

Final Independent External Peer Review Report Continuing Authorities Program, Section 205, City of Independence, Ohio, Flood Risk Management Project, Buffalo District

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 City of Independence Feasibility Study investigated alternatives to manage flood risk in the communities of the City of Independence, Ohio. The study is being conducted under the Continuing Authorities Program (CAP), authorized by Section 205 of the Flood Control Act of 1948, as amended. The study will result in a Detailed Project Report (DPR) and integrated National Environmental Policy Act (NEPA) Environmental Assessment (EA) documentation of the environmental impacts of a recommended Federal action.

The flood risk management (FRM) study includes the City of Independence, which is adversely impacted by flooding from the Cuyahoga River and its tributaries. The study area is located between river mile 11.5 and river mile 13.8 along the Cuyahoga River in Independence, Cuyahoga County, Ohio. The primary problem in Independence is frequent and serious flooding which inundates the commercial and industrial business area located in the vicinity of Old Rockside Road and Canal Road. In the last several years, flooding events have increased and these floods have subsequently caused extensive damages to businesses located in this area. In 2006, the flooding resulted in a Federal Disaster Declaration. Extensive rescue operations are required during the floods, and major cleanup and restoration expenses are incurred by local, state, and Federal governments. The most recent flooding in February 2011 occurred on Canal, Rockside, Granger, Old Brecksville, and Old Rockside Roads.

The primary opportunity at Independence is to provide an environmentally sound, economically justified structural, non-structural, or combination project that would significantly reduce the flood damage that occurs at Independence during high-flow events on the Cuyahoga River.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the CAP, Section 205, City of Independence, Ohio, Flood Risk Management (FRM) Project, Buffalo District (hereinafter: Independence CAP IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in guidance set forth by USACE (2012) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the

Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: plan formulation/economics, environmental impact analysis and compliance review, civil/structural engineering, and hydrology and hydraulic (H&H) 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 final candidates to confirm that they had no COIs, but Battelle made the final selection of the three-person Panel.

The Panel received electronic versions of the decision documents (721 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2012) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

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

IEPR panel members reviewed the decision documents individually. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, 10 Final Panel Comments were identified and documented. Of these, one was identified as having medium/high significance, four had medium significance, and five had medium/low significance.

Battelle received public comments from USACE on the Independence CAP (one five-page letter with 12 comments) and provided them to the IEPR panel members. The panel members were charged with determining whether any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the Independence CAP review documents. After completing its review, the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments.

Results of the Independent External Peer Review

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Independence CAP 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 study is very well written, is easy to follow, and presents a compelling case for moving to construction. Extensive research and analysis efforts have clearly been brought to bear, resulting in a well-detailed study. The study provides a balanced assessment of the economic, engineering, and environmental issues of the overall project; however, the Panel identified some elements of the project where additional analysis is warranted and places where clarification of project findings and objectives need to be documented in the Independence CAP study documents.

Environmental: The aquatic assessment was very well done and accessed all of the relevant data and information. The assessment of the tributary stream with the Ohio Primary Headwater Habitat methodology is especially noteworthy. However, the Panel's primary concern is that the information provided in the Environmental Assessment Report is insufficient to determine whether avoidance of Stream 3 is feasible and whether such avoidance would impact the proposed borrow area. The Panel believes that avoidance of Stream 3 (and potentially Stream 2) raises uncertainties about what portion of the proposed borrow area might be unavailable, potentially forcing another area to be found as a borrow area. The panel members suggest that additional text be added to the Environmental Assessment Report reflecting that avoidance of Stream 3 in the proposed borrow area will be assumed for the recommended plan. Additionally, the Panel noted that the incomplete wetlands characterization will likely have negligible impact on the recommended plan, as any wetlands that cannot be avoided by the project can be offset with wetland bank purchases. The Panel recommends that the wetland characterization for the project area be completed as soon as is feasible, and the results should be included in the Environmental Assessment Report. The Panel notes that the public comments expressed a similar concern regarding wetland characterization.

Plan Formulation/Economics: The economic analysis and the plan formulation process were clearly conducted with great diligence and are very well-detailed for a study of this size. However, the Panel determined that life safety hazards associated with the recommended plan are not analyzed in the Environmental Assessment Report. The report states that no human lives have been lost in any of the flood events in the historical record. It also notes that there is a long lead time before flood stages reach the area, giving residents and businesses ample time to prepare and evacuate. However, the Panel recommends that a qualitative assessment of the recommended plan's residual risk, including life safety hazards, be completed. Additionally, the Panel believes that an investigation of the full range of damage categories should be completed for flood damages. At a minimum, the panel members suggest that the Environmental Assessment Report should clearly state that damages to structures and their contents were the only damages used in the analyses and explain why other categories of damages were not included.

The Panel also observed that the number of iterations used in the Hydrologic Engineering Center (HEC) Flood Damage Reduction Analysis (FDA) runs is not identified. This raises the concern of whether the Monte Carlo sampling in HEC-FDA effectively converges on the distributions being modeled. The Panel believes that, while the number of iterations is unlikely to affect the selection or justification of the recommended plan, the confidence in the conclusions reached by the analyses is reduced in the absence of this information. It is suggested that the number of iterations in each simulation run in HEC-FDA be provided in the Environmental Assessment Report.

Finally, the Panel found that the base year for the economic period of analysis is not explicitly specified; therefore, the rationale for its selection and timing of annual cash flows from benefits and costs cannot be verified. The Panel recommends that the base year be identified along with the rationale so the potential impacts on the benefit-cost analysis can be assessed.

Engineering: The hydrologic and hydraulic analysis sections are well-written and are very detailed for a feasibility-level study of this size. The Panel's primary engineering finding is that the estimate of the 100-year flood flows used in the design of the levee system is not supported by the flow data and the trend analysis. The panel members believe that a 4- to 8-percent increase in the 100-year flood may require an increase in the height of the levee, which may impact the overall cost of the levee system. The Panel recommends that the HEC River Analysis System (RAS) model be run with the 1-percent annual exceedance chance (AEC) flood derived from the 1975-present record and determine changes, if any, in the levee height of Independence 1 Option B. Additionally, the Panel found that the entire period of record of flow data (1922 to 2016) was used for the uncertainty and risk analysis using HEC-FDA. However, the trend analysis documented in Appendix E, Section 4.2, shows that the peak annual flows recorded at Independence exhibit non-stationarity. The Panel's concern is that a dataset with a statistically significant trend may have undermined the scientific soundness of the risk analysis. The Panel recommends that the HEC-FDA program be run with the dataset from 1975-present. Last, the Panel observed that the selected downstream boundary condition (i.e., normal depth) for the hydraulic model does not account for the possibility that water levels at the project area would be impacted by varying Lake Erie levels. The Panel did note that the lake's levels can potentially impact the water surface levels along the proposed levee. The panel members suggest that the HEC-RAS model be calibrated based on Lake Erie levels during the historical events used for model calibration.

Table ES-1. Overview of 10 Final Panel Comments Identified by the Independence CAP IEPR Panel

No.	Final Panel Comment
Significance – Medium/High	
1	The information provided in the Environmental Assessment Report is insufficient to determine whether avoidance of Stream 3 is feasible and whether such avoidance would impact the proposed borrow area.
Significance – Medium	
2	The estimate of the 100-year flood flows utilized in the design of the levee system is not supported by the flow data and the trend analysis.
3	The period of record used for the risk-based analysis in Section 2.3 (Appendix I) may not have yielded scientifically sound results.
4	Life safety hazards associated with the recommended plan are not analyzed in the Environmental Assessment Report.
5	The selected downstream boundary condition (i.e., normal depth) for the hydraulic model does not account for potential impacts to water levels at the project area caused by varying Lake Erie levels.
Significance – Medium/Low	
6	Wetlands are not yet characterized, and the impacts of the project alternatives on wetland areas and potential mitigation are not yet analyzed, in the Environmental Assessment Report.
7	The analysis of flood damages in the Environmental Assessment Report does not appear to have investigated a range of damage categories.
8	The number of iterations used in the HEC-FDA runs is not identified, raising the issue of whether the Monte Carlo sampling in HEC-FDA effectively converges on the distributions being modeled.
9	The base year for the economic period of analysis is not explicitly specified; therefore, the rationale for its selection and timing of annual cash flows from benefits and costs cannot be verified.
10	It is unclear if the sample sizes for structures mentioned in Appendix I of the Environmental Assessment Report are representative of the population of structures at risk of flooding.

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LIST OF ACRONYMS

2D	Two-Dimensional
AdH	Adaptive Hydraulics
AEC	Annual Exceedance Chance
ATR	Agency Technical Review
CAP	Continuing Authorities Program
cfs	Cubic Feet per Second
COI	Conflict of Interest
DNR	Department of Natural Resources
DPR	Detailed Project Report
DrChecks	Design Review and Checking System
EA	Environmental Assessment
EC	Engineer Circular
EPA	Environmental Protection Agency
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
ESA	Endangered Species Act
FRM	Flood Risk Management
GRR	General Reevaluation Report
H&H	Hydrology and Hydraulic
HEC-FDA	Hydrologic Engineering Center-Flood Damage Reduction Analysis
HEC-RAS	Hydrologic Engineering Center-River Analysis System
HEC-HMS	Hydrologic Engineering Center -Hydrologic Modeling System
HEP	Habitat Evaluation Procedure
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
OCDL	Ohio Credible Data Law

OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PCX	Planning Center of Expertise
PHWH	Primary Headwater Habitat
PMF	Probable Maximum Flood
PDT	Project Delivery Team
QA/QC	Quality Assurance/Quality Control
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Services

1. INTRODUCTION

The City of Independence Feasibility Study investigated alternatives to manage flood risk in the communities of the City of Independence, Ohio. The study is being conducted under the Continuing Authorities Program (CAP), authorized by Section 205 of the Flood Control Act of 1948, as amended. The study will result in a Detailed Project Report (DPR) and integrated National Environmental Policy Act (NEPA) Environmental Assessment (EA) documentation of the environmental impacts of a recommended Federal action.

The flood risk management study includes the City of Independence, which is adversely impacted by flooding from the Cuyahoga River and its tributaries. The study area is located between river mile 11.5 and river mile 13.8 along the Cuyahoga River in Independence, Cuyahoga County, Ohio. The primary problem in Independence is frequent and serious flooding which inundates the commercial and industrial business area located in the vicinity of Old Rockside Road and Canal Road. In the last several years, flooding events have increased and these floods have subsequently caused extensive damages to businesses located in this area. In 2006, the flooding resulted in a Federal Disaster Declaration. Extensive rescue operations are required during the floods, and major cleanup and restoration expenses are incurred by local, state, and Federal governments. The most recent flooding in February 2011 occurred on Canal, Rockside, Granger, Old Brecksville, and Old Rockside Roads.

The primary opportunity at Independence is to provide an environmentally sound, economically justified structural, non-structural, or combination project that would significantly reduce the flood damage that occurs at Independence during high-flow events on the Cuyahoga River.

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 Continuing Authorities Program (CAP), Section 205, City of Independence, Ohio, Flood Risk Management (FRM) Project, Buffalo District (hereinafter: Independence CAP IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the Independence CAP IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the complete 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 1. Appendix D presents the organizational conflict of interest form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Independence CAP IEPR.

2. PURPOSE OF THE IEPR

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

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

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

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. Table 1 presents the major milestones and deliverables of the Independence CAP IEPR. Due dates for milestones and deliverables are based on the award/effective date listed in Table 1. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on September 26, 2017. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table 1. Major Milestones and Deliverables of the Independence CAP IEPR

Task	Action	Due Date
1	Award/Effective Date	9/7/2016
	Review documents available	5/2/2017
2	Battelle submits list of selected panel members	5/2/2017
	USACE confirms the panel members have no COI	5/5/2017
3	Battelle convenes kick-off meeting with USACE	5/8/2017
	Battelle convenes kick-off meeting with USACE and panel members	5/18/2017
4	Panel members complete their individual reviews	6/6/2017
	Panel members provide draft Final Panel Comments to Battelle	6/15/2017
	Battelle sends public comments to panel members for review	7/7/2017
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	7/12/2017

5	Battelle submits Final IEPR Report to USACE	7/20/2017
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	7/27/2017
6 ^a	Battelle convenes Comment Response Teleconference with panel members and USACE	9/7/2017
	Battelle submits pdf printout of DrChecks project file to USACE	9/25/2017
	Contract End/Delivery Date	8/30/2017 ^b

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

^b A no-cost time extension has been requested to complete this project.

Battelle identified, screened, and selected three panel members to participate in the IEPR based on their expertise in the following disciplines: plan formulation/economics, environmental impact analysis and compliance review, civil/structural engineering, and hydrology and hydraulic (H&H) engineering. The Panel reviewed the Independence CAP documents and produced 10 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 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

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

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Independence CAP review documents. 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 study is very well written, is easy to follow, and presents a compelling case for moving to construction. Extensive research and analysis efforts have clearly been brought to bear, resulting in a well-detailed study. The study provides a balanced assessment of the economic,

engineering, and environmental issues of the overall project; however, the Panel identified some elements of the project where additional analysis is warranted and places where clarification of project findings and objectives need to be documented in the Independence CAP IEPR study documents.

Environmental: The aquatic assessment was very well done and accessed all of the relevant data and information. The assessment of the tributary stream with the Ohio Primary Headwater Habitat methodology is especially noteworthy. However, the Panel's primary concern is that the information provided in the Environmental Assessment Report is insufficient to determine whether avoidance of Stream 3 is feasible and whether such avoidance would impact the proposed borrow area. The Panel believes that avoidance of Stream 3 (and potentially Stream 2) raises uncertainties about what portion of the proposed borrow area might be unavailable, potentially forcing another area to be found as a borrow area. The panel members suggest that additional text be added to the Environmental Assessment Report reflecting that avoidance of Stream 3 in the proposed borrow area will be assumed for the recommended plan. Additionally, the Panel noted that the incomplete wetlands characterization will likely have negligible impact on the recommended plan, as any wetlands that cannot be avoided by the project can be offset with wetland bank purchases. The Panel recommends that the wetland characterization for the project area be completed as soon as is feasible, and the results should be included in the Environmental Assessment Report. The Panel notes that the public comments expressed a similar concern regarding wetland characterization.

Plan Formulation/Economics: The economic analysis and the plan formulation process were clearly conducted with great diligence and are very well-detailed for a study of this size. However, the Panel determined that life safety hazards associated with the recommended plan are not analyzed in the Environmental Assessment Report. The report states that no human lives have been lost in any of the flood events in the historical record. It also notes that there is a long lead time before flood stages reach the area, giving residents and businesses ample time to prepare and evacuate. However, the Panel recommends that a qualitative assessment of the recommended plan's residual risk, including life safety hazards, be completed. Additionally, the Panel believes that an investigation of the full range of damage categories should be completed for flood damages. At a minimum, the panel members suggest that the Environmental Assessment Report should clearly state that damages to structures and their contents were the only damages used in the analyses and explain why other categories of damages were not included.

The Panel also observed that the number of iterations used in the Hydrologic Engineering Center (HEC) Flood Damage Reduction Analysis (FDA) runs is not identified. This raises the concern of whether the Monte Carlo sampling in HEC-FDA effectively converges on the distributions being modeled. The Panel believes that, while the number of iterations is unlikely to affect the selection or justification of the recommended plan, the confidence in the conclusions reached by the analyses is reduced in the absence of this information. It is suggested that the number of iterations in each simulation run in HEC-FDA be provided in the Environmental Assessment Report.

Finally, the Panel found that the base year for the economic period of analysis is not explicitly specified; therefore, the rationale for its selection and timing of annual cash flows from benefits and costs cannot be verified. The Panel recommends that the base year be identified along with the rationale so the potential impacts on the benefit-cost analysis can be assessed.

Engineering: The hydrologic and hydraulic analysis sections are well-written and are very detailed for a feasibility-level study of this size. The Panel's primary engineering finding is that the estimate of the 100-

year flood flows used in the design of the levee system is not supported by the flow data and the trend analysis. The panel members believe that a 4- to 8-percent increase in the 100-year flood may require an increase in the height of the levee, which may impact the overall cost of the levee system. The Panel recommends that the HEC River Analysis System (RAS) model be run with the 1-percent annual exceedance chance (AEC) flood derived from the 1975-present record and determine changes, if any, in the levee height of Independence 1 Option B. Additionally, the Panel found that the entire period of record of flow data (1922 to 2016) was used for the uncertainty and risk analysis using HEC-FDA. However, the trend analysis documented in Appendix E, Section 4.2, shows that the peak annual flows recorded at Independence exhibit non-stationarity. The Panel's concern is that a dataset with a statistically significant trend may have undermined the scientific soundness of the risk analysis. The Panel recommends that the HEC-FDA program be run with the dataset from 1975-present. Last, the Panel observed that the selected downstream boundary condition (i.e., normal depth) for the hydraulic model does not account for the possibility that water levels at the project area would be impacted by varying Lake Erie levels. The Panel did note that the lake's levels can potentially impact the water surface levels along the proposed levee. The panel members suggest that the HEC-RAS model be calibrated based on Lake Erie levels during the historical events used for model calibration.

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 information provided in the Environmental Assessment Report is insufficient to determine whether avoidance of Stream 3 is feasible and whether such avoidance would impact the proposed borrow area.

Basis for Comment

Two streams located within Parcel Nos. 561-18-002 and 561-19-002 of the proposed borrow area were evaluated as Primary Headwater Habitat (PHWH) streams. Stream 2 was evaluated as Modified Class I and Stream 3 was evaluated as Class III in the Environmental Assessment Report (page 15).

Stream 3 is a high-quality headwater stream that could be subject to disturbance by excavation activities at the borrow area under the recommended plan. However, as part of the conditions of a 401 certification from the Ohio Environmental Protection Agency (EPA), Stream 3 may need to be avoided or mitigated to preclude adverse impacts. In addition, while Stream 2 is a lower-quality PHWH class, it is a tributary to Stream 3 and may also need to be avoided to preclude downstream impacts. There is insufficient information to determine whether avoidance (which would be the preferred approach) is feasible. It would help to know the proportion of the proposed borrow area occupied by the Stream 3 and Stream 2 watersheds, and whether, by avoiding these watersheds, a different borrow area would need to be found.

Significance – Medium/High

Avoidance of Stream 3 (and potentially Stream 2) raises uncertainties about what portion of the proposed borrow area might be unavailable, potentially forcing another area to be found as a borrow area.

Recommendation for Resolution

1. Assume avoidance of Stream 3 in the proposed borrow area in determining whether implementation of the recommended plan as designed would be feasible. Additional text should be added to the EA reflecting that avoidance of Stream 3 in the proposed borrow area will be assumed for the recommended plan.

Final Panel Comment 2

The estimate of the 100-year flood flows utilized in the design of the levee system is not supported by the flow data and the trend analysis.

Basis for Comment

The feasibility level design of the levee system was completed based on the frequency analysis performed using Bulletin 17B on the entire record of floods at U.S. Geological Survey gage 04208000 (i.e., at Independence, Ohio). The analysis showed a 1-percent annual exceedance chance (AEC) flood to be 22,918 cubic feet per second (cfs) (page 8 of Appendix E). The 22,918-cfs flow was used in the HEC-RAS model to determine the height of the proposed levee system. The trend analysis documented in Appendix E, Section 4.2, shows that the peak annual flows recorded at Independence exhibit non-stationarity. A further analysis in the same section shows that if the peak annual flow series is divided into two sets—from 1940 to 1973 and from 1975 to the present (eliminating the record prior to 1940)—neither time series exhibits non-stationarity at the 5% significant level (as inferred from Appendix E, page 33). Using the 1975-present period, the 1-percent AEC flood was computed to be 23,780 cfs (a 4 percent increase over the Appendix E calculation), with an expected value of 24,908 cfs (an 8 percent increase).

Regardless of the cause(s) of the trend in the recorded annual peak flows, any frequency analysis must be completed on a dataset with no statistically significant trend. The 22,918 cfs is larger than the 2010 Flood Insurance Study estimate, but it is not justified for this feasibility study because of the detected trend in the dataset. The estimated 1-percent AEC flood of 23,780 cfs should have been used for the feasibility-level design. If the authors believe that the 22,918-cfs flow should be the design flow, then an explanation should be provided.

Significance – Medium

A 4- to 8-percent increase in the 100-year flood may require an increase in the height of the levee, which may impact the overall cost of the levee system.

Recommendation for Resolution

1. Run the HEC-RAS model with the 1-percent AEC flood derived from the 1975-present record and determine changes, if any, in the levee height.
2. Determine the cost associated with the increased height of the levee.

Final Panel Comment 3

The period of record used for the risk-based analysis in Section 2.3 (Appendix I) may not have yielded scientifically sound results.

Basis for Comment

The entire period of record of flow data (1922 to 2016) was used for the uncertainty and risk analysis using HEC-FDA modeling software. However, the trend analysis documented in Appendix E, Section 4.2, shows that the peak annual flows recorded at Independence exhibit non-stationarity. A further analysis in the same section shows that if the peak annual flow series is divided into two periods of record (from 1940-1973 and from 1975-present), neither time series exhibits non-stationarity at the 5% significant level (as inferred from Appendix E, page 33).

Regardless of the cause(s) of the trend in recorded annual peak flows, any risk analysis must be completed on a dataset with no statistically significant trend.

Significance – Medium

Using a dataset with a statistically significant trend may have undermined the scientific soundness of the risk analysis.

Recommendation for Resolution

1. Run the HEC-FDA program with the dataset from 1975-present.
2. Reassess the expected annual damage and benefit based on the HEC-FDA results.

Final Panel Comment 4

Life safety hazards associated with the recommended plan are not analyzed in the Environmental Assessment Report.

Basis for Comment

The Environmental Assessment Report states that no human lives have been lost in any of the flood events in the historical record. It also notes that there is a long lead time before flood stages reach the area, giving residents and businesses ample time to prepare and evacuate.

Without an analysis of the recommended plan's effect on life safety, the magnitude of this threat is not known and justification can be affected. Experience has shown that if a levee system is breached, water can reach dangerously high stages very rapidly, significantly shortening the time for evacuation. During a breach event, the velocity of water flow may rapidly escalate, increasing the chance that people and vehicles would be swept away rather than facing slowly rising water levels that allow for more time to evacuate.

Furthermore, a well-designed, well-built, and well-maintained levee system reduces the incentive to evacuate a protected area during a flood event, and this incentive decreases over time as residents and business owners witness the levee system's performance in reducing flood risk.

Thus, while long lead times and a history of no lives lost indicate a high degree of safety, residual risk still exists, and the consequences of levee failure or breach could be higher than they would be if the levee system were not built.

Significance – Medium

Failure of the levee system could potentially cause widespread damage and would present a significant life and safety threat to local residents.

Recommendation for Resolution

1. Conduct a qualitative assessment of the recommended plan's residual risk that includes life safety hazards.
2. Determine the location(s) of potential breach(es) where life safety hazards may occur.
3. Discuss in the Environmental Assessment Report how rapidly rising water would change life safety factors.
4. Describe why the recommended plan remains the best option while acknowledging that any residual risk poses a threat to human life and safety.

Final Panel Comment 5

The selected downstream boundary condition (i.e., normal depth) for the hydraulic model does not account for potential impacts to water levels at the project area caused by varying Lake Erie levels.

Basis for Comment

The selected downstream boundary condition for the HEC-RAS model of the Cuyahoga River is the normal depth (i.e., uniform flow conditions). However, as shown in Appendix E, Figure 4, Lake Erie is near the downstream extent of the HEC-RAS model. As noted by the Project Delivery Team (PDT) in response to the Panel's mid-review questions (distributed by Battelle to the Panel), the Lake Erie levels vary significantly and can vary during the course of a day due to wind setup. In addition, the PDT stated that the distance between the lake and the project area is large enough that the downstream boundary condition does not affect the HEC-RAS model results.

Since the flow regime in the Cuyahoga River is subcritical, Lake Erie levels will be controlling the downstream condition of the river. The HEC-RAS model is not calibrated using the Lake Erie levels during the historical flood levels. However, the PDT's position—that Lake Erie is too far downstream to impact the flood levels at the project area—can be confirmed in Appendix E by changing water levels at the downstream boundary condition of the model and determining whether the water levels at the project area are impacted by varying lake levels. If impacts are nonexistent or negligible, then the normal depth assumption for the design event is justified. However, if the water surface elevations at the project area vary significantly, then the variability in the lake levels must be incorporated into the feasibility study and final design.

Significance – Medium

The Lake Erie levels can potentially impact the water surface levels along the proposed levee.

Recommendation for Resolution

1. Calibrate the HEC-RAS model based on Lake Erie levels during the historical events used for model calibration.
2. Because the lake levels can vary significantly during the course of a day, vary the lake level within the range of historical records in the model and determine whether water surface elevations change within the project area.
3. If the water surface elevations at the project area vary significantly, incorporate the variability in lake levels into the feasibility study and final design.

Final Panel Comment 6

Wetlands are not yet characterized, and the impacts of the project alternatives on wetland areas and potential mitigation are not yet analyzed, in the Environmental Assessment Report.

Basis for Comment

At this time, the Environmental Assessment Report does not present verification of the National Wetland Inventory delineation of wetlands or a wetlands characterization on the project site due to a lack of access. This was recognized as a deficiency in the Environmental Assessment Report and in the comments submitted by Valley View, and steps are planned to conduct the necessary wetland characterization when access becomes available. However, until a wetlands characterization for the project site is completed, this remains an informational gap in the environmental assessment.

The Panel understands that wetlands were assessed in the proposed borrow area, and all except two were classified as Category 1; the others were Category 2, which does not raise any serious issues with avoidance or mitigation.

Significance – Medium/Low

The incomplete wetlands characterization will likely have negligible impact on the recommended plan, as any wetlands that cannot be avoided by the project can be offset with wetland bank purchases.

Recommendation for Resolution

1. Complete the wetland characterization for the project area as soon as is feasible, and update the Environmental Assessment Report.

Final Panel Comment 7

The analysis of flood damages in the Environmental Assessment Report does not appear to have investigated a range of damage categories.

Basis for Comment

Flood damages occur across a broad range of different categories, and two of the most significant are damages to commercial and personal vehicles and damage to infrastructure. Flood damages for these often-significant categories do not appear to have been analyzed for this Environmental Assessment Report. For example, Appendix I mentions that a set of depth-damage curves was used for vehicle damages. However, those curves are not presented in the report, and there is no calculation of vehicle damages.

Appendix I also notes that damages to infrastructure are not included in the analyses. However, an analysis of damages to structures and their contents satisfies the requirements for a feasibility-level planning study, so it is not unreasonable to exclude other categories.

Significance – Medium/Low

The limited range of damage categories analyzed affects the clarity and understanding of how future with-project damages were considered in the selection of the recommended plan.

Recommendation for Resolution

1. State clearly in the Environmental Assessment Report that damages to structures and their contents are the only damages used in the analyses.
2. Explain why other damage categories are not included.

Final Panel Comment 8

The number of iterations used in the HEC-FDA runs is not identified, raising the issue of whether the Monte Carlo sampling in HEC-FDA effectively converges on the distributions being modeled.

Basis for Comment

The number of iterations selected for a Monte Carlo simulation is important to ensure that the simulation accurately represents the system being modeled. Too few iterations can produce errant projections of key variables, especially in the modeling of natural systems characterized by large standard deviations or skewed distributions.

Furthermore, repeated runs of simulations with too few iterations will produce statistically significant differences in each run. If a system is characterized by a number of subsystems, different simulations may be necessary to produce reasonable results, each with its own iteration count.

Significance – Medium/Low

While the number of iterations is unlikely to affect the selection or justification of the recommended plan, the confidence in the conclusions reached by the analyses is reduced in the absence of this information.

Recommendation for Resolution

1. Provide the number of iterations in each simulation run in HEC-FDA.
2. Briefly explain why these iteration counts were selected, and describe the reasons for selecting different iteration counts if the study modeled subsystems.

Final Panel Comment 9

The base year for the economic period of analysis is not explicitly specified; therefore, the rationale for its selection and timing of annual cash flows from benefits and costs cannot be verified.

Basis for Comment

A base year is defined as the year when a proposed project is expected to be operational. It is typically years into the future from the present day to allow the project to be constructed. Almost all benefit streams accrue to the project beginning in the base year and continue to the end of the period of analysis.

Because of the time value of money, the selection of the base year is important when determining how the project benefits and operation and maintenance (O&M) costs are valued in current dollars. Cash flows occurring nearer in the future are worth more than those expected to accrue in later years.

Even a few years' difference between base years for the same project can have significant effects on the value of the full stream of expected cash flows, especially if the project is expected to be fully operational as soon as construction is complete and some benefit categories are expected to be delivered early in the project life and diminish over time.

Significance – Medium/Low

While the selection of a base year can have impacts on the benefit-cost analysis, it is unlikely to affect the selection or justification of the recommended plan because the base year would be the same for all alternative plans.

Recommendation for Resolution

1. Identify the base year in Appendix I, Economic Analysis.
2. Briefly explain the rationale for its selection as the year when project operations are expected to be under way.

Final Panel Comment 10

It is unclear if the sample sizes for structures mentioned in Appendix I of the Environmental Assessment Report are representative of the population of structures at risk of flooding.

Basis for Comment

Appendix I of the Environmental Assessment Report explains that data sets contained in the floodplain inventory used in the HEC-FDA analysis were derived by randomly sampling sets of structures believed to be representative of the population of structures exposed to flood risk.

Sampling is a cost-effective way of estimating structure values, content values, and first floor elevations, especially in large floodplains and/or cost-limited study efforts.

Typically, these types of sampling efforts are fully documented by displaying (1) the results of statistical analyses of the population size and (2) the calculations that demonstrate the representative nature of the sample collected. Without addressing the issue of sample bias and assuming a standard normal distribution, the formula for determining a reasonably representative sample is:

$$\frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

Where:

- N = population size
- p = percentage value
- z = confidence level
- e = desired margin of error

However, the sample sizes are not presented in the report, nor are there any tests or discussion of how well the samples represent the population being sampled.

Significance – Medium/Low

The incomplete information presented on representative samples affects the clarity and completeness of Appendix I but does not necessarily affect the conclusions reached or the justification of the recommended plan.

Recommendation for Resolution

1. Apply the formula above to test the sample sizes used in data collection.
2. Present the statistical calculations and briefly discuss in Appendix I how the sample size is reasonably representative of the population.

5. REFERENCES

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

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

APPENDIX A

IEPR Process for the Independence CAP Project

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

Table A-1 presents the schedule followed in executing the Independent External Peer Review (IEPR) of the Continuing Authorities Program (CAP), Section 205, City of Independence, Ohio, Flood Risk Management (FRM) Project, Buffalo District (hereinafter: Independence CAP IEPR). Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on May 2, 2017. Note that the actions listed under Task 6 occur after the submission of this report and are described in more detail at the end of this appendix.

Table A-1. Independence CAP Complete IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	9/7/2016
	Review documents available	5/2/2017
	Battelle submits draft Work Plan ^a	5/9/2017
	USACE provides comments on draft Work Plan	5/15/2017
	Battelle submits final Work Plan ^a	5/18/2017
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	9/12/2016
	USACE provides comments on COI questionnaire	12/5/2016
	Battelle submits list of selected panel members ^a	5/2/2017
	USACE confirms the panel members have no COI	5/5/2017
	Battelle completes subcontracts for panel members	5/12/2017
3	Battelle convenes kick-off meeting with USACE	5/8/2017
	Battelle sends review documents to panel members	5/15/2017
	Battelle convenes kick-off meeting with panel members	5/17/2017
	Battelle convenes kick-off meeting with USACE and panel members	5/18/2017
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	5/25/2017
4	Panel members complete their individual reviews	6/6/2017
	Battelle provides talking points for Panel Review Teleconference to panel members	6/8/2017
	Battelle convenes Panel Review Teleconference	6/8/2017
	Battelle provides Final Panel Comment templates and instructions to panel members	6/9/2017
	Panel members provide draft Final Panel Comments to Battelle	6/15/2017
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	6/16/2017 - 6/20/2017
	Panel finalizes Final Panel Comments	6/21/2017

Table A-1. Independence CAP Complete IEPR Schedule (continued)

Task	Action	Due Date
4	Battelle receives public comments from USACE	7/7/2017
	Battelle sends public comments to Panel	7/7/2017
	Panel members complete their review of public comments	7/11/2017
	Battelle and Panel review Panel's responses to public comments	7/12/2017
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	7/12/2017
5	Battelle provides Final IEPR Report to panel members for review	7/17/2017
	Panel members provide comments on Final IEPR Report	7/18/2017
	Battelle submits Final IEPR Report to USACE ^a	7/20/2017
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	7/27/2017
6 ^b	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	7/31/2017
	Battelle convenes teleconference with USACE to review the Comment Response process	7/31/2017
	Battelle convenes teleconference with Panel to review the Comment Response process	7/31/2017
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	8/21/2017
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	8/25/2017
	USACE PCX provides draft PDT Evaluator Responses to Battelle	8/28/2017
	Battelle provides draft PDT Evaluator Responses to panel members	8/30/2017
	Panel members provide draft BackCheck Responses to Battelle	9/5/2017
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	9/6/2017
	Battelle convenes Comment Response Teleconference with panel members and USACE	9/7/2017
	USACE inputs final PDT Evaluator Responses to DrChecks	9/14/2017
	Battelle provides final PDT Evaluator Responses to panel members	9/18/2017
	Panel members provide final BackCheck Responses to Battelle	9/21/2017
	Battelle inputs the Panel's final BackCheck Responses in DrChecks	9/22/2017
	Battelle submits pdf printout of DrChecks project file ^a	9/25/2017
	Contract End/Delivery Date	8/30/2017

^a Deliverable.

^b Task 6 occurs after the submission of this report. A no-cost time extension has been requested to complete this project.

At the beginning of the Period of Performance for the Independence CAP IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 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	Actual No. of Review Pages
Main Report	139
Appendix A: Cultural Resources Survey	228
Appendix C: Civil Structural Design Report	17
Appendix D: Flood Plain Utility Study	9
Appendix E: H&H Analysis	122
Appendix F: Cost Engineering Report	28
Appendix H: Real Estate	11
Appendix I: Economic Analysis	67
Public Comments (For Reference Only)	100
Total number of pages to be reviewed	721
Supporting Documents	
Phase I ESA Report for Independence Site 1 Option B	404

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

- USACE guidance, *Civil Works Review* (EC 1165-2-214), December 15, 2012
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, December 16, 2004.
- USACE Climate Change Adaptation Plan (June 2014)

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 three panel member questions to USACE. USACE was able to provide responses to all the questions during the teleconference. Six additional comments were sent after the teleconference and USACE was able to provide written responses to all the questions prior to the end of the review.

A.2 Review of Individual Comments

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

A.3 IEPR Panel Teleconference

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

A.4 Preparation of Final Panel Comments

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

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email

detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see description below)
 4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance¹: 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.,

¹ These are the new levels of significance provided by USACE prior to the Panel completing its review.

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, 10 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received a pdf file containing five pages of public comments on the Independence CAP IEPR (approximately 12 written comments from one entity) from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

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

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

A.6 Final IEPR Report

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

A.7 Comment Response Process

As part of Task 6, Battelle will enter the 10 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

APPENDIX B

Identification and Selection of IEPR Panel Members for the Independent CAP Project

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B.1 Panel Identification

The candidates for the Independent External Peer Review (IEPR) of the Continuing Authorities Program (CAP), Section 205, City of Independence, Ohio, Flood Risk Management (FRM) Project, Buffalo District (hereinafter: Independence CAP IEPR) Panel were evaluated based on their technical expertise in the following key areas: plan formulation/economics, environmental impact analysis and compliance review, civil/structural engineering and hydrology and hydraulic (H&H) engineering. These areas correspond to the technical content of the review documents and overall scope of the Independence CAP project.

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

Candidates were screened for the following potential exclusion criteria or COIs. These COI questions were intended to serve as a means of disclosure in order to better characterize a candidate's employment history and background. Battelle evaluated whether scientists in universities and consulting firms that are receiving U.S. Army Corps of Engineers (USACE) funding have sufficient independence from USACE to be appropriate peer reviewers. Office of Management and Budget (OMB) guidance (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.”

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

Panel Conflict of Interest Screening for the IEPR of Continuing Authorities Program (CAP), Section 205, City of Independence, Ohio, Flood Risk Management Project, Buffalo District

<p>1. Previous and/or current involvement by you or your firm in the Continuing Authorities Program (CAP), Section 205, City of Independence, Ohio, Flood Risk Management Project and related projects.</p>	
<p>2. Previous and/or current involvement by you or your firm in flood control projects/studies along the Cuyahoga River or throughout Cuyahoga County and surrounding counties in eastern Ohio and western Pennsylvania.</p>	
<p>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 or surrounding the City of Independence, Ohio, or the Village of Valley View.</p>	
<p>4. Current employment by the U.S. Army Corps of Engineers (USACE).</p>	
<p>5. Previous and/or current involvement with paid or unpaid expert testimony related to the CAP, Section 205, City of Independence, Ohio, Flood Risk Management Project.</p>	
<p>6. Previous and/or current employment or affiliation with the non-Federal sponsor or any of the following cooperating Federal, state, county, local and regional agencies, environmental organizations, and interested groups (for pay or pro bono):</p> <ul style="list-style-type: none"> • City of Independence, Ohio • Businesses along the Cuyahoga River in the City of Independence • Village of Valley View 	
<p>7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Cuyahoga River, the City of Independence, Ohio, or the Village of Valley View.</p>	
<p>8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Buffalo District.</p>	
<p>9. Previous or current involvement with the development or testing of models that will be used for, or in support of the CAP, Section 205, City of Independence, Ohio, Flood Risk Management Project.</p>	
<p>10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Buffalo District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Buffalo District. Please explain.</p>	

11. Any previous employment by USACE as a direct employee, notably if employment was with the Buffalo 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 Buffalo 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 risk management or flood damage reduction and include the client/agency and duration of review (approximate dates).	
14. Pending, current, or future financial interests in the CAP, Section 205, City of Independence, Ohio, Flood Risk Management Project and related contracts/awards from USACE.	
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.	
16. Significant portion of your personal or office's revenues within the last three years came from City of Independence, Ohio contracts or Village of Valley View contracts.	
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the CAP, Section 205, City of Independence, Ohio, Flood Risk Management Project.	
18. Participation in relevant prior and/or current Federal studies relevant to this project and/or the CAP, Section 205, City of Independence, Ohio, Flood Risk Management Project.	
19. Previous and/or current participation in prior non-Federal studies relevant to this project and/or CAP, Section 205, City of Independence, Ohio, Flood Risk Management Project, Buffalo District	
20. 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.	

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. One panel member held a dual role serving as both the civil/structural engineering and H&H engineering planning expert. One of the three final reviewers is an independent consultant; the other two are affiliated with a consulting company. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. Independence CAP IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Plan Formulator/Economist					
David Luckie	Independent Consultant	Mobile, AL	B.A., Economics & Finance	N/A	28
Environmental Impact Analysis and Compliance Review					
Chris Yoder	Midwest Biodiversity Institute	Columbus, OH	M.A., Zoology	N/A	40+
Civil/Structural Engineering and Hydrology and Hydraulic (H&H) Engineering					
Omid Mohseni	Barr Engineering	Minneapolis, MN	Ph.D., Civil Engineering (hydrology emphasis)	Yes	25

Table B-2 presents an overview of the credentials of the final three members of the Panel and their qualifications in relation to the technical evaluation criteria. More detailed biographical information regarding each panel member and his area of technical expertise is given in Section B.3.

Table B-2. Independence CAP IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Luckie	Yoder	Mohseni
Plan Formulation/Economics			
Minimum 15 years of demonstrated experience in economics and planning	X		
Minimum M.S. degree or higher in economics	W ²		
Familiar with Civil Works and related FRM projects	X		
Thorough understanding of the use of models similar to the Hydrologic Engineering Center’s Flood Damage Reduction Analysis (HEC-FDA) program	X		
Water resource planning experience in FRM plan formulation	X		
Familiar with Continuing Authorities Program Section 205 Flood Risk Management Project	X		
Familiar with the application of FDA and developing benefit-cost ratios for Section 205 project	X		

Technical Criterion	Luckie	Yoder	Mohseni
Environmental Impact Analysis and Compliance Review			
At least 15 years of experience directly related to water resource environmental evaluation or review and National Environmental Policy Act (NEPA) compliance		X	
Minimum M.S. degree or higher in a related field		X	
Must be familiar with the habitat, fish, and wildlife species that may be affected by the project alternatives in this study area		X	
An expert in compliance with additional environmental laws, policies, and regulations, including compliance in Fish and Wildlife Coordination Act and Endangered Species Act		X	
Familiar with United States Fish and Wildlife Service (USFWS) Habitat Evaluation Procedure (HEP) (USFWS, 1980) ³		X	
Sufficient expertise and knowledge regarding application of cultural resource rules, regulations and appropriate laws, including the National Historic Preservation Act, as amended, to ensure proposed project modifications are in compliance		X	
Civil/Structural Engineering			
Minimum of 15 years of experience in engineering or architecture			X
Experience in large FRM public works projects			X
Thorough understanding of design and performance of levees, floodwalls within an urban setting			X
Familiar with design and construction of both structural and non-structural FRM measures			X
Registered Professional Engineer			X
Hydrology and Hydraulic (H&H) Engineering			
Minimum of 15 years of experience in H&H engineering			X
Experienced with all aspects of H&H engineering including: northwest hydrology, urban H&H, open channel systems, effects of management practices and low-impact development on hydrology, design of earthen dams and detention ponds, use of nonstructural systems as they apply to flood proofing, warning systems, and evacuation			X
Familiar with Hydrologic Engineering Center (HEC) modeling computer software, including HEC River Analysis System (RAS) and HEC Hydrologic Modeling System (HMS), Flow 2D			X

Technical Criterion	Luckie	Yoder	Mohseni
Specialized experience in river engineering, sediment transport, and familiarity with rivers with water control structures and dredging projects			X
Proficient in the field of hydraulics and knowledgeable in hydrologic and floodplain engineering applications			X
Thorough understanding of HEC-RAS, including its application to non-standard situations involving interaction with the HEC-HMS model.			X
Working knowledge of hydrologic engineering tools and issue including the HEC-HMS model and flood frequency analysis methods			X
Working knowledge of interior/exterior drainage and floodplain issues, including the use of non-structural solutions			X
Registered Professional Engineer			X

² The PWS states that the Plan Formulator/Economist panel member should have a minimum M.S. degree or higher in economics. A waiver was submitted with the Selected Panel Deliverable noting that Mr. David Luckie earned a B.S. in economics and finance and has 28 years of experience directly related to water resources economic evaluation and planning. As a 17-year veteran of USACE, he is very familiar with the plan formulation process and has served on past USACE IEPR panels as an economist and Civil Works planner.

³ USFWS (1980). Habitat Evaluation Procedures: ESM 102. Division of Ecological Services, U.S. Fish and Wildlife Service, Department of the Interior, Washington, DC. March 31.

B.3 Panel Member Qualifications

Each panel member’s credentials, qualifications, and areas of technical expertise are summarized in the following paragraphs.

Name	David Luckie
Role	Plan Formulator / Economist
Affiliation	Independent Consultant
<p>Mr. Luckie is an independent consultant with nearly 30 years of professional experience in water resource economics, planning, plan formulation, benefit-cost analysis, and risk-based analysis. His public works experience encompasses decades of work with Federal and non-Federal agencies, as well as local and state organizations. He earned his B.S. in economics and finance from the University of South Alabama in 1986. His professional experience includes working with multidisciplinary teams to provide or review complex planning studies for dam safety, FRM, ecosystem restoration, and water supply and water quality studies. He is intimately familiar with Engineer Regulation (ER) 1105-2-100 and the 6-Step Planning Process and has prepared, supervised, or reviewed numerous planning studies in his career.</p>	

Mr. Luckie is familiar with the evaluation of alternative plans for FRM studies, and has conducted, supervised, or reviewed several water resource studies featuring numerous alternative plans constructed from an array of different management measures. Over the last three decades, Mr. Luckie has been involved in numerous FRM studies. Two examples are the Village Creek Watershed Study in Birmingham, Alabama, a multi-purpose project that included structural, non-structural, environmental, and recreation outputs, and the Charting Buffalo Study, a non-Federal evaluation of the benefits of creating greenspace through a combination of structural and non-structural management measures. He has also served as an IEPR panel member on the IEPR Little Colorado River at Winslow, Navajo County, Arizona Flood Risk Management Feasibility Study, where he applied his knowledge of ER-1105-2-100 and the 6-Step Planning Process.

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

Mr. Luckie is very familiar with USACE standards and procedures. He has extensive experience in performing National Economic Development (NED) analyses, specifically as they relate to FRM. For more than 25 years, he has performed, supervised, or reviewed NED procedures for technical accuracy and compliance with policy and guidance and accepted planning principles. Such studies as the Village Creek Watershed Feasibility Study and Buffalo Bayou GRR reflect this expertise.

Mr. Luckie has been using the HEC-FDA modeling software since its inception in the 1990s. He has also performed, reviewed, or trouble-shot scores of HEC-FDA analyses for Federal, non-Federal, and private sector clients. In addition, he has mentored interns and junior economists in USACE methodologies for FRM, requiring them to calculate without- and with-project condition damages, either by hand or with a Microsoft Excel spreadsheet, before allowing them to use HEC-FDA. He is also very familiar with the USACE Regional Economic System model and the estimation of Regional Economic Development benefits, and has used it for both Federal and non-Federal project proponents since its inception.

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

Name	Chris Yoder
Role	Environmental impact analysis and compliance review
Affiliation	Midwest Biodiversity Institute

Mr. Yoder is the Research Director at the Midwest Biodiversity Institute (MBI), Center for Applied Bioassessment and Biocriteria, in Hilliard, Ohio. He has an M.A. in zoology from DePauw University and more than 40 years of experience in the taxonomy, distribution, and life history of Eastern and Midwestern U.S. stream and riverine fish species. He has extensive experience directly related to water resources environmental evaluation and review, as well as with the National Environmental Policy Act (NEPA) process and analysis through his most recent work at MBI and during his 25 years at the Ohio Environmental Protection Agency (EPA). In addition, he is a certified trainer for fish assemblage, habitat, and chemical sampling under the Ohio Credible Data Law (OCDL) (2009); a Tier II Certified Fisheries Scientist (1986); a Level 3 Qualified Data Collector for fish, habitat, and water sampling under the OCDL; and trained by the U.S. Fish and Wildlife Service (USFWS) in Principles of Electrofishing.

While working for the Ohio EPA (1976-2001), Mr. Yoder gained extensive expertise related to Midwestern aquatic resources. Most of his work was conducted in the upper Ohio River, upper Mississippi River, and the Great Lakes. He has been conducting fish assemblage assessments of the Ohio River and streams since 1980, has conducted nearshore and tributary fish assemblage assessments in the Great Lakes for more than 20 years, and has recent experience with assemblage assessments of large Midwestern river fish. Mr. Yoder has also been involved in studies of aquatic nuisance species, including Asian carp. In surveys on the Illinois River Basin, he documented the presence of Asian carp, and he is currently examining restoration options for the DuPage River-Salt Creek watersheds where Asian carp is a risk to re-establishing connectivity with the lower Des Plaines River. Having worked in Ohio for most of his career and gaining technical experience at the Ohio EPA and the MBI, Mr. Yoder is familiar with the socioeconomic factors and cultural resources that may be affected by the project alternative both locally and in the region.

Mr. Yoder is familiar with environmental impact analysis and mitigation. He started his career at Wittenberg University conducting data collection, analysis, and reporting for an environmental impact statement to evaluate the effect of a reservoir on Buck Creek, Ohio, and has continued in this field to the present at MBI, where he provides direct technical assistance to Federal, regional, state, and local government and non-government organizations with monitoring and assessment design and bioassessment and biocriteria implementation issues and topics. As manager of the Ecological Assessment Section at Ohio EPA (1990-2001), he conducted research and development on methods and procedures for incorporating ecoregions, biological, chemical, and physical data in water quality management policy and programs.

Mr. Yoder has experience with the U.S. Fish and Wildlife Service (USFWS) Habitat Evaluation Procedures (HEP) (USFWS, 1980), Clean Water Act, Endangered Species Act (ESA), National Historic Preservation Act, and Ohio Qualitative Habitat Evaluation Index procedures. Mr. Yoder was the primary author of the Implementation Guidance Document, "Improving Water Quality Standards and Assessment Approaches for the Upper Mississippi River: UMR Clean Water Act Biological Assessment Implementation Guidance" (2011). This document provides methods and data for integrating biological assessment into Clean Water Act programs for the interstate and Minnesota portions of the Upper

Mississippi River. He was also a reviewer of the Endangered Fish section of the Ohio Department of Natural Resources (DNR) Strategic Plan and served on the Ohio DNR Interagency ad hoc workgroup on endangered fish and fish population data from 1986 to 1989.

Mr. Yoder has authored more than 70 publications and more than 200 technical reports relevant to his field of expertise, and has served as a manuscript reviewer for numerous peer-reviewed journals and technical reports such as the North American Journal of Fisheries Management, Journal of Environmental Monitoring and Assessment, and the U.S. EPA Ecological Report Series. A recipient of the North American Benthological Society Environmental Stewardship Award in 2009, Mr. Yoder is a member of the American Fisheries Society, the Ohio Academy of Science, and the Society for Freshwater Science.

Name	Omid Mohseni, Ph.D., P.E.
Role	Civil/structural engineering and hydrology and hydraulic (H&H) engineering
Affiliation	Barr Engineering

Dr. Mohseni is a senior water resources engineer at Barr Engineering Co. (Barr) and an adjunct associate professor in the Department of Civil Engineering at the University of Minnesota. He earned a Ph.D. in civil engineering from the University of Minnesota in 1999 and is a registered civil engineer (P.E.) in Minnesota. Dr. Mohseni has more than 25 years of experience in hydrodynamic modeling of rivers and lakes, hydrologic modeling of watersheds, open-channel hydraulics, design and analysis of hydraulic structures, and stormwater best management practices. He spent more than five years as associate director of the applied research program at the University of Minnesota’s St. Anthony Falls Laboratory, a teaching and research facility, before rejoining Barr. Dr. Mohseni has been teaching hydrology, open-channel flow, hydraulic structures, and fluid mechanics at the University of Minnesota and Mankato State University since 1999, and has published 22 scientific articles in refereed journals.

Dr. Mohseni has experience in large FRM public works projects and has a thorough understanding of design and performance of levees and floodwalls in an urban setting through his work at Barr. He was deeply involved in the Devils Lake levee alignment system, the City of Minot FRM project, the Fargo-Moorhead diversion system project, and the City of Oslo levee system project.

Dr. Mohseni has direct experience with all aspects of H&H engineering: northwest hydrology, urban H&H, open-channel systems, effects of management practices and low-impact development on hydrology, design of earthen dams and detention ponds, and the use of non-structural systems as they apply to flood-proofing, warning systems, and evacuation. This experience comes from his time at Barr and St. Anthony Falls Laboratory. Three examples of such studies are as follows. He led the hydrologic modeling efforts for the Minot FRM project in North Dakota, and helped with the hydraulic model of the Mouse River and the quality assurance/quality control (QA/QC) of the model. He also led hydrologic modeling efforts of the Park River for flood risk reduction at Grafton, North Dakota. In addition, he supported the hydraulic analysis of aqueducts and inlet structures, and the QA/QC of the hydraulic model of a diversion system to mitigate flooding in Fargo, North Dakota.

Dr. Mohseni is familiar with HEC modeling computer software through his work at Barr. He has performed or led the dam break analysis of more than 20 dams in the United States and Canada. He used the HEC-River Analysis System (RAS) on numerous dam break analysis projects, including the Brainerd Dam spillway project, the SaskPower dams on the Charlot River in Saskatchewan, and the St. Cloud Dam on the Mississippi River in Minnesota. Dr. Mohseni led the two-dimensional (2D) hydraulic modeling efforts and design of non-structural systems for flood reduction at wind turbines over an alluvial fan in California. He also led the 2D adaptive hydraulics (AdH) modeling of the Mio Hydroelectric Project for Consumers Energy Company to estimate the impact of tailwater levels on discharge through the emergency spillway, gated spillway, and spill tubes and to develop the new headwater rating curve for the project. The results of the analysis were incorporated in the HEC-Hydrologic Modeling System (HMS) model of the Au Sable River (a 1,700-square-mile area) to update the peak probable maximum flood (PMF) inflows and outflows and maximum water levels during the PMF event at six dams on the Au Sable River. In addition, Dr. Mohseni led the HEC-HMS modeling of the Park River, a 750-square-mile watershed; the Mouse River, a 7,700-square-mile watershed; Tazin Lake, with a 4,000-square-mile area; and a number of other drainage areas. He was the QA/QC lead for the interior drainage system design for the City of Minot, and conducted numerous frequency analyses on rivers in Minnesota, North Dakota, Michigan, Wisconsin, Canada, and Jordan.

Dr. Mohseni has specialized experience in river engineering and sediment transport, and is familiar with rivers with water control structures. As principal investigator, he managed numerous physical model studies to help with the design/improvement of structures such as the Folsom Dam auxiliary spillway system in California to optimize the performance of the proposed stilling basin downstream of a stepped spillway; offshore intake in the Potomac River in Fairfax County, Virginia, to determine the bed forms, bed load transport, and sediment withdrawal by the intake to devise a design to minimize sediment withdrawal by the intake; and a new design for the Bond Falls emergency spillway to discharge the PMF without undermining embankment stability.

APPENDIX C

Final Charge for the Independence CAP IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Continuing Authorities Program, Section 205, City of Independence, Ohio, Flood Risk Management Project, Buffalo District`

This is the final Charge to the Panel for the Independence CAP IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on May 18, 2017.

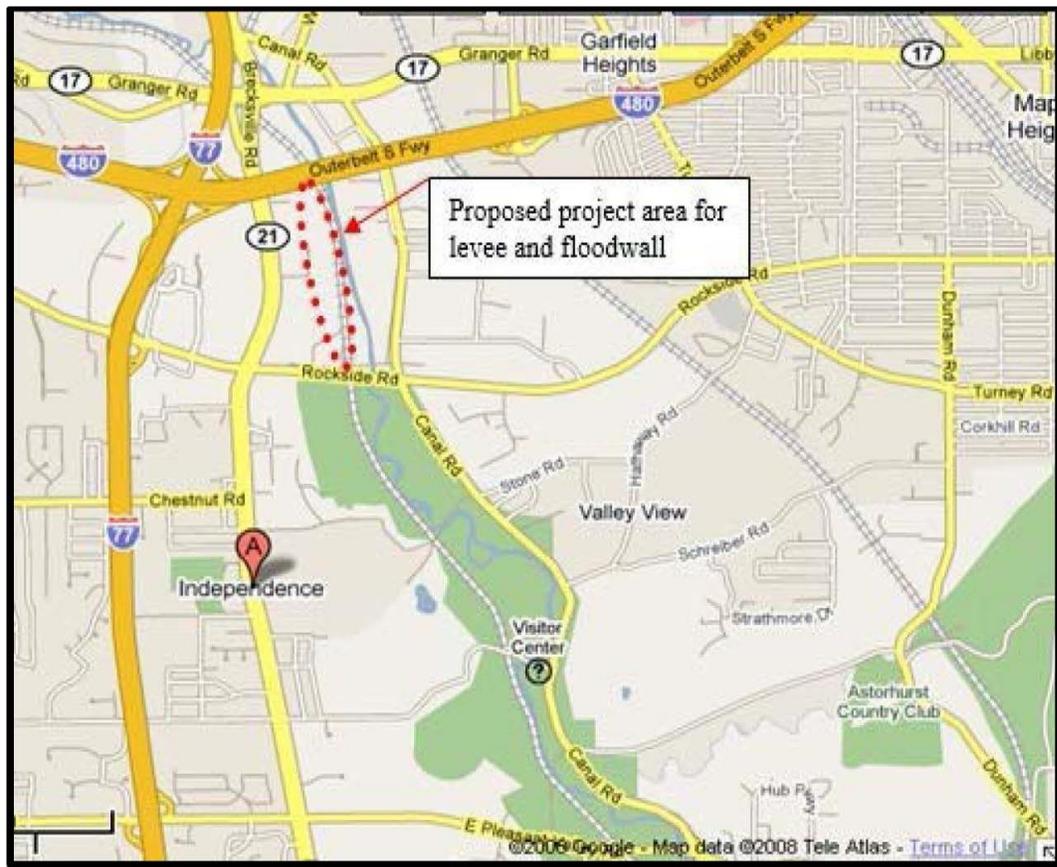
BACKGROUND

The City of Independence Feasibility Study will investigate alternatives to manage flood risk in the communities of the City of Independence, Ohio. The study is being conducted under the Continuing Authorities Program (CAP), authorized by Section 205 of the Flood Control Act of 1948, as amended. The study will result in a Detailed Project Report (DPR) and integrated National Environmental Policy Act (NEPA) Environmental Assessment (EA) documentation of the environmental impacts of a recommended Federal action.

The flood risk management (FRM) study includes the City of Independence, which is adversely impacted by flooding from the Cuyahoga River and its tributaries. The study area is located between river mile 11.5 and river mile 13.8 along the Cuyahoga River in Independence, Cuyahoga County, Ohio. The primary problem in Independence is frequent and serious flooding which inundates the commercial and industrial business area located in the vicinity of Old Rockside Road and Canal Road. In the last several years, flooding events have increased and these floods have subsequently caused extensive damages to businesses located in this area. In 2006, the flooding resulted in a Federal Disaster Declaration. Extensive rescue operations are required during the floods, and major cleanup and restoration expenses are incurred by local, state, and Federal governments. The most recent flooding in February 2011 occurred on Canal, Rockside, Granger, Old Brecksville, and Old Rockside Roads. The locations in the city are shown in Figure 1.

The primary opportunity at Independence is to provide an environmentally sound, economically justified structural, non-structural, or combination project that would significantly reduce the flood damage that occurs at Independence during high-flow events on the Cuyahoga River.

Figure 1: City of Independence, Ohio



OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the CAP, Section 205, City of Independence, Ohio, Flood Risk Management Project, Buffalo District (hereinafter: Independence CAP IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214, dated December 15, 2012), and the Office of Management and Budget's (OMB) *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4) for the Independence CAP documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in civil/structural engineering and hydrology and hydraulic engineering (dual role), plan formulation/

economics, and environmental impact analysis and compliance review issues relevant to the project. They will also have experience applying their subject matter expertise to flood risk management.

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

DOCUMENTS PROVIDED

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

Documents for Review

The following documents are to be reviewed by designated discipline.

Review Documents	Actual No. of Review Pages	Planning Formulator/ Economist	Civil/ Structural Engineer and Hydrology and Hydraulic Engineer*	Environmental Impact Analysis and Compliance Reviewer
Main Report	139	139	139	139
Appendix A: Cultural Resources Survey	228	228		228
Appendix C: Civil Structural Design Report	17		17	
Appendix D: Flood Plain Utility Study	9	9	9	9
Appendix E: H&H Analysis	122		122	
Appendix F: Cost Engineering Report	28	28	28	
Appendix H: Real Estate	11	11	11	11
Appendix I: Economic Analysis	67	67		
Public Comments (For Reference Only)	100	100	100	100
Total number of pages to be reviewed	721	582	426	487
Supporting Documents				
Phase I ESA Report for Independence Site 1 Option B	404	404	404	404

Documents for Reference

- USACE guidance *Civil Works Review* (EC 1165-2-214, December 15, 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- USACE Climate Change Adaptation Plan (June 2014)

SCHEDULE

This schedule is based on the May 2, 2017, receipt of the final review documents. Note that dates presented in the schedule below could change due to panel member and USACE availability.

Task	Action	Due Date
Attend Meetings and Begin Peer Review	Subcontractors complete mandatory Operations Security (OPSEC) training	6/11/ 2017
	Battelle sends review documents to panel members	5/15/2017
	Battelle convenes kick-off meeting with panel members	5/17/2017
	Battelle convenes kick-off meeting with USACE and panel members	5/18/2017
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	5/25/2017
Prepare Final Panel Comments	Panel members complete their individual reviews	6/6/2017
	Battelle provides talking points for Panel Review Teleconference to panel members	6/8/2017
	Battelle convenes Panel Review Teleconference	6/8/2017
	Battelle provides Final Panel Comment templates and instructions to panel members	6/9/2017
	Panel members provide draft Final Panel Comments to Battelle	6/15/2017
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	6/16/2017 through 6/20/2017
	Panel finalizes Final Panel Comments	6/21/2017
Review Public Comments	Battelle receives public comments from USACE	6/15/2017
	Battelle sends public comments to Panel	6/15/2017
	Panel completes its review of public comments	6/21/2017
	Battelle and Panel review Panel's responses to public comments	6/22/2017
	Panel drafts Final Panel Comment for public comments, if necessary	6/23/2017
	Panel finalizes Final Panel Comment regarding public comments, if necessary	6/26/2017

Task	Action	Due Date
Review Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	6/23/2017
	Panel members provide comments on Final IEPR Report	6/26/2017
	*Battelle submits Final IEPR Report to USACE	6/28/2017
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	7/6/2017
Comment/Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	7/10/2017
	Battelle convenes teleconference with USACE to review the Comment Response process	7/10/2017
	Battelle convenes teleconference with Panel to review the Comment Response process	7/10/2017
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	7/31/2017
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	8/4/2017
	USACE PCX provides draft PDT Evaluator Responses to Battelle	8/7/2017
	Battelle provides draft PDT Evaluator Responses to panel members	8/9/2017
	Panel members provide draft BackCheck Responses to Battelle	8/14/2017
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	8/15/2017
	Battelle convenes Comment Response Teleconference with panel members and USACE	8/16/2017
	USACE inputs final PDT Evaluator Responses to DrChecks	8/23/2017
	Battelle provides final PDT Evaluator Responses to panel members	8/25/2017
	Panel members provide final BackCheck Responses to Battelle	8/30/2017
	Battelle inputs panel members' final BackCheck Responses to DrChecks	9/1/2017
	*Battelle submits pdf printout of DrChecks project file	9/5/2017
	Contract End/Delivery Date**	8/30/2017

* Deliverables

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Independence CAP 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 Independence CAP documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

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

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

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

Please submit your comments in electronic form to Jessica Tenzar, tenzarj@battelle.org, no later than June 6, 2017, at 10 pm ET.

Independent External Peer Review
of the
Continuing Authorities Program (CAP), Section 205, City of Independence, Ohio,
Flood Risk Management Project, Buffalo District

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 USACE policy or 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. This includes opinions from named USACE personnel or others outside of USACE. 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?
3. Given the need for and intent of the decision document, assess the adequacy and acceptability of the project evaluation data used in the study analyses.
4. Given the need for and intent of the decision document, assess the adequacy and acceptability of the economic, environmental, and engineering assumptions that underlie the study analyses.
5. Given the need for and intent of the decision document, assess the adequacy and acceptability of the economic, environmental, and engineering methodologies, analyses, and projections.

6. Given the need for and intent of the decision document, assess the adequacy and acceptability of the applications of models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives. This includes inputs and outputs.
7. Given the need for and intent of the decision document, assess the adequacy and acceptability of the methods for integrating risk and uncertainty.
8. Given the need for and intent of the decision document, assess the adequacy and acceptability of the formulation of alternative plans and the range of alternative plans considered.
9. Given the need for and intent of the decision document, assess the adequacy and acceptability of the quality and quantity of the surveys, investigations, and engineering sufficient for conceptual design of alternative plans.
10. Given the need for and intent of the decision document, assess the adequacy and acceptability of the overall assessment of environmental impacts and any biological analyses.
11. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
12. Assess the considered and tentatively selected alternatives from the perspective of systems, including systemic aspects being considered from a temporal perspective, including the potential effects of climate change.
13. For the tentatively selected plan, assess whether the models used to assess life safety hazards are appropriate.
14. For the tentatively selected plan, assess whether the assumptions made for the life safety hazards are appropriate.
15. For the tentatively selected plan, assess whether 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. For the tentatively selected plan, assess whether the analysis adequately address the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project.

Battelle Summary Charge Questions to the Panel Members²

Summary Questions

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

Public Comment Questions

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

² Questions 1 through 3 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**

Continuing Authorities Program Section 205, City of Independence, Ohio, Flood Risk Management Project, Buffalo District

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

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

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

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

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

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

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

No additional information to report.

Courtney M. Brooks

Courtney M. Brooks

September 1, 2016

BATTELLE

It can be done