources and the need for mitigation of any damage to such resources resulting from such construction, operation, and maintenance.”

The major components of the authorized project are:

1. Increasing the depth of the Norfolk Harbor Channel from -45 feet to -55 feet MLLW over its existing 800- to 1,500-foot width to the coal terminal at Lamberts Point.

2. Increasing the depth of Thimble Shoal Channel from -45 feet to -55 feet MLLW over its existing 1,000-foot width.
3. Increasing the depth of the channel to Newport News from -45 feet to -55 feet MLLW over its existing 800-foot width to the coal terminal at Newport News.
4. Dredging a new channel, designated as the Atlantic Ocean Channel, off Virginia Beach to a depth of -57 feet MLLW (post-authorization design modified the depth to -60 feet MLLW) and a width of 1,000 feet (post-authorization design modified the width to 1,300 feet).
5. Constructing three fixed mooring anchorage facilities, each capable of accommodating two large vessels simultaneously.
6. Placing suitable dredged material resulting from project construction in a designated ocean placement site and unsuitable material in the Craney Island Dredged Material Management Area (CIDMMA) site.

Since its authorization in 1986, the project has been constructed in separable elements based on the needs of the Port Community and the financial capability of the Commonwealth of Virginia, acting through its agent, the Virginia Port Authority. The 50-Foot Outbound Element was completed in 1989, the 50-Foot Anchorage in 1999, and the 50-Foot Inbound Element in 2007.

The purpose of the GRR is to identify whether the authorized plan is still in the Federal interest and to evaluate measures that would improve the operational efficiency of the existing and forecast future fleet of commercial vessels using the Federal navigation channel. The results of the plan formulation effort to date indicate that the tentatively selected plan (TSP) consists of the deepening of the Norfolk Harbor Channel, Channel to Newport News, and Anchorage F (all in the inner harbor protected area) to a project depth of -55 feet MLLW; the deepening of the Thimble Shoal Channel (semi-protected Chesapeake Bay area) to -56 feet MLLW; and the deepening of the Atlantic Ocean Channel (open water area) to -59 feet MLLW. In addition, the Thimble Shoal Channel would be widened in two areas east and west of the Chesapeake Bay Bridge Tunnel to 1,200 feet on each segment. Note: Anchorage F still must be incrementally justified so depth was not presented at TSP.

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 Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report (hereinafter: Norfolk Harbor GRR IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

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

The Panel received electronic versions of the decision documents (1,622 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2012) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

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

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

Results of the Independent External Peer Review

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

Based on the Panel’s review, the report is well-written, thorough, and provides excellent supporting documentation on most engineering, environmental, economic, and plan formulation issues. The report provides a balanced assessment on the majority of the economic, engineering, and environmental issues of the overall project; however, the Panel identified several elements of the report that should be clarified or revised.

Plan Formulation and Economics: The Panel noted that the overall plan formulation section provides a clear exposition of the objectives of plan formulation and the data bearing on project formulation and selection decisions. However, the Panel has three major concerns. The first is the reasonableness and appropriateness of the economic assumptions. Neither the report nor the appendices provide a discussion of model calibration to allow the Panel to assess the adequacy of the assumptions and data underlying the evaluation of the economic benefits of alternatives. The Panel suggests that a model calibration be developed and a discussion showing data comparisons (model versus actual vessel operation and performance, external sources, and expectations) be added to the report. The second concern is whether the delay reductions at docks have been appropriately assigned or allocated to dock

capacity expansions rather than channel deepening. Without demonstrating that dock delay reductions have not become inordinately large as a proportion of with-project deepening benefits or that optimal expansions of dock capacities have been included in the without-project condition, it is not possible to assess the reasonableness and appropriateness of the assumptions and data underlying project benefit evaluations, which are the essence of selecting a recommended plan. The Panel suggests that the report add a discussion (with relevant data) of the formulation of the without-project condition to include the optimal expansion of dock capacities when justified by delay reduction benefits. The third concern is that the Panel is uncertain that plans have been formulated in accordance with ER 1105-2-100 and that the National Economic Development (NED) plan has been identified. Without the required discussion and data related to optimal timing, the Panel cannot assess whether the NED plan has been identified. The Panel recommends that USACE provide a discussion demonstrating that each project alternative is timed to maximize net NED benefits and that the NED plan also meets this timing requirement.

Engineering: The Panel found the navigation/hydraulic and geotechnical engineering sections of the GRR/EA to be well-written and very thorough. They noted it was one of the better decision documents they have reviewed. However, the Panel acknowledged a few items where project findings and objectives need to be clarified. Maintenance dredging costs may be underestimated due to the assumption that the CIDMMA will continue to have storage capacity throughout the 50-year maintenance dredging lifespan. The Panel recommends including offshore disposal costs in the maintenance dredge cost estimate and assuming that the CIDMMA will reach full capacity prior to the end of the project's 50-year lifespan. Also, the Panel noted that sedimentation rates may be underestimated, which has a direct effect on maintenance dredging volumes and operation and maintenance (O&M) costs. The Panel suggests using a preliminary level numerical sediment transport model that incorporates hydrodynamics and wave climate to determine sedimentation rates for the TSP and including this analysis in the report. Additionally, the report gives inconsistent values for the depth of the tunnel flange/bulkhead elevations. It is important that the exact elevation of the tunnel flanges be identified in the report, as it may affect both vessel accessibility and overall project costs. The Panel is also concerned that the document does not provide any information to support the low seismic risk statement. The report would benefit from more detailed information on seismic parameters and regional seismic risk and a discussion of the potential seismic impacts from regional oil fracking activities. Finally, the Panel noted that the report does not describe the geology related to the Chesapeake Bay Impact Crater (CBIC), making it unclear if the estimates of subsidence shown in the GRR/EA include this geologic disruption. The Panel suggests adding a description of the impact crater and correlation of the crater boundaries with the dredging limits.

Environmental: The Panel found the environmental section to be comprehensive and well-written. However, they did acknowledge a few issues that should be addressed. The Panel noted that the GRR/EA identifies three projects as future development of the Norfolk Harbor: Third Crossing, Craney Island Eastern Expansion, and Chesapeake Bay Bridge and Tunnel project. However, as required under the National Environmental Policy Act (NEPA), it does not appear these are included in the cumulative effects analysis. The Panel recommends that the report be updated with maps and text describing the extent and timeline of the three future projects and that the cumulative effects analysis be updated to include the future projects. Lastly, the report states that climate change and wind turbines are threats to the piping plovers but does not provide supporting documentation. The Panel suggests that the report be updated to include clear evidence to support this claim.

Table ES-1. Overview of 11 Final Panel Comments Identified by the Norfolk Harbor GRR IEPR Panel

| No. | Final Panel Comment |
|----------------------------------|--|
| Significance – High | |
| 1 | The reasonableness and appropriateness of the economic assumptions cannot be assessed because details on pertinent data and model calibration results, including objective data, are missing from documents provided for review. |
| 2 | The GRR/EA has not assessed whether the delay reductions at docks have been appropriately assigned or allocated to dock capacity expansions rather than channel deepening. |
| 3 | Sufficient data demonstrating that plans have been formulated in accordance with ER 1105-2-100 have not been provided to confirm that the National Economic Development Plan has been identified. |
| Significance – Medium/Low | |
| 4 | The exact depth of the joints (flanges) of the Thimble Shoal tunnel of the Chesapeake Bay Bridge Tunnel is not consistently defined in the report. |
| 5 | Maintenance dredging costs may be underestimated due to the assumption that the CIDMMA will continue to have storage capacity throughout the 50-year maintenance dredging lifespan. |
| 6 | Future Federal harbor projects are not discussed in the Norfolk Harbor GRR as required under NEPA. |
| Significance – Low | |
| 7 | It is unclear how wind turbines will have a negative impact on piping plovers. |
| 8 | The empirical and analytical methods used to derive sedimentation rates for the TSP may underestimate maintenance dredging volumes and costs. |
| 9 | The cost-sharing details of the berth dredging are not clearly defined and may impact the cost-share allocations. |
| 10 | The GRR/EA indicates seismic hazard is low, but does not provide Peak Ground Acceleration, seismic recurrence interval, or regional seismic data, including impacts related to regional oil fracking activities. |
| 11 | The GRR/EA describes the geology of the region, but does not mention the Chesapeake Bay Impact Crater, which may affect subsidence rates within the project area. |

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LIST OF ACRONYMS

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| ADM | Agency Decision Milestone |
| ATR | Agency Technical Review |
| CBBT | Chesapeake Bay Bridge Tunnel |
| CBIC | Chesapeake Bay Impact Crater |
| CIDMMA | Craney Island Dredged Material Management Area |
| COI | Conflict of Interest |
| DrChecks | Design Review and Checking System |
| EC | Engineer Circular |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| EP | Engineer Pamphlet |
| ER | Engineer Regulation |
| ERDC | Engineer Research and Development Center |
| FEMA | Federal Emergency Management Agency |
| GNF | General Navigation Features |
| GRR | General Reevaluation Report |
| IEPR | Independent External Peer Review |
| IWR | Institute for Water Resources |
| LSF | Local Service Facilities |
| MLLW | Mean Lower Low Water |
| NED | National Economic Development |
| NEPA | National Environmental Policy Act |
| O&M | Operation and Maintenance |
| ODMDS | Ocean Dredge Material Disposal Site |
| OEO | Outside Eligible Organization |
| OMB | Office of Management and Budget |
| PDT | Project Delivery Team |
| PGA | Peak Ground Acceleration |
| SLM | Senior Leader Meeting |
| USACE | United States Army Corps of Engineers |
| USFWS | United States Fish and Wildlife Services |
| TSP | Tentatively Selected Plan |
| WRDA | Water Resources Development Act |

1. INTRODUCTION

Norfolk Harbor (sometimes referred to as the Port of Hampton Roads) is a 25-square mile natural harbor serving port facilities in the cities of Norfolk, Newport News, Portsmouth, Chesapeake, and Hampton in southeastern Virginia. The Port is situated at the southern end of Chesapeake Bay, midway on the Atlantic Seaboard, approximately 170 miles south of Baltimore, Maryland, and 220 miles north of Wilmington, North Carolina. The harbor is formed by the confluence of the James, Nansemond, and Elizabeth Rivers. The Norfolk Harbor and Channels, Virginia, Project consists of a network of Federally improved channels extending from the Atlantic Ocean, through the Chesapeake Bay, and into the Port of Hampton Roads.

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2. Increasing the depth of Thimble Shoal Channel from -45 feet to -55 feet MLLW over its existing 1,000-foot width.
3. Increasing the depth of the channel to Newport News from -45 feet to -55 feet MLLW over its existing 800-foot width to the coal terminal at Newport News.
4. Dredging a new channel, designated as the Atlantic Ocean Channel, off Virginia Beach to a depth of -57 feet MLLW (post-authorization design modified the depth to -60 feet MLLW) and a width of 1,000 feet (post-authorization design modified the width to 1,300 feet).

5. Constructing three fixed mooring anchorage facilities, each capable of accommodating two large vessels simultaneously.
6. Placing suitable dredged material resulting from project construction in a designated ocean placement site and unsuitable material in the Craney Island Dredged Material Management Area (CIDMMA) site.

Since its authorization in 1986, the project has been constructed in separable elements based on the needs of the Port Community and the financial capability of the Commonwealth of Virginia, acting through its agent, the Virginia Port Authority. The 50-Foot Outbound Element was completed in 1989, the 50-Foot Anchorage in 1999, and the 50-Foot Inbound Element in 2007.

The purpose of the GRR is to identify whether the authorized plan is still in the Federal interest and to evaluate measures that would improve the operational efficiency of the existing and forecast future fleet of commercial vessels using the Federal navigation channel. The results of the plan formulation effort to date indicate that the tentatively selected plan (TSP) consists of the deepening of the Norfolk Harbor Channel, Channel to Newport News, and Anchorage F (all in the inner harbor protected area) to a project depth of -55 feet MLLW; the deepening of the Thimble Shoal Channel (semi-protected Chesapeake Bay area) to -56 feet MLLW; and the deepening of the Atlantic Ocean Channel (open water area) to -59 feet MLLW. In addition, the Thimble Shoal Channel would be widened in two areas east and west of the Chesapeake Bay Bridge Tunnel to 1,200 feet on each segment. Note: Anchorage F still must be incrementally justified so depth was not presented at TSP.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report (hereinafter: Norfolk Harbor GRR IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the Norfolk Harbor GRR 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 conflict of interest form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Norfolk Harbor GRR IEPR.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012).

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

In this case, the IEPR of the Norfolk Harbor GRR was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-214). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. The IEPR was completed in accordance with established due dates for milestones and deliverables as part of the final Work Plan, and 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: Civil Works planning/economics, environmental, geotechnical engineering, and hydraulic/channel design engineering. The Panel reviewed the Norfolk Harbor GRR documents and produced 11 Final Panel Comments in response to 13 charge questions provided by USACE, including one public comment question. 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 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

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

4.1 Summary of Final Panel Comments

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the Norfolk Harbor GRR IEPR review documents. The following summarizes the Panel’s findings.

Based on the Panel’s review, the report is well-written, thorough, and provides excellent supporting documentation on most engineering, environmental, economic, and plan formulation issues. The report provides a balanced assessment on the majority of the economic, engineering, and environmental issues of the overall project; however, the Panel identified several elements of the report that should be clarified or revised.

Plan Formulation and Economics: The Panel noted that the overall plan formulation section provides a clear exposition of the objectives of plan formulation and the data bearing on project formulation and selection decisions. However, the Panel has three major concerns. The first is the reasonableness and appropriateness of the economic assumptions. Neither the report nor the appendices provide a discussion of model calibration to allow the Panel to assess the adequacy of the assumptions and data underlying the evaluation of the economic benefits of alternatives. The Panel suggests that a model calibration be developed and a discussion showing data comparisons (model versus actual vessel operation and performance, external sources, and expectations) be added to the report. The second concern is whether the delay reductions at docks have been appropriately assigned or allocated to dock capacity expansions rather than channel deepening. Without demonstrating that dock delay reductions have not become inordinately large as a proportion of with-project deepening benefits or that optimal expansions of dock capacities have been included in the without-project condition, it is not possible to assess the reasonableness and appropriateness of the assumptions and data underlying project benefit evaluations, which are the essence of selecting a recommended plan. The Panel suggests that the report add a discussion (with relevant data) of the formulation of the without-project condition to include the optimal expansion of dock capacities when justified by delay reduction benefits. The third concern is that the Panel is uncertain that plans have been formulated in accordance with ER 1105-2-100 and that the National Economic Development (NED) plan has been identified. Without the required discussion and data related to optimal timing, the Panel cannot assess whether the NED plan has been identified. The Panel recommends that USACE provide a discussion demonstrating that each project alternative is timed to maximize net NED benefits and that the NED also meets this timing requirement.

Engineering: The Panel found the navigation/hydraulic and geotechnical engineering sections of the GRR/EA to be well-written and very thorough. They noted it was one of the better decision documents they have reviewed. However, the Panel acknowledged a few items where project findings and objectives need to be clarified. Maintenance dredging costs may be underestimated due to the assumption that the CIDMMA will continue to have storage capacity throughout the 50-year maintenance dredging lifespan. The Panel recommends including offshore disposal costs in the maintenance dredge cost estimate and assuming that the CIDMMA will reach full capacity prior to the end of the project’s 50-year lifespan. Also, the Panel noted that sedimentation rates may be underestimated, which has a direct effect on maintenance dredging volumes and operation and maintenance (O&M) costs. The Panel suggests using a preliminary level numerical sediment transport model that incorporates hydrodynamics and wave climate to determine sedimentation rates for the TSP and including this analysis in the report. Additionally, the report gives inconsistent values for the depth of the tunnel flange/bulkhead elevations. It is important that the exact elevation of the tunnel flanges be identified in the report, as it may affect both vessel accessibility and overall project costs. The Panel is also concerned that the document does not

provide any information to support the low seismic risk statement. The report would benefit from more detailed information on seismic parameters and regional seismic risk and a discussion of the potential seismic impacts from regional oil fracking activities. Finally, the Panel noted that the report does not describe the geology related to the Chesapeake Bay Impact Crater (CBIC), making it unclear if the estimates of subsidence shown in the GRR/EA include this geologic disruption. The Panel suggests adding a description of the impact crater and correlation of the crater boundaries with the dredging limits.

Environmental: The Panel found the environmental section to be comprehensive and well-written. However, they did acknowledge a few issues that should be addressed. The Panel noted that the GRR/EA identifies three projects as future development of the Norfolk Harbor: Third Crossing, Craney Island Eastern Expansion, and Chesapeake Bay Bridge and Tunnel project. However, as required under the National Environmental Policy Act (NEPA), it does not appear these are included in the cumulative effects analysis. The Panel recommends that the report be updated with maps and text describing the extent and timeline of the three future projects and that the cumulative effects analysis be updated to include the future projects. Lastly, the report states that climate change and wind turbines are threats to the piping plovers but does not provide supporting documentation. The Panel suggests that the report be updated to include clear evidence to support this claim.

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 reasonableness and appropriateness of the economic assumptions cannot be assessed because details on pertinent data and model calibration results, including objective data, are missing from documents provided for review.

Basis for Comment

Neither the report nor the appendices provide a discussion of model calibration to allow the Panel to assess the adequacy of the assumptions and data underlying the evaluation of the economic benefits of alternatives. The Panel needs to know how well the simulation model (HarborSym) replicates current logistical data, as well as the values of such data expected to prevail in the future under the without- and with-project conditions. Accordingly, items of interest include sailing draft distributions, projected fleets and assumed use of the associated fleet capacity to move projected tonnage, an estimate of transportation costs and how these costs compare to the estimates and forecasts in the trade literature.

Ideally, the benchmarks for calibration would be objective data drawn from actual operations and performance of vessels calling at Norfolk, projections of such vessel calls, and data available from the trade literature and other external sources. Model output data would be compared with objective calibration targets or benchmarks (e.g., sailing draft distributions, projected fleets and assumed use of the associated fleet capacity to move projected tonnage, the estimation of transportation costs and how these costs compare to the estimates and forecasts projected in the trade literature).

Significance – High

The adequacy of the assumptions and data underlying the economic evaluations is central to the technical or scientific basis for selecting, justifying, or implementing the recommended plan.

Recommendation for Resolution

1. Develop and provide a model calibration discussion for Norfolk Harbor showing data comparisons (model versus actual vessel operation and performance, external sources, and expectations).

Final Panel Comment 2

The GRR/EA has not assessed whether the delay reductions at docks have been appropriately assigned or allocated to dock capacity expansions rather than channel deepening.

Basis for Comment

The HarborSym documentation states, “HarborSym also captures and records time vessels spend at the dock in a ‘wait’ status due to system conflicts.” These waiting times are said to be generated in a Monte Carlo queuing context and dependent on vessel arrival rates and dock service times (e.g., cargo transfer times). Queuing costs can “spike” to very high levels as vessel calls at a service facility like a dock approach capacity.

The without-project condition is the most likely condition to prevail at Norfolk Harbor in the absence of the Federal project. In the case of dock delays, it is important to examine dock queuing costs and determine if and when these delay costs within the model justify dock capacity expansions and therefore when dock capacity expansions ought to be part of the most likely future without-project conditions. The definition of the without-project condition, including optimal expansions of the capacities of docks, is essential to avoid the inappropriate allocation or assignment of delay reduction benefits to channel deepening. If dock capacities are not assumed to be expanded when justified, then large delay costs may be assigned to the without-project condition and then be reduced and claimed as benefits under the assumption of reduced vessel calls attributable to deepening (more deeply loaded ships and larger ships). Therefore, including justified expansions of dock capacities is essential to the conceptually correct estimation of with-project benefits associated with deeper channels.

Without a demonstration that dock delay reductions have not become inordinately large as a proportion of with-project deepening benefits or a demonstration that optimal expansions of dock capacities have been included in the without-project condition, it is not possible to assess the reasonableness and appropriateness of the assumptions and data underlying project benefit evaluations, which are the essence of selecting a recommended plan.

Significance – High

The optimal formulation of the without-project condition with respect to dock capacities can be critical to the conceptually correct estimates of the with-project benefits of deepening.

Recommendation for Resolution

1. To avoid the fundamental concern and permit affirmation that project benefits appropriately reflect a reasonable without-project condition:
 - a. Provide a discussion (with relevant data) of the formulation of the without-project condition to include the optimal expansion of dock capacities when justified by delay reduction benefits, or
 - b. Display and break down for with-project conditions (i) the benefits attributable to delay reductions (presumably small or negligible if dock delay reductions have not inappropriately been included in with-project benefits) and (ii) the benefits attributable to other sources such as ocean voyage costs.

Final Panel Comment 3

Sufficient data demonstrating that plans have been formulated in accordance with ER 1105-2-100 have not been provided to confirm that the National Economic Development Plan has been identified.

Basis for Comment

ER 1105-2-100, subparagraph “o” ((USACE, 2000; p. 2-13) states,

“Project Implementation Timing. Alternative plans can differ in their implementation timing, that is, not all plans or features have to be in place at the beginning of the period of analysis. As project on-line dates are varied, annual benefits and costs will often vary. In general, the more the benefits vary through time and the longer the time to implementation from the base year (first year of period of analysis), the stronger this effect will be. *The best schedule for implementing project features shall be considered as an element in the formulation and evaluation of alternative plans.*” [emphasis added].

Clearly, identification of the National Economic Development (NED) plan depends on the optimal timing of each alternative to maximize net NED benefits.

The importance of optimally timing the NED plan is more than just a formality. In a context where budgets may be severely constrained, the optimal timing of the NED plan assists USACE in evaluating the project according to respective priorities. The Norfolk Harbor GRR is lacking the following key items:

- Data or analyses substantiating that the project alternatives (including the report-designated NED plan) have been optimized for project schedule based on the net NED benefit criterion.
- Assessment that the NED plan has been identified as required by the Principles and Guidelines (WRC 1983) depends on review of the above requested data and discussion.

Significance – High

Without the required discussion and data related to optimal timing, the Panel cannot assess whether the NED plan has been identified.

Recommendation for Resolution

1. Provide data and discussion demonstrating that the analysis confirms that each project alternative is timed to maximize net NED benefits and that the NED also meets this timing requirement.

Literature Cited:

USACE (2000). Planning – Planning Guidance Notebook. Engineering Regulation (ER) 1105-20-100. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. April 22.

WRC (1983). Economic and Environmental Principles and Guidelines for Water and Land Related Resources Studies. U.S. Water Resources Council, Washington, D.C. March 10.

Final Panel Comment 4

The exact depth of the joints (flanges) of the Thimble Shoal tunnel of the Chesapeake Bay Bridge Tunnel is not consistently defined in the report.

Basis for Comment

The report gives inconsistent values for the depth of the tunnel flange/bulkhead elevations of the Thimble Shoal tunnel of the Chesapeake Bay Bridge Tunnel (CBBT). For example, Appendix A, Section 7.2 states the top of the tunnel flange/bulkhead elevation is at “elevation -63 feet mean lower low water (MLLW) within the footprint of the channel. The tunnel itself is approximately 1.5’ below the flange/bulkhead.” However, Table 12 in Appendix A, Section 8.1.5 indicates that the top of the tunnel joints may actually be at -61.5 feet MLLW, based on a 2002 study by Transystems.

The variations in the elevation for top of the tunnel flanges make it difficult to analyze the project fully. If the top of the tunnel flanges is located at -61.5 feet, then the design depth of the channel will be reduced from 55 to 53.5 feet. This will affect the vessel accessibility and may change the overall project economics.

Significance – Medium/Low

The exact elevation may impact both vessel accessibility and overall project costs.

Recommendation for Resolution

1. Clarify the elevation of the tunnel flanges.
2. If the flange depth is located at elevation -61.5 feet, revise project costs based on the reduced vessel accessibility.

Final Panel Comment 5

Maintenance dredging costs may be underestimated due to the assumption that the CIDMMA will continue to have storage capacity throughout the 50-year maintenance dredging lifespan.

Basis for Comment

The cost estimate detailed in Appendix D, Cost for the Inner and Newport News Channels assumes that both new work and maintenance dredge will be completed via a hydraulic cutterhead dredge. The material placement will be at the Craney Island Dredged Material Management Area (CIDMMA). However, the CIDMMA is projected to reach full capacity prior to the end of the 50-year maintenance dredging lifespan. Once the CIDMMA site reaches full capacity, any remaining material will require placement at the Norfolk Ocean Dredge Material Disposal Site (ODMDS) site, which is located 35 miles from Craney Island.

The Panel believes that maintenance dredging costs may be underestimated due to the assumption that the CIDMMA will continue to have storage capacity throughout the 50-year maintenance dredging lifespan. Projected maintenance dredging costs do not appear to include additional transit costs associated with transporting dredge material from the Inner and Newport News Channels offshore to the Norfolk ODMDS once the CIDMMA site has reached full capacity. Placement at the Norfolk ODMDS site will require an alternative process such as using a hopper dredge for transport to the ODSMS site. The alternative process will have a significant impact on the unit cost of maintenance dredging. In addition, there is conflicting information regarding the remaining capacity of the CIDMMA site. GRR/EA, Section 3.1.2 states that the CIDMMA will reach full capacity in 2044; however, Appendix A Engineering, Section 6 indicates that the CIDMMA may reach full capacity as early as 2025. Either way, the CIDMMA does not have adequate capacity to store material during the 50-year lifetime of the projected maintenance dredging.

Significance – Medium/Low

Maintenance dredging costs may be underestimated due to the assumption that the CIDMMA will continue to have storage capacity throughout the maintenance dredging lifespan.

Recommendation for Resolution

1. Revise the maintenance dredge cost estimate to include offshore disposal using the assumption that the CIDMMA will reach full capacity prior to the end of the project's 50-year lifespan.
2. Revise the report to remove discrepancies regarding the projected closure year of the CIDMMA site.

Final Panel Comment 6

Future Federal harbor projects are not discussed in the Norfolk Harbor GRR as required under NEPA.

Basis for Comment

The National Environmental Policy Act (NEPA) states that known future Federal actions should be included in the overall analysis of the present project as part of the cumulative effects analysis.

The GRR/EA identifies three projects as future development of the Norfolk Harbor: Third Crossing, Craney Island Eastern Expansion, and Chesapeake Bay Bridge and Tunnel project. As per NEPA, the main report should include a more detailed description of the three future projects and their locations with respect to the proposed project alternatives and they should be part of the cumulative effects analysis.

Currently, the existing bridge tunnel is a hard impediment to any future increased vessel draft. A new tunnel, like the existing Chesapeake Bay Bridge Tunnel, could affect future navigation or vessel evolution (surface elevation or keel draft). Expansion of Craney Island as a new port facility will extend into the existing channel across from the Naval base. It is not made clear whether this expansion could impact the fleet operations with future larger naval vessels.

Analysis of known future projects is usually a way to determine whether the current project is independent of future plans or part of an overall larger project (segmentation). A map showing the current and future projects would help clarify the location of the three future projects relative to the alternatives.

Significance – Medium/Low

The GRR/EA does not provide a clear understanding of where the future projects would be located, which may impact the cumulative effects analysis.

Recommendation for Resolution

1. Clarify with maps and text the extent and timeline of the three future projects as they will affect existing or planned navigation improvements.
2. Expand the cumulative effects analysis to include the three future projects.

Final Panel Comment 7

It is unclear how wind turbines will have a negative impact on piping plovers.

Basis for Comment

In Appendix E, Biological Assessment (p.14) the following statement is made concerning piping plovers: “The main threats to the species are habitat loss and degradation, predation (particularly by dogs and cats), human disturbance, and more recently, *wind turbines* and climate change” (emphasis added). It is unclear to the Panel how wind turbines would negatively impact piping plovers as there are no references to support this statement.

Since the GRR/EA does not discuss wind turbines in the area of the project, it is not clear how the statement has relevance to the project. Piping plovers are shoreline birds that feed at the water’s edge. When disturbed, they generally fly low and for short distances. Their migratory flight patterns are not clear. Recent investigations (National Wind Watch, 2013, 2014; Stantial, 2014) indicate that either wind turbines would not impact piping plovers during migration or that more research is needed.

Declarative sentences or phrases need to be clearly referenced to support the claims cited in the text. Incorrect data are often quoted in non-scientific studies and are referenced in subsequent documents, even though they are not supported by scientific research. NEPA documents must not be sources for incorrect data.

Significance – Low

Without supporting documentation, it is impossible to assess the impact of wind turbines on piping plovers.

Recommendation for Resolution

1. Cite clear evidence that supports the claim that wind turbines impact piping plovers.
2. If unsupported, remove the sentence from Appendix E and clarify that recent investigations indicate that either wind turbines would not impact piping plovers during migration or that more research is needed.

Literature Cited:

National Wind Watch (2013). Researchers study wind turbines impact on piping plovers. Massachusetts. August 4. <https://www.wind-watch.org/news/2013/08/04/researchers-study-wind-turbines-impact-on-piping-plovers/>

National Wind Watch (2014). Tybee weighs turbines effects on birds. Georgia. January 28. <https://www.wind-watch.org/news/2014/01/28/tybee-weighs-turbines-effects-on-birds/>

Stantial, Michelle L. (2014). Flight Behavior of Breeding Piping Plovers: Implications for Risk of Collision with Wind Turbines. http://www.nj.gov/dep/fgw/ensp/pdf/plover-turbine_stantialthesis14.pdf

Final Panel Comment 8

The empirical and analytical methods used to derive sedimentation rates for the TSP may underestimate maintenance dredging volumes and costs.

Basis for Comment

Appendix A stated that sedimentation rates for the tentatively selected plan (TSP) were based on empirical and analytical methods. Use of these “first-order” estimating tools may not provide reasonable sedimentation rates for computing maintenance dredging volumes and costs. A major limitation is that the methods used do not include the effects of the hydrodynamics and local wave climate. A numerical sediment transport model that incorporates hydrodynamics and wave climate would provide a higher level of confidence in sedimentation rates for the TSP.

Significance – Low

Sedimentation rates may be underestimated, which has a direct correlation to maintenance dredging volumes and operation and maintenance (O&M) costs.

Recommendation for Resolution

1. Use a preliminary level numerical sediment transport model that incorporates hydrodynamics and wave climate to determine sedimentation rates for the TSP and update the report to include this analysis.

Final Panel Comment 9

The cost-sharing details of the berth dredging are not clearly defined and may impact the cost-share allocations.

Basis for Comment

GRR/EA Tables 1, 4-11, and 5-4 indicate that “Non-Federal Berthing Area Dredging Costs” are to be cost shared 50/50 by the Federal government and the local sponsor. However, according to Engineer Pamphlet (EP) 1165-2-1, paragraph 12-5 (USACE, 1999), which pertains to cost sharing and project cooperation for Federal navigation projects, Federal participation (cost sharing) is limited to the design and construction of general navigation features (GNFs) (including entrance and primary access channels), and costs for local service facilities (LSF), including dredging in berthing areas, shall be provided by the local non-Federal sponsor. The Federal cost sharing applies only to GNF areas.

GRR/EA, Section 5.7, second paragraph states that “Non-federal interests are responsible for and bear all costs for acquisition of necessary lands, easements, rights-of-way and relocations; terminal facilities; as well as dredging berthing areas and interior access channels to those berthing areas,” which is in agreement with EP 1165-2-1; however, it directly conflicts with the cost sharing tables presented in the GRR/EA.

For clarification, the report needs to be updated to reflect the accurate accounting for cost sharing of the LSF costs. LSF costs should be provided 100% by the non-Federal sponsor; however, revising the cost sharing of LSF will not affect total project costs and the benefit-cost ratio.

Significance – Low

Inconsistent presentation of the cost sharing affects the readability of the report, but not the total project costs or benefit-cost ratio.

Recommendation for Resolution

1. Revise the cost sharing for the berthing area dredging, or provide a justification for the 50/50 cost sharing for the berthing area dredging.
2. If the 50/50 cost sharing is justified, revise the conflicting text in Section 5.7 that states non-Federal interests are responsible for dredging of berthing areas.

Literature Cited:

USACE (1999). Water Resources Policies and Authorities – Digest of Water Resources Policies and Authorities. Engineer Pamphlet (EP) 1165-2-1. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. July 30.

Final Panel Comment 10

The GRR/EA indicates seismic hazard is low, but does not provide Peak Ground Acceleration, seismic recurrence interval, or regional seismic data, including impacts related to regional oil fracking activities.

Basis for Comment

GRR/EA, Section 2.5.1 (p. 44) indicates, “The risk of seismic events affecting the navigation channels in the project area is sufficiently low.” The document further states, “The Virginia Department of Emergency Management has identified no significant earthquakes within the most recent 200 years in eastern Virginia.”

The GRR/EA does not mention the 2011 Mineral, Virginia earthquake with $M_w=5.8$ g (seismic acceleration of 0.26g) that occurred (Horton, 2012, 2015; Jibson, 2012). Research and papers from the U.S. Geological Survey documented on its website indicate that landslides occurred up to 150 miles from the epicenter (Jibson, 2012); that seismic energy releases on the East Coast are upwards of 10 times the values seen in West Coast earthquakes (Horton, 2015); and that rock properties allow seismic waves to travel further without weakening in the older, denser rocks found on the East Coast (Horton, 2012, 2015).

The GRR/EA indicates no significant earthquakes have occurred in eastern Virginia, but does not discuss seismic activity in the Central Virginia Seismic Zone, Giles County Seismic Zone, and Eastern Tennessee Seismic Zone or recent research by the Federal Emergency Management Agency (FEMA) in the 2017 Fault Mapping Project (DMME, 2017a).

While the IEPR Panel agrees that the seismic risk is likely to be low, the document does not provide any information on the following, which is needed to support the low seismic risk statement:

- The seismic recurrence interval and Peak Ground Acceleration (PGA) used for the project
- Regional seismic activity and information on the seismic zones, fault systems, and earthquake epicenters related to the project location
- Oil fracking activity and discussion on the potential risk of increased seismic activity (DMME, 2017b).

Significance – Low

The technical quality of the report would be improved by providing more detailed information on seismic parameters and regional seismic risk and by adding a discussion on potential seismic impacts from regional oil fracking activities.

Recommendation for Resolution

1. Include the PGA and seismic recurrence interval that should be used for the GRR/EA.
2. Add a figure showing the location of known faults and regional seismic activity in the region and their proximity to the project dredging limits for each segment. Describe the historic seismic activity for the eastern region of the U.S., including the Central Virginia Seismic Zone. Recent data from the 2017 FEMA Faulting Mapping Project (DMME, 2017a) may be used.
3. Add a discussion related to oil fracking activities and potential seismic risk.

Literature Cited:

DMME (2017a). FEMA Fault Mapping Project. Virginia Division of Mines, Minerals, and Energy, Division of Geology and Mineral Resources. Available online at:

<https://www.dmme.virginia.gov/dgmr/FEMAFaultMapping.shtml>

DMME (2017b). Hydraulic Fracturing in Virginia. Virginia Division of Mines, Minerals, and Energy, Division of Gas and Oil. Available online at: <https://www.dmme.virginia.gov/dgo/HydraulicFracturing.shtml>

Horton, J.W., Jr., and Williams, R.A. (2012). The 2011 Virginia earthquake: What are scientists learning? EOS Transactions, American Geophysical Union, 93(33):317-318. Available online at:

<https://earthquake.usgs.gov/earthquakes/events/2011virginia/eost18821.pdf>

Horton, J.W., Jr., Chapman, M.C., and Green, R.A., eds. (2015). The 2011 Mineral, Virginia, Earthquake, and Its Significance for Seismic Hazards in Eastern North America, Boulder, Colorado, Geological Society of America Special Paper 509, 431pp. doi:10.1130/9780813725093. Available online at:

https://gsw.silverchair-cdn.com/gsw/Content_public/book/682/spe509-01.pdf?Expires=1514400675&Signature=dEDxCjCWpECvMvHGsewpcKxbelEvPyxX-6ul2FL48P~J2e349ajqHjT4Pzv7ephafHz7FflmyCQ54IsF-NZgmvorNSvEgYCjWQ7eOvhFrxAzLoM6dLagnMdHj4wdxXE3sUAWkuCzsd6Avvh0oZWYyWoEy~oMd9Vh~G51yd0kc8qvBZl6CqT7uAEemKzeAyB9iW6l09AQ-XvT6iJJ41oEWBvwKyWGVdysrNvBY8PAdZV~Oe2TyKN9tajNaP0VYKzp8CYTpDPeiFRtBsxOYmjiRtqUAhVBZ00WZPvi5EENun0JtVOLOtUMuQOcrAbAL5Byrc8lbrOPvO8Kp~EKPGGA9w &Key-Pair-Id=APKAIUCZBIA4LVPAVW3Q

Jibson, R.J., and Harp, E.L. (2012). Extraordinary Distance Limits of Landslides Triggered by the 2011 Mineral, Virginia, Earthquake. Bulletin of the Seismological Society of America, 102(6):2368–2377, December 2012. doi: 10.1785/0120120055. Available online at:

https://profile.usgs.gov/myscience/upload_folder/ci2015Mar1615553842737109-Virginia%20earthquake,%20BSSA-small.pdf

Final Panel Comment 11

The GRR/EA describes the geology of the region, but does not mention the Chesapeake Bay Impact Crater, which may affect subsidence rates within the project area.

Basis for Comment

GRR/EA Section 2.5, Affected Environment, describes the geology, physiography, and topography of the region (pp. 43-44) and the bathymetry, hydrology, and tidal processes (pp.44-46). It does not include any mention of the geology related to the Chesapeake Bay Impact Crater (CBIC).

A likely comet/meteor strike 35 million years ago created a 50-mile-wide impact crater, making substantial changes to the geology of the region (see Figure 1). The impact resulted in significant mega block faulting and fracturing of basement bedrock and disruption of sediment in the region. Since this crater is not mentioned in the GRR/EA, it is unclear if the estimates of subsidence shown in the GRR/EA include this geologic disruption.

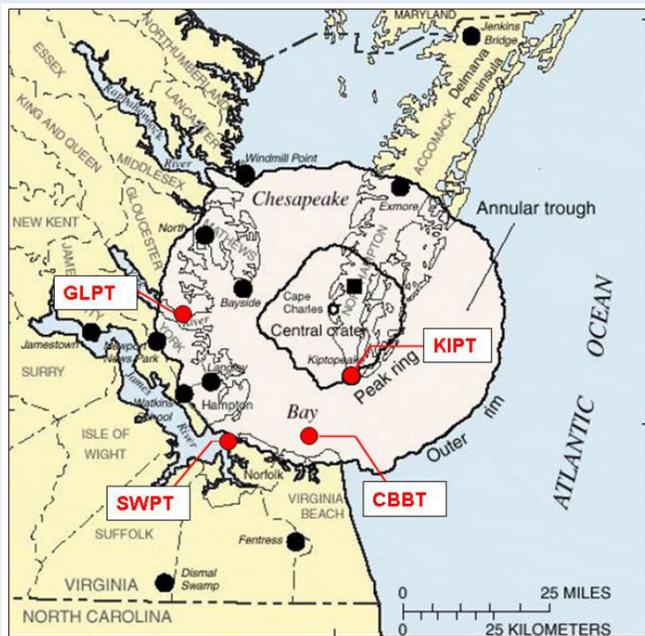


Figure 1. Comet or meteor impact crater limits in the Chesapeake Bay/Atlantic Ocean (Boon et al., 2010, p.20).

Significance – Low

The technical quality of the GRR/EA would be improved by including a description of the impact crater and correlation of the crater boundaries with the dredging limits for each segment and anticipated subsidence for the dredge limits.

Recommendation for Resolution

1. Include a narrative in the GRR/EA, Section 2.5.1, geologic background describing the CBIC.
2. Add a figure relating the boundary of the CBIC with the dredging limits for each segment.
3. Determine whether the subsidence/sea level rise estimates account for this geologic disruption of basement rock and sediment in the region and include narrative with subsidence estimates in the GRR/EA.

Literature Cited:

Boon, John D., Brubaker, John M., and Forrest, David R. (2010). Chesapeake Bay Land Subsidence and Sea Level Change: An Evaluation of Past and Present Trends and Future Outlook. William & Mary, Virginia Institute of Marine Science, Special Report No. 425 for the U.S. Army Corps of Engineers, Norfolk District, pp. 18-25.

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

USACE (2000). Planning – Planning Guidance Notebook. Engineering Regulation (ER) 1105-20-100. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. April 22.

USACE (1999). Water Resources Policies and Authorities – Digest of Water Resources Policies and Authorities. Engineer Pamphlet (EP) 1165-2-1. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. July 30.

WRC (1983). Economic and Environmental Principles and Guidelines for Water and Land Related Resources Studies. U.S. Water Resources Council, Washington, D.C. March 10.

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APPENDIX A

IEPR Process for the Norfolk Harbor GRR 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 Norfolk Harbor GRR 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 November 9, 2017. Note that the actions listed under Task 6, as well as the public comment review, 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 March 13, 2018. 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 Norfolk Harbor GRR IPER

| Task | Action | Due Date |
|----------------|--|------------|
| 1 | Award/Effective Date | 9/15/2017 |
| | Review documents available | 11/9/2017 |
| | Public comments received from USACE | 1/4/2018 |
| | Battelle submits draft Work Plan ^a | 10/13/2017 |
| | USACE provides comments on draft Work Plan | 10/20/2017 |
| | Battelle submits final Work Plan ^a | 11/14/2017 |
| 2 | Battelle submits list of selected panel members ^a | 10/24/2017 |
| | USACE confirms the panel members have no COI | 10/27/2017 |
| 3 | Battelle convenes kick-off meeting with USACE | 10/18/2017 |
| | Battelle convenes kick-off meeting with panel members | 11/10/2017 |
| | Battelle convenes kick-off meeting with USACE and panel members | 11/17/2017 |
| 4 | Panel members complete their individual reviews | 12/13/2017 |
| | Panel members provide draft Final Panel Comments to Battelle | 12/28/2017 |
| | Panel finalizes Final Panel Comments | 1/5/2018 |
| | Panel members complete their review of the public comments | 1/17/2018 |
| | Panel drafts Final Panel Comment on public comments, if necessary | 1/20/2018 |
| 5 | Battelle submits Final IEPR Report to USACE ^a | 1/10/2018 |
| | Battelle submits Addendum to the Final IEPR Report ^{a,b} | 1/31/2018 |
| 6 ^b | Battelle convenes Comment Response Teleconference with panel members and USACE | 2/22/2018 |
| | Battelle submits pdf printout of DrChecks project file ^a | 3/13/2018 |
| | Agency Decision Milestone (ADM) meeting ^c | 1/26/2018 |
| | Contract End/Delivery Date | 12/26/2018 |

^a Deliverable.

^b Task 6 and public comment activities occur 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. Note: On October 19, 2017, the DDN PCX confirmed it is no longer anticipated that a Senior Leaders Meeting (SLM) will be required for this task order.

At the beginning of the Period of Performance for the Norfolk Harbor GRR 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, including one public comment question, and two summary 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 |
|---|---------------------|
| General Reevaluation Report/ Environmental Assessment | 295 |
| Appendix A: Engineering | 283 |
| Appendix B: Economics | 76 |
| Appendix C: Real Estate Plan | 14 |
| Appendix D: Cost Engineering | 14 |
| Appendix E: Draft Biological Assessment | 82 |
| Appendix F: Environmental | 24 |
| Appendix G: Draft CZM Act Federal Consistency Determination | 11 |
| Appendix H: NMFS Essential Fish Habitat | 65 |
| Appendix I: Coordination | 89 |
| Appendix J: Hydrodynamic and Water Quality Modeling | 669 |
| Total Number of Review Pages | 1622 |
| Supplemental Information ^a | |
| Public Review Comments ^b | 150 |
| Risk Register | 10 |
| Total # of Reference Pages | 160 |

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

^b USACE will submit public comments to Battelle upon their availability according to the schedule in Table A-1, who will in turn submit the comments to the IEPR Panel for review. A separate Addendum to the Final Report will be submitted if additional Final Panel Comments are necessary.

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

- USACE guidance, *Civil Works Review* (EC 1165-2-214), December 15, 2012
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, December 16, 2004.
- Foundations of SMART Planning
- SMART Planning Bulletin (PB 2013-03)
- SMART – Planning Overview
- USACE Planning Modernization Summary
- Engineering and Construction Bulletin (ECB) 2012-18: Engineering Within the Planning Modernization Paradigm
- USACE Climate Change Adaptation Plan (June 2014)
- ETL 1100-2-1 – Procedures to Evaluate SLR Change Impacts Responses Adaptation
- ER 1100-2-8162 – Incorporating SLR Change in CW Programs

About three-quarters through the review, a teleconference was held with USACE, Battelle, and the Panel so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted seven panel member questions to USACE. USACE was able to provide verbal responses to all of the questions during the teleconference, but was not able to provide written responses to all the questions or data requests prior to the end of the review due to time constraints.

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

- USACE (1986). Norfolk Harbor and Channels, Virginia, Tunnel Cover Design Studies: General Design Memorandum 1, Appendix F. U.S. Army Corps of Engineers, Norfolk District. June 1986.
- Transystems (2002). The Chesapeake Bay Tunnel Study. Transystems Corporation. February 2002.

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.

The Panel also discussed responses to specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be conflicting. Each comment was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

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 Norfolk Harbor GRR IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Panel Comments:** Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see description below)
 4. Recommendation(s) for Resolution (see description below).

- **Criteria for Significance:** The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** 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, 11 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

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 (this document). Each panel member and Battelle technical and editorial reviewers reviewed the IEPR report prior to submission to USACE for acceptance.

A.7 Comment Response Process

As part of Task 6, Battelle will enter the 11 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will

respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

APPENDIX B

Identification and Selection of IEPR Panel Members for the Norfolk Harbor
GRR Project

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B.1 Panel Identification

The candidates for the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report (hereinafter: Norfolk Harbor GRR IEPR) Panel were evaluated based on their technical expertise in the following key areas: Civil Works planning/economics, environmental, geotechnical engineering, and hydraulic/channel design engineering. These areas correspond to the technical content of the review documents and overall scope of the Norfolk Harbor GRR project.

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

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

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

| Panel Conflict of Interest (COI) Screening Statements for the IEPR of the Norfolk Harbor GRR | |
|--|--|
| 1. Previous and/or current involvement by you or your firm in the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report and related projects. | |
| 2. Previous and/or current involvement by you or your firm in Deep Draft Navigation studies in southeastern Virginia, Chesapeake Bay, or specifically in Norfolk Harbor/ Port of Hampton Roads. | |
| 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 Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report and related projects. | |
| 4. Current employment by the U.S. Army Corps of Engineers (USACE). | |

| Panel Conflict of Interest (COI) Screening Statements for the IEPR of the Norfolk Harbor GRR | |
|--|--|
| 5. Previous and/or current involvement with paid or unpaid expert testimony related to Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report and related projects. | |
| 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 <i>(for pay or pro bono)</i> : (1) Commonwealth of Virginia (2) Virginia Port Authority. | |
| 7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to southeastern Virginia, Chesapeake Bay, or specifically in Norfolk Harbor/Port of Hampton Roads. | |
| 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, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Norfolk District. | |
| 9. Previous or current involvement with the development or testing of models that will be used for, or in support of the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report and related projects. | |
| 10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Norfolk 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 Norfolk District. Please explain. | |
| 11. Any previous employment by USACE as a direct employee, notably if employment was with the Norfolk 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 Norfolk District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role. | |

| Panel Conflict of Interest (COI) Screening Statements for the IEPR of the Norfolk Harbor GRR | |
|---|--|
| 13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning Deep Draft Navigation, and include the client/agency and duration of review (approximate dates). | |
| 14. Pending, current, or future financial interests in Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report, related projects, and related contracts/awards from USACE. | |
| 15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts (estimate percentage). | |
| 16. Significant portion of your personal or office's revenues within the last three years came from Commonwealth of Virginia, or the Virginia Port Authority contracts (estimate percentage). | |
| 17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report and related projects. | |
| 18. Participation in relevant prior and/or current Federal studies relevant to this project and/or Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report and related projects. | |
| 19. Previous and/or current participation in prior non-Federal studies relevant to the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report and related projects. | |
| 20. Has your research or analysis been evaluated as part of the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report and related projects? | |
| 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 to whether that firm serves as a prime or as a subcontractor to a prime. Candidates were asked to clarify the relationship in the screening questions.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member's affiliation, location, education, and overall years of experience. One panel member held a dual role serving as both the economics and Civil Works planning expert. One of the four final reviewers are an independent consultant; the other three are consultants affiliated with a consulting company. 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. Norfolk Harbor GRR IEPR Panel: Summary of Panel Members

| Name | Affiliation | Location | Education | P.E. | Exp (yrs) |
|---|------------------------------------|---------------------|--|------|-----------|
| Civil Works Planning / Economics (Dual Role) | | | | | |
| Larry Prather | DR Reed and Associates | Middletown, MD | B.A., Economics ABD -- Ph.D., Economics | N/A | 38 |
| Environmental | | | | | |
| Paul Looney | Independent Consultant | Pensacola, FL | M.S., Coastal Zone Studies/Biology | N/A | 37 |
| Geotechnical Engineering | | | | | |
| Mike Hartley | PND Engineers, Inc. | Seattle, WA | M.S., Civil/Geotechnical Engineering | Yes | 39 |
| Hydraulic/channel design engineering | | | | | |
| Michael Giovannozzi | AquaTerra Consulting International | West Palm Beach, FL | M.S., Civil Engineering | Yes | 17 |

Table B-2 presents an overview of the credentials of the 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. Norfolk Harbor GRR IEPR Panel: Technical Criteria and Areas of Expertise

| Technical Criterion | Prather | Looney | Hartley | Giovannozzi |
|---|---------|--------|---------|-------------|
| Civil Works Planning / Economics (Dual Role) | | | | |
| Minimum of 10 years of demonstrated experience as a water resources planner for Deep Draft Navigation (DDN) projects and economics, including containerized trade | X | | | |
| Demonstrated experience applying USACE plan formulation processes, procedures, and standards to DDN channel improvement projects and dredged material management plans | X | | | |
| Demonstrated experience in applying USACE procedures and standards for DDN economic analyses and in formulating and evaluating alternative plans for those projects | X | | | |
| Knowledge of tools employed for economic analysis, risk analysis, and trade/fleet forecast development | X | | | |
| Experience directly working for or with USACE in applying Principles and Guidelines to Civil Works project evaluations (highly recommended) | X | | | |
| Active participation in related professional societies | X | | | |
| Environmental | | | | |
| At least 15 years of demonstrated experience directly related to water resource environmental evaluation and National Environmental Policy Act (NEPA) compliance for DDN channel improvement and dredged material management projects | | X | | |
| Minimum M.S. degree or higher in a related field | | X | | |
| Familiar with the habitat, fish and wildlife species, and archeology that may be affected by the project alternatives in this study area | | X | | |
| Familiar with Chesapeake Bay and mid-Atlantic Ocean biology and has knowledge of marine systems | | X | | |
| Expert in compliance with environmental laws, policies, and regulations, including the Fish and Wildlife Coordination Act and the Endangered Species Act | | X | | |
| Geotechnical Engineering | | | | |
| Minimum of 15 years of demonstrated engineering experience in geo-civil design and geotechnical evaluation of DDN projects | | | X | |
| Minimum M.S. degree or higher in geotechnical engineering | | | X | |
| Demonstrated experience related to USACE geotechnical practices for design and construction of DDN channels and dredged material management (upland and beneficial use areas) | | | X | |
| Experience in geotechnical risk analysis | | | X | |

Table B-2. Norfolk Harbor GRR IEPR Panel: Technical Criteria and Areas of Expertise (continued).

| Technical Criterion | Prather | Looney | Hartley | Giovannozzi |
|--|---------|--------|---------|-------------|
| Active participation in related professional engineering and scientific societies | | | X | |
| Registered Professional Engineer | | | X | |
| Hydraulic/channel design engineering | | | | |
| 15 years of demonstrated experience or combined equivalent of education and experience in DDN channel design | | | | X |
| Minimum M.S. degree in civil, coastal, or hydraulic engineering | | | | X |
| Familiar with the application of USACE civil, hydraulic, and coastal engineering requirements for feasibility studies (including channel design and effects of currents, sedimentation, and water quality) | | | | X |
| Specialized experience in subsurface investigations for channel design, dredged material management, and the design of dredged material placement areas (PAs) (upland and beneficial use) | | | | X |
| Familiar with standard USACE hydrologic and hydraulic computer models and has 5-10 years of experience working with numerical modeling applications for navigation projects | | | | X |
| Registered Professional Engineer | | | | X |

B.3 Panel Member Qualifications

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

| <i>Name</i> | <i>Role</i> | <i>Affiliation</i> |
|---------------|--|------------------------|
| Larry Prather | Civil Works Planning / Economics (Dual Role) | DR Reed and Associates |

Mr. Prather is currently an economist at DR Reed and Associates (DRRA) and previously held positions in economics, planning, and public policy at USACE (1978-2015). He has 38 years of professional experience as an economist. Mr. Prather received a B.A. in economics and completed all requirements for a Ph.D. in economics except the dissertation from Rice University.

Mr. Prather is familiar with deep draft economics, including containerized trade. He is currently leading DRRA efforts to design a methodology for developing and maintaining national inland waterway traffic demand forecasts. Alternative methods are being evaluated against a set of evaluation criteria to identify the methodology to provide a set of forecasts that model barge demand for the entire Inland Marine Transportation System (IMTS). The purpose of the forecasts will be to support system traffic routing/costing and equilibrium modeling, but also to assist HQUSACE Asset Management of the IMTS, economic updates for General Investigation studies, and construction general programs.

Mr. Prather has Civil Works planning experience. As a water resources planner for Deep Draft Navigation (DDN) projects, he provided planning and policy analysis and reviewed numerous deep draft navigation studies. Major studies include Los Angeles Harbor, Long Beach Harbor, the Houston Ship Channel, Boston Harbor, Mississippi River-Baton Rouge to the Gulf, Toledo Harbor Dredge Material Management, and the Columbia River Deepening.

Mr. Prather has applied USACE plan formulation processes, procedures, and standards to numerous DDN channel improvement projects and dredged material management plans during his time at USACE. As a senior planning and policy executive in HQUSACE, he was often dispatched to advise field planning teams in such studies. In addition to the studies in the previous paragraph, he supported studies of the Port of New York and New Jersey, Tampa Harbor, and the Port of Miami. In the early 1990s, he prepared the engineering circular that launched the dredged material management planning program. He continued to support the advancement of plan formulation procedures and dredged material management planning in his role as the principal senior USACE liaison to the American Association of Port Authorities (AAPA) and as a Work Group Co-Chair of the AAPA-Corps Quality Partnership Initiative. He was the initial lead in developing the revisions to the Principles and Guidelines mandated by the Water Resources Development Act of 2007 and issued the first draft revision for public comment. As the Chief of Policy Guidance, he was one of the HQUSACE principals charged with resolving plan formulation issues in deep draft planning reports under review by the Review Branch in the Policy Division, and participated in virtually every deep draft navigation study that was approved by the Corps from 1996 to 2005.

In 2012, at the request of the HQUSACE Chief, Policy and Planning Division, Mr. Prather was a reviewer of the Corps report to Congress assessing the need for waterway and port modernization that will result from increases in post-Panamax container vessel use: *Preparing for Post-Panamax Vessels*. The analysis included costs of modernization, commodity trade forecasting, shipping economics, and other

data that will drive deepening and other expansion at U.S. ports. The review also included alternative financing of port improvements, including a larger role for states and port authorities.

Mr. Prather understands the tools employed for economic analysis, risk analysis, and trade/fleet forecast development through his work experience. As the lead economist for USACE (1978-1995), he conducted economic analyses, supervised navigation systems analyses, and supervised numerous large navigation studies such as the Monongahela Lock and Dam 7 & 8 Study, the Lower Ohio (L&D 52 & 53) Study, the Lower Monongahela River Navigation Study, the Winfield Lock Replacement Study, the Kentucky Lock Study, and the McAlpine Lock Replacement Study. He also supervised the formulation and publication of HQUSACE Civil Works policy guidance and served as co-chair of the USACE-American Association of Port Authorities Committee on Corps Deep Draft Authorities and Policies. Mr. Prather actively participates in the navigation activities of the National Waterways Conference and the American Association of Port Authorities. He has made numerous navigation-related presentations to the U.S. Conference of Mayors, among them, a presentation to the Mayors Ports Task Force on deep draft plan formulation related to the Water Resources Reform and Development Act of 2014. For many years he was part of the HQUSACE team that oversaw the work of preparing fleet forecasts, commodity forecasts, and container analysis.

| <i>Name</i> | <i>Role</i> | <i>Affiliation</i> |
|--------------------|----------------------|-------------------------------|
| Paul Looney | Environmental | Independent Consultant |

Mr. Looney, Senior Scientist at Scalar Consulting Group Inc. in Pensacola, Florida, has 37 years of professional experience, 27 of them as an ecologist. He has an M.S. in coastal zone studies/biology from the University of West Florida, and is a Certified Environmental Professional (CEP), a Senior Ecologist, and a Professional Wetland Scientist (PWS). The theme for his Master’s Thesis was research and documentation of the environmental impacts related to deposition of dredged material in a coastal environment. Mr. Looney is an active member of the National Association of Environmental Professionals and serves as their newsletter editor.

Mr. Looney has broad experience in water resource environmental evaluation and NEPA compliance for DDN channel improvement projects. He was the lead scientist for the Alabama Port Authority Environmental Impact Statement (EIS) for the creation of a container port in Mobile, Alabama. He also completed the NEPA/ecological review of the Savannah Harbor Deepening EIS. Mr. Looney has authored seven peer-reviewed publications examining the ecological effects of dredged material deposition on existing barrier island vegetation. He has also performed wetland delineations; threatened and endangered species, vegetation, and wildlife investigations; coastal zone management investigations; Section 7 formal consultations; Biological Assessments; Essential Fish Habitat Assessments; and NEPA assessment documentation (on coastal projects in Florida and Alabama). Mr. Looney is familiar with Chesapeake Bay and mid-Atlantic Ocean biology. He has evaluated traditional Civil Works plan benefits for DDN projects including the Dredge Material Management Plan for Baltimore Harbor and Channels (Virginia and Maryland). He also has experience with the IWR Plan, having used it on three IEPR reviews for USACE.

His knowledge of environmental laws, policies, and regulations, particularly the Fish and Wildlife Coordination Act and the Endangered Species Act, was applied recently during the IEPR of the Three Rivers Study, Southeast Arkansas Integrated Feasibility Report and Environmental Assessment. He has completed several NEPA projects in coastal Florida (Environmental Assessment), Louisiana (EIS), and

Alabama (EIS) that required intensive coordination with the USFWS and the NMFS concerning both terrestrial and marine species.

Mr. Looney was responsible for natural resource impact surveys of nearby wetlands and threatened and endangered species. He developed a coastal wetland evaluation model, based on Hydrogeomorphic Model (HGM), for the evaluation of coastal fringing wetlands and tidal flats associated with the Choctaw Point Container Port EIS, Mobile, Alabama. The model was used for a multi-agency (Federal and state) evaluation of all impacted wetlands and was agreed upon after intensive collaboration between all agencies.

| <i>Name</i> | <i>Role</i> | <i>Affiliation</i> |
|-----------------------|--------------------------|---------------------|
| Michael Hartley, P.E. | Geotechnical Engineering | PND Engineers, Inc. |

Mr. Hartley is a past senior vice president of PND Engineers, Inc. and currently provides consulting services as a senior geotechnical engineer through PND. He earned his M.S. in civil/geotechnical engineering in 1979 from Oregon State University and is a registered professional engineer in the states of Alaska and Washington. He has 39 years of experience providing civil, coastal, and geotechnical engineering services for projects throughout the United States and overseas. His geotechnical engineering experience includes the studies and design for marine infrastructure, levees, dams, buildings, roads, trails, bridges, breakwaters, and dredging projects.

Mr. Hartley has performed civil design and geotechnical investigations on marine projects throughout the coastal waters of the United States, Canada, Russia, Brazil, and Iraq. He is a recognized expert in the Federal court system in civil, coastal, and geotechnical engineering. Geotechnical evaluations have included dredging and design of port facilities (docks, fender systems, mooring buoys, and dolphins for small ships to large cruise ship terminals and container wharfs, marinas and offshore artificial islands using dredged material containment). Geotechnical investigations have been conducted for docking facilities in up to 140 feet of water and in soft marine sediments to bedrock. He is an expert in static and seismic stability evaluation for both upland, riverine, and offshore marine environments and has conducted evaluations for dredging and sites with steep slopes and high seismic environments common in Alaskan waters. He is also proficient in the evaluation of soft marine clays and procedures for accelerating settlement for stability and consolidation.

Mr. Hartley is experienced in the geotechnical practices for design and construction of DDN channels and dredged material management (upland and beneficial use areas). He was the lead geotechnical engineer and civil designer for dredged channels and marina expansion for the City of Cordova, Alaska. As part of this activity, Mr. Hartley provided dredged spoil containment berms and designed new upland areas for industrial building and parking expansion on the dredge fill areas. Mr. Hartley was responsible for dredge channel design for deep draft vessels for the Seward Coal Port. As part of this activity he performed the offshore geotechnical investigation in support of berth and shiploader designs and the static and seismic analysis for deep draft dredge slope designs. Mr. Hartley has provided evaluations of navigation channels for the Newmont mine in the Arctic waters of the Northwest Passage of Canada. He has also provided necessary analysis of navigation channels for oil response vessels for port facilities in Prince William Sound at Chenega Bay and Tatitlek and provided geotechnical designs for roads and port facilities for the State of Alaska.

Mr. Hartley has extensive experience in geotechnical risk analysis. He has served as a geotechnical engineer expert on numerous panels involving large high-head dams, performing peer review of proposed seepage corrections and geotechnical assessment of static and seismic conditions for stability. Relevant design modifications include Campbell Lake Dam safety studies and design of rehabilitation measures using sheetpile. He is experienced in both failure mode analysis and risk assessment of embankment dams and using risk-based procedures, most recently having reviewed the risk assessment for levees in Mt. Vernon and Burlington and for levees in San Francisco Bay. He evaluated the procedures used by two separate geotechnical firms for levee stability assessments as part of the USACE Skagit River, Washington IEPR. Mr. Hartley was the lead geotechnical engineer involving the evaluation of offshore stability for the San Francisco Airport expansion 1.5 miles into San Francisco Bay. The concept study for this \$1.8 billion project included civil and geotechnical requirements for dredge, static and seismic stability, and civil design improvements required for runways and taxiways.

Mr. Hartley has experience in the evaluation of risk reduction measures for dam safety assurance and dredging projects, reflected in his efforts in support of USACE IEPR dam safety assurance projects for the Dover, Bluestone, and Bolivar Dams, as well as other construction-phase review services. This has included risk assessment for dredging projects for Seward Coal Port, San Francisco Airport Expansion, Chenega Oil Spill Response Facility, Tatitlek Oil Spill Response Facility, and assessment of the Nome Breakwater navigation channel and breakwater. He has testified in Federal court on risk-based assessment analysis and is very familiar with probabilistic methods of geotechnical assessment of levees, recently performing an IEPR review for the Skagit River levee system in Washington state. Other relevant projects include Sherwood Estates Dam, Squaw Harbor Dam, Lyon Lake Dam, Upper Petersburg Creek Dam, Cabin Creek Dam, Campbell Lake Dam, Valdez Creek Dam, and levee assessment for Skagit County. He has used USACE publications in the design, risk-based assessment, and review of flood control dam and levee reviews. He is also familiar with all applicable USACE design criteria and USACE engineering manuals, and has used these in the design of projects and in the peer review of designs by others. Examples include the West Bank Levee designs peer review for WBV 12, 14f.2, and 18 levees, and the geotechnical design analysis for the Permanent Canal Closures and Pumps (PCCP) cofferdams in New Orleans.

Mr. Hartley provided assessment of the Valdez Creek tailings dam seepage of contaminated materials into nearby creeks and assessment of thermal heat syphons to control seepage underneath the Red Dog Mine earthfill dam. Mr. Hartley has also worked on road design, road decommissioning, and fish passage structure design at hundreds of sites in Washington, Oregon, California, and Alaska as part of many indefinite delivery contracts. Mr. Hartley has also provided geotechnical analysis for cofferdams, riverine and coastal port facilities, and marine bulkheads for coastal and riverine navigable channels.

| <i>Name</i> | <i>Role</i> | <i>Affiliation</i> |
|----------------------------------|--|---|
| Michael Giovannozzi, P.E. | Hydraulic/Channel Design Engineer | AquaTerra Consulting International |

Mr. Giovannozzi is a coastal engineer and independent consultant with more than 17 years of engineering experience in both government and private sectors in the fields of coastal and hydraulic engineering throughout the United States, including of deep draft navigation projects. He earned both a B.S. and an M.S. in civil engineering from the University of Delaware. He is a registered professional

engineer in Washington, Florida, Alabama, Connecticut, Georgia, South Carolina, Texas, North Carolina, New Jersey, and Delaware. He worked for three years with USACE Philadelphia District (2001-2004), two years with USACE Seattle District (2009-2011), and 12 years in private consulting.

Mr. Giovannozzi has extensive experience designing navigation improvement projects in tidally influenced systems, including channel deepening projects. In the area of coastal current studies, Mr. Giovannozzi has performed extensive hydrodynamic and sediment transport modeling, morphologic analysis, and engineering assessments for multiple projects to determine expected water levels, tidal exchange, wave conditions, and circulation patterns. While at USACE Philadelphia District, he was the hydraulic engineer for a coastal inlet hydrodynamics study that involved numerical modeling to predict sediment transport potential for several alternative sand borrow-area strategies for a Federal beach fill project near a coastal inlet in Ocean City, New Jersey. Mr. Giovannozzi was the coastal engineer for a dredging/environmental restoration project for an island community located on the Intracoastal Waterway in Palm Beach County, Florida. The work included tidal hydraulic modeling, channel optimization, and dredging costs estimates for hydraulic and mechanic dredging to restore tidal connectivity.

He is familiar with USACE coastal engineering requirements for feasibility studies (including channel design and effects of navigation channels on currents, sedimentation, and water quality). Mr. Giovannozzi has demonstrated experience in deep draft navigation channel design. Notably, he was involved in the hydrodynamic modeling and navigation studies of the canals for the World Islands Mega Project in Dubai, United Arab Emirates. The project required a balanced design that allowed for safe navigation of pleasure craft, provided sufficient flow to minimize siltation and improve tidal flow, while also minimizing shoreline erosion. The study included hydrodynamic and sediment transport modeling and determination of safe navigational clearances for vessels. In addition, Mr. Giovannozzi was the lead project engineer for a Section 905(b) Reconnaissance Study that examined the potential need for navigation improvements for the Neah Bay Entrance Channel in Washington state to enable deeper draft vessels to use the port for commerce and as a safe harbor of refuge.

Mr. Giovannozzi also has specialized experience in subsurface investigations for channel design, dredged material management, and the design of dredged material PAs (upland and beneficial use). He is familiar with both mechanical and hydraulic dredging technologies and has completed the USACE Dredging Fundamentals Course. While at USACE Seattle District, he was the project manager for the outer reach of the Grays Harbor Navigation Channel Maintenance Dredging project, and also worked with Miami Dade County on several channel and berth deepening projects at the Port of Miami. Mr. Giovannozzi recently developed a dredged material management plan for the Panama Canal Authority. The dredge disposal plan included best management strategies (including beneficial reuse) for six confined upland and nearshore disposal areas for marina and riverine dredging along the Pacific region of the Panama Canal. The work included a review of subsurface sediments for beneficial reuse, construction of internal dikes, and expansion of the perimeter dikes in order to optimize storage within the disposal areas.

Mr. Giovannozzi is familiar with standard USACE hydrologic and hydraulic computer models and has been working with numerical modeling applications for navigation projects for more than 15 years. For example, the USACE numerical wave and circulation models, CMS Wave and CMS Flow, respectively, were used to assess channel re-alignment scenarios for the Quillayute Navigation Channel Improvement Study in Washington State. The computer models were used to optimize the channel modification scheme to improve hydraulic efficiency with an aim to reduce future maintenance dredging activities. Recommendations were provided to alter the channel cross section and to rehabilitate a nearby sea dike

to optimize the channel flow. In addition, Mr. Giovannozzi performed wave and circulation modeling for a navigation study to assess the feasibility of deepening the Intracoastal Waterway to accommodate deep-draft megayachts at a yacht repair facility located near the Port of Palm Beach in Palm Beach County, Florida.

Mr. Giovannozzi is an active member of the American Society of Civil Engineers; Coasts, Oceans, Ports, and Rivers Institute; and the Association of Coastal Engineers. He regularly attends and presents at national and international conferences on flood damage reduction and shoreline protection. In addition, he served as the Secretary for the World Association for Waterborne Transport Infrastructure (PIANC) Recreational Committee Work Group on Marina Design and as PIANC YP-Com Vice-Chair of the Americas.

APPENDIX C

Final Charge for the Norfolk Harbor GRR IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report

This is the final Charge to the Panel for the Norfolk Harbor GRR IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on November 14, 2017.

BACKGROUND

Norfolk Harbor (sometimes referred to as the Port of Hampton Roads) is a 25-square mile natural harbor serving port facilities in the cities of Norfolk, Newport News, Portsmouth, Chesapeake, and Hampton in southeastern Virginia. The Port is situated at the southern end of Chesapeake Bay, midway on the Atlantic Seaboard, approximately 170 miles south of Baltimore, Maryland, and 220 miles north of Wilmington, North Carolina. The harbor is formed by the confluence of the James, Nansemond, and Elizabeth Rivers. The Norfolk Harbor and Channels, Virginia, Project consists of a network of Federally improved channels extending from the Atlantic Ocean, through the Chesapeake Bay, and into the Port of Hampton Roads.

The Norfolk District completed a feasibility study of the Norfolk Harbor, the findings and recommendations of which were documented in a report entitled “Norfolk Harbor and Channels, Virginia, Feasibility Report and Final Environmental Impact Statement, July 1980,” and Final Environmental Impact Statement Addendum, December 1980 (all in House Document 99-85 dated 18 July 1985, 3 volumes). The report recommended deepening the major channels in Hampton Roads to a depth of -57 feet mean lower low water (MLLW), as well as lesser improvements on the Elizabeth River and its Southern Branch.

The project recommended in the feasibility study was authorized for construction in Section 201 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99- 662), as described in House Document 99-85, dated 18 July 1985, entitled “Norfolk Harbor and Channels, Virginia.” The authority states, as follows:

“The project for navigation, Norfolk Harbor and Channels, Virginia: Report of the Chief of Engineers, dated November 20, 1981, at a total cost of \$551,000,000, with an estimated first Federal cost of \$256,000,000 and an estimated first non-Federal cost of \$295,000,000, including such modifications as the Secretary determines to be necessary and appropriate for mitigation of any damage to fish and wildlife resources resulting from construction, operation, and maintenance of each segment of the proposed project. The Secretary, in conjunction with appropriate Federal, State, and local agencies, shall study the effects that construction, operation, and maintenance of each segment of the proposed project will have on fish and wildlife resources and the need for mitigation of any damage to such resources resulting from such construction, operation, and maintenance.”

The major components of the authorized project are:

1. Increasing the depth of the Norfolk Harbor Channel from -45 feet to -55 feet MLLW over its existing 800- to 1,500-foot width to the coal terminal at Lamberts Point.
2. Increasing the depth of Thimble Shoal Channel from -45 feet to -55 feet MLLW over its existing 1,000-foot width.
3. Increasing the depth of the channel to Newport News from -45 feet to -55 feet MLLW over its existing 800-foot width to the coal terminal at Newport News.

4. Dredging a new channel, designated as the Atlantic Ocean Channel, off Virginia Beach to a depth of -57 feet MLLW (post-authorization design modified the depth to -60 feet MLLW) and a width of 1,000 feet (post-authorization design modified the width to 1,300 feet).
5. Constructing three fixed mooring anchorage facilities, each capable of accommodating two large vessels simultaneously.
6. Placing suitable dredged material resulting from project construction in a designated ocean placement site and unsuitable material in the Craney Island Dredged Material Management Area (CIDMMA) site.

Since its authorization in 1986, the project has been constructed in separable elements based on the needs of the Port Community and the financial capability of the Commonwealth of Virginia, acting through its agent, the Virginia Port Authority. The 50-Foot Outbound Element was completed in 1989, the 50-Foot Anchorage in 1999, and the 50-Foot Inbound Element in 2007.

The purpose of the GRR is to identify whether the authorized plan is still in the Federal interest and to evaluate measures that would improve the operational efficiency of the existing and forecast future fleet of commercial vessels using the Federal navigation channel. The results of the plan formulation effort to date indicate that the tentatively selected plan (TSP) consists of the deepening of the Norfolk Harbor Channel, Channel to Newport News, and Anchorage F (all in the inner harbor protected area) to a project depth of -55 feet MLLW; the deepening of the Thimble Shoal Channel (semi-protected Chesapeake Bay area) to -56 feet MLLW; and the deepening of the Atlantic Ocean Channel (open water area) to -59 feet MLLW. In addition, the Thimble Shoal Channel would be widened in two areas east and west of the Chesapeake Bay Bridge Tunnel to 1,200 feet on each segment. Note: Anchorage F still must be incrementally justified so depth was not presented at TSP.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report (hereinafter: Norfolk Harbor GRR IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214, dated December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004). Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4) for the 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 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

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

Documents for Review

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

| Review Documents | Subject Experts | | | | |
|---|---------------------|-----------------------------------|---------------|-----------------------|---------------------------------------|
| | No. of Review Pages | Civil Works Planner/ Economics | Environmental | Geotechnical Engineer | Hydraulic/ Channel Design Engineer |
| General Reevaluation Report/ Environmental Assessment | 295 | 295 | 295 | 295 | 295 |
| Appendix A: Engineering | 283 | | | 283 | 283 |
| Appendix B: Economics | 76 | 76 | | | |
| Appendix C: Real Estate Plan | 14 | 14 | 14 | | |
| Appendix D: Cost Engineering | 14 | 14 | | 14 | 14 |
| Appendix E: Draft Biological Assessment | 82 | | 82 | | |
| Appendix F: Environmental | 24 | | 24 | | |
| Appendix G: Draft CZM Act Federal Consistency Determination | 11 | | 11 | | |
| Appendix H: NMFS Essential Fish Habitat | 65 | | 65 | | |
| Appendix I: Coordination | 89 | | 89 | | |
| Appendix J: Hydrodynamic and Water Quality Modeling | 669 | | | | 669 |
| Total Number of Review Pages | 1622 | 399 | 580 | 592 | 1261 |
| Supplemental Information* | | | | | |
| Public Review Comments** | 50 | 50 | 50 | 50 | 50 |
| Risk Register | 10 | 10 | 10 | 10 | 10 |
| Total # of Reference Pages | 60 | 60 | 60 | 60 | 60 |

Documents for Reference

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

SCHEDULE & DELIVERABLES

This schedule is based on the receipt date of the final review documents. 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 Working Days |
|--|--|------------------------|
| Attend Meetings and Begin Peer Review | Subcontractors complete mandatory Operations Security (OPSEC) training | 12/3/2017 |
| | Battelle sends review documents to panel members | 11/10/2017 |
| | Battelle convenes kick-off meeting with panel members | 11/6/2017 |
| | Battelle convenes kick-off meeting with USACE and panel members | 11/17/2017 |
| | Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE | 11/13/2017 |
| | Battelle participates in the Agency Decision Milestone (ADM) Meeting | Feb/March 2018 |
| Prepare Final Panel Comments and Review Public Comments | Panel members complete their review of the documents | 12/13/2017 |
| | Battelle provides talking points to panel members for Panel Review Teleconference | 12/15/2017 |
| | Battelle convenes Panel Review Teleconference | 12/18/2017 |
| | Battelle provides Final Panel Comment templates and instructions to panel members | 12/19/2017 |
| | Panel members provide draft Final Panel Comments to Battelle | 12/28/2017 |
| | Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments | 12/29/2017 - 1/07/2018 |
| | Panel finalizes Final Panel Comments | 1/8/2018 |
| | Battelle receives public comments from USACE | 12/15/2017 |
| | Battelle sends public comments to Panel | 12/19/2017 |
| | Panel members complete their review of the public comments | 1/2/2018 |

| Task | Action | Due Date Working Days |
|--|--|----------------------------|
| Prepare FPCs and Review Public Comments | Battelle and Panel review Panel's responses to public comments | 1/3/2018 |
| | Panel drafts Final Panel Comment on public comments, if necessary | 1/5/2018 |
| | Panel finalizes Final Panel Comment regarding public comments, if necessary | 1/9/2018 |
| Review Final IEPR Report | Battelle provides Final IEPR Report to panel members for review | 1/11/2018 |
| | Panel members provide comments on Final IEPR Report | 1/16/2018 |
| | Battelle submits Final IEPR Report to USACE* | 1/18/2018 |
| | USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance | 1/25/2018 |
| Comment/Response Process | Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE | 1/29/2018 |
| | Battelle convenes teleconference with USACE to review Comment Response process | 1/29/2018 |
| | Battelle convenes teleconference with Panel to review Comment Response process | 1/29/2018 |
| | USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review | 2/14/2018 |
| | USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed | 2/21/2018 |
| | USACE PCX provides draft PDT Evaluator Responses to Battelle | 2/22/2018 |
| | Battelle provides draft PDT Evaluator Responses to panel members | 2/26/2018 |
| | Panel members provide draft BackCheck Responses to Battelle | 3/1/2018 |
| | Battelle convenes teleconference with panel members to discuss draft BackCheck Responses | 3/2/2018 |
| | Battelle convenes Comment Response Teleconference with panel members and USACE | 3/5/2018 |
| | USACE inputs final PDT Evaluator Responses to DrChecks | 3/12/2018 |
| | Battelle provides final PDT Evaluator Responses to panel members | 3/14/2018 |
| | Panel members provide final BackCheck Responses to Battelle | 3/19/2018 |
| | Battelle inputs the panel members' final BackCheck Responses to DrChecks | 3/19/2018 |
| | Battelle submits pdf printout of DrChecks project file* | 3/20/2018 |
| | | Contract End/Delivery Date |

* Deliverables

** Battelle will provide public comments to the Panel 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. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

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

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

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager (Jessica Tenzar; tenzarj@battelle.org) or Program Manager (Rachel Sell; sellr@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Rachel Sell (sellr@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

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

Independent External Peer Review of the Norfolk Harbor and Channels Deepening Project, Hampton Roads, Virginia, General Reevaluation Report

Charge Questions and Relevant Sections as Supplied by USACE

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?¹

¹ This question will be provided with the Public Comments after the Panel has completed its review of the IEPR documents. This is done to ensure the independence of the Panel's review.

Battelle Summary Charge Questions to the Panel Members²

Summary Questions

1. 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.
2. Please provide positive feedback on the project and/or review documents.

² Questions 1 and 2 are Battelle supplied questions and should not be construed or considered part of the list of USACE-supplied questions. These questions were delineated in a separate appendix in the final Work Plan submitted to USACE.

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APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire Independent External Peer Review

Norfolk Harbor and Channel Deepening Project, Hampton Roads, Virginia, General Reevaluation Report

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

NAME OF FIRM: **Battelle Memorial Institute**
REPRESENTATIVE'S NAME: **Courtney M. Brooks**
TELEPHONE: **614-424-5623**
ADDRESS: **505 King Avenue, Columbus, OH 43201**
EMAIL ADDRESS: **brooksc1@battelle.org**

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

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

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

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

V. ADDITIONAL INFORMATION. Report relevant aspects of your firm's background or present circumstances not addressed above that might reasonably be construed by others as affecting your firm's judgment. Please include any information that may reasonably: impair your firm's objectivity; skew the competition in favor of your firm; or allow your firm unequal access to nonpublic information.
No additional information to report.

Courtney M. Brooks

Courtney M. Brooks

September 6, 2017

Date

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BATTELLE

It can be done