

Final Independent External Peer Review Report Bartons Creek Watershed, Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report

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 study area for the Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report is the entire Bartons Creek River watershed, which lies entirely within Wilson County, Tennessee. The city of Lebanon, Tennessee, lies within Wilson County. Though flood-related damages occur at numerous locations within the watershed, the primary damage center is the Lebanon Public Square. The project sponsor is the City of Lebanon.

The Bartons Creek basin has a long history of flood damages. Major flooding with widespread impacts occurred in 1928, 1939, 1962, 1963, 1979, 1989, and 2010. Since 1903, the flood of record known on Bartons and Sinking Creek in Lebanon occurred on August 3, 1939. It is known that a very large flood occurred in 1903 in Lebanon, but there is not sufficient data to establish the exact height of the flood. The most recent major flood occurred during May 2010. The flood followed a historic two-day rainfall with a statistical precipitation recurrence interval of greater than 100-year event. Rainfall on May 1 and 2 resulted in record flood stages in the Bartons Creek Basin. Radar rainfall in the Bartons Creek Basin ranged from 10 to 12 inches; gage rainfall recorded 10 inches during the event. Numerous bridges on secondary roads and railroads were either damaged or washed away. Floodwaters in the Lebanon Public Square reached as high as 3 feet in May 1979, 4 feet in August 1939, and 2.5 feet in May 2010. Less widespread, more localized flooding also occurs throughout the basin at greater frequencies. Flooding can be the result of widespread major rain events or small intense storms and thunderstorms.

Flooding occurs throughout the Bartons Creek Basin, with the major damage centers being on Sinking Creek. There are also several homes on Bartons Creek that lie in the floodway. The largest damage center, the one of most concern to the City of Lebanon, is the Lebanon Public Square. Sinking Creek, a tributary of Bartons Creek, flows underneath the west side of the Lebanon Public Square. Lebanon, Tennessee, CAP Section 205 study focused on Sinking Creek based on two primary factors: feedback from the City and the locations of the main damage centers, which lie along Sinking Creek.

In a feasibility-level evaluation, several alternative solutions are evaluated to identify the most economically viable solution. These alternatives are formulated by considering various combinations of structural and nonstructural measures. Structural flood risk management strategies include channel modifications and diversions; modification of culverts and/or bridges; modification of detention structures, retention structures, and peak flow control structures; and implementation of other stream restoration projects throughout the watershed where measures are needed to slow velocities or allow the stream to reclaim an abandoned floodplain. Nonstructural flood risk management actions include acquisition and removal of flood-prone structures in the floodplain or floodway; protection or improvement of existing

open space through easements and acquisitions; elevation and flood-proofing of existing structures where applicable; and creation, enhancement, or restoration of wetlands to increase floodplain storage capacity and restore hydrologic function. Other nonstructural options being considered include flood warning systems and stage gages, temporary evacuation plans, and enhanced local management and regulation of the floodplain.

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 Bartons Creek Watershed, Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report (hereinafter: Bartons Creek 205 IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2018). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2018) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: planning formulator/economist, environmental law compliance specialist, and hydraulic and hydrology (H&H) engineer. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of all the final candidates to independently confirm that they had no COIs, and Battelle made the final selection of the three-person Panel from this list.

The Panel received electronic versions of the decision documents (315 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

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

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

Battelle received one PDF file containing the sole public comment received on the Bartons Creek 205 project from USACE (totaling three pages of remarks) and provided it to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comment raised any additional discipline-specific technical concerns with regard to the Bartons Creek 205 review documents. After completing its review, the Panel confirmed that no new issues or concerns were identified.

Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2018) in the Bartons Creek 205 review documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel’s findings.

Based on the Panel’s review, the report is well-written, is concise, and provides excellent supporting documentation on engineering, environmental, economic, and plan formulation issues. The Panel believes the project team assessed the flooding issues and developed a sensible range and number of alternatives. The alternatives were evaluated properly, and the appropriate conclusions were drawn. The Panel offers up two low-level comments: one suggesting ways of clarifying the planning objectives, and the other asking for clarification on whether the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) was consulted regarding the potential for prime/unique farmlands in the area.

Table ES-1. Overview of two Final Panel Comments Identified by the Bartons Creek 205 IEPR Panel

No.	Final Panel Comment
Significance – Low	
1	The language used to describe the planning objectives varies throughout the review documents, causing confusion.
2	It is unclear whether the USDA NRCS was consulted in the determination of the potential for prime/unique farmland.

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Table of Contents

	Page
Executive Summary	i
1. INTRODUCTION.....	1
2. PURPOSE OF THE IEPR.....	2
3. METHODS FOR CONDUCTING THE IEPR	2
4. RESULTS OF THE IEPR.....	3
4.1 Summary of Final Panel Comments	3
4.2 Final Panel Comments	3
5. REFERENCES.....	6
Appendix A. IEPR Process for the Bartons Creek 205 Project	
Appendix B. Identification and Selection of IEPR Panel Members for the Bartons Creek 205 Project	
Appendix C. Final Charge for the Bartons Creek 205 IEPR	
Appendix D. Conflict of Interest Form	

List of Tables

	Page
Table ES-1. Overview of two Final Panel Comments Identified by the Bartons Creek 205 IEPR Panel.....	iii

LIST OF ACRONYMS

CAP	Continuing Authorities Program
COI	Conflict of Interest
DrChecks	Design Review and Checking System
EA	Environmental Assessment
EC	Engineer Circular
EIS	Environmental Impact Statement
EO	Executive Order
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
FEMA	Federal Emergency Management Agency
FS	Feasibility Study
H&H	Hydraulic and Hydrology
HEA	Habitat Equivalency Analysis
HEC-FDA	Hydrologic Engineering Center Flood Damage Reduction Analysis
HEC-FIA	Hydrologic Engineering Center Flood Impact Analysis
HEC-HMS	Hydrologic Engineering Center Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center River Analysis System
HEC-GeoRAS	Hydrologic Engineering Center Geospatial River Analysis System
HEC-GeoHMS	Hydrologic Engineering Center Geospatial Hydrologic Modeling System
HEC-DSSVue	Hydrologic Engineering Center Data Storage System
HEC-SSP	Hydrologic Engineering Center Statistical Software Package
HEP	Habitat Evaluation Procedures
HQ-USACE	USACE Headquarters
HTRW	Hazardous, Toxic and Radioactive Waste
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
NED	National Economic Development
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NRDA	Natural Resource Damage Assessment

O&M	Operation and Maintenance
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PCX	Planning Center of Expertise
PDT	Project Delivery Team
QC	Quality Control
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

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1. INTRODUCTION

The study area for the Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report is the entire Bartons Creek River watershed, which lies entirely within Wilson County, Tennessee. The city of Lebanon, Tennessee, lies within Wilson County. Though flood-related damages occur at numerous locations within the watershed, the primary damage center is the Lebanon Public Square. The project sponsor is the City of Lebanon.

The Bartons Creek basin has a long history of flood damages. Major flooding with widespread impacts occurred in 1928, 1939, 1962, 1963, 1979, 1989, and 2010. Since 1903, the flood of record known on Bartons and Sinking Creek in Lebanon occurred on August 3, 1939. It is known that a very large flood occurred in 1903 in Lebanon, but there is not sufficient data to establish the exact height of the flood. The most recent major flood occurred during May 2010. The flood followed a historic two-day rainfall with a statistical precipitation recurrence interval of greater than 100-year event. Rainfall on May 1 and 2 resulted in record flood stages in the Bartons Creek Basin. Radar rainfall in the Bartons Creek Basin ranged from 10 to 12 inches; gage rainfall recorded 10 inches during the event. Numerous bridges on secondary roads and railroads were either damaged or washed away. Floodwaters in the Lebanon Public Square reached as high as 3 feet in May 1979, 4 feet in August 1939, and 2.5 feet in May 2010. Less widespread, more localized flooding also occurs throughout the basin at greater frequencies. Flooding can be the result of widespread major rain events or small intense storms and thunderstorms.

Flooding occurs throughout the Bartons Creek Basin, with the major damage centers being on Sinking Creek. There are also several homes on Bartons Creek that lie in the floodway. The largest damage center, the one of most concern to the City of Lebanon, is the Lebanon Public Square. Sinking Creek, a tributary of Bartons Creek, flows underneath the west side of the Lebanon Public Square. Lebanon, Tennessee, CAP Section 205 study focused on Sinking Creek based on two primary factors: feedback from the City and the locations of the main damage centers, which lie along Sinking Creek.

In a feasibility-level evaluation, several alternative solutions are evaluated to identify the most economically viable solution. These alternatives are formulated by considering various combinations of structural and nonstructural measures. Structural flood risk management strategies include channel modifications and diversions; modification of culverts and/or bridges; modification of detention structures, retention structures, and peak flow control structures; and implementation of other stream restoration projects throughout the watershed where measures are needed to slow velocities or allow the stream to reclaim an abandoned floodplain. Nonstructural flood risk management actions include acquisition and removal of flood-prone structures in the floodplain or floodway; protection or improvement of existing open space through easements and acquisitions; elevation and flood-proofing of existing structures where applicable; and creation, enhancement, or restoration of wetlands to increase floodplain storage capacity and restore hydrologic function. Other nonstructural options being considered include flood warning systems and stage gages, temporary evacuation plans, and enhanced local management and regulation of the floodplain.

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 Bartons Creek Watershed, Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report (hereinafter: Bartons Creek 205 IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers

(USACE), Engineer Circular (EC) *Review Policy for Civil Works* (EC 1165-2-217) (USACE, 2018) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the Bartons Creek 205 IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the schedule followed in executing the IEPR. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE in the final Work Plan according to the schedule listed in Table A-1. Appendix D presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Bartons Creek 205 IEPR.

2. PURPOSE OF THE IEPR

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

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

In this case, the IEPR of the Bartons Creek 205 was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-217). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

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

Battelle identified, screened, and selected three panel members to participate in the IEPR based on their expertise in the following disciplines: planning formulator/economist, environmental law compliance specialist, and hydraulic and hydrology (H&H) engineer. The Panel reviewed the Bartons Creek 205 documents and produced two Final Panel Comments in response to 16 charge questions provided by USACE for the review. This charge included two overview questions and one public comment question

added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

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

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

4. RESULTS OF THE IEPR

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

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2018) in the Bartons Creek 205 IEPR review documents. The following summarizes the Panel's findings.

Based on the Panel's review, the report is well-written, is concise, and provides excellent supporting documentation on engineering, environmental, economic, and plan formulation issues. The Panel believes the project team assessed the flooding issues and developed a sensible range and number of alternatives. The alternatives were evaluated properly, and the appropriate conclusions were drawn. The Panel offers up two low-level comments: one suggesting ways of clarifying the planning objectives, and the other asking for clarification on whether the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) was consulted regarding the potential for prime/unique farmlands in the area.

4.2 Final Panel Comments

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

Final Panel Comment 1

The language used to describe the planning objectives varies throughout the review documents, causing confusion.

Basis for Comment

The problem statement in the Executive Summary is clearly stated, as follows: “Lebanon experiences damages from flooding due to historic encroachment into the floodplain, which causes a loss of flood storage capacity and insufficient flow capacity or flow restrictions in the Bartons Creek Watershed.” Following the problem statement, the objectives are clearly stated: in short, a reduction both in flood risk and in damages to structures/critical infrastructure along Sinking Creek by the year 2025.

However, subsequent references to the objectives include variations of the objectives. In Table 11 of the Detailed Project Report and Environmental Assessment (DPR/EA), there is an evaluation of the ability of each plan to meet the planning objectives and avoid the constraints. The second objective listed is “maintain or improve the environment”, which would seem to be more of a constraint, rather than an objective for a Section 205 project.

In Section 4.2.3, Step 5 of the eight-step decision-making process (outlined in Executive Order [EO] 11988) includes the following planning objective: “Maintain or improve the environment, including aquatic habitat,” which similarly would seem to be more of a constraint, rather than an objective for a Section 205 project.

Section 3.2.1 relates the planning objectives with respect to National Economic Development (NED) principals, specifically: “Reduce flood damages to structures located along Sinking Creek by the year 2025” and “Reduce flood risk to critical infrastructure along Sinking Creek by the year 2025.”

While the minor differences in the stated objectives do not detract from the report’s conclusions, the decision document would be improved by providing consistent objectives throughout the DPR/EA.

Significance – Low

A clear discussion of the objectives would explain how the process for determining the Tentatively Selected Plan was consistent with the Section 205 authority.

Recommendation for Resolution

1. Review the objectives cited above, and revise the discussion to clarify their status as objectives or constraints.

Final Panel Comment 2

It is unclear whether the USDA NRCS was consulted in the determination of the potential for prime/unique farmland.

Basis for Comment

The project site is described as cattle pasture and therefore has the potential to be prime/unique farmland. In Table 26 of the DPR/EA, the finding for prime/unique farmland is “N/A,” which indicates that the project area does not contain prime, unique, statewide, or local important farmland. However, no documentation is provided to support the determination that the project area is not prime/unique farmland—for example, by soil map review and/or consultation with the USDA NRCS.

Significance – Low

The lack of documentation does not negate the project sponsor’s determination, but including the rationale for the finding would strengthen the demonstration of National Environmental Policy Act (NEPA) compliance.

Recommendation for Resolution

1. In Section 6.4 of the DPR/EA, describe how it was determined that the project area does not contain prime/unique farmland.

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

APPENDIX A

IEPR Process for the Bartons Creek 205 Project

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

Table A-1 presents the major milestones and deliverables of the Bartons Creek 205 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 December 12, 2018. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the PDF printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) by April 22, 2019. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table A-1. Major Milestones and Deliverables of the Bartons Creek 205 IEPR

Task	Action	Due Date
1	Award/Effective Date	11/9/2018
	Review documents available	12/12/2018
	Public comments available	2/5/2019
	Battelle submits draft Work Plan ^a	11/20/2018
	USACE provides comments on draft Work Plan	11/29/2018
	Battelle submits final Work Plan ^a	12/4/2018
2	Battelle submits list of selected panel members ^a	11/29/2018
	USACE confirms the panel members have no COI	12/3/2018
3	Battelle convenes kick-off meeting with USACE	11/19/2018
	Battelle convenes kick-off meeting with panel members	12/20/2018
	Battelle convenes kick-off meeting with USACE and panel members	12/20/2018
4	Panel members complete their individual reviews	1/23/2019
	Panel members provide draft Final Panel Comments to Battelle	2/5/2019
	Battelle sends public comments to panel members for review	2/5/2019
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	2/7/2019
	Panel finalizes Final Panel Comments	2/12/2019
5	Battelle submits Final IEPR Report to USACE ^a	2/15/2019
6 ^b	Battelle convenes Comment Response Teleconference with panel members and USACE	To Be Determined if needed
	Battelle submits PDF printout of DrChecks project file ^a	No later than 4/22/2019
	Contract End/Delivery Date	10/30/2019

^a Deliverable.

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

At the beginning of the Period of Performance for the Bartons Creek 205 IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 16 charge questions provided by USACE, two overview questions and one public comment question added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

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

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

Review Documents	No. of Review Pages
Bartons Creek Watershed, Lebanon, TN - Section 205, Flood Risk Management Feasibility Report and Environmental Assessment	75
Appendix A – H&H	44
Appendix B – Civil Design	20
Appendix C – HTRW	12
Appendix D – Real Estate	20
Appendix E – Cost Estimate**	60
Appendix F – Economics	45
Appendix G – Environmental	22
Appendix H – 106 Summary	2
Public Comments	3
Total Number of Review Pages	315

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

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

About halfway through the review, Battelle submitted 36 panel member questions to USACE asking for clarification regarding different aspects of the project. USACE provided written responses to all 36 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 Bartons Creek 205 IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with the other panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Panel Comments:** Each Final Panel Comment was presented as part of a four-part structure:

1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see descriptions below)
 4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.
 5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.
 - Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, two 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 one state agency letter which represented the sole public comment received for the Bartons Creek 205 project from USACE. Battelle then sent the public comment 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 confirmed that no new issues or concerns were identified in the agency letter.

A.6 Final IEPR Report

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

A.7 Comment Response Process

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

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APPENDIX B

Identification and Selection of IEPR Panel Members for the Bartons Creek
205 Project

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B.1 Panel Identification

The candidates for the Bartons Creek Watershed, Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report (hereinafter: Bartons Creek 205 IEPR) Panel were evaluated based on their technical expertise in the following key areas: planning formulator/economist, environmental law compliance specialist, and hydraulic and hydrology (H&H) engineer. These areas correspond to the technical content of the review documents and overall scope of the Bartons Creek 205 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 USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. Guidance in OMB (2004, p. 18) states,

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

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Bartons Creek 205

1. Previous and/or current involvement by you or your firm in the Bartons Creek Watershed, Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report (Bartons Creek 205) and related projects.
2. Previous and/or current involvement by you or your firm in flood control and Bartons Creek Watershed.
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 related to Bartons Creek 205 or related projects.
4. Current employment by the U.S. Army Corps of Engineers (USACE).

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Bartons Creek 205

5. Previous and/or current involvement with paid or unpaid expert testimony related to Bartons Creek 205.
6. Previous and/or current employment or affiliation with the non-Federal sponsors or any of the following cooperating Federal, state, county, local and regional agencies, environmental organizations, and interested groups (*for pay or pro bono*):
 - City of Lebanon, Tennessee.
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to Bartons Creek Watershed.
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Nashville District.
9. Previous or current involvement with the development or testing of models that will be used for, or in support of, the Bartons Creek 205 project.
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Nashville District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Nashville District. Please explain.
11. Any previous employment by USACE as a direct employee, notably if employment was with the Nashville 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 Nashville District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood management, and include the client/agency and duration of review (approximate dates).
14. Pending, current, or future financial interests in contracts/awards from USACE related to the Bartons Creek 205 project.
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Bartons Creek 205

16. Significant portion of your personal or office’s revenues within the last three years came from City of Lebanon, Tennessee, contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Bartons Creek 205 project.
18. Participation in relevant prior and/or current Federal studies related to the Bartons Creek 205 project.
19. Previous and/or current participation in prior non-Federal studies related to the Bartons Creek 205 project.
20. Has your research or analysis been evaluated as part of the Bartons Creek 205 project?
21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.

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

B.2 Panel Selection

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

Table B-1. Bartons Creek 205 IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Planning Formulator / Economist					
David Bastian	Independent consultant	Annapolis, MD	M.S., River Engineering	Yes	36
H&H Engineering					
Bruce Halverson	Kleinschmidt Associates	Madison, WI	M.S., Civil Engineering	Yes	36
Environmental Law Compliance Specialist					
Alane Young	Covington Civil & Environmental, LLC	Gulfport, MS	M.S., Geology	N.A.	32

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 on the panel members and their areas of technical expertise is given in Section B.3.

Table B-2. Bartons Creek 205 IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Bastian	Halverson	Young
Planning Formulator / Economist			
Minimum of 15 years of demonstrated experience in economics and planning	X		
M.S. degree or higher in economics (waived by USACE due to years of experience)	X		
Familiarity with the Civil Works flood risk management projects	X		
Thorough understanding of use of models similar to the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA) software program	X		
Water resource planning experience in flood risk management plan formulation	X		
Familiarity with CAP Section 205 flood risk management projects	X		
H&H Engineering			
Minimum of 15 years of experience directly related to H&H engineering		X	
Registered professional engineer (P.E.)		X	
Understanding of open channel dynamics		X	
Familiarity with HEC River Analysis System (HEC-RAS) and HEC Hydrologic Modeling System (HEC-HMS)		X	

Table B-2. Bartons Creek 205 IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Bastian	Halverson	Young
Environmental Law Compliance Specialist			
At least 15 years of experience directly related to water resource environmental evaluation or review and the National Environmental Policy Act (NEPA) process analysis			X
Must have a biological or environmental background that is familiar with the project area and environmental impact analysis and mitigation			X
Familiarity with fish and wildlife habitat and species, socioeconomic factors, and cultural resources that may be affected by the project alternative in the study area and region			X
Familiarity with and experience with U.S. Fish and Wildlife Service (USFWS) Habitat Evaluation Procedures (HEP), the Clean Water Act, and the Endangered Species Act.			X

B.3 Panel Member Qualifications

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

Name	David Bastian, P.E.
Role	Planning Formulator / Economist
Affiliation	Independent consultant

Mr. Bastian is an independent consultant and P.E. for David Bastian Consulting in Annapolis, Maryland. His work specializes in USACE feasibility studies and their technical and policy compliance, adherence to plan formulation, and review of feasibility studies incorporating incremental cost analysis, ecosystem restoration, flood risk reduction, deep draft navigation, dredged material disposal, and hydraulic and river engineering. He earned his B.S. in civil engineering from the Georgia Institute of Technology and an M.S. in river engineering from Delft University, Holland.

Mr. Bastian has 36 years of experience with USACE and as a contractor/consultant on USACE projects involving feasibility studies and public works planning, all based on the USACE six-step planning process. As a reviewer at HQ-USACE, he became familiar with and has direct experience with Engineer Regulation (ER) 1105-2-100 (Principles and Guidelines) as well as other USACE engineering regulations, manuals, and pamphlets and continues to use and stay familiar with the “planning community toolbox.” He co-authored the USACE Planner’s Workshop Manual. His project history has resulted in his review of and collaboration on more than 100 USACE reports evaluating and comparing alternative plans. Mr. Bastian is a practitioner of ER 1105-2-100, including Appendix F, whose guidance specifically addresses the CAP. He is aware that General Projects implemented under Section 205, Flood Control Act of 1948, as amended, are formulated for structural or non-structural measures for flood damage reduction in accordance with current policies and procedures governing projects of the same type specifically authorized by Congress (as outlined in Appendix E of ER 1105-2-100). As such, he

understands that benefit and cost, risk and uncertainty, cost effectiveness, and incremental cost analyses are to be undertaken using procedures appropriate for the scope and complexity of the project.

Mr. Bastian has over 20 years of experience in flood risk evaluation and has worked directly to identify and evaluate flood risk. For nine years, he was involved in the coastal economic evaluation for coastal Louisiana restoration, the greater New Orleans hurricane and storm damage risk reduction system, and four other study areas along the Louisiana and Texas coasts. His extensive flood risk reduction review experience includes the Delaware River Basin Comprehensive Flood Risk Management Interim Feasibility Study and Integrated Environmental Assessment for New Jersey (2016) and the Souris River Basin Integrated Feasibility Report/Environmental Assessment (2017). He helped author and/or provide policy and technical compliance to the following studies: Upper Turkey Creek, Johnson & Wyandotte Counties, Kansas, Flood Risk Management Project; Kansas City Local Flood Protection Project (2005-2006); Kansas City, Kansas, and Kansas City, Missouri, Topeka Local Flood Damage Reduction Project (2006-2007); and Mississippi River Levee System (Units L-455 & R471-460), St. Joseph, Missouri/Elwood, Kansas (2006-2007) study.

Mr. Bastian is familiar with large, complex Civil Works projects with high public and interagency interests through his extensive involvement with the Louisiana Coastal Study area pre- and post-Hurricane Katrina. Mr. Bastian is familiar with USACE flood risk and hurricane/coastal damage risk reduction analysis and economic benefit calculations, including the use of standard USACE computer programs such as the HEC Flood Impact Analysis (HEC-FIA) modeling program. He has reviewed HEC-FIA and other model applications and their outputs for several flood risk reduction projects for technical economic justification.

During his career, Mr. Bastian has developed economic input databases for deep-draft navigation studies at the Institute for Water Resources (IWR) (1980-1987); evaluated deep-draft economic feasibility for enlarging the Panama Canal (1987-1993); reviewed feasibility studies for economic justification (1993-1998) at USACE Headquarters (HQ-USACE); and reviewed and/or authored planning and economic analyses for various USACE projects (2001-present), including hurricane and storm damage risk reduction analyses for the New Orleans District, its architectural/engineering firms, and non-Federal sponsors (2006-2011).

Since 1993, Mr. Bastian has reviewed USACE studies with a focus on evaluating and comparing alternative plans for compliance with plan formulation processes, procedures, and standards. Since 2001, he has participated in the preparation of the Kansas City, Turkey Creek, Texas City, and Boardman flood risk management and post-Hurricane Katrina and Texas City hurricane and storm damage risk reduction studies. He also has reviewed the Blanchard environmental restoration study and various dam safety studies regarding plan formulation compliance and economic justification.

Mr. Bastian's experience at HQ-USACE and as a contractor/consultant on USACE projects includes applying ER 1105-2-100 to projects subject to Civil Works project evaluations, all of which involved the six-step planning process. During his career, he has reviewed and collaborated on more than 100 USACE reports evaluating and comparing alternative plans. He also has direct experience with other USACE engineer regulations, manuals, and pamphlets and was the co-author of the USACE Planner's Workshop Manual.

Mr. Bastian has evaluated and conducted National Economic Development (NED) analysis procedures as they relate to flood risk management and to hurricane and coastal storm damage risk reduction. Specifically, for the Kansas City, Turkey Creek, Texas City, and Boardman studies, he evaluated

traditional NED plan benefits associated with flood risk management and evaluated application of HEC-FDA software.

Mr. Bastian’s previous employment at USACE included positions as Deputy Chief of Staff for Support, Office Chief of Engineers; Assistant Director of Civil Works, Office Chief of Engineers; technical and policy compliance review expert, Washington Level Review Center; and navigation research, USACE IWR. He has served as a USACE Washington-level technical and policy compliance review expert and managed interdisciplinary reviews of over 70 feasibility reports. Mr. Bastian’s participation in professional societies includes the American Society of Civil Engineers, the American Association of Port Authorities, the Permanent International Association of Navigation Congresses, and the Western Dredging Association.

Name	Bruce Halverson, P.E.
Role	Hydrology and Hydraulic Engineering
Affiliation	Kleinschmidt Associates

Mr. Halverson is a senior engineering consultant with Kleinschmidt Associates. He specializes in analyses of extreme hydrologic events and the quantification of their effects, risk analyses and the development of H&H designs, use of modeling systems, and computer programming related to hydraulic modeling. He earned an M.S. in civil engineering from Louisiana State University, is a registered P.E. in Illinois and Wisconsin, and is a Certified Floodplain Manager.

Mr. Halverson is Kleinschmidt’s primary quality control (QC) reviewer and modeling strategist for all H&H projects. He has extensive experience with projects involving risk, uncertainty, frequency, and damage potential assessments. One example of this experience is the hydrologic and hydrodynamic modeling he conducted after Hurricane Katrina for the USACE Interagency Performance Evaluation Task Force. This modeling included a HEC Hydrologic Modeling System (HEC-HMS) model to compute the runoff from the hurricane’s overnight rainfall and a HEC River Analysis System (HEC-RAS) unsteady-state model that featured 100 storage areas, more than 80 hydraulic structures, 34 miles of interconnected canals, and 4 pump stations. The end results of the modeling were flood inundation approximations which will be used to evaluate various remediation plans for dealing with future hurricanes. Mr. Halverson has had substantial involvement as technical advisor or primary investigator for more than 30 large riverine modeling projects, including simulations of historic flood events, dam failure analyses, or design events such as Probable Maximum Floods. These rivers include the Connecticut River, Wisconsin River, Broad River (South Carolina), Winooski River (Vermont), Clinton River (Michigan), and St. Joseph River (Michigan).

Mr. Halverson has experience with many different USACE modeling packages, including HEC-RAS, HEC-HMS, HEC-FDA, HEC Geospatial River Analysis System (HEC-GeoRAS), HEC Geospatial Hydrologic Modeling System (HEC-GeoHMS), HEC Data Storage System (HEC-DSSVue), HEC Statistical Software Package (HEC-SSP), and their predecessor models. For the Section 205 Flood Damage Reduction Study for Blacksnake Creek (St. Joseph, Missouri), Mr. Halverson was responsible for performing H&H modeling to determine if there was a reasonable expectation that remedial measures would be cost-effective and warrant Federal interest. The modeling effort included the use of XP Solutions’ XP-SWMM modeling software and USACE’s HEC-RAS, as well as HEC-FDA in conjunction with the HEC-RAS model results. He also performed flood frequency and flood damage risk assessment for the Belle Isle Flood Damage Reduction Project (Monona, Wisconsin), which included the development

of flood risk statistics and annual expected damages used to determine eligibility for Federal Emergency Management Agency (FEMA) flood damage mitigation funding.

Mr. Halverson recently served as the modeling expert for the Chicago District USACE Technical Review Committee for Lake Michigan Diversion Accounting. For that effort, his primary responsibility was to review procedures and models used to develop flow diversion quantities from Lake Michigan.

Mr. Halverson is a member of the Association of State Floodplain Managers, Society of American Military Engineers, and Association of State Dam Safety Officials. He also has served on the Board of Directors for the Midwest Hydro Users Group.

Name	Alane Young
Role	Environmental Law Compliance Specialist
Affiliation	Covington Civil & Environmental, LLC

Ms. Young is a project manager/senior geologist at Covington Civil & Environmental, LLC. She earned her M.S. in geology from Mississippi State University in 1986. She has 32 years of experience in managing environmental projects. Her key responsibilities through her career have been preparing National Environmental Policy Act (NEPA) environmental documentation, including categorical exclusions and environmental assessments (EAs), and assisting in the preparation of environmental impact statements (EISs). Her expertise also includes performing Phase I and Phase II environmental site assessments (ESAs), site characterizations, soil and groundwater remediation projects, wetland delineations, and environmental permitting. She also has managed U.S. Environmental Protection Agency Brownfield Assessments Grants.

Ms. Young is an expert in compliance with environmental laws, policies, and regulations. She recently served as the environmental science/NEPA expert for the Integrated Draft Feasibility Study and Environmental Impact Statement (FS/EIS), Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi (January 2018 – October 2018). Her responsibility was to review the draft FS/EIS for compliance with Council on Environmental Quality regulations for implementing NEPA, and specifically compliance with the following acts, executive orders and USACE policies: Endangered Species Act, Fish and Wildlife Coordination Act, Clean Air Act, Clean Water Act, Magnuson-Stevens Fishery Conservation and Management Act, National Historic Preservation Act, Bald and Golden Protection Act, Migratory Bird Treaty Act, Farmland Protection Policy Act, Federal Water Project Recreation Act, Resource Conservation and Recovery Act, Executive Order (EO) 11988 Floodplain Management, EO 11990 Protection of Wetlands, EO 12898 Environmental Justice, EO 13112 Invasive Species, EO 13690 Flood Risk Management, energy requirements and conservation potential, and USACE policy on climate change adaptation. She reviewed the project’s Habitat Evaluation Procedures (HEP) report, which included an aquatic evaluation of the post-construction aquatic habitat conditions, especially impacts to obligate and facultative riverine guilds. Her responsibilities also included review of the wetland delineation and determination, the Phase I cultural resources survey, and the environmental evaluation of hazardous, toxic and radioactive waste (HTRW) sites.

Ms. Young has experience with water resource environmental evaluation and review. She has been integrally involved in ecosystem and water resource project development, planning, permitting, implementation, management, and monitoring of Mississippi’s Natural Resource Damage Assessment

(NRDA) Early Restoration Phases I, III, and IV projects, with over \$100 million in projects funded. She works with the Mississippi DWH Trustee Implementation Group to develop NRDA restoration projects for NRDA settlement monies in accordance with the Programmatic Damage Assessment and Restoration Plan and Programmatic EIS. Following Hurricane Katrina in 2005, Ms. Young was responsible for NEPA compliance for 21 Hurricane Katrina disaster recovery projects (funded by FEMA and the U.S. Department of Housing and Urban Development) across the Mississippi Gulf Coast, and she was task lead for NEPA environmental compliance for the Galveston County (Texas) Housing Assistance Program Round 2 for Hurricane Ike. These disaster recovery projects required preparation of NEPA EAs and in some cases included Phase I ESAs, Phase II ESAs, and environmental remediation.

Ms. Young is familiar with U.S. Fish and Wildlife Service (USFWS) HEPs and other methods of determining non-monetary values of fish and wildlife resources and evaluating suitability, assessing habitat impacts, and formulating mitigation. Ms. Young was actively involved in the development of the Grand Bay National Estuarine Research Reserve/National Wildlife Refuge Land Acquisition and Habitat Management project. The project consisted of acquisition of up to 8,000 acres and land management of up to 17,500 acres. Historic project development included Habitat Equivalency Analysis (HEA) to determine the marsh benefits from acquisition and management actions. Monitoring data will be collected to assess project success using the USFWS Rapid Assessment Metrics to Enhance Wildlife Habitat and Biodiversity within Southern Open Pine Ecosystems, which includes metrics on wet longleaf and slash pine flatwoods and savannas.

Ms. Young was also actively involved in the development of the Hancock County Marsh Living Shoreline Project, which includes the construction of approximately six miles of breakwater (Living Shoreline) and the creation of 46 acres of subtidal reef and 46 acres of marsh. Project development included HEA to determine marsh benefits resulting from reduced shoreline erosion and the creation of marsh. Project development also included Resource Equivalency Analysis to determine the biomass of secondary productivity that will result from the colonization of the breakwater, establishment of the living shoreline/reef, and colonization of the subtidal reef. Monitoring data will be collected to assess project success.

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APPENDIX C

Final Charge for the Bartons Creek 205 IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Bartons Creek Watershed, Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report

This is the final Charge to the Panel for the Bartons Creek 205 IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on December 10, 2018. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

The study area is the entire Bartons Creek River watershed, which lies entirely within Wilson County, Tennessee. The city of Lebanon, Tennessee, lies within Wilson County. Though flood-related damages occur at numerous locations within the watershed, the primary damage center is the Lebanon Square. The project sponsor is the City of Lebanon.

The Bartons Creek basin has a long history of flood damages. Major flooding with widespread impacts occurred in 1928, 1939, 1962, 1963, 1979, 1989, and 2010. Since 1903, the flood of record known on Bartons and Sinking Creek in Lebanon occurred on August 3, 1939. It is known that a very large flood occurred in 1903 in Lebanon, but there is not sufficient data to establish the exact height of the flood. The most recent major flood occurred during May 2010. The flood followed a historic two-day rainfall with a statistical precipitation recurrence interval of greater than 100-year event. Rainfall on May 1 and 2 resulted in record flood stages in the Bartons Creek Basin. Radar rainfall in the Bartons Creek Basin ranged from 10 to 12 inches; gage rainfall recorded 10 inches during the event. Numerous bridges on secondary roads and railroads were either damaged or washed away. Floodwaters in the Square reached as high as 3 feet in May 1979, 4 feet in August 1939, and 2.5 feet in May 2010. Less widespread, more localized flooding also occurs throughout the basin at greater frequencies. Flooding can be the result of widespread major rain events or small intense storms and thunderstorms.

Flooding occurs throughout the Bartons Creek basin with the major damage centers being on Sinking Creek. There are also several homes on Bartons Creek that lie in the floodway. The largest damage center, the one of most concern to the City of Lebanon, is the Lebanon Public Square. Sinking Creek, a tributary of Bartons Creek, flows underneath the west side of the Lebanon Public Square. The City of Lebanon study would focus on Sinking Creek based on feedback from the City and because the main damage centers are along Sinking Creek.

In a feasibility-level evaluation, several alternative solutions are evaluated to identify the most economically viable solution. These alternatives are formulated by considering various combinations of structural and nonstructural measures. Structural flood risk management strategies include channel modifications and diversions; modification of culverts and/or bridges; modification of detention structures, retention structures, and peak flow control structures; and implementation of other stream restoration projects throughout the watershed where measures are needed to slow velocities or allow the stream to reclaim an abandoned floodplain. Nonstructural flood risk management actions considered include acquisition and removal of flood-prone structures in the floodplain or floodway; protection or improvement of existing open space through easements and acquisitions; elevation and flood-proofing of existing structures where applicable; and creation, enhancement, or restoration of wetlands to increase floodplain storage capacity and restore hydrologic function. Other nonstructural options being considered include flood warning systems and stage gages, temporary evacuation plans, and enhanced local management and regulation of the floodplain.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Bartons Creek Watershed, Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report (hereinafter: Bartons Creek 205 IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Review Policy for Civil Works* (Engineer Circular [EC] 1165-2-217, dated February 20, 2018), and the Office of Management and Budget's (OMB's) *Final Information Quality Bulletin for Peer Review* (December 16, 2004). Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

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

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

DOCUMENTS PROVIDED

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

Review Documents	Subject Matter Experts			
	Approx. No. of Review Pages	Planning Formulator/ Economist	Hydraulic and Hydrology (H&H) Engineering	Environmental Law Compliance Specialist
Bartons Creek Watershed, Lebanon, TN - Section 205, Flood Risk Management Feasibility Report and Environmental Assessment	75	75	75	75
Appendix A – H&H	44		44	

Review Documents	Subject Matter Experts			
	Approx. No. of Review Pages	Planning Formulator/ Economist	Hydraulic and Hydrology (H&H) Engineering	Environmental Law Compliance Specialist
Appendix B – Civil Design	20		20	
Appendix C – HTRW	12			12
Appendix D – Real Estate	20	20		
Appendix E – Cost Estimate**	60	60		
Appendix F – Economics	45	45		
Appendix G – Environmental	22			22
Appendix H – 106 Summary	2			2
Public Comments *	20	20	20	20
Total Number of Review Pages	315	220	159	131

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

**12 pages of appendix, the additional pages are all attachments

Documents for Reference

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

SCHEDULE & DELIVERABLES

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

Task	Action	Due Date
Attend Meetings and Begin Peer Review	Subcontractors complete mandatory Operations Security (OPSEC) training	1/6/2019
	Battelle sends review documents to panel members	12/21/2018
	Battelle convenes kick-off meeting with panel members	12/20/2018
	Battelle convenes kick-off meeting with USACE and panel members	12/20/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	1/8/2019
Prepare Final Panel Comments and Review Public Comments	Panel members complete their individual reviews	1/23/2019
	Battelle provides talking points for Panel Review Teleconference to panel members	1/25/2019
	Battelle convenes Panel Review Teleconference	1/28/2019
	Battelle provides Final Panel Comment templates and instructions to panel members	1/29/2019
	Panel members provide draft Final Panel Comments to Battelle	2/4/2019
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	2/05/2019 - 2/11/2019
	Panel finalizes Final Panel Comments	2/12/2019
	Battelle receives public comments from USACE	2/12/2019
	Battelle sends public comments to Panel**	2/14/2019
	Panel completes its review of public comments	2/20/2019
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	2/21/2019
	Panel drafts Final Panel Comment for public comments, if necessary	2/25/2019
	Panel finalizes Final Panel Comment regarding public comments, if necessary	2/27/2019
Review Final IEPR Report	Battelle provides Final IEPR Report to panel members for review	3/1/2019
	Panel members provide comments on Final IEPR Report	3/5/2019
	*Battelle submits Final IEPR Report to USACE	3/7/2019
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	3/14/2019
Comment/Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	3/18/2019
	Battelle convenes teleconference with Panel to review the Comment Response process	3/18/2019
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	3/18/2019
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	4/8/2019
	USACE PCX provides draft PDT Evaluator Responses to Battelle	4/12/2019

Task	Action	Due Date
	Battelle provides draft PDT Evaluator Responses to panel members	4/15/2019
	Panel members provide draft BackCheck Responses to Battelle	4/22/2019
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	4/23/2019
	Battelle convenes Comment Response Teleconference with panel members and USACE	4/24/2019
	USACE inputs final PDT Evaluator Responses to DrChecks	5/1/2019
	Battelle provides final PDT Evaluator Responses to panel members	5/2/2019
	Panel members provide final BackCheck Responses to Battelle	5/7/2019
	Battelle inputs panel members' final BackCheck Responses to DrChecks	5/8/2019
	*Battelle submits PDF printout of DrChecks project file	5/9/2019

* Deliverables

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

CHARGE FOR PEER REVIEW

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

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

General Charge Guidance

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

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

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

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

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

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

Independent External Peer Review of the Bartons Creek Watershed. Lebanon, Tennessee, Continuing Authorities Program (CAP), Section 205, Flood Risk Management Feasibility Report

Charge Questions and Relevant Sections as Supplied by USACE

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

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

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

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

Broad Evaluation Charge Questions

1. Is 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 models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives.
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 significant 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.

For the tentatively selected plan, assess whether:

13. The models used to assess life safety hazards are appropriate.
14. The assumptions made for the life safety hazards are appropriate.
15. The quality and quantity of the surveys, investigations, and engineering are sufficient for a concept design considering the life safety hazards and to support the models and assumptions made for determining the hazards.
16. The analysis adequately addresses the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project.

Battelle Summary Charge Questions to the Panel Members¹

Summary Questions

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

¹ Questions 17 through 19 are Battelle-supplied questions and should not be construed or considered part of the list of USACE-supplied questions. These questions were delineated in a separate appendix in the final Work Plan submitted to USACE.

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

Public Comment Questions

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

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APPENDIX D

Conflict of Interest Form

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David Kaplan
USACE, Institute for Water Resources
October 24, 2018
C-2

Conflicts of Interest Questionnaire
Independent External Peer Review

**Bartons Creek Watershed, Lebanon, Tennessee, Continuing Authorities Program (CAP), Section
205, Flood Risk Management Feasibility Report**

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

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

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

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

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

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

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

No additional information to report.



Courtney Brooks

October 24, 2018

Date

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal

BATTELLE

It can be done