

# Final Independent External Peer Review Report McCook Levee, Illinois, Continuing Authorities Program (CAP), Section 205 Small Flood Risk Management Project

Prepared by  
Battelle Memorial Institute

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

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Task Order: W912HQ18F0057

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It can be done

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## Executive Summary

### PROJECT BACKGROUND AND PURPOSE

McCook Levee is located on the west bank of the Des Plaines River in western Cook County, about 12 miles southwest of Downtown Chicago. The surrounding area is mostly urbanized, with a strong industrial base. The area under study focuses specifically on overbank flooding associated with the Des Plaines River and interior drainage related to the McCook Levee, which is part of the Summit Conduit sub-watershed. Drainage from this sub-watershed is conveyed in a system of ditches, sewers, and culverts to a large ditch that runs parallel to the McCook Levee, called the McCook Ditch. Flow in the McCook Ditch is routed to the east under the McCook Levee and the Des Plaines River directly to the Chicago Sanitary and Ship Canal (CSSC) via the Summit Conduit. The McCook Levee was originally constructed around the turn of the 20<sup>th</sup> century by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), then known as the Sanitary District of Chicago. It is essentially segmented in two sections: the southern portion and the northern portion.

Southern McCook Levee: The southern portion of the levee extends between Lawndale Avenue and the Indiana Harbor Belt Railroad tracks, approximately 3,300 feet south of IL-171. This portion of the levee has several low spots where the level of protection is lower than the 1% annual chance flood profile as identified by MWRDGC hydraulic modeling. MWRDGC estimates that the Des Plaines River has overtopped the McCook Levee at this ditch overflow location at least 17 times since 1948 and at the dip in the levee under the IL-171 bridges 10 times over the same period. At present, most of this area behind this section of the levee is higher than the levee, and no structures are considered to be at risk of flooding behind the southern portion of the levee.

Northern McCook Levee: The northern portion of the levee extends northeast from Lawndale Avenue approximately 4,100 feet to the Chicago & Illinois Railroad tracks. The levee continues approximately 550 feet north to tie into high ground at 47<sup>th</sup> Street. In 1979, a section of the levee breached; MWRDGC repaired the damaged portion and drove steel sheet pile along the length of the levee to increase the height of flood protection and to prevent seepage through, but not under, the levee. The top of the levee along this portion is above the 1% annual chance flood profile for the Des Plaines River, and there are no known overtopping occurrences since the repairs and elevation were completed in 1979.

The area behind this portion of the levee contains several industries that are in danger of flooding, either from breaching or overtopping of the McCook Levee or from the McCook Ditch overbanking as a result of limited outlet capacity via the Summit Conduit. The area potentially impacted by flooding behind the McCook Levee is entirely industrial. The industries include a recycling company, repair shops, trucking and intermodal facilities, manufacturing operations, and an oil and fuel handling facility.

West Lyons Levee: The West Lyons Levee is located in the Village of Lyons north of McCook and is a separate system than the McCook Levee. It extends approximately 1,400 feet between 47<sup>th</sup> Street and 45<sup>th</sup> Street. The top of the levee is above the 1% annual chance flood profile for the Des Plaines River, and there are no known overtopping occurrences. The area behind this portion of the levee is a residential neighborhood. Although it is a separate system than the McCook Levee based on its existing elevation, if a plan to raise the McCook Levee is selected, the West Lyons Levee may become part of the McCook Levee Continuing Authorities Program (CAP) project to ensure a complete levee system with a tie-in to high ground.

Alternatives considered during the feasibility study for the Draft Detailed Project Report and Integrated Environmental Assessment (Draft DPR/IEA) of the McCook Levee CAP project included modification of the drainage of the McCook Ditch partnered with either full or segmented rehabilitation of the northern portion of the McCook Levee, rehabilitation or elevation of the West Lyons Levee, and implementation of non-structural measures.

## Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the McCook Levee, Illinois, Continuing Authorities Program (CAP), Section 205 Small Flood Risk Management Project (hereinafter: McCook Levee CAP IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2018). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2018) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: plan formulation/ economics, environmental law compliance, hydrology and hydraulic (H&H) engineering, and civil/geotechnical 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 (736 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

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

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

Battelle received public comments from USACE on the McCook Levee CAP (approximately six pages of written comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the McCook Levee CAP review documents. After completing its review, the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments

## Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2018) in the McCook Levee CAP IEPR 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 and concise, and provides excellent supporting documentation on engineering, environmental, economic, and plan formulation issues. The report provides a balanced assessment of the economic, engineering, and environmental issues of the overall project; however, the Panel identified several elements of the report that should be clarified or revised.

**Plan Formulation/Economics:** Overall, the plan formulation/economics analysis is excellent, with the data presented clearly and incorporated appropriately into models. However, no detailed breakdown or integrated discussion of individual cost or benefit elements is presented in the Draft DPR/IEA. Without a more complete description of the benefit/cost analysis, the full suite of methods, models, assumptions, and analyses upon which the benefit/cost ratios are founded cannot be evaluated. The Panel recommends that a screening criteria matrix for each alternative that lists the project component(s) and associated criteria be developed.

The Panel also noted that improving the safety of residents and employees and reducing economic damages is listed as “opportunity” and several sections within the report note public safety and loss of life as a potential consequence. Unlike life-safety, significant effort has gone into quantifying economic damages in the alternatives analysis. The Panel suggests updating the alternatives analysis to include a qualitative or quantitative measure of life-safety comparison metric(s) across all alternatives.

The Panel observed that some highly precise values are not supported by the data, which could undermine the credibility of the analyses. Reporting of analytic results to a higher degree of precision than is supported by the quality of the data and underlying assumptions overstates the confidence of the

evaluation result and understates the reported high degree of uncertainty. The Panel recommends that a rationale for the selection of significant digits in analytic results be developed and presented in the report.

**Engineering:** The engineering analysis was straightforward, and it is apparent that a strong effort was invested in capturing, characterizing, and identifying implications of uncertainty into the project. However, the Panel believes that operational factors, such as those associated with a proposed sluice gate under the Recommended Plan to control the diversion of water in the system may be overly complex and not realistically operate as intended. These types of operational malfunctions may exacerbate upstream flooding, resulting in additional damages and increased project costs. The Panel suggests exploring alternative structures that minimizes the amount of human intervention required to function as designed.

The Panel noted that select geotechnical analyses have been performed only for the existing McCook Levee condition. However, no analyses are presented with respect to the West Lyons Levee. Preliminary analyses can be performed for the West Lyons Levee based on available information and assumed parameters. The overall geotechnical evaluation would benefit from a summary table that describes the full portfolio of failure modes and which were analyzed as part of this study and which are anticipated to be performed in the future for the Recommended Plan. Without sufficient geotechnical analyses, the methods, models, assumptions, and analyses used cannot be fully evaluated as required by EC 1165-2-217 (USACE, 2018).

**Environmental:** From an environmental perspective, the material presented and the analysis presented are adequate and appropriate for this project. However, the Panel noted that while USACE has identified significant uncertainty in future benefits and costs as a result of climate change, this uncertainty has not been explicitly incorporated into the analyses. Therefore, the total estimated risk reduction associated with the alternatives is potentially overstated. The Panel recommends that a chart be created for each evaluated hazard that presents the minimum, maximum, and best-guess (triangular distribution) hazard magnitude for (a) current day; (b) 25 years in the future; and (c) 50 years in the future.

**Table ES-1. Overview of Seven Final Panel Comments Identified by the McCook Levee CAP IEPR Panel**

No.	Final Panel Comment
<b>Significance Medium/High</b>	
1	The benefit/cost ratios derived for each alternative, and the methods for performing the benefit analysis, are not fully described in the Draft DPR/IEA.
<b>Significance – Medium</b>	
2	Public safety and loss of life are not quantitatively addressed in the Draft DPR/IEA, despite being identified as a primary opportunity.
3	While potential ramifications due to climate change are discussed, no quantitative evaluation is included for the projected life span of the project (50 years).
4	A sluice gate proposed under the Recommended Plan to control the diversion of water in the system may not operate as intended and may exacerbate upstream flooding, resulting in additional damages and increased project costs.
<b>Significance – Medium/Low</b>	
5	The reported analytic significant figures/decimal places generate a perception of a higher degree of certainty than is supported by the data and project assumptions.
6	Geotechnical analyses of the West Lyons Levee alternatives are not presented in the Draft DPR/IEA for each alternative or the Recommended Plan.
<b>Significance – Low</b>	
7	Both the buyout and dry floodproofing discussions lack sufficient detail for an effective comparison.

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## LIST OF ACRONYMS

<b>ASCE</b>	American Society of Civil Engineers
<b>ATR</b>	Agency Technical Review
<b>CAP</b>	Continuing Authorities Program
<b>CE/ICA</b>	Cost Effectiveness/Incremental Cost Analysis
<b>COI</b>	Conflict of Interest
<b>CSSC</b>	Chicago Sanitary and Ship Canal
<b>CWA</b>	Clean Water Act
<b>DOT</b>	Department of Transportation
<b>DPR/IEA</b>	Detailed Project Report and Integrated Environmental Assessment
<b>DrChecks</b>	Design Review and Checking System
<b>EC</b>	Engineer Circular
<b>ECB</b>	Engineering and Construction Bulletin
<b>ER</b>	Engineer Regulation
<b>ERDC</b>	Engineer Research and Development Center
<b>ESA</b>	Endangered Species Act
<b>H&amp;H</b>	Hydrology and Hydraulics
<b>HEC-FDA</b>	Hydrologic Engineering Center - Flood Damage Reduction Analysis
<b>HEC-HMS</b>	Hydrologic Engineering Center - Hydrologic Modeling System
<b>HEC-RAS</b>	Hydrologic Engineering Center - River Analysis System
<b>HEP</b>	Habitat Evaluation Procedures
<b>IEPR</b>	Independent External Peer Review
<b>IWR</b>	Institute for Water Resources
<b>LiDAR</b>	Light Detection and Ranging
<b>MCACES</b>	Micro-Computer Aided Cost Estimating System
<b>MWRDGC</b>	Metropolitan Water Reclamation District of Greater Chicago
<b>NEPA</b>	National Environmental Policy Act
<b>O&amp;M</b>	Operation and Maintenance
<b>OEO</b>	Outside Eligible Organization
<b>OMB</b>	Office of Management and Budget
<b>PCX</b>	Planning Center of Expertise

<b>PDT</b>	Project Delivery Team
<b>QHEI</b>	Qualitative Habitat Evaluation Index
<b>SAR</b>	Safety Assurance Review
<b>SWS</b>	Society of Wetland Scientists
<b>SysML</b>	Systems Modeling Language
<b>UC</b>	University of California
<b>USACE</b>	United States Army Corps of Engineers
<b>USFWS</b>	United States Fish and Wildlife Service
<b>WSA</b>	Wetland Science Applications, Inc.
<b>WTI</b>	Wetland Training Institute

## 1. INTRODUCTION

McCook Levee is located on the west bank of the Des Plaines River in western Cook County, about 12 miles southwest of Downtown Chicago. The surrounding area is mostly urbanized, with a strong industrial base. The area under study focuses specifically on overbank flooding associated with the Des Plaines River and interior drainage related to the McCook Levee, which is part of the Summit Conduit sub-watershed. Drainage from this sub-watershed is conveyed in a system of ditches, sewers, and culverts to a large ditch that runs parallel to the McCook Levee, called the McCook Ditch. Flow in the McCook Ditch is routed to the east under the McCook Levee and the Des Plaines River directly to the Chicago Sanitary and Ship Canal (CSSC) via the Summit Conduit. The McCook Levee was originally constructed around the turn of the 20<sup>th</sup> century by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), then known as the Sanitary District of Chicago. It is essentially segmented in two sections: the southern portion and the northern portion.

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The area behind this portion of the levee contains several industries that are in danger of flooding, either from breaching or overtopping of the McCook Levee or from the McCook Ditch overbanking as a result of limited outlet capacity via the Summit Conduit. The area potentially impacted by flooding behind the McCook Levee is entirely industrial. The industries include a recycling company, repair shops, trucking and intermodal facilities, manufacturing operations, and an oil and fuel handling facility.

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Alternatives considered during the feasibility study for the Draft Detailed Project Report and Integrated Environmental Assessment (Draft DPR/IEA) of the McCook Levee CAP project included modification of the drainage of the McCook Ditch partnered with either full or segmented rehabilitation of the northern portion of the McCook Levee, rehabilitation or elevation of the West Lyons Levee, and implementation of non-structural measures.

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 McCook Levee, Illinois, Continuing Authorities Program (CAP), Section 205 Small Flood Risk Management Project (hereinafter: McCook Levee CAP IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Review Policy for Civil Works* (EC 1165-2-217) (USACE, 2018) 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 McCook Levee CAP IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the schedule followed in executing the IEPR. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE in the final Work Plan according to the schedule listed in Table A-1. Appendix D presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the McCook Levee CAP IEPR.

## 2. PURPOSE OF THE IEPR

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

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the engineering, 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 McCook Levee CAP was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-217). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

### 3. METHODS FOR CONDUCTING THE IEPR

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

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: plan formulation/economics, environmental law compliance, hydrology and hydraulic (H&H) engineering, and civil/geotechnical engineering. The Panel reviewed the McCook Levee CAP documents and produced seven Final Panel Comments in response to 18 charge questions provided by USACE for the review. This charge included two overview questions and one public comment question added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

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

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

### 4. RESULTS OF THE IEPR

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

#### 4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2018) in the McCook Levee CAP IEPR review documents. The following summarizes the Panel's findings.

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

**Plan Formulation/Economics:** Overall, the plan formulation/economics analysis is excellent, with the data presented clearly and incorporated appropriately into models. However, no detailed breakdown or integrated discussion of individual cost or benefit elements is presented in the Draft DPR/IEA. Without a more complete description of the benefit/cost analysis, the full suite of methods, models, assumptions,

and analyses upon which the benefit/cost ratios are founded cannot be evaluated. The Panel recommends that a screening criteria matrix for each alternative that lists the project component(s) and associated criteria be developed.

The Panel also noted that improving the safety of residents and employees and reducing economic damages is listed as “opportunity” and several sections within the report note public safety and loss of life as a potential consequence. Unlike life-safety, significant effort has gone into quantifying economic damages in the alternatives analysis. The Panel suggests updating the alternatives analysis to include a qualitative or quantitative measure of life-safety comparison metric(s) across all alternatives.

The Panel observed that some highly precise values are not supported by the data, which could undermine the credibility of the analyses. Reporting of analytic results to a higher degree of precision than is supported by the quality of the data and underlying assumptions overstates the confidence of the evaluation result and understates the reported high degree of uncertainty. The Panel recommends that a rationale for the selection of significant digits in analytic results be developed and presented in the report.

**Engineering:** The engineering analysis was straightforward, and it is apparent that a strong effort was invested in capturing, characterizing, and identifying implications of uncertainty into the project. However, the Panel believes that operational factors, such as those associated with a proposed sluice gate under the Recommended Plan to control the diversion of water in the system may be overly complex and not realistically operate as intended. These types of operational malfunctions may exacerbate upstream flooding, resulting in additional damages and increased project costs. The Panel suggests exploring alternative structures that minimizes the amount of human intervention required to function as designed.

The Panel noted that select geotechnical analyses have been performed only for the existing McCook Levee condition. However, no analyses are presented with respect to the West Lyons Levee. Preliminary analyses can be performed for the West Lyons Levee based on available information and assumed parameters. The overall geotechnical evaluation would benefit from a summary table that describes the full portfolio of failure modes and which were analyzed as part of this study and which are anticipated to be performed in the future for the Recommended Plan. Without sufficient geotechnical analyses, the methods, models, assumptions, and analyses used cannot be fully evaluated as required by EC 1165-2-217 (USACE, 2018).

**Environmental:** From an environmental perspective, the material presented and the analysis presented are adequate and appropriate for this project. However, the Panel noted that while USACE has identified significant uncertainty in future benefits and costs as a result of climate change, this uncertainty has not been explicitly incorporated into the analyses. Therefore, the total estimated risk reduction associated with the alternatives is potentially overstated. The Panel recommends that a chart be created for each evaluated hazard that presents the minimum, maximum, and best-guess (triangular distribution) hazard magnitude for (a) current day; (b) 25 years in the future; and (c) 50 years in the future.

## 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 benefit/cost ratios derived for each alternative, and the methods for performing the benefit analysis, are not fully described in the Draft DPR/IEA.**

### Basis for Comment

No detailed breakdown or integrated discussion of individual cost or benefit elements is presented in the Draft DPR/IEA. Section 3.5.2 of the Draft DPR/IEA, “Comparison of Alternatives” (p. 47), presents a qualitative overview of the developed alternatives. Table 7 (Draft DPR/IEA, p. 49) presents a summary of estimated costs. Table 8 (Draft DPR/IEA, p. 50) presents a summary of costs and benefits. Without a more complete description of the benefit/cost analysis, the full suite of methods, models, assumptions, and analyses upon which the benefit/cost ratios are founded cannot be evaluated as required by EC 1165-2-217 (USACE, 2018).

The Economic Analysis (Appendix C) highlights three aspects to the risk analysis: hazard, performance, and consequences. The consequences capture both the ‘benefits’ as well as the ‘costs.’ Summaries are presented of the estimated benefits and costs. However, no detailed breakdowns listing data sources, assumptions, and uncertainty magnitudes are presented, resulting in probability estimates without documentation. Additionally, some benefits, such as loss of life, are not meaningful when reported on an annualized basis (for example, 0.25 deaths per year) rather than on a per-event basis or over the course of the project. Reporting values as aggregates over the course of the project may provide a more meaningful representation of the expected conditions.

The suite of consideration criteria for the alternatives and Recommended Plan should, at a minimum, provide a qualitative evaluation of these factors and include implications in the overall project benefit/cost ratio. The Principles and Requirements for Federal Investments in Water Resources (March 2013) encourage Federal investments that promote economic development and protect the environment (Water Resources Development Act of 2007). These considerations include (1) seeking to maximize sustainable economic development; (2) seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and (3) protecting and restoring functions of natural systems and mitigating any unavoidable damage to natural systems.

### Significance – Medium/High

Without sufficient documentation describing the development of benefits and costs, the methods, models, assumptions, and analyses cannot be fully evaluated as required by EC 1165-2-217.

### Recommendations for Resolution

1. Develop a screening criteria matrix for each alternative that lists the project component(s) and associated criteria.
2. Characterize the three consideration factors under the 2013 Principles and Requirements for Federal Investments in Water Resources (sustainable economic development; wise use of

floodplains; and protecting/restoring natural systems) for each alternative (including the Recommended Plan).

3. Include a summary discussion of the assumptions and analyses by which the reported criteria were developed for each project component (for example, loss of life based on inundation depth).
4. Develop a “Final Array of Alternatives” table that summarizes the benefits, costs, and range (minimum, maximum, best guess) of the benefit/cost ratios.
5. Present documentation for each alternative that substantiates the development of Appendix C Tables 23, 24, 25, 26, and 27.

## Literature Cited

Principles and Requirements for Federal Investments in Water Resources (2013). Available at [https://obamawhitehouse.archives.gov/sites/default/files/final\\_principles\\_and\\_requirements\\_march\\_2013.pdf](https://obamawhitehouse.archives.gov/sites/default/files/final_principles_and_requirements_march_2013.pdf).

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## Final Panel Comment 2

**Public safety and loss of life are not quantitatively addressed in the Draft DPR/IEA, despite being identified as a primary opportunity.**

### Basis for Comment

Section 3.1 of the Draft DPR/IEA, “Problems and Opportunities” (p. 30), lists improving the safety of residents and employees and reducing economic damages as “opportunities.” With regard to life safety, the following examples from the Draft DPR/IEA highlight public safety and loss of life as a potential consequence.

Section 3.5.2, “Comparison of Alternatives” (Draft DPR/IEA, p. 48) notes that “While the probability of inundation through failure or overtopping is reduced by the proposed levee repairs, the consequences of overtopping remain high both in terms of potential life safety and economic damages.”

Appendix C (Section 2.3.2, p. 13) defines ‘life safety risk’ as “the possibility of life loss as a result of inundation.” Section 2.3.2.2 (p. 13) notes that the “depth of flooding for the leveed area was modeled to estimate the exterior-interior relationship and the viability of non-structural measures, but also provides a better understanding of the risk of life loss, or life safety risk.”

Appendix C (Section 3.3.2, p. 17) notes that the “non-structural alternative affects the overall life safety impacts by removing structures through buyouts, or altering the level of inundation anticipated within structures through floodproofing modifications... This alternative does not eliminate the risk to life safety, but it does result in a significant risk reduction.” The Panel notes that for all alternatives, including the Recommended Plan, ‘risk’ has not been fully eliminated and significant residual risk has been acknowledged to exist.

Appendix C (Section 4.3.2) discusses risk reduction through increased warning time. If this is a significant risk reduction element, perhaps this should be included in all plans, including the Recommended Plan.

Appendix D (Superiority Analysis, p. 5) states that the “overtopping location for the McCook/West Lyons Levee is not ideal.” This discussion further states that “While the first floors of the homes are at or near the 100-year flood level, there is a low area in the back yards with greater than an eight foot depth which brings up concerns of possible loss of life.” Other than these statements, no further discussion or quantification of life safety is provided.

Although, significant effort has gone into quantifying economic damages in the alternatives analysis, no quantitative analysis of life-safety improvement was documented. The level of effort conducted to quantify the damages, combined with the examples provided above, suggests to the Panel that life safety improvement should be addressed in more detail than is currently presented in the report.

### Significance – Medium

Exclusion of a life-safety improvement evaluation in the alternatives analysis may lead to selection of an alternative that does not maximize benefits across all evaluation criteria.

## Recommendations for Resolution

1. Revise the alternatives analysis to include a quantitative measure of life-safety comparison metric(s) across all alternatives.
2. Include documentation of life-safety comparison metric assumptions for each alternative.

### Final Panel Comment 3

**While potential ramifications due to climate change are discussed, no quantitative evaluation is included for the projected life span of the project (50 years).**

#### Basis for Comment

The Draft DPR/IEA (p. 59) notes that long-term shifts in precipitation frequencies and storm intensities are possible in the future and that shifts in the storm frequency could “ultimately change the level of protection afforded by a proposed levee.”

Appendix D (Hydrology and Hydraulics [H&H], p. 4) notes that “USACE policy requires that flood risk management projects be designed using a risk-based analysis.” The uncertainty that goes into a risk analysis includes both statistical uncertainty (past data) as well as projected future uncertainty. Future uncertainty is based on past data (statistics) and engineering judgment to create forward-looking “probabilities.”

The USACE Climate Change Adaptation Plan (USACE, 2014) notes (p. 7) that “It is the policy of USACE to integrate climate change preparedness and resilience planning and actions in all activities for the purpose of enhancing the resilience of our built and natural water-resource infrastructure and the effectiveness of our military support mission, and to reduce the potential vulnerabilities of that infrastructure and those missions to the effects of climate change and variability.”

Appendix D (H&H) does document (p. 9 through p. 23) a qualitative evaluation of climate change impacts to the project and concludes that the “project area could be significantly impacted by climate change” (p. 23). It also concluded that it was “not feasible at this time to raise the levee higher in regard to climate change concerns” (p. 23).

The benefit-cost determination has been defined to span a period of 50 years. USACE has identified significant uncertainty in future benefits and costs as a result of climate change. This uncertainty has not been explicitly incorporated into the analyses; therefore, the total estimated risk reduction associated with the alternatives is potentially overstated as a result of hazards increasing in magnitude and/or benefits attributed to reduced exposure decreasing. A possible future reduction in the project level of protection is a project vulnerability. This vulnerability should be characterized using best available data to inform the potential magnitude of this vulnerability in the future.

#### Significance – Medium

An incomplete evaluation of the full spectrum of uncertainties for project hazards may overstate the calculated benefit-cost ratio for the developed alternatives, including the Recommended Plan.

#### Recommendations for Resolution

1. Create a chart for each evaluated hazard that presents the minimum, maximum, and best-guess (triangular distribution) hazard magnitude for (a) current day; (b) 25 years in the future; and (c) 50 years in the future.
2. Document the assumptions/basis for the minimum, maximum, and best-guess values.
3. For hazards deemed ‘data driven’, list the data collection efforts required to confirm/refute the assumptions for future events.

4. Include data collection, analysis, and reporting in the project cost (Operations and Maintenance).

### **Literature Cited**

USACE (2014). Climate Change Adaptation Plan. U.S. Army Corps of Engineers, Climate Preparedness and Resilience Steering Committee. June 2014. 53 pp.

## Final Panel Comment 4

**A sluice gate proposed under the Recommended Plan to control the diversion of water in the system may not operate as intended and may exacerbate upstream flooding, resulting in additional damages and increased project costs.**

### Basis for Comment

The draft DPR/IEA (Section 3.6.1, p. 55) and Appendix D (pp. 7-8) indicate that the Recommended Plan will rely on human operation of the proposed sluice gate on the Lawndale culvert. Stage increases upstream of the project in the Des Plaines River could result if all of the interior drainage is diverted from the protected area directly to the river. Specifically, a gate set at the “correct” elevation by an operator is proposed to prevent potential stage increases of approximately one tenth of a foot that could extend approximately 8 miles upstream during the 100-year event.

It does not appear that any type of redundancy in the operation of this sluice gate has been accounted for in the Recommended Plan. If not properly operated, there is the potential for additional impacted areas and damages that have not been discussed and or anticipated decreases in the project benefits. In a highly urbanized system such as this, the panel is concerned that even a tenth of a foot increase over the 100-year event may result in unaccounted for project costs. Reliance on human intervention to set the gate could result in incorrect operation and unaccounted-for upstream impacts.

### Significance – Medium

Anticipated project benefits (i.e., avoided damages) may not be realized as a result of an intricate sluice gate design configuration that may be prone to operational malfunctions, resulting in greater-than-anticipated consequence events and a lower-than-anticipated benefit/cost ratio.

### Recommendations for Resolution

1. Consider including an engineered structure under Lawndale that minimizes the amount of human intervention required to provide the desired degree of serviceability.
2. Include uncertainty in costs/damages as a result of incorrect gate operation.
3. Incorporate this uncertainty in the overall benefit/cost ratio.

## Final Panel Comment 5

**The reported analytic significant figures/decimal places generate a perception of a higher degree of certainty than is supported by the data and project assumptions.**

### Basis for Comment

The Draft DPR/IEA (p. 58) notes that it aims to help “decision makers...better understand the potential uncertainty in costs and benefits.” A summary of uncertainties is presented in Table 9 (Draft DPR/IEA, pp. 50-54). These uncertainties are significant in magnitude and span all aspects of the project (i.e., construction cost, economic costs, H&H analyses, geotechnical analyses). However, some highly precise values are not supported by the data, which could undermine the credibility of the analyses. Select examples of reported values that appear inconsistent with the acknowledged magnitude of uncertainty include:

- Appendix A (Civil Engineering): A 39-inch diameter reinforced concrete pipe is proposed based on the hydraulic modeling results. This is a non-standard size and is typically rounded to a standard pipe size, up to a 42-inch diameter or down to a 36-inch diameter, depending on intended results.
- Appendix B (Cost Engineering): The listed % contingency values in the ‘Abbreviated Risk Analysis’ table on PDF page 16 of 23 (the actual pages are not numbered) are calculated to up to four significant figures (65.08%).
- Appendix C (Economic Analysis): Table 25 lists the minimum benefit/cost ratio as 0.42, while all other benefit/cost ratio values are listed to one decimal place.
- Appendix D (H&H): Table 2-4, Water Surface Profile Summary, lists water surface elevations to two decimal places, where aggregate uncertainty likely requires rounding to the nearest foot or half foot.
- Appendix E (Geotechnical Analysis): Table 6 lists calculated factors of safety to two decimal places, where aggregate uncertainty likely requires rounding to the tenth.

### Significance – Medium/Low

Reporting of analytic results to a higher degree of precision than is supported by the quality of the data and underlying assumptions overstates the confidence of the evaluation result and understates the reported high degree of uncertainty.

### Recommendations for Resolution

1. Develop and document in the Draft DPR/IEA a rationale for the selection of significant digits in analytic results.
2. Prepare a table that lists the analysis type and the developed approach for significant figures.
3. Apply that rationale consistently across all analyses.

## Final Panel Comment 6

**Geotechnical analyses of the West Lyons Levee alternatives are not presented in the Draft DPR/IEA for each alternative or the Recommended Plan.**

### Basis for Comment

Select geotechnical analyses have been performed for the existing McCook Levee condition (Appendix E, p. 1) only; no analyses are presented with respect to the West Lyons Levee. EC 1165-2-217 (USACE, 2018) requires the review of “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.” The Panel is unable to complete this charge item as the information is not presented.

Preliminary analyses can be performed for the West Lyons Levee based on available information and assumed parameters. This initial cursory evaluation will help summarize design assumptions, identify ‘gaps’ in knowledge, and help inform configuration of future data collection campaigns.

The overall geotechnical evaluation would benefit from a summary table that describes the full portfolio of failure modes and which were analyzed as part of this study and which are anticipated to be performed in the future for the Recommended Plan. For example, rapid-draw down analyses were not presented in the DPR/IEA and it is unclear if this analysis will be addressed in future studies.

The following items are noted in the main report, but detailed analyses are not provided.

- Appendix E (p. 7) notes that a lower crest elevation of the McCook Levee is currently recommended (El. +602.5 feet), compared with the previous target crest elevation of El. +604.5 feet from the 1980s feasibility report.
- The current geotechnical analyses focus on existing slope stability (landside), I-wall stability (landside), and seepage.
- Evaluation conducted as part of the seepage analyses includes a toe drain (a new feature). Settlement is acknowledged as a design factor but is not included in this study (Appendix E, p. 12).
- Historic overtopping is noted (2013) (Appendix E, p. 12) but is not directly analyzed as part of the repairs (the Panel notes that splash pads were added on the landside of sheet pile segments in New Orleans following ‘lessons learned’ from Hurricanes Katrina and Rita). The main report (Table 9, p. 51) notes that “Projected rainfall in Illinois is anticipated to increase in intensity...” This intensity change will have impacts to the hydrograph and water surface elevation profiles. Overtopping and rapid drawdown-slope stability are impacted by changes in precipitation intensity.
- Analyses utilize the existing sheet pile as part of the flood protection system. The Panel was unable to locate a top-of-sheet pile wall survey to confirm the elevation adequacy along the sheet pile alignment. Portions of the levee are identified as having experienced settlement up to 3 feet (Appendix E, p. 12). If the sheet pile elevations are below target, it is not clear how they will be modified to meet target level of protection elevation.
- It is stated (DRP/IEA, p. 11 and Appendix E, p. 11) that the levee has experienced significant erosion which has completely exposed the sheetpile cutoff on the riverward side of the levee, resulting in significant risk to the stability of the sheetpile cutoff wall and the levee structure itself.

It is unclear from the presented documentation that the erosional mechanism was identified and appropriately mitigated within the developed alternatives/Recommended Plan. Appendix D (p. 9) notes that a bathymetric survey was performed for this current study. It is not clear whether this data was incorporated into the slope stability analyses and evaluation of scour/erosion potential, or whether the geotechnical analyses relied on geometric configurations assumed for the 1980s feasibility study. Updated data is available that can be used to complete the slope stability analyses.

### **Significance – Medium/Low**

Without sufficient geotechnical analyses, the methods, models, assumptions, and analyses used cannot be fully evaluated as required by EC 1165-2-217.

### **Recommendations for Resolution**

1. Perform a preliminary analysis (based on available information and a list of assumptions) for the West Lyons Levee alignment to generate a baseline analysis for each alternative.
2. Provide a comprehensive suite of geotechnical failure modes that constitute “performance” of the levee system (where “performance” is part of the risk definition: hazard, performance, consequences).
3. Identify which failure mode(s) are being analyzed for each of the alternatives.
4. Identify which failure mode(s) are being analyzed in the future for the Recommended Plan.
5. Perform slope stability analyses both landward and riverward. Include the effects of rapid drawdown on the water side.
6. Discuss the implications of incorporating existing sheet pile into new designs and associated uncertainties.
7. Include results from the bathymetric survey (discussed in Appendix D) on the river-side geometric configuration.
8. Utilize the bathymetric survey data (Appendix D) to discuss observations/implications of waterside scour/erosion.
9. Discuss potential causes of riverside erosion and countermeasures necessary to ensure stability of the levee section.

### **Literature Cited**

USACE (2018). Water Resources Policies and Authorities: Review Policy for Civil Works. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) No. 1165-2-217. February 20, 2018.

## Final Panel Comment 7

**Both the buyout and dry floodproofing discussions lack sufficient detail for an effective comparison.**

### Basis for Comment

The Draft DPR/IEA lacks sufficient detail to compare buyout versus dry floodproofing as non-structural alternatives and their components. In addition, the methodology and data used in the comparison are not discussed in the text or appendices.

### Significance –Low

A more detailed comparison of non-structural versus structural components of alternatives would decrease uncertainty in the selection of alternatives and their components.

### Recommendation for Resolution

1. Develop more detailed cost estimates both for buying facilities and for dry floodproofing facilities.
2. Discuss and compare the estimates in the Draft DPR/IEA and describe the methodology and data for these alternatives in the main report or appendices.
3. Develop (if not done currently) and incorporate damage estimates for both non-structural alternatives in the Draft DPR/IEA.

## 5. REFERENCES

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

Principles and Requirements for Federal Investments in Water Resources (2013). Available at [https://obamawhitehouse.archives.gov/sites/default/files/final\\_principles\\_and\\_requirements\\_march\\_2013.pdf](https://obamawhitehouse.archives.gov/sites/default/files/final_principles_and_requirements_march_2013.pdf).

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

USACE (2014). Climate Change Adaptation Plan. U.S. Army Corps of Engineers, Climate Preparedness and Resilience Steering Committee. June 2014. 53 pp.

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

Water Resources Development Act of 2007. Available at <https://www.congress.gov/110/plaws/publ114/PLAW-110publ114.pdf>.

# APPENDIX A

IEPR Process for the McCook Levee CAP 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 McCook Levee Continuing Authorities Program (CAP) 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 May 1, 2018. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE’s Design Review and Checking System (DrChecks) project file (the final deliverable) on September 28, 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 McCook Levee CAP IPER**

Task	Action	Due Date
1	Award/Effective Date	4/25/2018
	Review documents available	5/1/2018
	Public comments available	5/29/2018
	Battelle submits draft Work Plan <sup>a</sup>	5/7/2018
	USACE provides comments on draft Work Plan	5/14/2018
	Battelle submits final Work Plan <sup>a</sup>	5/17/2018
2	Battelle submits list of selected panel members <sup>a</sup>	5/11/2018
	USACE confirms the panel members have no COI	5/16/2018
3	Battelle convenes kick-off meeting with USACE	5/2/2018
	Battelle convenes kick-off meeting with panel members	5/25/2018
	Battelle convenes kick-off meeting with USACE and panel members	5/29/2018
4	Panel members complete their review of the documents	6/25/2018
	Panel members complete their review of the public comments	7/5/2018
	Panel members provide draft Final Panel Comments to Battelle	7/6/2018
	Panel drafts Final Panel Comment on public comments, if necessary	7/10/2018
5	Battelle submits Final IEPR Report to USACE <sup>a</sup>	7/20/2018
6 <sup>b</sup>	Battelle convenes Comment Response Teleconference with panel members and USACE	9/11/2018
	Battelle submits pdf printout of DrChecks project file <sup>a</sup>	9/28/2018
	Contract End/Delivery Date	4/30/2019

<sup>a</sup> Deliverable.

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

At the beginning of the Period of Performance for the McCook Levee CAP 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 18 charge questions provided by USACE, plus two overview questions and one public comment question

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
McCook Levee, Illinois: Draft Detailed Project Report and Integrated Environmental Assessment	88
Appendix A: Civil Engineering	59
Appendix B: Cost Engineering	23
Appendix C: Economic Analysis	38
Appendix D: Hydrology and Hydraulics	182
Appendix E: Geotechnical Analysis	173
Appendix F: HTRW Phase 1	35
Appendix G: Real Estate Planning Report	17
Appendix H: Section 404(b)(1) Evaluation	17
Appendix I: Draft Finding of No Significant Impact	4
Public Comments <sup>a</sup>	6
<b>Total No. of Review Pages</b>	<b>736</b>

<sup>a</sup> USACE submitted public comments to Battelle upon their availability according to the schedule in Table A-1. Battelle in turn submitted the comments to the IEPR Panel for review.

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

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

The Panel had four clarifying questions for USACE during the course of its review. Therefore, Battelle determined, and the Planning Center of Expertise (PCX) confirmed, that a mid-review teleconference with USACE was not necessary. An email was sent to USACE with the four questions developed by the Panel. USACE was able to provide written responses to all the questions prior to the end of the review.

In addition, 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.

- McCook, IL Section 205 Federal Interest Determination (FID) submitted by Chicago District to the Great Lakes and Ohio Division (LRD) in August 2015
- Appendix G – McCook Levee Real Estate Plan DQC edits.pdf

## **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 (this document) and decide which panel member should serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the final IEPR report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

## A.4 Preparation of Final Panel Comments

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

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

5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.
- Guidelines for Developing Recommendations: The Recommendations 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, seven Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

## A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received a PDF file containing six pages of public comments on the McCook Levee CAP project from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

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

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

## A.6 Final IEPR Report

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

## A.7 Comment Response Process

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

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# APPENDIX B

Identification and Selection of IEPR Panel Members for the McCook Levee CAP Project

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## B.1 Panel Identification

The candidates for the McCook Levee, Illinois, Continuing Authorities Program (CAP), Section 205 Small Flood Risk Management Project (hereinafter: McCook Levee CAP project) independent external peer review (IEPR) Panel were evaluated based on their technical expertise in the following key areas: plan formulation/economics, environmental law compliance, hydrology and hydraulics (H&H) engineering, and civil/geotechnical engineering. These areas correspond to the technical content of the review documents and overall scope of the McCook Levee CAP 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 COIs. These COI questions were intended to serve as a means of disclosure in order to better characterize a candidate’s employment history and background. Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. Guidance in OMB (2004, p. 18) states,

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

### Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the McCook Levee CAP

1. Previous and/or current involvement by you or your firm in the McCook Levee, Illinois, Continuing Authorities Program (CAP), Section 205 Small Flood Risk Management Project and related projects.	
2. Previous and/or current involvement by you or your firm in flood risk management projects in Illinois, particularly in Chicago on the Des Plaines River.	
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	

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the McCook Levee CAP

projects in the McCook Levee, Illinois, CAP, Section 205 Small Flood Risk Management Project or related projects.	
4. Current employment by the U.S. Army Corps of Engineers (USACE).	
5. Previous and/or current involvement with paid or unpaid expert testimony related to McCook Levee, Illinois, CAP, Section 205 Small Flood Risk Management Project.	
6. Previous and/or current employment or affiliation 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> ): <ul style="list-style-type: none"> <li>• Metropolitan Water Reclamation District of Greater Chicago (MWRDGC)</li> </ul>	
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Chicago Area, particularly the communities of McCook, Lyons, and Summit, Illinois.	
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Chicago District.	
9. Previous or current involvement with the development or testing of models that will be used for, or in support of the McCook Levee, Illinois, CAP, Section 205 Small Flood Risk Management Project.	
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Chicago 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 Chicago District. Please explain.	
11. Any previous employment by USACE as a direct employee, notably if employment was with the Chicago 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 Chicago District. If yes, provide title/description, dates employed,	

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the McCook Levee CAP	
and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.	
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood risk management and include the client/agency and duration of review (approximate dates).	
14. Pending, current, or future financial interests in McCook Levee, Illinois, CAP, Section 205 Small Flood Risk Management Project-related contracts/awards from USACE.	
15. Significant portion of your personal or office’s revenues within the last three years came from USACE contracts.	
16. Significant portion of your personal or office’s revenues within the last three years came from MWRDGC contracts.	
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to McCook Levee, Illinois, CAP, Section 205 Small Flood Risk Management Project.	
18. Participation in relevant prior and/or current Federal studies relevant to this project and/or McCook Levee, Illinois, CAP, Section 205 Small Flood Risk Management Project.	
19. Previous and/or current participation in prior non-Federal studies relevant to this project and/or McCook Levee, Illinois, CAP, Section 205 Small Flood Risk Management Project.	
20. Has your research or analysis been evaluated as part of the McCook Levee, Illinois, CAP, Section 205 Small Flood Risk Management Project?	
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. Two of the four final reviewers are affiliated with a consulting company; the other two are independent consultants. 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. McCook Levee CAP IEPR Panel: Summary of Panel Members**

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
<b>Plan Formulation / Economics</b>					
Ken Casavant	Independent consultant	Pullman, WA	Ph.D., Economics	N/A	40+
<b>Environmental Law Compliance</b>					
Charles Newling	Wetland Science Applications, Inc.	Briggsville, WI	M.S., Zoology (wildlife ecology)	N/A	43
<b>Hydrology and Hydraulic (H&amp;H) Engineering</b>					
Brad Woznak	SEH, Inc.	St. Paul, MN	B.S., Civil Engineering	Yes	21+
<b>Civil / Geotechnical Engineering</b>					
Rune Storesund	Independent consultant	Kensington, CA	Dr.Eng., Civil Engineering	Yes	18

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

**Table B-2. McCook Levee CAP IEPR Panel: Technical Criteria and Areas of Expertise**

Technical Criterion	Casavant	Newling	Woznak	Storesund
<b>Plan Formulator / Economist</b>				
Minimum 15 years of demonstrated experience in economics and planning	X			
Familiarity with the Civil Works flood risk management projects	X			
Thorough understanding of the use of models similar to the Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) software	X			
Water resource planning experience in flood risk management plan formulation	X			
Familiarity with CAP Section 205 flood risk management projects	X			
Minimum M.S. degree or higher in economics	X			
<b>Environmental Law Compliance Specialist</b>				
At least 15 years of experience directly related to water resources environmental evaluation or review and the National Environmental Policy Act (NEPA) process and analysis		X		
Biological or environmental background and is familiar with the project area and environmental impact analysis and mitigation		X		
Familiarity with fish and wildlife habitat and species, socioeconomic factors, and cultural resources that may be affected by the project alternative in the study area and region		X		
Familiarity and experience with United States Fish and Wildlife Service Habitat Evaluation Procedures (HEP) (USFWS, 1980), Clean Water Act, Endangered Species Act (ESA), National Historic Preservation Act, and Ohio Qualitative Habitat Evaluation Index (QHEI) procedures		X		
<b>Hydrology and Hydraulic Engineer</b>				
Minimum of 15 years of experience in H&H engineering			X	
Understanding of open-channel one-dimensional and two-dimensional unsteady flow hydraulic models			X	
Knowledge of the application of levees and flood walls, flap-gate control structures, and non-structural solutions involving floodproofing			X	
Capable of determining system non-stationarity and assessing system climate change vulnerability, adaptability, and resilience			X	
Familiarity with HEC-FDA modeling software, including HEC River Analysis System (HEC-RAS) and HEC Hydrologic Modeling System (HEC-HMS)			X	

**Table B-2. McCook Levee CAP IEPR Panel: Technical Criteria and Areas of Expertise, continued**

Technical Criterion	Casavant	Newling	Woznak	Storesund
Familiarity with Safety Assurance Review (SAR)			X	
Licensed Professional Engineer			X	
<b>Civil / Geotechnical Engineer</b>				
Minimum of 10 years of experience in civil engineering and/or geotechnical engineering				X
Minimum Master’s degree in engineering				X
Experience in in the design of flood risk management projects, particularly levees and non-structural measures				X
Perform a technical review of the geotechnical analysis				X
Familiar with SARs				X
Licensed Professional Engineer				X

### B.3 Panel Member Qualifications

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

<b>Name</b>	<b>Ken Casavant, Ph.D.</b>
<b>Role</b>	<b>Economics</b>
<b>Affiliation</b>	<b>Independent Consultant</b>

Dr. Casavant is a professor and economist at the School of Economic Sciences at Washington State University, Director of the Freight Policy Transportation Institute, and adjunct professor at North Dakota State’s Upper Great Plains Transportation Institute. He earned his Ph.D. in agricultural economics from Washington State University in 1971. Dr. Casavant has nearly 50 years of experience as an economist, with expertise in flood risk management plan formulation, and is familiar with CAP Section 205 flood risk management projects.

Dr. Casavant is familiar with USACE plan formulation processes, procedures, and standards. He has more than 15 years of experience in plan formulation, evaluation, and comparison of alternative plans for numerous flood risk management studies, navigation studies, ecosystem restoration projects, and feasibility studies, including his technical reviews of the Lower Columbia River Channel Deepening Project, the Upper Mississippi and Illinois Navigation Study, the Barataria Basin Barrier Shoreline Restoration Study, and the Mississippi River Gulf Outlet Ecosystem Restoration Plan, many of them inclusive of flood risk management requirements. The Mississippi-Illinois system project was a navigation lock system replacement project, including coastal inland waterway system needs. For the Delaware

River Main Channel Deepening Project, he assessed and documented the benefits of the project. For the Upper Mississippi and Illinois Navigation Study, he examined alternative shipping flows, including shallow and deep draft, and calculated benefits as part of the economic evaluation.

Dr. Casavant has worked with USACE methodologies for cost-effectiveness/incremental cost analysis (CE/ICA) and has a detailed knowledge of USACE standards and procedures, including the Institute for Water Resource (IWR) Planning Suite. As an economist or a combined Civil Works planner/economist for USACE IEPRs, he has studied and evaluated alternative plans for navigation lock replacement projects as well as navigation/dredging projects, such as the Savannah Harbor Expansion Project General Reevaluation Report. Over the last 10 years, he has applied USACE standards and procedures to 13 USACE projects, including the IWR Planning Suite methodologies, with a focus on effective and efficient ecological and natural sustained output per dollar of relevant expenditure for alternative project formulations. He has also applied the USACE six-step planning process, which is governed by Engineer Regulation (ER) 1105-2-100, *Planning Guidance Notebook*, during his work as a technical reviewer and peer reviewer on more than 20 projects such as the Port of Iberia Channel Deepening Project in 2006 for USACE, the External Independent Economic Opinion on Identifying and Measuring NED Benefits: Navigation Shipping, and the Morganza to the Gulf IEPR study, a hurricane protection and storm damage risk project.

Dr. Casavant has a thorough understanding of the use of models similar to the Hydrologic Engineering Center - Flood Damage Reduction Analysis (HEC-FDA) modeling computer software. He has reviewed and critiqued such models in various IEPRs, some of which have even relied on model results augmented by actual data. In his class on resource economics, he has reviewed and taught about various models used to evaluate benefits and costs of flood damage reduction and restoration.

Dr. Casavant has experience identifying, reviewing, and evaluating impacts on environmental resources from structural flood risk and impacts related to hurricane and coastal storm damage risk reduction projects. From risk assessment in Monte Carlo evaluations to traditional risk models in the IWR Planning Suite, he has broad and applied experience working with risk-informed approaches to decision-making. The six most recent projects he has contributed to had critical components concerning the impacts of environmental resources from flood risk and coastal storm damage. He has also been a plan formulator expert on Louisiana Water Resources Council IEPRs; several of the projects under review had a specific objective to evaluate the damage reduction and the risk associated with achieving benefits from flood risk management, and one project focused specifically on the impact on shorelines.

Dr. Casavant has published more than 70 journal articles and has contributed to hundreds of written documents, including chapters in books, books, abstracts, proceedings, professional materials, conference papers, and research bulletins, circulars, and reports. He is a member of numerous professional associations, such as the Transportation Research Board - National Research Council, the International Agricultural Economics Association, and the Logistics and Physical Distribution Association.

<b>Name</b>	<b>Charles Newling, PWS, CWB</b>
<b>Role</b>	<b>Environmental Law Compliance</b>
<b>Affiliation</b>	<b>Wetland Science Applications, Inc.</b>

Mr. Newling is the senior wetland regulatory scientist and senior vice-president of Wetland Science Applications, Inc. (WSA) and the Wetland Training Institute (WTI), Inc. He earned his M.S. in zoology with a focus in wildlife ecology from Southern Illinois University, Carbondale, in 1975. He holds certifications as a Professional Wetland Scientist, Certified Wildlife Biologist, and Certified Wetland Delineator. His 43-year career has focused on environmental evaluation of water resources (primarily wetlands) in both the public and private sectors for compliance with the Clean Water Act and the National Environmental Policy Act (NEPA). He has a strong knowledge of ecological wetlands, wet prairies, streams, and interconnected habitat, having conducted functional analyses of these environments since 1975 (including environments in the Great Lakes ecosystem).

Mr. Newling worked for USACE from 1975 to 1989, as both an Environmental Resources Specialist at the New England Division and as a Wildlife Biologist with the Wetlands Research Team at the Waterways Experiment Station. He served as the national in-house consultant on matters of wetland delineation (including, when necessary, providing expert testimony), wetland development and restoration, and coordination of USACE’s wetland training program. Mr. Newling participated in the preparation of the 1987 "Corps of Engineers Wetland Delineation Manual" and served as chief technical advisor to the three-member team representing USACE in the negotiations that produced the 1989 "Federal Manual for Identifying and Delineating Jurisdictional Wetlands." Since leaving USACE, Mr. Newling has served as co-founder and senior vice-president of both WTI and WSA. Through WTI, he has organized and conducted training sessions primarily for private industry as well as numerous sessions under contract to Federal and state agencies. Since 1989, he has been personally involved in providing direct instruction on wetlands topics to over 3,000 students. The WTI training sessions, conducted nationwide, have included wetland delineation, wetland soils and hydrology, wetland construction and restoration, plant identification, wetland delineation in disturbed and problem areas, wetland evaluation techniques, and Federal wetland regulation. As a senior wetland regulatory scientist at WSA, he has served as a consultant to private industry and government on wetland delineation, wetland construction and restoration, wetland functions and values, mitigation monitoring, and wetland mitigation banking.

Mr. Newling served as a senior technical reviewer for the 1997 State of Washington Wetland Delineation Method developed by the Washington Department of Ecology and served as a member of the Statewide Technical Committee providing guidance for the 1999 Methods for Assessing Wetland Functions developed by the Washington Department of Ecology. He served as a peer reviewer for the 2008 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region. His expertise in wetlands includes integral experience with riparian habitats and riverine systems, including peer review work (as the environmental panel member) for major river-related projects, including the Upper Des Plaines River and Tributaries Feasibility Study; the Upper Turkey Creek Johnson County and Wyandotte County; Cedar River—Cedar Rapids, Iowa, Flood Risk Management Feasibility Study; the Cache la Poudre at Greeley, Colorado, General Investigation Feasibility Study; the Truckee Meadows Flood Control Project, Nevada, General Reevaluation Report; the Middle Mississippi River Regulatory

Works Project; and the Forest View, Illinois, Continuing Authority Project (CAP) Section 205, Small Flood Risk Management Detailed Project Report.

Because he was born and raised in Chicago and its suburbs, worked as a biologist for the Lake County (Illinois) Forest Preserve District in 1975, and participated in the IEPR for the Upper Des Plaines River and Forest View, Illinois, projects, Mr. Newling is familiar with fish and wildlife habitat and species, socioeconomic factors, and cultural resources that may be affected by the project alternative in the McCook Levee area and region. He is familiar with cultural resource review requirements, which have applied to virtually all of the permits on which he has worked, and he is aware of the need to comply with applicable regulations.

Mr. Newling has specialized knowledge of a broad array of environmental laws, with a strong focus on the requirements of the Clean Water Act (CWA), NEPA, and the Endangered Species Act (ESA). Most of his work in the Great Lakes area has involved environmental evaluation of compliance with the CWA, NEPA, and the ESA. His familiarity with United States Fish and Wildlife Service (USFWS) Habitat Evaluation Procedures (HEPs) is based on more than 13 years of experience working for the USACE New England Division Regulatory Branch and the USACE Waterways Experiment Station Environmental Laboratory. He was involved as a participant in the early development stages of the HEP Handbook and has used it periodically throughout his career, most recently in IEPR analyses of USACE proposed projects. His USACE work involved evaluation and long-term monitoring of habitat development projects. From 1981 to 1989, he was the technical coordinator for USACE wetland training, including evaluation of wetland functions and values, and he has organized, conducted, and served as primary instructor in wetland-related training courses. He has also provided rapid response assistance to USACE District offices nationwide on technical matters of wetland delineation and restoration.

Mr. Newling has experience with the National Historic Preservation Act and the Ohio Qualitative Habitat Evaluation Index (QHEI) procedures through his work on various projects, including the IEPR for the Blanchard River Watershed in Ohio (postponed before full completion).

Mr. Newling is a member of The Wildlife Society, Association of State Wetland Managers, Society of Ecological Restoration, and Wisconsin Wetlands Association. He has served on the Board of Directors for the Society of Wetland Scientists (SWS), is past Liaison to the SWS National Certification Program, and is past President of the SWS South Central Chapter. He is a current Board Member of the G.M. Sutton Avian Research Center.

<b>Name</b>	<b>Brad Woznak, P.E., PH, CFM</b>
<b>Role</b>	<b>Hydrology and Hydraulic (H&amp;H) Engineering</b>
<b>Affiliation</b>	<b>SEH, Inc.</b>

Mr. Brad Woznak has over 21 years of experience in H&H engineering and is a Senior Professional Engineer at SEH Inc., St. Paul, Minnesota. He has a B.S. in civil engineering from the University of Minnesota and is a registered Professional Engineer in Minnesota, Indiana, South Dakota, Colorado, Iowa, Wisconsin, and Nebraska. He also is a Professional Hydrologist registered by the American

Institute of Hydrology and a Certified Floodplain Manager through the Association of State Floodplain Managers.

Mr. Woznak has been involved with numerous aspects of H&H engineering related to all aspects of water resources, including flood mitigation design, interior drainage analysis, riverine modeling, and detention and retention pond design and analysis. His primary job responsibilities are H&H analyses associated with water resources projects in the Midwest for USACE, municipalities, and private clients. He has worked on several H&H projects in the Midwest with large river systems, including completion of a Federal Emergency Management Agency Conditional Letter of Map Revision on the Minnesota River in Chaska, Minnesota; a flood mitigation study for the Minnesota Department of Transportation (DOT) on a crossing of the Minnesota River near Chanhassen, Minnesota; several other hydraulic studies and bank stabilization projects for municipalities on the Minnesota River in southwest Minnesota; multiple flood mitigation projects on the Red River of the North for USACE; and flood mitigation projects on the Cedar River in Austin, Minnesota.

Mr. Woznak has an understanding of open-channel, one-dimensional and two-dimensional unsteady flow hydraulic models through his work serving as Senior Professional Engineer on multiple projects, including the evaluation of proposed project impacts on the Minnesota River for the Minnesota DOT, Roby Creek Letter of Map Revision in Watertown, South Dakota, multiple bridge replacement projects in South Dakota, and most recently the Ebner Coulee Floodway Mapping project in La Crosse, Wisconsin. He has a strong understanding of hydrology and how it applies to flood risk management projects through his work on the Interior Flood Control Design for USACE in East Grand Forks, Minnesota, and subsequent interior drainage analyses and coincidental frequency analyses on multiple flood risk management projects for municipalities throughout the Midwest. He has been involved in flood risk management analyses starting with the USACE East Grand Forks project and continuing to the present with various municipal flood risk management projects such as for the Cities of Austin, Minnesota; Hobart, Indiana; and Council Bluffs, Iowa.

Mr. Woznak is knowledgeable in the application of levees and floodwalls, flap-gate control structures, and non-structural solutions involving floodproofing. His experience on multiple flood risk management projects for the USACE on the Red River of the North, City of Austin, Minnesota, flood risk management projects (and multiple others) all included the evaluation, final design, and construction of levees, floodwalls, and flap-gate control or other gated interior drainage structures. He is knowledgeable in non-structural solutions primarily through assisting municipalities throughout the Midwest with floodplain zoning and development issues. Some of the communities assisted include the City of Burnsville, Minnesota; Rice Lake, Wisconsin; Hobart, Indiana; and multiple communities in Minnesota and Wisconsin along the St. Croix River.

Mr. Woznak is capable of determining system non-stationarity and assessing system climate change vulnerability, adaptability, and resilience. Through his work with the USACE St. Paul District on the Fargo-Moorhead Metro Study, he became familiar with climate change vulnerability and system non-stationarity related to large-scale flood risk reduction projects. For that project, a panel of experts from across the United States was formed to assess and address climate change implications and system non-stationarity and the potential effects on the proposed project. While not directly involved with these discussions, as part of the ongoing modeling efforts and tasks, Mr. Woznak was briefed on the findings and overall results of the panel findings. Serving as senior H&H engineer on multiple flood risk reduction projects, many of

which are outlined above, system non-stationarity and assessment of system climate change vulnerability, adaptability, and resilience is a part of the evaluation of all these projects.

Mr. Woznak is well versed and competent in Hydrologic Engineering Center (HEC) modeling computer software, including HEC River Analysis System (RAS) and HEC Hydrologic Modeling System (HMS). He received formal training in each through the University of Wisconsin-Madison (HEC-RAS) and HEC (HEC-GeoHMS and HEC-GeoRAS). He was also co-housed in the USACE St. Paul District offices to assist with HEC-RAS modeling for the Fargo Moorhead-Metro project. He has served on numerous Type II Safety Assurance Reviews (SARs) for flood mitigation projects in Minnesota and Nebraska as approved by St. Paul District and Omaha District.

Mr. Woznak is an active member of the American Institute of Hydrology, the Minnesota Association of Floodplain Managers, and the Association of State Floodplain Managers.

<b>Name</b>	<b>Rune Storesund, Dr. Eng, P.E., G.E.</b>
<b>Role</b>	<b>Geotechnical Engineering</b>
<b>Affiliation</b>	<b>Independent Consultant</b>

Dr. Storesund is the Principal Engineer at Storesund Consulting and the Executive Director of the University of California (UC), Berkeley Center for Catastrophic Risk Management. He also serves as an on-call expert geotechnical engineer (G.E.) to the State of California's Department of Consumer Affairs for its annual examination. He earned his doctorate (Dr.Eng) in Civil Engineering from UC Berkeley; is a registered Civil Engineer in California, Louisiana, Hawaii, and Washington; and is a registered Geotechnical Engineer in California. He has 18 years of experience in planning, design, operation and maintenance (O&M), construction, and decommissioning of Civil Works structures and has worked on a variety of projects throughout the United States and internationally.

Dr. Storesund has participated in numerous projects related to USACE geotechnical practices. For more than 10 years, he directly participated in engineering design, specification development, DrChecks, and Micro-Computer Aided Cost Estimating System (MCACES/MII) cost evaluations. He has demonstrated experience performing geotechnical evaluations and geo-civil design for USACE flood risk management projects with dredged material disposal sites and utilizing dredged material for ecosystem restoration. Most recently, he served as a geotechnical engineer of record for the final shaping of the Hamilton Wetland Restoration project in Novato, California (the entire project spanned 2004 through 2014). The project involved the deepening of the Port of Oakland, transporting the material via barge to an off-coast pumping station, then pumping the dredged materials into a former Army airbase to create constructed beneficial wetland and upland habitats. He performed site characterization, engineering analyses (e.g., settlement, static/dynamic slope stability, seepage, wave runup), construction oversight, and post-project monitoring (terrestrial light detection and ranging [LiDAR]). Other USACE flood protection projects he has worked on include the West Sacramento Flood Control Project; the Las Gallinas Coastal Inundation Study; the Upper Penitencia Creek Flood Improvement Project; the San Lorenzo Flood Control Project; and the USACE Upper Napa River Flood Protection Project.

Dr. Storesund has experience related to the design of flood risk management projects associated with levee and flood risk management structures' design and construction, including static and dynamic slope

stability, seepage through earthen embankments, and underseepage. He has been an active participant in American Society of Civil Engineers (ASCE) committees on the local and national level since 1998.

Dr. Storesund is familiar with large, complex Civil Works projects with high public and interagency interests. Following Hurricane Katrina, which hit the greater New Orleans area in 2005, he participated in a review of the performance of the Hurricane Defense System for the greater New Orleans area, the largest and most complex flood protection project in the United States. He completed a study evaluating the improved Hurricane Protection System from a holistic systems-based perspective, using the modeling tool “Systems Modeling Language” (SysML) to synthesize and integrate disparate system elements. He has also worked on the Louisiana Coastal Restoration initiative (with the Environmental Defense Fund) and the National Science Foundation-sponsored Resilient and Sustainable Infrastructures project, evaluating interconnected, interrelated, interactive critical infrastructures in the California Delta.

Dr. Storesund has extensive experience with SARs, having recently participated in the SAR for the USACE Princeville IEPR. In addition, in the aftermath of Hurricane Katrina, he participated in an ASCE assessment that served as the basis for the Guiding Principles for conducting USACE SARs. He has been active in advancing risk-informed decision making for critical infrastructure identification and management of uncertainties. His 'systems' synthesis perspective is unique among his peers, and he has routinely evaluated the application of redundancy, resiliency, and robustness.

# APPENDIX C

Final Charge for the McCook Levee CAP IEPR

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## Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the McCook Levee, Illinois, Continuing Authorities Program (CAP), Section 205 Small Flood Risk Management Project

***This is the final Charge to the Panel for the McCook Levee CAP IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on May 17, 2018.***

### BACKGROUND

McCook Levee is located on the west bank of the Des Plaines River in western Cook County, about 12 miles southwest of Downtown Chicago. The surrounding area is mostly urbanized, with a strong industrial base. The area under study focuses specifically on overbank flooding associated with the Des Plaines River and interior drainage related to the McCook Levee, which is part of the Summit Conduit sub-watershed. Drainage from this sub-watershed is conveyed in a system of ditches, sewers, and culverts to a large ditch that runs parallel to the McCook Levee, called the McCook Ditch. Flow in the McCook Ditch is routed to the east under the McCook Levee and the Des Plaines River directly to the Chicago Sanitary and Ship Canal (CSSC) via the Summit Conduit. The McCook Levee was originally constructed around the turn of the 20<sup>th</sup> century by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), then known as the Sanitary District of Chicago. It is essentially segmented in two sections: the southern portion and the northern portion.

Southern McCook Levee: The southern portion of the levee extends between Lawndale Avenue and the Indiana Harbor Belt Railroad tracks, approximately 3,300 feet south of IL-171. This portion of the levee has several low spots where the level of protection is lower than the 1% annual chance flood profile as identified by MWRDGC hydraulic modeling. MWRDGC estimates that the Des Plaines River has overtopped the McCook Levee at this ditch overflow location at least 17 times since 1948 and at the dip in the levee under the IL-171 bridges 10 times over the same period. At present, most of this area behind this section of the levee is higher than the levee, and no structures are considered to be at risk of flooding behind the southern portion of the levee.

Northern McCook Levee: The northern portion of the levee extends northeast from Lawndale Avenue approximately 4,100 feet to the Chicago & Illinois Railroad tracks. The levee continues approximately 550 feet north to tie into high ground at 47<sup>th</sup> Street. In 1979, a section of the levee breached; MWRDGC repaired the damaged portion and drove steel sheet pile along the length of the levee to increase the height of flood protection and to prevent seepage through, but not under, the levee. The top of the levee along this portion is above the 1% annual chance flood profile for the Des Plaines River, and there are no known overtopping occurrences since the repairs and elevation were completed in 1979.

The area behind this portion of the levee contains several industries that are in danger of flooding, either from breaching or overtopping of the McCook Levee or from the McCook Ditch overbanking as a result of limited outlet capacity via the Summit Conduit. The area potentially impacted by flooding behind the McCook Levee is entirely industrial. The industries include a recycling company, repair shops, trucking and intermodal facilities, manufacturing operations, and an oil and fuel handling facility.

West Lyons Levee: The West Lyons Levee is located in the Village of Lyons north of McCook and is a separate system than the McCook Levee. It extends approximately 1,400 feet between 47<sup>th</sup> Street and 45<sup>th</sup> Street. The top of the levee is above the 1% annual chance flood profile for the Des Plaines River,

and there are no known overtopping occurrences. The area behind this portion of the levee is a residential neighborhood. Although it is a separate system than the McCook Levee based on its existing elevation, if a plan to raise the McCook Levee is selected, the West Lyons Levee may become part of the McCook Levee Continuing Authorities Program (CAP) project to ensure a complete levee system with a tie-in to high ground.

Alternatives considered during the feasibility study for the Draft Detailed Project Report and Integrated Environmental Assessment (Draft DPR/IEA) of the McCook Levee CAP project included modification of the drainage of the McCook Ditch partnered with either full or segmented rehabilitation of the northern portion of the McCook Levee, rehabilitation or elevation of the West Lyons Levee, and implementation of non-structural measures.

## OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the McCook Levee, Illinois, Continuing Authorities Program (CAP), Section 205 Small Flood Risk Management Project (hereinafter: McCook Levee CAP 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] 1165-2-217, dated February 20, 2018), 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 1165-2-217) for the decision documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) who meet the technical criteria and areas of expertise required for and relevant to the project.

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

## DOCUMENTS PROVIDED

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

Review Documents	No. of Review Pages	Subject Matter Experts			
		Planning Formulation / Economics	Environ. Law Compliance	H&H Engineer	Civil/ Geotechnical Engineer
McCook Levee, Illinois: Draft Detailed Project Report and Integrated Environmental Assessment	88	88	88	88	88
Appendix A: Civil Engineering	59			59	59
Appendix B: Cost Engineering	23	23		23	23
Appendix C: Economic Analysis	38	38			
Appendix D: Hydrology and Hydraulics	182			182	
Appendix E: Geotechnical Analysis	173				173
Appendix F: HTRW Phase 1	35	35	35		
Appendix G: Real Estate Planning Report	17	17	17	17	17
Appendix H: Section 404(b)(1) Evaluation	17	17	17	17	17
Appendix I: Draft Finding of No Significant Impact	4	4	4	4	4
Public Comments*	100	100	100	100	100
<b>Total Number of Review Pages</b>	<b>736</b>	<b>322</b>	<b>261</b>	<b>490</b>	<b>481</b>

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

### Documents for Reference

- USACE guidance *Civil Works Review* (EC 1165-2-217, February 20, 2018)
- Office of Management and Budget’s *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- Foundations of SMART Planning
- SMART Planning Bulletin (PB 2013-03)
- SMART – Planning Overview
- Planning Modernization Fact Sheet.
- USACE Climate Change Adaptation Plan (June 2014)
- *Procedures to Evaluate SLR Change Impacts Responses Adaptation* (ETL 1100-2-1)
- *Incorporating SLR Change in CW Programs* (ER 1100-2-8162)

### 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
<b>Attend Meetings and Begin Peer Review</b>	Battelle convenes kick-off meeting with USACE	5/4/2018
	Battelle sends review documents to panel members	5/29/2018
	Battelle convenes kick-off meeting with panel members	5/30/2018
	Battelle convenes kick-off meeting with USACE and panel members	5/30/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	6/8/2018
<b>Prepare Final Panel Comments</b>	Panel members complete their review of the documents	6/25/2018
	Battelle provides talking points to panel members for Panel Review Teleconference	6/27/2018
	Battelle convenes Panel Review Teleconference	6/28/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	6/29/2018
	Panel members provide draft Final Panel Comments to Battelle	7/6/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	7/07/2018 - 7/15/2018
	Panel finalizes Final Panel Comments	7/16/2018
<b>Review Public Comments</b>	Battelle receives public comments from USACE	5/24/2018
	Battelle sends public comments to Panel	6/27/2018
	Panel members complete their review of the public comments	7/5/2018
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	7/6/2018
	Panel drafts Final Panel Comment on public comments, if necessary	7/10/2018
	Panel finalizes Final Panel Comment regarding public comments, if necessary	7/12/2018
<b>Review Final IEPR Report</b>	Battelle provides Final IEPR Report to panel members for review	7/18/2018
	Panel members provide comments on Final IEPR Report	7/20/2018
	Battelle submits Final IEPR Report to USACE*	7/24/2018
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	7/31/2018
<b>Comment/Response Process</b>	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	8/2/2018
	Battelle convenes teleconference with USACE to review Comment Response process	8/2/2018
	Battelle convenes teleconference with Panel to review Comment Response process	8/2/2018
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	8/23/2018
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	8/30/2018

Task	Action	Due Date
<b>Comment/Response Process</b>	USACE PCX provides draft PDT Evaluator Responses to Battelle	8/30/2018
	Battelle provides draft PDT Evaluator Responses to panel members	9/4/2018
	Panel members provide draft BackCheck Responses to Battelle	9/7/2018
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	9/10/2018
	Battelle convenes Comment Response Teleconference with panel members and USACE	9/11/2018
	USACE inputs final PDT Evaluator Responses to DrChecks	9/18/2018
	Battelle provides final PDT Evaluator Responses to panel members	9/19/2018
	Panel members provide final BackCheck Responses to Battelle	9/24/2018
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	9/27/2018
	Battelle submits pdf printout of DrChecks project file*	9/28/2018
	Contract End/Delivery Date	4/30/2019

\* 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 1165-2-217).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.

3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
7. Please focus the review on assumptions, data, methods, and models.

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

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

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

## Independent External Peer Review of the McCook Levee, Illinois, Continuing Authorities Program (CAP), Section 205 Small Flood Risk Management Project

### Charge Questions and Relevant Sections as Supplied by USACE

The following Charge to Reviewers outlines the objective of the Independent External Peer Review (IEPR) for the subject study and the specific advice sought from the IEPR Panel.

The objective of the IEPR is to obtain an independent evaluation of whether the interpretations of analysis and conclusions based on analysis are reasonable for the subject study. The IEPR Panel is requested to offer a broad evaluation of the overall study decision document in addition to addressing the specific technical and scientific questions included in the charge. The Panel has the flexibility to bring important issues to the attention of decision makers, including positive feedback or issues outside those specific areas outlined in the charge.

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

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

#### **Broad Evaluation Charge Questions**

1. Are the need for and intent of the decision document clearly stated?
2. Does the decision document adequately address the stated need and intent relative to scientific and technical information?

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.

For the tentatively selected plan, assess whether:

13. The models used to assess life safety hazards are appropriate
14. The assumptions made for the life safety hazards are appropriate
15. The quality and quantity of the surveys, investigations, and engineering are sufficient for a concept design considering the life safety hazards and to support the models and assumptions made for determining the hazards
16. The analysis adequately address the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project.
17. From a public safety perspective, the proposed alternative is reasonably appropriate, or should other alternatives be considered.

### **Specific Technical and Scientific Charge Questions**

18. Have the modifications to the McCook Ditch drainage been appropriately designed?

### **Battelle Summary Charge Questions to the Panel Members<sup>1</sup>**

#### **Summary Questions**

19. 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.
20. Please provide positive feedback on the project and/or review documents.

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<sup>1</sup> Questions 19 through 21 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.

**Public Comment Questions**

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

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# APPENDIX D

## Conflict of Interest Form

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

**CONTINUING AUTHORITIES PROGRAM, SECTION 205**  
**MCCOOK LEVEE, ILLINOIS**  
**SMALL FLOOD RISK MANAGEMENT PROJECT**

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

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

March 26, 2018

\_\_\_\_\_  
Date

***BATTELLE***

**It can be done**