

Final Independent External Peer Review Report DuPage River, Feasibility Report and Integrated Environmental Assessment

Prepared by
Battelle Memorial Institute

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

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The DuPage River and its tributaries drain approximately 350 square miles in suburban Cook, DuPage, and Will Counties in the Chicago Metropolitan area. Major storm events occurred in the basin in 1996, 2008, 2009, and most recently in April 2013 resulting in overbank flooding to at least 20 communities and significant damage to residential and non-residential structures, critical infrastructure, and the closure of two major interstate highways (I-80 and I-55) for several days. Flooding in the watershed poses life-safety risks. The DuPage River, Illinois Feasibility Study is a flood risk management study authorized by Section 206 of the Flood Control Act of 1958 (P.L. 85-500).

The watershed includes East and West Branches, which exist primarily in DuPage County, a main stem in Will County, and several tributaries to each of the three main waterways. The largest tributary, Lily Cache Creek, flows into the main stem in Will County. The study will investigate a range of alternatives to address flood risk in the watershed, including floodwater storage, levees and floodwalls, and non-structural measures such as buyouts and floodproofing. Flood damages occur across the watershed with some concentrated high damage areas as well as additional dispersed damage areas. It is expected that alternative plans will include multiple projects formulated to manage concentrated risk areas as well as the isolated pockets.

Independent External Peer Review Process

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

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: Civil Works planning/economics, environmental law compliance, hydrology and hydraulics (H&H) engineering, geotechnical engineering, and civil engineering. Battelle screened the candidates to identify those most

closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of all the final candidates to independently confirm that they had no COIs, and Battelle made the final selection of the four-person Panel from this list.

The Panel received electronic versions of the decision documents (1,931 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, 11 Final Panel Comments were identified and documented. Of these, five were identified as having medium significance, five had medium/low significance, and one had low significance.

Battelle received public comments from USACE on the DuPage River (approximately 250 pages of verbal transcripts and 41 written comments totaling 96 pages of comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the DuPage River 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 DuPage River 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, concise, and provides excellent supporting documentation on most 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 where clarification of project findings, decisions, and objectives need to be documented or revised.

Plan Formulation/Economics: The Panel agrees that overall the DuPage Draft Feasibility Report/Integrated Environmental Assessment (DFR/IEA) thoroughly documents the overarching future basin modifications and the alternative analysis leading up to the Tentatively Selected Plan (TSP) was methodical and well organized. However, some of the final decisions that have led to the currently

proposed TSP need clarification. The Panel's primary concern is that the DFR/IEA does not clearly explain how the study objectives, constraints, and net benefits were applied to develop the final TSP selection. It states that the process of identifying the National Economic Development (NED) and TSP plan involved identification of alternatives that meet study objectives, avoid constraints, and have the highest net benefits, but there is no explanation of how these elements were balanced, or how they were evaluated to determine the TSP from the list of alternatives. This clarification will allow for an understanding of final decisions made.

In addition, it is not clear to the Panel regarding why the Lisle Levee was included in the TSP and the Lacey Restriction storage alternative was excluded. The Panel believes that the conclusion that the Lisle Levee is feasible, given the uncertainty in both benefits and costs, is not supported by the information provided and does not understand why, given its positive net benefits, the Lacey Restriction storage alternative was dropped from the TSP. Lastly, the Panel noted that the DFR/IEA does not fully describe or evaluate the impacts of the non-structural alternative and believes it should be assessed.

Engineering: The DFR/IEA and Appendix A do a good job of detailing the development of model parameters, model development, calibration, and results for the without-project and with-project alternatives. The discussion of the impacts of precipitation due to climate change is detailed and provides a good basis for future predictions. However, the Panel believes that the structural damages analysis does not accurately assess damages because it uses a single universal 48-hour duration for the TSP. Using a universal value for the critical duration for all storm frequency events does not accurately assess structural damages in river sections with higher or lower critical durations.

The Panel found that the DFR/IEA does not include a comparison of the effective Flood Insurance Study (FIS) floodplain delineation with the with-project TSP. Including this information would strengthen the understanding of the future with-project. Lastly, the Panel noted that the basis of the engineering design and cost estimate is unclear due to the inclusion of two geotechnical reports in Appendix E that provide design suggestions that were not included in the final design.

Environmental: The Panel agreed that USACE did a good job of preparing a concise National Environmental Policy Act (NEPA) document and noted that this project was a great example of when and how to integrate an EA with a planning/engineering report. However, the environmental assessment has a few areas where additional or updated information is necessary to document current conditions and impact assessment.

The Panel believes that details on the wetland assessment and mitigation of impacts should be documented in the DFR/IEA. The methodology used to conduct the wetland assessment is not described, so the Panel cannot be sure whether the assessment/delineation conclusions can be supported. The DFR/IEA also does not include an analysis of the impacts associated with filling wetlands associated with hardening the toe of the levee. Without this analysis and a discussion of compensatory water storage or other mitigation measures, the justification for the Finding of No Significant Impact (FONSI) is incomplete.

The Panel found that evaluation of potential changes to environmental quality and impacts associated with the non-structural measures was incompletely considered in the DFR/IEA. Without a full analysis of the potential impacts associated with implementing the non-structural features, the justification for the selection of this alternative is incomplete.

The Panel also noted that the cumulative effects assessment does not consider other reasonably foreseeable impacts associated with long-term operation and maintenance of the levee. The land that

constitutes the Lisle Levee is privately owned and customary practices are such that the landowners install fences and gates, may use fertilizers and/or pesticides on the levee lands adjacent to the East Branch DuPage River, and/or plant non-native species on the levee. Furthermore, levee operation and maintenance (O&M) may include long-term use of insecticides for mosquito control (Appendix C, p. 5). These potential future actions along the rebuilt levee have the potential for cumulative long-term adverse impacts on wildlife, native plants, habitat, and water quality in the levee area.

Table ES-1. Overview of 11 Final Panel Comments Identified by the DuPage River IEPR Panel

No.	Final Panel Comment
Significance – Medium	
1	The DFR/IEA does not clearly explain how the study objectives, constraints, and net benefits were applied to develop the final TSP selection.
2	The conclusion that the Lisle Levee is feasible, given the uncertainty in both benefits and costs, is not supported by the information provided in the DFR/IEA.
3	It is not clear why the Lacey Restriction storage alternative was dropped from the TSP, given its positive net benefits.
4	The structural damages analysis does not accurately assess damages because it uses a single universal 48-hour duration for the TSP.
5	Details on the wetland assessment and mitigation of impacts have not been documented in the DFR/IEA.
Significance – Medium/Low	
6	It is not clear why the DFR/IEA relies upon unrelated and outdated studies to characterize the macroinvertebrate, bivalve, and fish communities when more recent studies from the project area are available.
7	The cumulative effects assessment does not consider other reasonably foreseeable impacts associated with long-term operation and maintenance of the levee.
8	The DFR/IEA does not fully describe or evaluate the impacts of the non-structural alternative.
9	The DFR/IEA does not include a comparison of the effective FIS floodplain delineation with the with-project TSP.
10	The basis of the engineering design and cost estimate is not clear due to the inclusion of two geotechnical reports in Appendix E that provide design suggestions that were not included in the final design.
Significance – Low	
11	Potential impacts on several protected species that could occur in the study area are not discussed in the DFR/IEA.

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LIST OF ACRONYMS

ACE	Annual chance exceedance
ADM	Agency Decision Milestone
BCR	Benefit-cost ratio
COI	Conflict of Interest
DFR	Draft Feasibility Report
DrChecks	Design Review and Checking System
EC	Engineer Circular
ER	Engineer Regulation
ERA	Engineering Resource Associates, Inc.
ERDC	Engineer Research and Development Center
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FONSI	Finding of No Significant Impact
H&H	hydrology and hydraulics
HEC-FDA	Hydrologic Engineering Center's Flood Damage Assessment
IEA	Integrated Environmental Assessment
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
MBI	Midwest Biodiversity Institute
NED	National Economic Development
NEPA	National Environmental Policy Act
O&M	Operation and maintenance
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PDT	Project Delivery Team
PPA	Project Partnership Agreement
SLM	Senior Leader Meeting
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
TSP	Tentatively Selected Plan

1. INTRODUCTION

The DuPage River and its tributaries drain approximately 350 square miles in suburban Cook, DuPage, and Will Counties in the Chicago Metropolitan area. Major storm events occurred in the basin in 1996, 2008, 2009, and most recently in April 2013 resulting in overbank flooding to at least 20 communities and significant damage to residential and non-residential structures, critical infrastructure, and the closure of two major interstate highways (I-80 and I-55) for several days. Flooding in the watershed poses life-safety risks. The DuPage River, Illinois Feasibility Study is a flood risk management study authorized by Section 206 of the Flood Control Act of 1958 (P.L. 85-500).

The watershed includes East and West Branches, which exist primarily in DuPage County, a main stem in Will County, and several tributaries to each of the three main waterways. The largest tributary, Lily Cache Creek, flows into the main stem in Will County. The study will investigate a range of alternatives to address flood risk in the watershed, including floodwater storage, levees and floodwalls, and non-structural measures such as buyouts and floodproofing. Flood damages occur across the watershed with some concentrated high damage areas as well as additional dispersed damage areas. It is expected that alternative plans will include multiple projects formulated to manage concentrated risk areas as well as the isolated pockets.

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 DuPage River, Feasibility Report and Integrated Environmental Assessment (hereinafter: DuPage River 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 the DuPage River 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 DuPage River 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 DuPage River 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: Civil Works planning/economics, environmental law compliance, hydrology and hydraulics (H&H) engineering, geotechnical engineering, and civil engineering. The Panel reviewed the DuPage River documents and produced 11 Final Panel Comments in response to 16 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; p. D-4) in the DuPage River IEPR review documents. The following summarizes the Panel's findings.

Based on the Panel's review, the report is well-written, concise, and provides excellent supporting documentation on most 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 where clarification of project findings, decisions, and objectives need to be documented or revised.

Plan Formulation/Economics: The Panel agrees that overall the DuPage Draft Feasibility Report/Integrated Environmental Assessment (DFR/IEA) thoroughly documents the overarching future basin modifications and the alternative analysis leading up to the Tentatively Selected Plan (TSP) was methodical and well organized. However, some of the final decisions that have led to the currently proposed TSP need clarification. The Panel's primary concern is that the DFR/IEA does not clearly explain how the study objectives, constraints, and net benefits were applied to develop the final TSP selection. It states that the process of identifying the National Economic Development (NED) and TSP plan involved identification of alternatives that meet study objectives, avoid constraints, and have the highest net benefits, but there is no explanation of how these elements were balanced, or how they were evaluated to determine the TSP from the list of alternatives. This clarification will allow for an understanding of final decisions made.

In addition, it is not clear to the Panel regarding why the Lisle Levee was included in the TSP and the Lacey Restriction storage alternative was excluded. The Panel believes that the conclusion that the Lisle Levee is feasible, given the uncertainty in both benefits and costs, is not supported by the information provided and does not understand why, given its positive net benefits, the Lacey Restriction storage alternative was dropped from the TSP. Lastly, the Panel noted that the DFR/IEA does not fully describe or evaluate the impacts of the non-structural alternative and believes it should be assessed.

Engineering: The DFR/IEA and Appendix A do a good job of detailing the development of model parameters, model development, calibration, and results for the without-project and with-project alternatives. The discussion of the impacts of precipitation due to climate change is detailed and provides a good basis for future predictions. However, the Panel believes that the structural damages analysis does not accurately assess damages because it uses a single universal 48-hour duration for the TSP. Using a universal value for the critical duration for all storm frequency events does not accurately assess structural damages in river sections with higher or lower critical durations.

The Panel found that the DFR/IEA does not include a comparison of the effective Flood Insurance Study (FIS) floodplain delineation with the with-project TSP. Including this information would strengthen the understanding of the future with-project. Lastly, the Panel noted that the basis of the engineering design and cost estimate is unclear due to the inclusion of two geotechnical reports in Appendix E that provide design suggestions that were not included in the final design.

Environmental: The Panel agreed that USACE did a good job of preparing a concise National Environmental Policy Act (NEPA) document and noted that this project was a great example of when and how to integrate an EA with a planning/engineering report. However, the environmental assessment has a few areas where additional or updated information is necessary to document current conditions and impact assessment.

The Panel believes that details on the wetland assessment and mitigation of impacts should be documented in the DFR/IEA. The methodology used to conduct the wetland assessment is not described, so the Panel cannot be sure whether the assessment/delineation conclusions can be supported. The

DFR/IEA also does not include an analysis of the impacts associated with filling wetlands associated with hardening the toe of the levee. Without this analysis and a discussion of compensatory water storage or other mitigation measures, the justification for the Finding of No Significant Impact (FONSI) is incomplete.

The Panel found that evaluation of potential changes to environmental quality and impacts associated with the non-structural measures was incompletely considered in the DFR/IEA. Without a full analysis of the potential impacts associated with implementing the non-structural features, the justification for the selection of this alternative is incomplete.

The Panel also noted that the cumulative effects assessment does not consider other reasonably foreseeable impacts associated with long-term operation and maintenance of the levee. The land that constitutes the Lisle Levee is privately owned and customary practices are such that the landowners install fences and gates, may use fertilizers and/or pesticides on the levee lands adjacent to the East Branch DuPage River, and/or plant non-native species on the levee. Furthermore, levee operation and maintenance (O&M) may include long-term use of insecticides for mosquito control (Appendix C, p. 5). These potential future actions along the rebuilt levee have the potential for cumulative long-term adverse impacts on wildlife, native plants, habitat, and water quality in the levee area.

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 DFR/IEA does not clearly explain how the study objectives, constraints, and net benefits were applied to develop the final TSP selection.

Basis for Comment

Section 3 of the DFR/IEA describes the screening process for selecting options for further analysis. The DFR/IEA shows (p. 68) how the screening process eliminates many of the alternatives through preliminary screening, secondary screening, evaluation and comparison, and then identification of the TSP. Table 3-9 (pp. 68-69) shows more fully how the first three steps proceeded and how the numbers of alternatives were reduced. The final list of alternative plans is shown in Section 3.8.4 (pp. 72-73). However, it is not clear how the TSP was finally chosen from the list of alternatives in Table 3-12 on p. 88).

Section 3.10 (p. 89) states that the process of identifying the NED and TSP plan involved identification of alternatives that meet study objectives, avoid constraints, and have the highest net benefits. There is no explanation of how these elements were balanced, or how they were evaluated.

It is therefore not clear why the TSP is not completely consistent with standards set in Section 3.10. The DUNS3 plan, which showed small negative net benefits (-\$6,000) in Table 3-12, is included in the TSP, whereas the levee Repair to Design option (EBLL1), which also showed small negative net benefits (-\$5,000), was not included.

Significance – Medium

The lack of transparency in the final step of the selection of the TSP undermines the legitimacy of the plan formulation process.

Recommendations for Resolution

1. Describe the process for moving from the final array of alternative plans (Section 3.8.4, p. 72) to the TSP.
2. Explain why some alternatives with slightly negative net benefits were retained in the TSP and others were not. Specifically, why DUNS3 was retained and EBLL1 was not.

Final Panel Comment 2

The conclusion that the Lisle Levee is feasible, given the uncertainty in both benefits and costs, is not supported by the information provided in the DFR/IEA.

Basis for Comment

The conclusion that the Lisle Levee (EBLL2) is feasible and therefore should be part of the TSP is not well supported given the uncertainty in both its benefits and costs. The benefit-cost ratio (BCR) for this levee is 1.01. The levee is responsible for over 50 percent of the first costs for the entire project, and over 50 percent of the annual costs, while accounting for only 1.2 percent of the project benefits based on numbers presented in the table found on page ES-4 and Table 3-13 (p. 90), Tentatively Selected Plan Summary. The first costs of EBLL2 are not fully described in Appendix D.

In addition, it is not clear in the DFR/IEA why the estimates of benefits and costs presented in Table 3-12 (p. 88), Economic Evaluation of Alternatives, are different from those in Table 3-13 (p. 90). The progression of decision-making suggests that the results presented in Table 3-12 are less detailed than those in Table 3-13. This implies that the levee becomes less feasible with increasing detail in the analysis, reinforcing the Panel's concern that the data do not support the USACE conclusion that the Lisle Levee is feasible.

Finally, the uncertainty and risk surrounding the benefit and cost estimates should be described in the context of how it might affect the feasibility of the decision. The Planning Guidance Notebook (ER 1105-2-100; USACE, 2000a) echoes the Principles and Guidelines (p. 2-11):

“Risk and Uncertainty. The P&G state that planners shall characterize, to the extent possible, the different degrees of risk and uncertainty inherent in water resources planning and to describe them clearly so decisions can be based on the best available information.”

Significance – Medium

Failure to discuss the feasibility of the Lisle Levee portion of the project calls into question the justification for over 50 percent of project costs

Recommendations for Resolution

1. Add a discussion that addresses the low feasibility of the Lisle Levee portion of the project.
2. Explain why benefits and cost estimates differ between Table 3-12 and Table 3-13.
3. Characterize the different degrees of uncertainty in the final benefit and cost estimates, and the resulting implications for feasibility of the Lisle Levee.
4. If the feasibility is still uncertain, research improved estimates of both benefits and costs for any project element that is not certain.
5. Add a summary in Appendix D showing the major components of the first costs of the Lisle Levee.
6. Review the BCR any time the project costs or benefits change to ensure that the project is still economically viable.

Final Panel Comment 2

7. Look for additional benefits that might strengthen the case for feasibility.

Literature Cited:

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

Final Panel Comment 3

It is not clear why the Lacey Restriction storage alternative was dropped from the TSP, given its positive net benefits.

Basis for Comment

Table 3-12 (p. 88) shows the Lacey Restriction storage alternative on its own (EB6) has positive net benefits, but it was dropped from the TSP without explanation. Appendix H, however, confirms that this alternative was in fact retained (Table 1, p. 3, Appendix H), and the DFR/IEA states (p. 75), “This alternative provided significant reductions in water surface elevation in the downtown Lisle area” and that “nearly 283 acre-feet of new flood storage” is created with this option.

The USACE Planning Guidance Notebook (ER 1105-2-100; USACE, 2000a) states (p. 2-7) that during the fifth step of the planning process the beneficial and adverse effects of each plan must be compared. The guidance document goes on to say that the recommended plan must be preferable to implementing any of the other alternatives considered. In the case of the Lacey Restriction, it is not clear why this element is not included in the recommended plan, given the positive net benefits shown.

Significance – Medium

Failure to describe the process of excluding the Lacey Restriction from the TSP raises questions about whether the TSP is the best alternative to meet the objectives of this project.

Recommendations for Resolution

1. Explain why the Lacey Restriction storage alternative was not part of the final TSP.
2. Clearly describe how and why the net benefit calculation was or was not used in identifying the TSP.

Literature Cited:

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

Final Panel Comment 4

The structural damages analysis does not accurately assess damages because it uses a single universal 48-hour duration for the TSP.

Basis for Comment

To evaluate structural damages in the watershed, the Hydrologic Engineering Center's Flood Damage Assessment (HEC-FDA) model uses critical duration as one of the model parameters for variable storm frequency rainfall depths. Appendix A presents the development for the critical durations and finds that in most river reaches the critical storm duration is 48 hours. There are two exceptions. In the DuPage River mainstem in Will County, the critical duration for the 2-year through 50-year events is 72 hours, although for the 100-year through 500-year events it is 48 hours. In the Lily Cache, the critical duration is 24 hours, as shown in Appendix A, Table 3.

Structural damages analysis for the TSP used the universal value of 48 hours for the critical duration for all storm frequency events. This does not accurately assess structural damages in river sections with higher or lower critical durations.

Appendix A further states this has an impact on determining structural damages and there is a need to address this issue with the local sponsor.

Significance – Medium

Structural damages analysis should use established values for critical duration. Using single universal critical duration values will result in either under- or over-estimating structural damages.

Recommendations for Resolution

1. Meet with the local sponsor to discuss the critical duration analysis, and determine resolution for structural damages estimates and impacts on the TSP.
2. Include determined values for critical duration in future HEC-FDA model updates.

Final Panel Comment 5

Details on the wetland assessment and mitigation of impacts have not been documented in the DFR/IEA.

Basis for Comment

The proposed project must comply with existing Federal laws. Project compliance with environmental regulations is typically described in a NEPA compliance document. The Panel found that there was incomplete documentation to demonstrate compliance with Section 404 of the Clean Water Act.

The methodology used to conduct the wetland assessment is not described in Section 4.3.2.1, so the Panel cannot be sure whether the assessment/delineation conclusions can be supported. Section 4.5 of the DFR/IEA does not include an analysis of the impacts associated with filling wetlands associated with hardening the toe of the levee, nor are the potential impacts summarized in Table 4.2 (p. 105). Without this analysis and a discussion of compensatory water storage or other mitigation measures, the justification for the FONSI is incomplete.

The Village of Woodbridge's August 22, 2018 comment letter also raises the issue of incomplete documentation to support the effects determination on this topic.

Significance – Medium

Implementation of the TSP could be negatively affected because the compliance documentation is incomplete.

Recommendations for Resolution

1. Describe the methods used to conduct the wetland assessment/delineation in the DFR/IEA.
2. Modify Section 4.3.2.1 to provide more detail about the process that will be followed to develop the wetland mitigation plan.
3. Add a sub-section on hydrology to Section 4.5 and describe the potential downstream impacts associated with the proposed wetland fill.
4. Revise Table 4.2 (p. 105) as needed once the effects determination has been updated.

Final Panel Comment 6

It is unclear why the DFR/IEA relies upon unrelated and outdated studies to characterize the macroinvertebrate, bivalve, and fish communities when more recent studies from the project area are available.

Basis for Comment

Near-shore habitat in the East Branch DuPage River will be filled and altered with the Lisle Levee rebuild. The potential impacts on macroinvertebrates, bivalves, and fish must therefore be rigorously evaluated.

Characterization of the current baseline fish community relies upon results from surveys completed between 1979 and 1983. Characterization of mussels and clams in the project area appears to be based upon best professional judgment of what might be present. Characterization of the baseline macroinvertebrate community extrapolates from a study conducted in the Lower DuPage River watershed (MBI, 2014). None of the study sites in that 2014 report overlap with the Lisle Levee project area.

The 2014 report from the Midwest Biodiversity Institute (MBI) references recent investigations completed in the East Branch DuPage River that characterized macroinvertebrate and fish communities (MBI, 2013; MBI, 2008). These recent studies by the MBI have more relevant spatial and temporal scales for characterizing the project baseline. All relevant data should be used to describe the baseline condition of the macroinvertebrate, bivalve, and fish communities in the project area.

Future baseline conditions without levee modifications should also be addressed so that any impacts on macroinvertebrates, bivalves, and fish may be evaluated and compared with the TSP.

Significance – Medium/Low

Incomplete analysis of potential impacts on indigenous aquatic life could negatively affect the justification for the TSP.

Recommendations for Resolution

1. Review the 2008 and 2013 MBI reports on the *Biology and Water Quality of the East Branch DuPage River*, as well as other studies that MBI may have completed in the Lisle Levee area, and summarize the relevant findings for the project area.
2. Modify Sections 4.3.2.3 and 4.3.2.4 of the DFR/IEA to more fully describe current macroinvertebrate, bivalve, and fish communities in the project area.
3. Verify the conclusions of the impact analysis for macroinvertebrates, fish, and mussels after completing Items 1 and 2. Revise Sections 4.5.2.2 and 4.5.2.3 of the DFR/IEA if any conclusions change
4. Add the references to MBI's East Branch DuPage River studies to Section 6 of the DFR/IEA.
5. Evaluate the overall potential for beneficial or adverse environmental impacts from the levee and add this to the description of the benefits of the TSP (Section 5.1.1 in the DFR/IEA).

Literature Cited:

MBI (2008). Biology and Water Quality Study of East Branch and West Branches of the DuPage River and Salt Creek Watersheds; DuPage, Kane and Will Counties, Illinois. Technical Report MBI/2008-12-3. Midwest Biodiversity Institute, Center for Applied Bioassessment and Biocriteria, Columbus, OH. December 31.

MBI (2013). Biological and Water Quality Study of the East Branch DuPage River Watershed; DuPage and Will Counties, Illinois. Technical Report MBI/2011-12-8. Midwest Biodiversity Institute, Center for Applied Bioassessment and Biocriteria, Columbus, OH. October 31.

MBI (2014). 2012 Biological and Water Quality Study of the Lower DuPage River Watershed: Will and DuPage Counties. Final Report. Technical Report MBI/2014-03-01. Midwest Biodiversity Institute, Center for Applied Bioassessment and Biocriteria, Columbus, OH. March 31. Available online at: http://www.dupagerivers.org/documents/2012_study.pdf.

Final Panel Comment 7

The cumulative effects assessment does not consider other reasonably foreseeable impacts associated with long-term operation and maintenance of the levee.

Basis for Comment

Population in the watershed is expected to grow and will result in adverse impacts on water quality in the river (DFR/IEA, p. 30). The existing conditions at the Lisle Levee and Levee Banks include plant cover consisting of invasive weeds, manicured turf, ornamental plantings, and woody species (p. 96); and the East Branch DuPage River is on the State of Illinois' 303(d) list for water quality impairment of indigenous aquatic life due to multiple contaminants including phosphorus and a pesticide (pp. 17-18).

The land that constitutes the Lisle Levee is privately owned; customary practices are such that the landowners install fences and gates, may use fertilizers and/or pesticides on the levee lands adjacent to the East Branch DuPage River, and/or plant non-native species on the levee. Furthermore, levee O&M may include long-term use of insecticides for mosquito control (Appendix C, p. 5). These potential future actions along the rebuilt levee have the potential to result in cumulative long-term adverse impacts on wildlife, native plants, habitat, and water quality in the levee area.

Using native species to establish plant cover on the levee may have both ecological and water quality benefits. If USACE can quantify and commit to using native species, the potential environmental benefits may be used to strengthen the case for the feasibility of the levee. The DFR/IEA states that native species will be used "where feasible" (p. 80) and they will consider them (p. 111). Further, the USACE explains that the local non-Federal sponsor will be responsible for the maintenance of the levee (p. 115), including outreaching to communities and residents. The partner will be eligible for funding for repair as long as they are consistent with the Project Partnership Agreement (PPA) and the project O&M Manual.

Green infrastructure/low impact development (LID) design elements were identified in the DFR/IEA to be incorporated as structural and non-structural measures. These measures would include use of native plants, elimination of fertilizers, and LID features such as bio-swales, rain gardens, pervious surfaces, etc. Specific details describing green infrastructure/LID features for each of the selected projects in the TSP are not identified or discussed, creating the potential that these features will not be implemented.

Concern about landowner actions and incursions on the levee was raised in a public comment from Jane Wilmoth.

Significance – Medium/Low

Incomplete analysis of cumulative effects in the DFR/IEA could negatively affect the justification for the TSP.

Recommendations for Resolution

1. Evaluate and discuss the potential cumulative impacts related to levee and levee bank O&M as potential reasonably foreseeable future actions in DFR/IEA Section 4.6.

Final Panel Comment 7

2. Revise Appendix C to identify acceptable mosquito control practices that will minimize potential adverse impacts on water quality; include an analysis of how mosquito control might impact indigenous aquatic life either in Appendix C or in the DFR/IEA.
3. Revise Appendix C to clarify what aspects of vegetation planting and maintenance on the levee will be assumed by the project sponsor and what responsibilities and restrictions apply to the landowners.
4. Revise DFR/IEA Section 4.6 to describe the mitigation measures that will be implemented to minimize these potential reasonably foreseeable cumulative impacts.
5. Evaluate the overall potential for positive or negative environmental impacts from the levee and add this to the description of the benefits of the TSP (DFR/IEA Section 5.1.1).
6. Include additional details in Section 3.8.4 describing planned green infrastructure/low impact development features for structural and non-structural measures.
7. Include specifics of levee maintenance protocols into the PPA and Project O&M manual.

Final Panel Comment 8

The DFR/IEA does not fully describe or evaluate the impacts of the non-structural alternative.

Basis for Comment

All selected alternatives should undergo a full and detailed analysis of impacts on the natural and human environments in a NEPA review (USACE, 1988). Details about the project sponsor's responsibilities related to site restoration and maintenance are not included in Appendix C. Evaluation of potential changes to environmental quality and impacts associated with the non-structural measures is missing for some of the resources in DFR/IEA Section 4.5. Without a full analysis of the potential impacts associated with implementing the non-structural features, the justification for the FONSI is incomplete.

Concern about long-term management of sites with removed structures was raised during public comment in a submission from Karen Rebuehr.

Significance – Medium/Low

The incomplete description of the non-structural alternative and impact assessment of that alternative could negatively affect the justification for the recommended plan.

Recommendations for Resolution

1. Evaluate the impacts of the non-structural measures on the natural and human environments.
2. Revise the following sections of the DFR/IEA to present the findings from the evaluation conducted for Recommendation #1: 4.5.1.4, 4.5.1.5, 4.5.2.1, 4.5.2.4, 4.5.2.5, 4.5.2.6, and 4.3.
3. Include a discussion of the impacts that may be expected at those locations where acquisition and removal of structures is implemented.
4. Revise Appendix C to clarify what aspects of site restoration and maintenance will be assumed by the project sponsor at the properties where the non-structural measure of acquisition is implemented.
5. Add a discussion of the environmental quality changes to the section on selection of the TSP (Section 3.10 of the DFR/IEA)

Literature Cited

USACE (1988). Procedures for Implementing National Environmental Policy Act. Engineer Regulation (ER) 200-2-2. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. March 4.

Final Panel Comment 9

The DFR/IEA does not include a comparison of the effective FIS floodplain delineation with the with-project TSP.

Basis for Comment

Public comments identified concerns with flooding and potential flooding impacts due to the implementation of the TSP. The DFR/IEA and Appendix A do not clearly discuss whether there are impacts on the floodplain upstream and downstream of the selected TSP projects.

Comparing the effective Federal Emergency Management Agency (FEMA) FIS floodplain with the TSP floodplain for the 100-year event, 1% annual chance exceedance (ACE) and 500-year event, .2% ACE would provide a clear demonstration of floodplain reduction benefits due to the TSP. In addition, comparing the without-project and with-project floodplains for the 100-year (1% ACE) and 500-year (.2% ACE) would further demonstrate how the TSP projects are affecting the watershed floodplain upstream and downstream of the proposed projects.

In its public comment submission, the U.S. Environmental Protection Agency expressed similar concerns: whether the flood hazard mapping in Will County is scheduled for revision, how the lack of information affects the TSP, and if there would be constraints on Will County from updating the H&H models. The DFR/IEA addresses the use of best available data for the Will County portion of the H&H model; however, it does not discuss possible constraints that could impact Will County model updates.

Significance – Medium/Low

Including floodplain mapping in the DFR/IEA will lead to a clear understanding of the impacts the TSP has upon the DuPage River watershed floodplain.

Recommendations for Resolution

1. Provide floodplain mapping in Appendix A, comparing the FEMA FIS, without-project, and with-project floodplains.
2. Discuss in Appendix A floodplain mapping impacts on the watershed in the locations of the TSP projects.
3. Discuss in Appendix A any constraints that could impact model updates in the Will County portion of the watershed.

Final Panel Comment 10

The basis of the engineering design and cost estimate is unclear due to the inclusion of two geotechnical reports in Appendix E that provide design suggestions that were not included in the final design.

Basis for Comment

Attachment 2 of Appendix E, Geotechnical Analysis and Design, is a Final Report by Engineering Resource Associates, Inc. (ERA) dated July 3, 2012, and also includes a second report dated May 18, 2012. Having two versions of what appears to be the same report is confusing

These reports include several recommendations/analyses that are not consistent with current USACE design guidance and analysis methodologies (USACE, 2005, 2003, 2000b, 1992). The following are inconsistencies in the July 3, 2012 report:

1. Seepage Analysis (Appendix E, Attachment 2, p. 24):
 - a. A single boring location was used for the analysis. No discussion of why this section was selected as critical was found. Additional sections should have been considered and/or analyzed.
 - b. The analysis consisted of a simple seepage quantity calculation. As stated in the report, seepage quantity is not a current USACE design criteria.
 - c. A seepage analysis determining exit gradient is necessary to evaluate the proposed levee based on current USACE design criteria.
2. Slope Stability Analysis (Appendix E, Attachment 2, p. 25):
 - a. A single boring location was used for the analysis. No discussion of why this section was selected as critical was found. Additional sections should have been considered and/or analyzed.
 - b. Analysis was performed by hand using the Modified Bishop's method. Analysis using Spencer's or Morgenstern-Price's method and computerized tools is more consistent with current USACE analysis methodologies.
 - c. Computerized analysis would allow for many more than three failure surfaces to be analyzed, thereby better refining the calculated minimum factor of safety.
 - d. Results from the three analyzed failure surfaces were averaged, reported, and compared to design guidance for each analyzed case. Minimum calculated factors of safety should be compared to design guidance.
3. Five options are presented (Appendix E, Attachment 2, p. 31ff): to address the Embankment Foundation Stability problem, i.e., the seepage quantity, identified by ERA. Since seepage quantity is not a USACE design criterion, inclusion of these options results in the basis of the levee design and the cost estimate for the levee being unclear. USACE indicated during the mid-review teleconference that none of these options was included in the USACE levee design or the cost estimate.

Final Panel Comment 10

Appendix E, paragraph 43 (p. 25) indicates that additional work is needed to design the levee. However, the current design cross-section and required project features are not described. The last two pages of Appendix D, Attachment 2, shows a cross-section of the existing and proposed levee. This section shows a centerline raise of the existing levee using 3H:1V side slopes. It is unclear if the section shown in Appendix D is consistent with the intent of Appendix E.

Significance – Medium/Low

The report documents should clearly indicate the design basis of the levee. Analysis, conclusions, and recommendations that are not part of the design basis should not be included in the report documents.

Recommendations for Resolution

1. Add a paragraph to Appendix E describing the proposed levee geometry (side slopes, crest width, and centerline location relative to existing levee centerline) and confirm that the proposed geometry is consistent with the last two pages of Appendix D.
2. Revise Appendix E to explain what parts of the two ERA reports are being used and relied upon by USACE. Consider removing all portions of the ERA reports that are not being relied upon.
3. Revise the reports in Appendix E to remove references and portions of the reports that are not consistent with current USACE design guidance.

Literature Cited:

USACE (2005). Engineering and Design: Design Guidance for Levee Underseepage. Engineer Technical Letter (ETL) 1110-2-569. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. May 1.

USACE (2003). Engineering and Design: Slope Stability. Engineer Manual (EM) 1110-2-1902. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. October 3.

USACE (2000b). Engineering and Design: Design and Construction of Levees. EM 1110-2-1913. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. April 30.

USACE (1992). Engineering and Design: Design, Construction, and Maintenance of Relief Wells. EM 1110-2-1914. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. May 29.

Final Panel Comment 11

Potential impacts on several protected species that could occur in the study area are not discussed in the DFR/IEA.

Basis for Comment

The proposed project must comply with existing Federal laws. Project compliance with environmental regulations is typically described in a NEPA compliance document. The Panel found that there was incomplete documentation to demonstrate compliance with state and Federal laws related to protection of listed species.

For example, there are 14 state-listed species of fish and mussels in the watershed (p. 19), but no description of how many of them occur in the project area. It is important to present the potential distribution of these species in the project area and potential impacts on them. It is also unclear whether the list of species in the project area is up to date.

Significance – Low

Compliance documentation is incomplete, which could negatively affect implementation of the recommended plan.

Recommendations for Resolution

1. Modify the DFR/IEA to address potential impacts on listed fish and mussels. Discuss potential distribution of these species in the project area in Section 4.3.2.8, and potential impacts on them in Section 4.5.2.6.
2. In DFR/IEA Section 4.3.2.8 update the description of the potential listed species (Federal, state, aquatic, terrestrial) that may occur in the project area.
3. Modify DFR/IEA Section 4.5.2.6 to fully justify the determination that the project is not likely to adversely affect each of the protected species analyzed.

5. REFERENCES

MBI (2008). Biology and Water Quality Study of East Branch and West Branches of the DuPage River and Salt Creek Watersheds; DuPage, Kane and Will Counties, Illinois. Technical Report MBI/2008-12-3. Midwest Biodiversity Institute, Center for Applied Bioassessment and Biocriteria, Columbus, OH. December 31.

MBI (2013). Biological and Water Quality Study of the East Branch DuPage River Watershed; DuPage and Will Counties, Illinois. Technical Report MBI/2011-12-8. Midwest Biodiversity Institute, Center for Applied Bioassessment and Biocriteria, Columbus, OH. October 31.

MBI (2014). 2012 Biological and Water Quality Study of the Lower DuPage River Watershed: Will and DuPage Counties. Final Report. Technical Report MBI/2014-03-01. Midwest Biodiversity Institute, Center for Applied Bioassessment and Biocriteria, Columbus, OH. March 31. Available online at: http://www.dupagerivers.org/documents/2012_study.pdf.

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.

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 (1988). Procedures for Implementing National Environmental Policy Act. Engineer Regulation (ER) 200-2-2. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. March 4.

USACE (1992). Engineering and Design: Design, Construction, and Maintenance of Relief Wells. EM 1110-2-1914. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. May 29.

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

USACE (2000b). Engineering and Design: Design and Construction of Levees. EM 1110-2-1913. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. April 30.

USACE (2003). Engineering and Design: Slope Stability. Engineer Manual (EM) 1110-2-1902. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. October 3.

USACE (2005). Engineering and Design: Design Guidance for Levee Underseepage. Engineer Technical Letter (ETL) 1110-2-569. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. May 1.

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.

APPENDIX A

IEPR Process for the DuPage River 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 DuPage River 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 August 27, 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 December 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 DuPage River IPER

Task	Action	Due Date
1	Award/Effective Date	8/13/2018
	Review documents available	8/27/2018
	Public comments available	10/1/2018
	Battelle submits draft Work Plan ^a	8/21/2018
	USACE provides comments on draft Work Plan	8/24/2018
	Battelle submits final Work Plan ^a	8/30/2018
2	Battelle submits list of selected panel members ^a	8/22/2018
	USACE confirms the panel members have no COI	8/24/2018
3	Battelle convenes kick-off meeting with USACE	8/20/2018
	Battelle convenes kick-off meeting with panel members	9/7/2018
	Battelle convenes kick-off meeting with USACE and panel members	9/7/2018
4	Panel members complete their individual reviews	10/2/2018
	Panel members provide draft Final Panel Comments to Battelle	10/15/2018
	Battelle sends public comments to panel members for review	10/4/2018
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	10/9/2018
	Panel finalizes Final Panel Comments	10/22/2018
5	Battelle submits Final IEPR Report to USACE ^a	10/26/2018
6 ^b	Battelle convenes Comment Response Teleconference with panel members and USACE	12/11/2018
	Battelle submits pdf printout of DrChecks project file ^a	12/28/2018
	Agency Decision Milestone (ADM) meeting ^c (estimated date)	11/14/2018
	Post-ADM Senior Leader Meeting (SLM) ^c	To be determined
	Contract End/Delivery Date	8/13/2019

^a Deliverable.

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

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

At the beginning of the Period of Performance for the DuPage River 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 16 charge questions provided by USACE, 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
Main Report	140
Appendix A: H&H	295
Appendix B: Economics	128
Appendix C: Real Estate	12
Appendix D: Cost and Civil	61
Appendix E: Geotechnical	220
Appendix F: HTRW	898 ^b
Appendix G: Coordination and Environmental Analysis	62
Appendix H: Plan Formulation Screening	15
Public Comments ^a	346
Total Number of Review Pages	1831

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

^b Over half of these pages were considered supplemental information only and were not considered part of the overall 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.

About halfway through the review, a teleconference was held with USACE, Battelle, and the Panel so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 24 panel member questions to USACE. USACE was able to provide responses to all the questions during the teleconference, or was able to provide written responses to all the questions prior to the end of the review. The responses include four additional documents listed below.

- 2005-08-25-Hydraulic Evaluation Report.pdf
- Cowardin_Classification of Aquatic Habitats. Pdf
- EBhydEvalRpt.pdf
- WBhydEvalRpt.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 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 DuPage River 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 description below)
 4. Recommendation(s) for Resolution (see description below).
- **Criteria for Significance:** The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.
 5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.

- **Guidelines for Developing Recommendations:** The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 11 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received 43PDF files containing 96 pages of public comments and 250 pages of transcripts on the DuPage River 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 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. However, the Panel noted that some of the issues raised in the public comments were similar to concerns raised in the IEPR Final Panel Comments, and therefore included notations to those public comments in the applicable 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 11 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

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APPENDIX B

Identification and Selection of IEPR Panel Members for the DuPage River Project

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B.1 Panel Identification

The candidates for the DuPage River, Feasibility Report and Integrated Environmental Assessment (hereinafter: DuPage River IEPR) Panel were evaluated based on their technical expertise in the following key areas: Civil Works planning/economics, environmental law compliance, hydrology and hydraulics (H&H) engineering, geotechnical engineering, and civil engineering. These areas correspond to the technical content of the review documents and overall scope of the DuPage River project.

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

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

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

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the DuPage River FR/IEA

1. Previous and/or current involvement by you or your firm in the DuPage River, Feasibility Report and Integrated Environmental Assessment (DFR/IEA) and related projects.
2. Previous and/or current involvement by you or your firm in flood control in DuPage and Will Counties in the Chicago Metropolitan area
3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&M) of any projects in the DuPage River DFR/IEA or related projects.
4. Current employment by USACE.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the DuPage River FR/IEA

5. Previous and/or current involvement with paid or unpaid expert testimony related to the DuPage River DFR/IEA.

6. Previous and/or current employment or affiliation with members of the non-Federal sponsors or any of the following cooperating Federal, State, County, local, and regional agencies, environmental organizations, and interested groups (*for pay or pro bono*):

- DuPage County, Illinois Stormwater Management Planning Committee
- Will County, Illinois Executive Office.

7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to DuPage and Will Counties in the Chicago Metropolitan area.

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 DuPage River DFR/IEA.

Note: The following models are mentioned in the document - Hydrologic Engineering Center's Flood Damage Analysis (HEC-FDA) version 1.4.2; HEC-River Analysis System (HEC-RAS) version 5.1; Full Equations Model (FEQ) versions 10.73 and 10.80; Hydrologic Simulation Program - Fortran (HSPF) version 11.0; and Micro-Computer Aided Cost Estimating System (MCACES) MII

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, 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 management and include the client/agency and duration of review (approximate dates).

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the DuPage River FR/IEA

14. Pending, current, or future financial interests in contracts/awards from USACE related to the DuPage River DFR/IEA.
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 DuPage County, Illinois Stormwater Management Planning Committee or Will County, Illinois Executive Office contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the DuPage River DFR/IEA.
18. Participation in relevant prior and/or current Federal studies related to the DuPage River DFR/IEA.
19. Previous and/or current participation in prior non-Federal studies related to the DuPage River DFR/IEA.
20. Has your research or analysis been evaluated as part of the DuPage River DFR/IEA?
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. 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. DuPage River IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Civil Works Planner/Economist (Dual Role)					
Gretchen Greene	Greene Economics, LLC	Vancouver, WA	Ph.D., Food and Resource Economics	N/A	20
Environmental Law Compliance Expert					
Judith Dudley	Independent Consultant	Bellingham, WA	Ph.D., Biology (ecosystems ecology)	N/A	32
H&H Engineer					
Larry Fluty	Independent Consultant	Brooksville, FL	Ph.D., Civil Engineering and Water Resources	Yes	39
Geotechnical / Civil Engineer					
Michael Lambert	Shannon & Wilson, Inc.	Pulaski, TN	M.S., Geotechnical Engineering	Yes	30

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. DuPage River IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Greene	Dudley	Fluty	Lambert
Civil Works Planner/Economist (Dual Role)				
Minimum of 15 years of demonstrated experience in economics	X			
M.S. degree or higher in economics	X			
Familiarity with Civil Works flood risk management projects	X			
Thorough understanding of the use of models similar to the Hydrologic Engineering Center's Flood Damage Analysis (HEC-FDA)	X			
Environmental Law Compliance Expert				
Minimum of 15 years of experience directly related to water resources environmental evaluation or review		X		
M.S. degree or higher in a related field		X		
At least 10 years of experience in evaluating and conducting National Environmental Policy Act (NEPA) impact assessments		X		
Should be familiar with and have experience with Endangered Species Act (ESA), Clean Water Act and essential fish habitat (EFH), and Fish and Wildlife Coordination Act (FWCA) in the Mid-West		X		
H&H Engineer				
Minimum of 15 years of experience in H&H engineering in the Mid-West United States			X	
Familiarity with the USACE application of risk and uncertainty in flood risk management studies			X	
Familiarity with USACE hydrologic and hydraulic computer models: Hydraulic Engineering Center (HEC) modeling computer software including HEC River Analysis System (RAS) or Hydrologic Modeling System (HEC-HMS)			X	
Geotechnical/Civil Engineer (Dual Role)				
Minimum of 15 years of experience in geotechnical engineering/civil engineering and design				X
B.S. degree or higher in engineering				X
Experience in design and implementation of flood risk management project including levees and earthen impoundment design				X
Safety Assurance Review experience				X

B.3 Panel Member Qualifications

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

Name	Gretchen Greene, Ph.D.
Role	Civil Works Planner/Economist
Affiliation	Greene Economics, LLC

Dr. Gretchen Greene, a principal economist with Greene Economics, LLC, has been specializing in water resources, ecosystem service valuation, regional economic impact assessment, benefit-cost analysis, regulatory analysis, public infrastructure, investment economic development, socioeconomic analysis, recreation demand, population projections, and urban water demand forecasting for more than 20 years. She also has Civil Works planning experience on numerous projects related to water resources, including dam feasibility, levee alterations, flood protection, port development, conservation, and ecosystem service payments. She earned her Ph.D. in food and resource economics from the University of Florida in 1998.

Dr. Greene has extensive experience with economic analysis of water resource development, having worked on numerous Indian Water Rights litigation cases that hinge on benefit-cost analyses following the Principles and Guidelines for Water Resource Development, using the National Economic Development approach. She also led the Dredged Material Management Study, “Risk-Based Analysis of the Lewiston Levee,” which was part of a dredged material management Environmental Impact Statement (EIS) for the Snake River system, in which she estimated flood damage reduction benefits of the Lewiston Levee system. Dr. Greene prepared a benefit-cost economic analysis of various dredge plans, levee alterations, and dredged material disposal options for USACE Walla Walla District. For this effort, she estimated flood damage reduction benefits using the USACE HEC-FDA model; environmental benefits and costs were evaluated separately. The model and results were operated and presented in a manner consistent with USACE Engineering Manual 1110-2-1619, Risk Based Analysis for Flood Damage Reduction Studies.

Dr. Greene has more than 20 years of experience working with USACE. For Savannah USACE, she worked on a Water Supply Reallocation Report for the City of Thomson, Georgia (Chasman & Associates). Dr. Greene has reviewed and completed several other flood damage prevention feasibility analyses including work for the Carson River Water subconservancy, and in Ventura County, California regarding flooding from sea level rise. She has also studied marine transportation as part of the economic analysis of rules that currently govern the transfer of oil within Washington State waters. This effort focused on the costs and benefits associated with changes in oil transfer safety procedures affecting vessels and four different types of marine facilities that transfer oil on or over state waters.

She has used the USACE plan formulation process as a contractor to USACE. The process forms the basis for benefit-cost analysis that she uses every day as an economist. She is familiar with the IWR Planning Suite and used the USACE six-step planning process (following ER 1105-2-100) over two decades for a number of projects: the Lewiston Levee project, a Water Supply Reallocation Report for the Savannah District, in the analysis of recreational benefits of a Proposed Water Storage Facility on the Fort Apache Indian Reservation in Arizona, and as a reviewer for Fargo Moorhead, the Alton to Gale Organized Levee Districts, and the Savannah Harbor General Reevaluation Report and EIS. Most of the

projects described above also included an element of National Economic Development benefits calculation and review. A related recent effort was conducted for the Washington State Legislature and provided a basin-level economic analysis of investing in water infrastructure for water supply, flood prevention, stormwater management, and fisheries and habitat.

Dr. Greene is an active member of the Population Association of America, Western International Economic Association, the American Agricultural Economic Association, and the Society for Benefit Cost Analysis.

Name	Judith Dudley, Ph.D, CLM
Role	Environmental Law Compliance Expert
Affiliation	Independent Consultant

Dr. Dudley, an independent consultant specializing in environmental impact analysis, ecological risk assessment, aquatic ecology, and water quality assessments, has more than 25 years of experience directly related to environmental evaluation or review. She earned her M.S. in biological sciences (aquatic ecology) from the University of Pittsburgh in 1983, and a Ph.D. in biological science (ecology) from Boston University in 1991. She is a Certified Lake Manager (CLM) per standards set by the North American Lake Management Society, and has experience in field surveys, soil/sediment/water analyses, bioassays, biological community surveys, bioaccumulation modeling, nutrient modeling and best management practice (BMP) evaluation, artificial stream studies, data analysis, and coordinating data collection by volunteers.

Dr. Dudley has contributed to permitting efforts with myriad state and Federal agencies on issues ranging from NEPA compliance, to Clean Water Act permits and compliance studies, to Endangered Species Act consultations. She is experienced in conducting NEPA impact assessments, including cumulative effects analysis, and has provided senior technical support and management on NEPA projects for such Federal agencies as the Veteran’s Administration (National Cemetery Administration facility siting projects), USACE (BRAC actions), National Park Service (Facility Construction projects), Department of Housing and Urban Development (Urban Redevelopment), Federal Aviation Administration (facility siting), and others. As the Principal Scientist, Dr. Dudley was responsible for providing technical oversight of two NEPA Environmental Assessments (EAs) that were prepared concurrently in support of site selection for construction of a \$3.7 billion steel and stainless steel processing plant in the Southeastern U.S. The alternate sites were each >3000 acres, with substantial wildlife and wetlands issues, located on the banks of large rivers. The EAs included the CWA §401 and §404 permitting support documents, including the wetlands mitigation plans. USACE issued a Finding of No Significant Impact (FONSI), and the project was constructed at the preferred site in Alabama.

Specific experience related to Endangered Species Act compliance has included numerous Section 7 consultations at sites across the U.S. These have addressed potential impacts on marine and freshwater species at upland and aquatic sites. Several of these projects also required that Dr. Dudley conduct consultations on essential fish habitat to complete the required inter-agency impact assessment review.

In Illinois, Dr. Dudley has worked as a limnologist on a CWA §303 Permit Modification to evaluate phosphorus loading at a water supply reservoir in Jasper County and served as an aquatic ecologist at a lake in Montgomery County to evaluate a CWA §404 permit application and §401 certification for inter-basin water transfer. Elsewhere in the Midwest she has worked as a limnologist on a sediment restoration

project at a CERCLA (Superfund) site in Michigan and managed a laboratory team to evaluate more than 500 algae and invertebrate samples collected from the Missouri River basin during and immediately after a significant flood event.

Dr. Dudley served as Principal Scientist/Ecologist on a wetland restoration planning project for the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), which had the distinction of being the largest Wetland Reserve Program site in the U.S. The project’s goal was to restore the drained and altered wetlands to achieve historic ecological communities at over 30,000 acres. There was significant habitat for upland protected species in one area designated for wetland restoration and Dr. Dudley was responsible for steering NRCS toward coordination with state and Federal agencies to achieve more comprehensive Fish and Wildlife Coordination Act (FWCA) compliance to address the competing conservation interests in those areas.

She served on an IEPR Panel for USACE as a subcontractor to Battelle to review the Kansas City, Missouri and Kansas, Section 216 Flood Risk Management Project Phase 2 Feasibility Report. Her particular responsibility was to evaluate the Environmental Impact Assessment process. As part of her review she identified deficiencies in the ESA and FWCA compliance processes which the Corps was able to address promptly and prior to completing the IEPR process.

Name	Larry Fluty, Ph.D, P.E., CFM
Role	Hydrology and Hydraulic (H&H) Engineering
Affiliation	Independent Consultant

Dr. Fluty has 39 years of experience managing and designing civil engineering facilities involving solutions for water resources, flood control, stormwater drainage, reservoir design, and water supply surface water planning. He earned his Ph.D. in civil engineering/water resources from Grant University in 2012 and is a registered professional engineer in the states of Florida, Kentucky, Ohio, Virginia, and West Virginia. Additionally, he is an Association of State Floodplain Managers Certified Floodplain Manager (CFM). Dr. Fluty has extensive hydrology and hydraulic (H&H) engineering background in erosion control, environmental compliance and restoration, hydraulic studies, levee and water supply reservoir design, flood control, stream stabilization, waterway and wetland permitting, dam design and inspections, and hydraulic safety audits and studies.

In his previous role as the Director for Water Resources for Cardno, Dr. Fluty was responsible for all water resource and drainage discipline projects. He was also responsible for the planning, design, permitting, and construction administration for water resource projects, as well as all aspects of H&H modeling. As such, he is experienced with the USACE HEC model series (including HEC (2D) RAS and HEC-HMS). He is highly experienced with integrated 2D modeling using FLO-2D and other integrated 2D models. Dr. Fluty’s experience includes Federal Emergency Management Agency (FEMA) floodplain analysis and mapping, master drainage plans, watershed management plans, and water quality improvement plans for large-scale regional and urban watersheds.

Dr. Fluty has more than 30 years of experience supporting USACE flood risk management projects, preparing FEMA flood hazard maps, and preparing Digital Flood Insurance Rate Maps (DFIRM) and a Flood Insurance Rate Study (FIS). His experience with flood risk management and mapping has evolved into the development of automated GIS parameterization coupled with automated modeling and production of flood risk assessments and mapping. While working for various cooperating technical

partners (CTPs), he produced more than 1,000 FEMA Map Panels and completed six county-wide DFIRM studies and the H&H modeling and mapping of more than 25,000 miles of streams.

Specific project experience includes serving as project manager for the Southwest Florida Water Management District's (SFWMD's) Watershed Management Program. While working on this contract, Dr. Fluty was responsible for managing and conducting watershed flood modeling and flood risk management projects for the Blue Sink, Weeki Wachee Prairie, Chassahowitzka River, City of Dunedin, City of Bushnell, and City of Safety Harbor watersheds. Dr. Fluty has also served as the project manager for the Hernando County, Florida, FEMA Map Modernization Project, where he assisted Hernando County with the update of outdated flood maps to meet the requirements for Risk Map and DFIRM formats.

Dr. Fluty is also familiar within the Rio Grande basin and has a solid understanding of the geomorphology of alluvial rivers. He has significant experience with complex integrated 2D models where interactions between groundwater and surface water play an important part in understanding the watershed of alluvial rivers. Dr. Fluty has experience with several alluvial river projects such as the Cave Creek Drainage Master Plan, Cave Creek Arizona; Maricopa Mountains Alluvial Fan #1 FEMA Stage Analysis, Arizona; and El Rio Watercourse, Arizona.

Dr. Fluty is highly capable and experienced in addressing the requirements necessary for performing USACE SARs, and in completing and presenting risk management requirements per Engineer Regulation (ER) 1105-2-101 and related guidance. This experience includes performing SAR reviews for the Nolichucky River Watershed, Nashville District, and the L-40 Levee Conveyance Reconnaissance Study for SFWMD and USACE Jacksonville District.

Dr. Fluty is very familiar with the impact of other disciplines on the outcome on flood risk management and flood reduction projects. He has worked with environmental professionals on impacts on natural systems and has collaborated with planners to evaluate future land use and with geotechnical engineers to evaluate potential constraints on hydraulic structures. Dr. Fluty has worked with interdisciplinary project teams, serving as project manager on the SFWMD Everglades Protection Area Bc87(3) Project, West Palm Beach, Florida, the Trinity River Restoration Project, Trinity County, California, and the Yatesville Reservoir, Huntington, West Virginia.

Dr. Fluty also has experience evaluating risk for flood, damages, and life/safety aspects. Working with the USACE Jacksonville District and the SFWMD, he participated in peer design conferences, evaluated the H&H models developed by the project team, and reviewed and modified the proposed Operating Manuals to ensure consistent and compatible performance of the project components with the existing Central and Southern Florida Flood Control Project. Dr. Fluty also conducted risk management assessment of the alternatives and final project for flood risk impact, life and safety, and other criteria as specified by ER 1105-2-101.

Dr. Fluty is a member of the American Water Resources Association, the American Society of Civil Engineers, the Association of State Floodplain Managers, and the Society of American Military Engineers. He served as the H&H engineering IEPR panel member on the Leon Creek Watershed Feasibility Study, San Antonio, in Bexar County, Texas.

Name	Michael Lambert, M.E., P.E.
Role	Geotechnical/Civil Engineer
Affiliation	Shannon and Wilson, Inc.

Mr. Lambert, a geotechnical engineer with Shannon & Wilson, Inc., oversees site investigations, develops geotechnical-related design and construction recommendations, develops and reviews project plans and specifications, and monitors compliance with project plans and specifications. He earned his M.E. in civil engineering from the University of Louisville in 1988, has more than 30 years of direct geotechnical and soil engineering experience, and is a registered professional engineer in Missouri, Arkansas, Oregon, Tennessee, and California.

Mr. Lambert has been involved in pre-construction flood risk management projects such as Howard Bend Levee, Missouri; Yakima River Levee, Washington; and the Missouri Bottom Levee System, Missouri. Post-construction flood risk management projects include St. Louis City Flood Wall Evaluation; Stockton, California Levee Evaluation/Design for Department of Water Resources; Lewiston Idaho Levee; Chesterfield Levee, Missouri; East St. Louis Flood Protection Project, Illinois; Marine Corps Base Camp Pendleton Air Station Levee, California; City of Reedsport Levee, Oregon; and Coweeman Levee, Washington. For each of these projects, he conducted design activities in accordance with USACE methods and criteria, considering risk and fragility analysis concepts as part of each project.

Mr. Lambert is experienced in the geotechnical aspects of urban levees, floodwalls, earthen levees, and channel structures along large river systems such as the Mississippi River, Ohio River, Missouri River, and Illinois River. Relevant urban levee projects have included support for the Howard Bend Levee System in Maryland Heights, Missouri, and the City of St. Louis Floodwall along the Mississippi River. He has also inspected more than 484 miles of USACE levees and more than 56 miles of U.S. Bureau of Reclamation irrigation canals. His experience with floodwall design and construction is demonstrated by the Howard Bend Levee System in Maryland Heights. As senior geotechnical engineer and project manager, he was responsible for reconstruction and upgrading to provide protection from a 500-year flood event. The flood protection system included earthen levee floodwalls, closure structures, and a pump station. Engineering and design evaluations of channel structures conducted by Mr. Lambert include several locks and dams (L&D) along the Mississippi River (L&D 25 and Mel Price), and Ohio River (Olmsted, L&D 52, L&D 53, Cannelton Lock, and Markland Lock).

All of these projects, including the non-USACE projects, were completed in accordance with USACE guidance including USACE's safety assurance policy and guidance (SAR), applicable risk assessment methodology. Mr. Lambert has served on the Type I IEPR for the Phase II Post-Authorization Decision Documents (PADD) for the Sacramento River Bank Protection Project (SRBPP), California, and the Delaware River Basin Comprehensive Flood Risk Management Interim Feasibility Study and Integrated Environmental Assessment for New Jersey, and multiple Type II IEPR teams for levee projects including two projects for the Chesterfield-Monarch Levee, six projects for the Wood River Levee System, and one project for the mainline Mississippi River Levee in Tunica, Mississippi.

APPENDIX C

Final Charge for the DuPage River IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the DuPage River, Feasibility Report and Integrated Environmental Assessment

This is the final Charge to the Panel for the <DuPage River> IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on August 30, 2018. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

The DuPage River and its tributaries drain approximately 350 square miles in suburban Cook, DuPage, and Will Counties in the Chicago Metropolitan area. Major storm events occurred in the basin in 1996, 2008, 2009, and most recently in April 2013 resulting in overbank flooding to at least 20 communities and significant damage to residential and non-residential structures, critical infrastructure, and the closure of two major interstate highways (I-80 and I-55) for several days. Flooding in the watershed poses life-safety risks. The DuPage River, Illinois Feasibility Study is a flood risk management study authorized by Section 206 of the Flood Control Act of 1958 (P.L. 85-500).

The watershed includes East and West Branches, which exist primarily in DuPage County, a main stem in Will County, and several tributaries to each of the three main waterways. The largest tributary, Lily Cache Creek, flows into the main stem in Will County. The study will investigate a range of alternatives to address flood risk in the watershed, including floodwater storage, levees and floodwalls, and non-structural measures such as buyouts and floodproofing. Flood damages occur across the watershed with some concentrated high damage areas as well as additional dispersed damage areas. It is expected that alternative plans will include multiple projects formulated to manage concentrated risk areas as well as the isolated pockets.

OBJECTIVES

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

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

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

DOCUMENTS PROVIDED

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

Review Documents	No. of Review Pages	Subject Matter Experts			
		Civil Works Planner/Economist	Environ. Law Compliance	H&H Engineer	Civil Engineer/Geotechnical Engineer
Main Report	140	140	140	140	140
Appendix A: H&H	295			295	
Appendix B: Economics	128	128			
Appendix C: Real Estate	12	12	12		
Appendix D: Cost and Civil	61	61			61
Appendix E: Geotechnical	220				220
Appendix F: HTRW	898**		898**		
Appendix G: Coordination and Environmental Analysis	62	62	62		
Appendix H: Plan Formulation Screening	15	15	15	15	15
Public Comments*	100	100	100	100	100
Total Number of Review Pages	1931	518	1227	550	536

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

** Over half of these pages are supplemental information only.

Documents for Reference

- USACE guidance *Review Policy for Civil Works* (EC 1165-2-217, February 20, 2018)
- Office of Management and Budget’s *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- Foundations of SMART Planning
- Feasibility Study Milestones (PB 2017-01, January 10, 2017)

- SMART – Planning Overview
- Planning Modernization Fact Sheet.

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
Attending Meetings and Begin Peer Review	Subcontractors complete mandatory Operations Security (OPSEC) training	10/7/2018
	Battelle convenes kick-off meeting with USACE	8/20/2018
	Battelle sends review documents to panel members	9/10/2018
	Battelle convenes kick-off meeting with panel members	9/11/2018
	Battelle convenes kick-off meeting with USACE and panel members	9/11/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	9/21/2018
Prepare Final Panel Comments and Review Public Comments	Panel members complete their individual reviews	10/2/2018
	Battelle provides talking points for Panel Review Teleconference to panel members	10/3/2018
	Battelle convenes Panel Review Teleconference	10/4/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	10/5/2018
	Panel members provide draft Final Panel Comments to Battelle	10/12/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	10/13/2018 10/21/2018
	Panel finalizes Final Panel Comments	10/22/2018
	Battelle receives public comments from USACE	10/1/2018
	Battelle sends public comments to Panel**	10/4/2018
	Panel completes its review of public comments	10/9/2018
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	10/10/2018
	Panel drafts Final Panel Comment for public comments, if necessary	10/16/2018
	Panel finalizes Final Panel Comment regarding public comments, if necessary	10/18/2018
	Battelle provides Final IEPR Report to panel members for review	10/24/2018

Task	Action	Due Date
Review Final IEPR Report	Panel members provide comments on Final IEPR Report	10/25/2018
	*Battelle submits Final IEPR Report to USACE	10/29/2018
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	11/5/2018
Comment/Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	11/7/2018
	Battelle convenes teleconference with USACE to review the Comment Response process	11/7/2018
	Battelle convenes teleconference with Panel to review the Comment Response process	11/7/2018
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	11/21/2018
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	11/29/2018
	USACE PCX provides draft PDT Evaluator Responses to Battelle	11/30/2018
	Battelle provides draft PDT Evaluator Responses to panel members	12/4/2018
	Panel members provide draft BackCheck Responses to Battelle	12/7/2018
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	12/10/2018
	Battelle convenes Comment Response Teleconference with panel members and USACE	12/11/2018
	USACE inputs final PDT Evaluator Responses to DrChecks	12/18/2018
	Battelle provides final PDT Evaluator Responses to panel members	12/19/2018
	Panel members provide final BackCheck Responses to Battelle	12/24/2018
	Battelle inputs panel members' final BackCheck Responses to DrChecks	12/27/2018
	*Battelle submits pdf printout of DrChecks project file	12/28/2018
SLM 1	Senior Leader Meeting (SLM) 1 - Agency Decision Milestone (ADM) Meeting	11/1/2018
SLM 2	Senior Leader Meeting 2 – Post-ADM	TBD
	Contract End/Delivery Date	8/13/2019

* Deliverables

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

CHARGE FOR PEER REVIEW

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

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

General Charge Guidance

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

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

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

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

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

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

Independent External Peer Review of the DuPage River, Feasibility Report and Integrated Environmental Assessment

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 addresses the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project.

From a public safety perspective, is the proposed alternative reasonably appropriate or are there other alternatives that should be considered?

Battelle Summary Charge Questions to the Panel Members¹

Summary Questions

17. 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.
18. Please provide positive feedback on the project and/or review documents.

Public Comment Questions

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

¹ Questions 17 through 19 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.

APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire
Independent External Peer Review
DuPage River, Feasibility Report and Integrated Environmental Assessment

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

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

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

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

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

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

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

No additional information to report.



Jason Jenkins

8/6/2018

Date

BATTELLE

It can be done