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Final Independent External Peer Review Report Cedar River – Cedar Rapids, Iowa, Flood Risk Management Feasibility Study with Integrated Environmental Assessment

Prepared by
Battelle Memorial Institute

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

Contract No. W911NF-07-D-0001
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October 28, 2010

SHORT-TERM ANALYSIS SERVICE (STAS)

on

Final Independent External Peer Review Report
Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study with Integrated Environmental Assessment

by

Battelle
505 King Avenue
Columbus, OH 43201

for

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Scientific Services Program

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FINAL
INDEPENDENT EXTERNAL PEER REVIEW REPORT
for the

Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study with Integrated Environmental Assessment

EXECUTIVE SUMMARY

The Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study is a Congressionally authorized study undertaken by the U.S. Army Corps of Engineers (USACE) together with the non-Federal sponsor, the City of Cedar Rapids, to investigate and evaluate flood risk management options within the City.

The study area for the Cedar Rapids Flood Risk Management Feasibility Study is located in Linn County, Iowa. Downtown Cedar Rapids is on the left descending bank of the Cedar River, while the right descending bank consists of residential commercial and industrial areas. Most of the land area on either side of the river lies within the 100-year floodplain. Historically, major floods in this area have been caused by a combination of rainfall and snowmelt or by heavy rainfall alone. On the Cedar River, the flood of record is the June 2008 event. In Cedar Rapids, the river crested above the 500-year flood stage. During this flood, 10 square miles of the city, including the entire downtown and nearby neighborhoods, were inundated and 20% of the City's population was evacuated. The flood caused an estimated $2.4 billion in damages. A total of 7,846 properties were damaged by the flood. All of the City's critical infrastructure was impacted by the flood. The City is still recovering from the June 2008 flood.

The project area consists of two main areas: the east and west sides of the Cedar River within the boundaries of the City of Cedar Rapids. The east side starts on the north end of town at J Avenue NE (just north of Water Treatment Plant) and proceeds through downtown to Cargill on the south end of town. The east side also includes (south and downstream of Cargill) the Cedar Valley neighborhood and the Water Pollution Control Facility. The west side starts above the Edgewood Bridge on the north of town in what is referred to as the "Edgewood Neighborhood" and progresses downstream to the Time Check Neighborhood (Ellis Park) and ends at the A Street Landfill.

USACE is conducting an Independent External Peer Review (IEPR) of the Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study with Integrated Environmental Assessment (hereinafter called the Cedar Rapids Flood Risk Management Feasibility Study). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to coordinate the IEPR of the Cedar Rapids Flood Risk Management Feasibility Study. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and was conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2010), USACE (2007), and

OMB (2004). This final report describes the IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

Four panel members were selected for the IEPR from more than 15 identified candidates. Based on the technical content of the Cedar Rapids Flood Risk Management Feasibility Study and the overall scope of the project, the final panel members were selected for their technical expertise in the following key areas: plan formulation, economics, hydraulic engineering, and environment/ecology. Although the Panel was disclosed to USACE, Battelle made the final decision on selecting the Panel.

The Panel received electronic versions of the Cedar Rapids Flood Risk Management Feasibility Study documents, totaling more than 1,700 pages, along with a charge that solicited comments on specific sections of the documents to be reviewed. The charge was prepared by Battelle to assist USACE in developing the charge questions that were to guide the peer review, according to guidance provided in USACE (2010) and OMB (2004). USACE was given the opportunity to provide comments and revisions, and subsequently approved the final charge questions.

The USACE Project Delivery Team briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review. In addition to this teleconference, a teleconference with USACE, the Panel, and Battelle was held halfway through the review period to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. The Panel produced more than 175 individual comments in response to the 50 charge questions.

IEPR panel members reviewed the Cedar Rapids Flood Risk Management Feasibility Study documents individually. The panel members then met via teleconference with Battelle to review key technical comments, discuss charge questions for which there were conflicting responses, 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, or low); and (4) recommendations on how to resolve the comment. Overall, 12 Final Panel Comments were identified and documented. Of these, two were identified as having high significance, six had medium significance, and four had low significance.

Table ES-1 summarizes the Final Panel Comments by level of significance. Detailed information on each comment is contained in Appendix A of this report.

Table ES-1. Overview of 12 Final Panel Comments Identified by the Cedar Rapids Flood Risk Management Feasibility Study IEPR Panel

Significance – High	
1	The analysis of existing cultural resources within the Cedar Rapids Flood Risk Management Feasibility Study Area (Study Area) remains to be completed, creating a potential for increased project costs.
2	The 2008 flood event created additional economic uncertainties such that existing and future project damage estimates need further justification.
Significance – Medium	
3	The costs and benefits of Alternative 1A-C require further justification because this alternative creates the greatest reduction in Expected Annual Damage (EAD) and may have a benefit-to-cost ratio (BCR) approaching 1.0.
4	The topic of Environmental Justice, as it relates to the Federally Supportable Plan (FSP), requires a more detailed examination.
5	The effects of project implementation on the borrow and disposal areas require further description and analysis.
6	The Cedar Rapids Flood Risk Management Feasibility Study (Study) should either clarify the rationale for the selection of the 1% (100-year) flood event as a project objective or restate the objective.
7	The economic analysis should consider the benefits of the existing flood protection system for the 'future without project' condition because this could affect BCR and the justification of the FSP.
8	The potential for erosion and sedimentation in the Cedar River due to project implementation needs to be addressed.
Significance – Low	
9	A summary of the justification to lower the contingency cost from 25 to 20% (Appendix B of the Study) and why it should be this low for this project should be presented in the Main Report.
10	Additional text is needed to clarify the hydrology of the subwatersheds on the protected side of the watershed, which have to be pumped during a flood event.
11	Section 3 of the Study contains potentially contradictory statements pertaining to watershed planning and flood risk for the future 'without project' conditions.
12	The Study could be strengthened by incorporating some of the material from the appendices into the Main Report.

The IEPR panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2010; p. D-4) in the Cedar Rapids Flood Risk Management Feasibility Study. Overall, the Study was well assembled, was comprehensive, and followed standard planning guidance. The Study met all of the objectives put forward to some extent; however, the degree to which it will meet some of the objectives is highly uncertain. The majority of the Panel's comments focused on the need

for more detail and clarification of certain considerations and assumptions utilized in determining the Federally Supportable Plan (FSP). The IEPR Panel recognized that the methods utilized to select the FSP were complicated by economic and cultural resource uncertainties such that existing and future project damage estimates may require further justification. The Study appropriately addressed environmental issues with the exception of potential downstream impacts of sediment loads due to changes in hydraulics, and the determination of, and impacts to, the final designated borrow area. The following statements summarize the Panel's findings, which are described in more detail in the Final Panel Comments (see Appendix A).

Plan Formulation Rationale: The Study covered a most complicated planning effort with the occurrence of such a large flood event in 2008. Even with this extraordinary event creating planning problems, the document was well written and did an excellent job of "telling the story." The general approach used in determining the FSP was well presented, followed planning guidance, and went through full iterations of planning. The report did not completely address effects on the borrow areas or the potential increased project costs related to cultural issues. Flood risk benefits of the existing system should be included in the analysis, which could potentially reduce the benefits of the FSP. Additional evaluation and documentation is recommended to support the FSP and to explain why Alternative 1A-C cannot be economically justified.

Economics: From an economics perspective, the Study executed a sound approach to develop estimates of flood damages and benefits, annual costs, and regional income and employment for all alternatives. However, it is suggested that an economic evaluation be introduced into the engineering analysis (of effectiveness of the existing Flood Control structures in the 'without project' condition) to strengthen the decision. In addition, the residual damages with 'project in place' may leave almost as many problems as 'without project' conditions.

Engineering: The engineering aspects of the study used current state-of-practice methods for hydrology, hydraulics, geotechnical, and structural engineering, resulting in a thorough feasibility level study. The hydrology and hydraulics also addressed uncertainty very well. The hydraulics section of the report was well written and the analysis was close to flawless, utilizing calibrated models and reflecting sound decisions. The geotechnical and environmental sections were sound.

Environmental: The report identified and addressed a wide array of environmental issues very well. Due to its focus on an urban area, there should be minimal impact to environmental resources. The report, however, did not thoroughly address the downstream impacts of potential project-induced erosion or deposition of sediment loads, nor did it adequately address the final disposition (i.e., condition and management) of borrow areas or potential disposal sites. Likewise, the impact on the west side of the project area resulting from the FSP (i.e., lack of west-side protection) needs to be addressed more thoroughly.

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LIST OF ACRONYMS

AAD	Average Annual Damages
ATR	Agency Technical Review
BCR	Benefit-to-Cost Ratio
COI	Conflict of Interest
DrChecks	Design Review and Checking System
EAD	Expected Annual Damage
FEMA	Federal Emergency Management Agency
FSP	Federally Supportable Plan
HTRW	Hazardous, Toxic, and Radioactive Waste
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
NED	National Economic Development
NTP	Notice to Proceed
OMB	Office of Management and Budget
SHSI	State Historical Society of Iowa
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WRDA	Water Resources Development Act

1. INTRODUCTION

The Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study is a Congressionally authorized study undertaken by the U.S. Army Corps of Engineers (USACE) together with the non-Federal sponsor, the City of Cedar Rapids, to investigate and evaluate flood risk management options within the City.

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USACE is conducting an Independent External Peer Review (IEPR) of the Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study with Integrated Environmental Assessment (hereinafter called the Cedar Rapids Flood Risk Management Feasibility Study [Study]). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to coordinate the IEPR of the Cedar Rapids Flood Risk Management Feasibility Study. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and was conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2010), USACE (2007), and OMB (2004). This final report describes the IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

The objective of the work described here was to conduct an IEPR of the Cedar Rapids Flood Risk Management Feasibility Study in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers Engineer Circular *Civil Works Review Policy* (EC No. 1165-2-209) (USACE, 2010), USACE CECW-CP memorandum *Peer Review Process* (USACE, 2007), and OMB bulletin *Final Information Quality Bulletin for Peer Review* (OMB,

2004). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels, was engaged to coordinate the IEPR of the Cedar Rapids Flood Risk Management Feasibility Study. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the existing environmental, economic, and engineering analyses contained in the Cedar Rapids Flood Risk Management Feasibility Study. Detailed information on the Final Panel Comments is provided in Appendix A.

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 (2010) and USACE (2007).

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 economic, engineering, and environmental analysis 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 Cedar Rapids Flood Risk Management Feasibility Study was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization under Section 501(c)(3) of the U.S. Internal Revenue Code with experience conducting IEPRs for USACE.

3. METHODS

This section describes the method followed in selecting the members of the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described by USACE (2010) and in accordance with USACE (2007) and OMB (2004) guidance. 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).

3.1 Planning and Schedule

After receiving the notice to proceed (NTP), 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., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan.

Table 1 defines the schedule followed in executing the IEPR. Due dates for milestones and deliverables are based on the NTP date of August 12, 2010. Note that the work items listed in Task 7 occur after the submission of this report. Battelle will enter the 12 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.

Table 1. Cedar Rapids Flood Risk Management Feasibility Study IEPR Schedule

TASK	ACTION	DUE DATE
1	**Notice to Proceed (NTP)**	8/12/2010
	Draft Review documents available	8/25/2010
	*Battelle submits draft Work Plan	8/31/2010
	USACE provides comments on draft Work Plan	9/2/2010
	Teleconference (if necessary)	9/2/2010
	*Battelle submits final Work Plan	9/8/2010
2	Battelle requests input from USACE on the COI questionnaire	8/19/2010
	USACE provides comments on COI	8/20/2010
	*Battelle submits list of selected panel members	9/1/2010
	USACE provides comments on selected panel members	9/2/2010
	Battelle completes subcontracts for panel members	9/15/2010
3	USACE provides final charge to Battelle	8/27/2010
4	USACE/Battelle kick-off meeting	8/24/2010
	Battelle sends final review documents to panel members	9/16/2010
	USACE/Battelle/Panel kick-off meeting	9/17/2010
	USACE/Battelle/Panel mid-review meeting	9/28/2010
	Panel members complete their review	10/5/2010
5	Convene Panel review teleconference	10/7/2010
	Battelle submits Working Draft Final Panel Comments to USACE	10/21/2010
	Panel members provide draft Final Panel Comments to Battelle	10/15/2010
6	*Battelle submits Final IEPR Report to USACE	10/28/2010
7	Battelle inputs Final Panel Comments to DrChecks; Battelle provides Final Panel Comment response template to USACE	10/29/2010
	USACE PDT provides draft Evaluator Responses and clarifying questions to Battelle	11/5/2010
	Teleconference between Battelle, IEPR Panel, and USACE PDT to discuss Final Panel Comments, draft responses, and clarifying questions	11/15/2010
	USACE inputs final Evaluator Responses in DrChecks	11/23/2010
	Battelle inputs the Panel's BackCheck Responses in DrChecks	11/302010
	*Battelle submits pdf printout of DrChecks project file	12/1/2010
	Project Closeout	2/7/2011

Deliverables are noted with an asterisk (*)

3.2 Identification and Selection of IEPR Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: plan formulation, economics, hydraulic engineering, and environment/ecology. These areas correspond to the technical content of the Cedar Rapids Flood Risk Management Feasibility Study and the overall scope of the Cedar Rapids Flood Risk Management Feasibility Study project.

To identify candidate panel members, Battelle reviewed experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle initially identified more than 15 candidates for the Panel, evaluated their technical expertise, and inquired about potential conflicts of interest. Of these, Battelle chose seven of the most qualified candidates and confirmed their interest and availability. Of the seven candidates, four were proposed for the final Panel and three were proposed as backup reviewers. Information about the candidate panel members, including brief biographical information, highest level of education attained, and years of experience, was provided to USACE for feedback. Battelle made the final selection of panel members according to the selection criteria described in the Work Plan.

The four proposed primary reviewers constituted the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed conflicts of interest, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or COIs.[1] These COI questions were intended to serve as a means of disclosure and to better characterize a potential candidate's employment history and background. 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.

- Involvement by you or your firm[2] in the Cedar River Cedar Rapids, Iowa Flood Risk Management Project, Feasibility Study Report with Integrated Environmental Assessment
- Involvement by you or your firm[2] in flood control, ecosystem restoration, and recreational restoration in the Cedar Rapids Metropolitan Area, Indian and Dry Run Watersheds, Cedar River Watershed, Cedar River, Cedar Rapid River, and Indian Creek

[1] Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "….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."

- Involvement by you or your firm[2] in the Cedar River Cedar Rapids, Iowa Flood Risk Management Project, Feasibility Study Report with Integrated Environmental Assessment related projects
- Current employment by the U.S. Army Corps of Engineers (USACE)
- Involvement with paid or unpaid expert testimony related to Cedar River Cedar Rapids, Iowa Flood Risk Management Project, Feasibility Study Report with Integrated Environmental Assessment
- Current or previous employment or affiliation with members of the cooperating agencies or local sponsors, including:
  USFWS, USEPA, Region 7, IADNR, Iowa Department of Agricultural and Land Stewardship, Sac & Fox Nation of Oklahoma, Sac and Fox of Missouri, Sac and Fox of Iowa, Iowa Tribe of Kansas and Nebraska, Iowa of Oklahoma, Ho Chunk Nation of Wisconsin, Menominee, Winnebago, Otoe-Missouria Tribe of Oklahoma, Yankton Sioux, Linn County Conservation Board, City of Cedar Rapids, Sierra Club, Iowa Chapter, Sierra Club, Cedar Rapids Chapter, The Nature Conservancy, Iowa Field Office, Izaak Walton League, Linn County Chapter, Audubon Society, State Historical Society of Iowa, National Park Service Eastern Office of Project Review, Community Development Division Iowa Department of Economic Development General Services Administration, US Department of Homeland Security, FEMA, Iowa Recovery Center, Midwest Office National Trust for Historic Preservation, Iowa Office of the State Archaeologist, National Czech & Slovak Museum & Library, Iowa Historic Preservation Alliance, National Park Service, Midwest Office, National Trust for Historic Preservation, Cedar Rapids Public Works Department, Re-build Iowa Organization, Iowa Homeland Security and Emergency Management Division (for pay or pro bono).
- Past, current or future interests or involvements (financial or otherwise) by you, your spouse or children related to Cedar Rapids Metropolitan Area, Indian and Dry Run Watersheds, Cedar River Watershed, Cedar River, Cedar Rapid River, and Indian Creek.
- 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 Rock Island District.
- Current firm[2] involvement with other USACE projects, specifically those projects/contracts that are with the Rock Island District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by the USACE as a direct employee or contractor (either as an individual or through your firm2) within the last 10 years, notably if those projects/contracts are with the Rock Island District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood control, ecosystem restoration, and

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

- Pending, current or future financial interests in Cedar River Cedar Rapids, Iowa Flood Risk Management Project, Feasibility Study Report with Integrated Environmental Assessment related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last 3 years came from USACE contracts.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to Cedar River Cedar Rapids, Iowa Flood Risk Management Project, Feasibility Study Report with Integrated Environmental Assessment.
- Participation in relevant prior Federal studies relevant to this project and/or Cedar River Cedar Rapids, Iowa Flood Risk Management Project, Feasibility Study Report with Integrated Environmental Assessment including:
    - Review of Reports (Preliminary Examination) for Flood Control on the Iowa and Cedar Rivers, Iowa and Minnesota, War Department, Corps of Engineers, Rock Island District, 01 July1946
    - House Document No 166, 89th Congress, 1st Session, Letter from the Secretary of the Army Transmitting a Letter from the Chief of Engineers, dated January 26, 1965
    - Floodplain Information, Cedar River, Linn County, Iowa, prepared for the State of Iowa, Iowa Natural Resources Council, by the U.S. Army Corps of Engineers, Rock Island District, October 1967
    - IowaCedar River Basin, Stage 2 Document, U.S. Army Corps of Engineers, Rock Island District, March 1980
    - IowaCedar River Basin Feasibility Report, Main Report, June 1982, U.S. Army Corps of Engineers, Rock Island District
    - Flood Insurance Study, County of Linn, Unincorporated Areas, June 15, 1982, Community No. 190829, Federal Emergency Management Agency
    - Flood Insurance Study, City of Cedar Rapids, Iowa, Linn County, Revised March 18, 1991, Community No. 190187, Federal Emergency Management Agency
    - Initial Assessment for Flood Damage Reduction – Section 205, Cedar Rapids, Linn County, Iowa, Cedar River, Indian Creek, and Dry Creek Watersheds and Time Check Levee, U.S. Army Corps of Engineers – Rock Island District, May 2004
    - Background Cultural Research and Geomorphological Investigation of Measures for the Cedar River Flood Risk Management Feasibility Study, Linn County, Cedar Rapids, Iowa. Volume I
    - Management Summary and Text, Volume II—Figures and Appendices A-F (Draft Report, BCA 1620, January). Prepared by Bear Creek Archeology, Inc., Cresco, Iowa under U.S. Army Corps of Engineers, Rock Island District Contract W912EK08D0002, Delivery Order 0016, Modifications 14. (2010)
- Participation in prior non-Federal studies relevant to this project and/or Cedar River Cedar Rapids, Iowa Flood Risk Management Project, Feasibility Study Report with Integrated Environmental Assessment:

- Stormwater Master Plan, Cedar Rapids Metropolitan Area/Indian and Dry Run Watersheds Utility Study, Linn County Regional Planning Commission, Prepared by Camp Dresser & McKee (CDM) Inc., The Sears Tower, Suite 450, 233 South Wacker Drive, Chicago, Illinois, April 1998
- City of Cedar Rapids – Framework Plan for the Reinvestment and Revitalization (River Corridor Redevelopment Plan) Sasaki and Associates, December 2008
- Cedar Rapids River Corridor Redevelopment Flood Mitigation Options Stanley Consultants Inc., March 2009
- City of Cedar Rapids, Flood Protection Study – Water Pollution Control Facilities, HDR Engineering, Inc., February 2009
- Flood Response Manual – City of Cedar Rapids, Iowa. Prepared By Cedar Rapids Public Works Department, March 2009
- Flood Abatement Study – Phase 1 Alliant Energy Company, Prairie Creek Station, Cedar Rapids, Iowa. URS, October 2008
- Cedar Rapids Area Inspections – Inspections of Pipelines, Five-in-One Dam, and Cedar Rapids Flood Walls. Anderson-Bogert Engineers, Inc, and Lambourne Env. Diving Service, October 2008

- 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:

[2] Includes any joint ventures in which your firm is involved.

In selecting the final members of the Panel from the list of candidates, Battelle chose experts who best fit the expertise areas and had no COIs. The four final reviewers were either affiliated with consulting companies or were independent engineering consultants. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. Although the Panel was disclosed to USACE, Battelle made the final decision on selecting the Panel. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning their review and within 1 day of their subcontracts being finalized, all 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, and other pertinent information for the Panel.

3.3 Preparation of the Charge and Conduct of the IEPR

Charge questions were provided by USACE and included in the draft and final Work Plans. In addition to a list of 50 charge questions/discussion points, the final charge included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report).

Battelle planned and facilitated a final kick-off meeting via teleconference, during which USACE presented project details to the Panel. Before the meeting, the IEPR Panel received an electronic version of the Cedar Rapids Flood Risk Management Feasibility Study documents and the final charge. A full list of the documents reviewed by the Panel is provided in Appendix B of

this report. The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle.

3.4 Review of Individual Comments

Prior to completion of the review of the Study documents, a teleconference with USACE, the Panel, and Battelle was held halfway through the review period to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. At the end of the review period, the Panel produced approximately 175 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. As a result of the review, Battelle was able to summarize the 175 comments into a preliminary list of 19 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 IEPR Panel Teleconference

Battelle facilitated a 4-hour teleconference with the Panel so that the panel experts, many of whom are from diverse scientific backgrounds, 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 IEPR report and decide which panel member would 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 high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance to the Panel.

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

At the end of these discussions, the Panel identified 12 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared 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 Cedar Rapids Flood Risk Management Feasibility Study.

- 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 the merged individual comments table, a summary 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 other IEPR 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 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, low; see description below)
  4. Recommendation 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: Describes a fundamental problem with the project that could affect the recommendation or justification of the project
  2. Medium: Affects the completeness or understanding of the reports/project
  3. Low: Affects the technical quality of the reports but will not affect the recommendation of the project.
- Guidance for Developing the Recommendation: The recommendation was to include specific actions that the 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).

At the end of this process, 12 Final Panel Comments were prepared and assembled. 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. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified using Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), searches of websites of universities or other compiled expert sites, and referrals. Battelle prepared a draft list of primary and backup candidate panel members (who were screened for availability, technical background, and COIs), and provided it to USACE for feedback. Battelle made the final selection of panel members.

An overview of the credentials of the final four primary members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 2. Cedar Rapids Flood Risk Management Feasibility Study IEPR Panel: Technical Criteria and Areas of Expertise

	Rogers	Antle	Zevenbergen	Newling
Plan Formulation (one expert needed)	**X**			
Expert from academia, public agency, or consulting firm with a minimum 10 years of demonstrated experience in public works planning	X			
Minimum 5 years of experience working directly with or for the USACE	X			
Minimum 5 years of experience dealing with USACE planning process as outlined in ER-1105-2-100 Planning Guidance Notebook, especially with regard to flood risk management studies, outlined in Appendix E as "Flood Damage Reduction"	X			
Degree in planning or related field	X			
Economics (one expert needed)		**X**		
Expert from academia, public agency, or consulting firm with a minimum 10 years of demonstrated experience directly related to water resource economic evaluation or review		X		
Minimum 5 years of experience working directly with or for the USACE		X		
Minimum 5 years of experience dealing with USACE planning process as outlined in ER-1105-2-100 Planning Guidance Notebook, especially with regard to flood risk management studies, outlined in Appendix E as "Flood Damage Reduction"		X		
M.S. degree or higher in economics		X		
Hydraulic Engineering (one expert needed)			**X**	
Expert from academia, public agency, or consulting firm with a minimum 10 years of experience in hydrologic and hydraulic engineering with emphasis on large public works projects, or as a professor from academia with extensive background in hydrologic and hydraulic theory and practice			X	
Familiar with USACE application of risk and uncertainty analyses in flood risk management studies			X	
Familiar with standard USACE hydrologic and hydraulic computer models, including HEC-HMS, HEC-RAS, HEC-FDA, and HEC-DSS			X	
Registered Professional Engineer			X	

Table 2. Continued

	Rogers	Antle	Zevenbergen	Newling
M.S. degree or higher in engineering			X	
Environmental/Ecology (one expert needed)				**X**
Expert from academia, public agency, or consulting firm with a minimum 10 years of experience directly related to water resource environmental evaluation or review and National Environmental Policy Act				X
Minimum 5 years of experience working directly with or for USACE				X
Familiar with USACE calculation and application of environmental impacts and benefits				X
M.S. degree or higher in related field				X

Barton Rogers

Role: This panel member was chosen primarily for his multi-purpose planning experience and expertise.
Affiliation: GEC, Inc.

Barton Rogers (Plan Formulator): Mr. Rogers is a senior biologist and project manager with GEC, Inc. specializing in Civil Works and wetland projects. He earned his M.S. in Forestry, Wildlife, and Fisheries from Louisiana State University in 1979 and received his Planning Associate Certification in 2004 during his 11 years (1994 –2005) at USACE. He has over 34 years of experience conducting environmental evaluations, is experienced in multi-purpose planning, and has served as instructor for the ecosystem restoration planning section of a USACE-wide class entitled "Hydrologic and Hydraulic Considerations in Planning."
Mr. Rogers has over 11 years of direct experience working with USACE, having been a plan formulator with USACE from 1998-2005 and a consultant on Plan Formulation for Corps Projects from 2005-present. He has experience working as a biologist and planner and has developed restoration plans for both large and small Civil Works and regulatory projects. He has over 5 years of experience using USACE planning processes outlined in ER-1105-2-100 Planning Guidance notebook, including Appendix E "Flood Damage Reduction," and has served as project manager for several flood control projects, including Donaldsonville to the Gulf of Mexico, Goose Bayou and Lower Lafitte, and East Baton Rouge Parish. He has managed several multipurpose watershed projects for USACE, including Amite River and Tributaries, Bayou Manchac, Louisiana, which is using ecosystem restoration to reduce flood damages. He is experienced with various USACE models to support restoration projects and has used HGM to evaluate project impacts and develop mitigation plans. Mr. Rogers has served on three previous ecosystem restoration/flood management-related IEPR panels as plan formulation expert, including the Missouri River Ecosystem Restoration Study and the East Branch Dam Flood Risk Management Study. Mr. Rogers has co-authored more than 30 publications and has been the recipient of numerous awards, including one Chief of Engineer's Award and several USACE Team Achievement Awards.

Lloyd Antle

Role: This panel member was chosen primarily for his economics experience and expertise.
Affiliation: Independent Consultant

Lloyd Antle (Economist): Dr. Antle is an independent consultant and study manager specializing in plan formulation and economics. He earned his Ph.D. in economics from the University of Cincinnati in 1979 and has over 32 years of direct experience in water resources planning with a focus on flood damage reduction and water resource studies. He was a regional and supervisory economist for 32 years (1963–1995) with USACE and is experienced with all phases of the economic analyses associated with flood risk management, water resource studies, and environmental restoration. He was the economist for the first 10 years of the McClellan-Kerr/Arkansas River Navigation System multiple-purpose project, using an integrated economic input model to evaluate the regional economy with and without the water resources development project. This study helped to validate the efficacy of post-construction analyses by examining a range of benefits over a large region and identifying the actual effects of a large water resources development project. Dr. Antle is familiar with the USACE ER 1105-2-100 Planning Guidance

notebook, including Appendix E, "Flood Damage Reduction" regulations; his experience includes comprehensive water resource planning, flood control, and multipurpose projects. His expertise in flood risk management is reflected in his experience in developing flood damage functions from surveys of urban and rural areas at Louisville District for a multi-year project as well as the aforementioned Kerr-McClellan Arkansas River project. In 1987, he was selected supervisor of the Institute for Water Resources (IWR) Navigation Studies Division (combining the USACE Navigation Analysis Center with the National Waterway Study team), supplying USACE with state-of-the-art systems analysis capabilities. Dr. Antle has been awarded the Meritorious Civilian Service and Superior Civilian Service Awards.

Lyle Zevenbergen

Role: This panel member was chosen primarily for his hydraulic engineering experience and expertise.
Affiliation: Ayres Associates, Inc.

Lyle Zevenbergen (Hydraulic Engineer): Dr. Zevenbergen is a senior hydraulic engineer and manager of the river engineering department at Ayres Associates. He earned his Ph.D. in Applied Earth Science from the University of London in 1989. He is a registered professional engineer in six states (Arizona, Colorado, Georgia, New Hampshire, New Mexico, and South Carolina) and has more than 23 years of experience in hydrologic and hydraulic engineering for numerous large public works projects for USACE, including feasibility studies (setback levee and other flood controls), environmental rehabilitation and restoration, and general hydrologic and hydraulic modeling. He is familiar with USACE application of risk uncertainty analyses in flood damage reduction studies, having worked on projects such as the Yuba River Setback Levee Project for the Sacramento District. In addition, he is currently the hydraulic expert on a risk and uncertainty study related to bridge hydraulics and scour. Dr. Zevenbergen has been involved in numerous floodplain hydrology analyses, such as the hydraulic modeling and simulation for the Nassau River Floodplain Study, Jacksonville District; Probable Maximum Flood simulation for Denver's Westerly Creek Inundation Analysis, Omaha District; and supervision of the analysis and design processes related to short-term erosion potential, long-term arroyo shifting, and countermeasure design for the Tijeras Arroyo Flooding and Erosion Evaluation (New Mexico). He is familiar with standard USACE hydrologic and hydraulic computer models and has used them for numerous USACE projects, bridge projects, and Federal Emergency Management Agency (FEMA) flood studies. His work combines math modeling and programming skills with in-depth knowledge of fluid mechanics and channel dynamics, including 1D and 2D hydraulic models (WSPRO, HEC-2, HEC-RAS, UNET, FESWMS-2DH, RMA-2V), and hydrology models HEC-HMS, HEC-RAS, HEC-FDA and HEC-DSS (both the original version and DSS-Vue). He is experienced with the IEPR process and has participated on two IEPR reviews as a hydraulic engineering panelist: (1) EnviroFish Version 1.0 Model documentation and software for the USACE Ecosystem Restoration Planning Center of Expertise and (2) Safety Assurance Review for the Rio de la Plata Project, Puerto Rico. He is a member of American Society of Civil Engineers and the Environmental and Water Resources Institute.

Charles Newling

Role: This panel member was chosen primarily for his environmental science and ecology experience and expertise.
Affiliation: Wetland Science Applications, Inc.

Charles Newling (Environmental/Ecologist): Mr. Newling is the Senior Wetland Regulatory Scientist and Senior Vice-President of Wetland Science Applications, Inc. and the Wetland Training Institute, Inc. He earned his M.S. in zoology/wildlife ecology from Southern Illinois University Carbondale in 1975. He holds certifications as a Professional Wetland Scientist, Certified Wildlife Biologist, certified wetland delineator, and a qualified wetland specialist. He has over 35 years of experience in water resources and wetlands for both public and private sector projects. Mr. Newling has more than 14 years of experience working with USACE, having worked for both the USACE New England Division Regulatory Brach and the USACE Waterways Experiment Station Environmental Laboratory (now ERDC-EL). His work for USACE involved evaluation and long-term monitoring of habitat development projects. He also participated in development of the USACE Wetland Delineation Manual and assisted in efforts to develop and standardize evaluation of wetlands and related habitat. He has a strong knowledge of ecological wetlands, wet prairies, streams, and interconnected habitat, having conducted functional analyses of these environs since 1975. From 1981 to 1989, he was the Technical Coordinator for USACE wetland training, including courses of evaluation of wetland functions and values, and he has organized, conducted, and served as primary instructor in wetland-related training courses, including Wetland Specialist, Wetland Soils and Hydrology, Wetland Field Techniques, Introduction to Wetlands, Wetlands of the United States, Wetland Development and Restoration, Wetland Functions and Values Assessment, and Wetland Delineation. His consulting expertise has focused on wetland delineation, wetland construction and restoration, the assessment of wetland functions and values, mitigation monitoring, and wetland mitigation banking. He has provided rapid response assistance to USACE District offices nationwide on technical matters of wetland delineation and restoration, including, when necessary, providingexpert testimony. Mr. Newling is familiar with USACE calculation and application of environmental impacts and benefits and is versed in various assessments models, including HGM, WET, HEP, and WFAM. He has been an author on over 20 publications and a contributor to several state and Federal publications. He is a member of The Wildlife Society, Association of State Wetland Managers, Society of Ecological Restoration, and Wisconsin Wetland Association and has served on the Board of Directors for the Society of Wetland Scientists as Liaison to the SWS National Certification Program.

5. SUMMARY OF FINAL PANEL COMMENTS

The IEPR panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2010; p. D-4) in the Cedar Rapids Flood Risk Management Feasibility Study. Overall, the Study was well assembled, was comprehensive, and followed standard planning guidance. The Study met all of the objectives put forward to some extent; however, the degree to which it will meet some of the objectives is highly uncertain. The majority of the Panel's comments focused on the need for more detail and clarification of certain considerations and assumptions utilized in

determining the Federally Supportable Plan (FSP). The IEPR Panel recognized that the methods utilized to select the FSP were complicated by economic and cultural resource uncertainties such that existing and future project damage estimates may require further justification. The Study appropriately addressed environmental issues with the exception of potential downstream impacts of sediment loads due to changes in hydraulics, and the determination of, and impacts to, the final designated borrow area. The following statements summarize the Panel's findings, which are described in more detail in the Final Panel Comments (see Appendix A).

Plan Formulation Rationale: The Study covered a most complicated planning effort with the occurrence of such a large flood event in 2008. Even with this extraordinary event creating planning problems, the document was well written and did an excellent job of "telling the story." The general approach used in determining the FSP was well presented, followed planning guidance, and went through full iterations of planning. The report did not completely address effects on the borrow areas or the potential increased project costs related to cultural issues. Flood risk benefits of the existing system should be included in the analysis, which could potentially reduce the benefits of the FSP. Additional evaluation and documentation is recommended to support the FSP and to explain why Alternative 1A-C cannot be economically justified.

Economics: From an economics perspective, the Study executed a sound approach to develop estimates of flood damages and benefits, annual costs, and regional income and employment for all alternatives. However, it is suggested that an economic evaluation be introduced into the engineering analysis (of effectiveness of the existing Flood Control structures in the 'without project' condition) to strengthen the decision. In addition, the residual damages with 'project in place' may leave almost as many problems as 'without project' conditions.

Engineering: The engineering aspects of the study used current state-of-practice methods for hydrology, hydraulics, geotechnical, and structural engineering, resulting in a thorough feasibility level study. The hydrology and hydraulics also addressed uncertainty very well. The hydraulics section of the report was well written and the analysis was close to flawless, utilizing calibrated models and reflecting sound decisions. The geotechnical and environmental sections were sound.

Environmental: The report identified and addressed a wide array of environmental issues very well. Due to its focus on an urban area, there should be minimal impact to environmental resources. The report, however, did not thoroughly address the downstream impacts of potential project-induced erosion or deposition of sediment loads, nor did it adequately address the final disposition (i.e., condition and management) of borrow areas or potential disposal sites. Likewise, the impact on the west side of the project area resulting from the FSP (i.e., lack of west-side protection) needs to be addressed more thoroughly.

Table 3 lists the 12 Final Panel Comment statements by level of significance.

Table 3. Overview of 12 Final Panel Comments Identified by Cedar Rapids Flood Risk Management Feasibility Study IEPR Panel

Significance – High	
1	The analysis of existing cultural resources within the Cedar Rapids Flood Risk Management Feasibility Study Area (Study Area) remains to be completed, creating a potential for increased project costs.
2	The 2008 flood event created additional economic uncertainties such that existing and future project damage estimates need further justification.
Significance – Medium	
3	The costs and benefits of Alternative 1A-C require further justification because this alternative creates the greatest reduction in Expected Annual Damage (EAD) and may have a benefit-to-cost ratio (BCR) approaching 1.0.
4	The topic of Environmental Justice, as it relates to the FSP, requires a more detailed examination.
5	The effects of project implementation on the borrow and disposal areas require further description and analysis.
6	The Cedar Rapids Flood Risk Management Feasibility Study (Study) should either clarify the rationale for the selection of the 1% (100-year) flood event as a project objective or restate the objective.
7	The economic analysis should consider the benefits of the existing flood protection system for the 'future without project' condition because this could affect BCR and the justification of the FSP.
8	The potential for erosion and sedimentation in the Cedar River due to project implementation needs to be addressed.
Significance – Low	
9	A summary of the justification to lower the contingency cost from 25 to 20% (Appendix B of the Study) and why it should be this low for this project should be presented in the Main Report.
10	Additional text is needed to clarify the hydrology of the subwatersheds on the protected side of the watershed, which have to be pumped during a flood event.
11	Section 3 of the Study contains potentially contradictory statements pertaining to watershed planning and flood risk for the future 'without project' conditions.
12	The Study could be strengthened by incorporating some of the material from the appendices into the Main Report.

6. REFERENCES

OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, DC. 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 (2007). Peer Review Process. Department of the Army, US Army Corps of Engineers, Washington, DC. CECW-CP Memorandum. March 30.

USACE (2010). Water Resources Policies and Authorities: Civil Works Review Policy. Department of the Army, US Army Corps of Engineers, Washington, DC. Engineer Circular (EC) No. 1165-2-209. January 31.

APPENDIX A

Final Panel Comments

on the

Cedar Rapids Flood Risk Management Feasibility Study

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Comment 1
The analysis of existing cultural resources within the Cedar Rapids Flood Risk Management Feasibility Study Area (Study Area) remains to be completed, creating a potential for increased project costs.
Basis for Comment:
The District and the City of Cedar Rapids have done an extensive job of identifying and dealing with the most complicated aspects of cultural resources for this project. This project is on track to manage the needed preservation issues, based on the Cedar Rapids Flood Risk Management Feasibility Study and on the coordination with the State Historical Society of Iowa (SHSI) that has transpired. The Panel has some concerns since the cultural investigations analysis is not complete, as per the Panel and USACE mid-review teleconference, and there is a potential for increased project costs due to avoidance or data recovery for cultural sites. The Panel understands that even though the structures have been identified, the costs to mitigate have not been fully determined. It appears that mitigation costs are limited "up to 1% of total construction costs" (page 233, 5th paragraph). The Panel is aware that USACE Headquarters has the authority to grant an exception to the 1% of total construction cost limit. The Panel is unsure if this 1% was used as the cultural mitigation costs. The cultural mitigation costs could potentially escalate when the cultural investigations are complete. The Panel has concerns that these costs could potentially affect the justification or selection of the Federally Supportable Plan (FSP).
Significance – High:
The cost of cultural mitigation could increase the cost of the recommended plan, which could affect the justification of the project.
Recommendations for Resolution:
1. Include a summary as to how the resolution of the cultural resources would impact the final cost of the project. If the 1% limit is lifted, a discussion should be added to describe how this would affect the justification of the project. Additional discussion characterizing these unknown costs, and thus putting them into perspective, would reduce the uncertainty surrounding these costs. 2. Include a discussion explaining how this potential cultural cost uncertainty was factored into the reduced contingency evaluation, and whether the 1% limit was used in the contingency evaluation. 3. Revise the sentence that discusses the 1% of total construction costs for mitigation costs associated with cultural resources (page 233, 5th paragraph) to include the word "limited."

Comment 2:
The 2008 flood event created additional economic uncertainties such that existing and future project damage estimates need further justification.
Basis for Comment:
The computed benefit-to-cost ratios (BCRs) are directly related to frequency-damage and elevation-damage data developed for the Study. Section 4.2.2.1 paragraph 3 (page 157) states that the Cedar Rapids Flood Risk Management Feasibility Study presents a "unique situation" relative to existing conditions as a result of the "devastating record flood event in June 2008." The unique situation increases economic uncertainty and may impact BCRs for the various alternatives. • Table B-19 (Appendix B) shows damages from the 2008 flood. Compared with the costs of similar frequency flood events given in Tables B-20 to B-24, the costs estimated for future floods of similar magnitude are significantly less. For example, in Table B-19 Water Control Facilities experienced $44,516,100 in damage in 2008, whereas the maximum value in Table B-23 is $28,200,000. Paragraph d (page B-37) provides only a brief discussion on how Table B-23 was developed. Another example is Parks and Recreation damages, which were $1,774,700 in 2008 (Table B-19), but the maximum value in Table B-24 is slightly less ($1,750,000). Given the increase in green space anticipated on the west side, it is possible that damages to Parks and Recreation would actually increase rather than decrease. • The comparisons made in the previous bullet are only between the 2008 event and a similar, but more extreme event. The differences could translate throughout the damage-frequency tables and impact Expected Annual Damage (EAD) calculations and BCRs. If the damage-frequency tables overly discount future damages, BCRs would be low.
Significance – High:
Given the economic uncertainties created by the 2008 flood, there is a potential for overly discounting flood damage that could impact BCRs of the various alternatives and selection of the FSP.
Recommendations for Resolution:
1. Provide additional justification for the uncertainty factors used to generate the damage-frequency curves due to their potential impact on computed BCRs.

Comment 3:
The costs and benefits of Alternative 1A-C require further justification because this alternative creates the greatest reduction in EAD and may have a BCR approaching 1.0.
Basis for Comment:
As computed from data in Table B-71 (Appendix B), (FSP) (Alternative 4C) achieves only a 50% reduction in EAD, compared to an 82% reduction in EAD for Alternative 1A-C. BCRs for Alternatives 4C and 1A-C are 1.06 and 0.77 (Table 43), respectively. However, further discussion (page 205) indicates that the BCR of Alternative 4C increases to 1.15, based on reduced contingency. This implies a BCR for Alternative 1A-C of 0.84, based on a similar reduction in contingency because the designs of Alternatives 4C and 1A-C are similar. A more detailed examination of benefits and costs could increase the BCR of Alternative 1A-C further.
Significance – Medium:
When several factors are considered together, further investigation of Alternative 1A-C may be warranted as this alternative may better achieve project objectives.
Recommendations for Resolution:
1. Carry Alternative 1A-C through the selection process even though its calculated BCR is less than 1.0 at an earlier step.

Comment 4:

The topic of Environmental Justice, as it relates to the FSP, requires a more detailed examination.

Basis for Comment:

Environmental Justice does not appear to be considered equally for all alternatives, specifically the FSP (Alternative 4C):

- The Environmental Justice topic is discussed on pages 110 through 112 of the Cedar Rapids Flood Risk Management Feasibility Study and in Section 4.4.5, Other Social Effects, on page 204. These sections emphasize the equal distribution of risk and benefit for all residents.
- Pages 254 through 256 indicate that Environmental Justice was addressed through public involvement, but that flood-impacted areas (i.e., Study Area) have higher percentages of minority, disabled, below poverty line, female-headed households, households on Social Security, households on public assistance, and renter-occupied households than the rest of Cedar Rapids.
- As computed from the data in Table 27 of the Main Report, the west side (unprotected in the FSP) contains a population of nearly 8,000 (populations of Reaches 2A at 405, 2B at 3362, 2C at 1705, and 2D at 2434) compared to 1,300 (populations of Reaches 4A/B at 20, 5A at 823, 5B at 425 and 5C at 76) on the east side. Therefore, the relatively few residents on the east side disproportionately benefit at the expense of the many more residents on the west side.
- The FSP results in quantified negative benefits to the west side neighborhoods due to increased water surface elevation levels (page 261, Table 54). The FSP distributes risk and benefit unequally to all residents by actually increasing risk for the west side population to benefit the east side population.
- Protecting the east side (as in the FSP) benefits all the residents of Cedar Rapids, but at the expense of the west side residents located in Study Reaches 2A, 2B, 2C and 2D.

Significance – Medium:

A rationale needs to be provided for selecting the FSP when it does not protect the majority of the population at risk of flooding (8,000 unprotected and 1,300 protected).

Recommendations for Resolution:

1. Define other project benefits, specifically for the west side, that exceed the negative benefits produced by the FSP. These should include flood protection measures such as grants for flood proofing. The benefits that are developed should exceed the computed negative benefits.

Comment 5:

The effects of project implementation on the borrow and disposal areas require further description and analysis.

Basis for Comment:

Potential secondary impacts away from the immediate project area, at disposal and borrow sites, can be substantial and must comply with current law and regulations. Borrow and disposal areas are features of the FSP, and their effects on the human environment should be made clear in the Main Report even if these effects are minimal. If borrow or disposal areas are already permitted (e.g., by a third-party vendor who has already complied with applicable laws and regulations to operate the site), then it could be stated that borrow/disposal sites already exist and are environmentally compliant.

If there are "Waters of the U.S." at the borrow and disposal areas, then this should be addressed in the Clean Water Act and 404(b)(1) sections. The effects of the overall federal action should be disclosed, including direct, indirect, and cumulative.

If the final borrow plan has not been fully developed, a maximum, or worst-case scenario, should be shown. The proposed use of the airport buffer zone is a reasonable idea for a borrow area. This location may be a mowed grassy area, managed to reduce avian activity and animal use in general around the airport. It is not clear, after the borrow material is taken, if these areas would be similar in the future to the way they are now--mowed grassy areas simply several feet lower in elevation. The Panel assumes that this borrow area would be designed to drain well and not have water features that would attract wildlife, the habitat value would likely remain unchanged (low), and environmental effects would be minimal.

Of the possible borrow sites identified around the airport, three borrow sites have been discovered to have potential hazardous, toxic, and radioactive waste (HTRW) issues. The Panel assumes these sites will not be considered as part of the final borrow plan, nor will any of the other sites yet to be investigated, if HTRW issues are discovered. The plan for dealing with such issues should be stated explicitly in the main report.

Significance – Medium

The potential effects to the human environment from use and management of the borrow and disposal areas are not fully described and could affect project implementation.

Recommendations for Resolution:

1. Expand the report sections for the existing, "future without" and "future with" project conditions for the proposed borrow and disposal areas, including direct, indirect, and cumulative effects. However, if any of the borrow or disposal areas are already permitted for these uses, then all that is needed is a statement verifying their permitted status, not the full disclosure.
2. Include a maximum or worst-case scenario if the final borrow plan has not been fully developed. Any notes about allowing the areas to drain and not creating attractions for wildlife should be added.
3. Include a plan to avoid any HTRW areas around the airport identified during the testing process.

Comment 6:
The Cedar Rapids Flood Risk Management Feasibility Study (Study) should either clarify the rationale for the selection of the 1% (100-year) flood event as a project objective or restate the objective.
Basis for Comment:
The planning objective, as stated, is to develop a plan to provide protection against an event that is greater than a 1% (100-year) flood event. The Panel assumes that USACE is stating that an alternative that provided anything less than a 1% (100-year) flood protection would not be considered or would not meet the planning objective. The objective should not be so specific that reasonable alternatives are precluded. This objective conflicts with ER 1105-2-100, which states that plans are to be formulated to ensure that all reasonable alternatives are evaluated. The plans should be optimized to determine the plan with the greatest net NED benefits. Potentially, the NED plan could have ended up providing protection less than the stated 100-year planning goal. Many NED plans for flood risk reduction projects result in providing protection for the 25- to 50-year flood event. Even though this Study recommends an NED plan for the 500-year event (which is unusually high), such a specific protection level should not be specified.
Significance – Medium:
The selection of the flood event is the main planning point and needs to be clear to help guide the rest of the planning process and lead to a better understanding of the Cedar Rapids Flood Risk Management Feasibility Study.
Recommendations for Resolution:
1. Rewrite the main objective to state "to maximize (or optimize) the NED benefits associated with flood risk reduction for the Cedar Rapids Study Area" 2. Remove text stating a specific level of event.

Comment 7:

The economic analysis should consider the benefits of the existing flood protection system for the 'future without project' condition because this could affect BCR and the justification of the FSP.

Basis for Comment:

The Cedar Rapids Flood Risk Management Feasibility Study does not consider the existing flood protection system (existing levees and flood flight measures) in determining the 'future without project' conditions. The economic analysis then assumes that the projects have no value in the 'future without project' condition. However, elsewhere in the report, it is stated that the City intends to utilize the existing system in the 'future without project' condition. The Panel believes that the existing system does provide some level of protection and benefits.

The main reason the existing flood control system was not considered was that it does not meet current USACE standards for design or maintenance or Federal Emergency Management Agency (FEMA) levee certification standards. Consequently, the benefits of the existing flood protection system were eliminated from the 'future without project' condition. No hydrologic or hydraulic analysis of the level of flood protection provided by the existing flood control system was conducted, so the economic analysis was not able to incorporate the benefits of the existing system.

The existing flood protection may still provide some flood damage reduction benefits, which should be considered in the 'future without project' conditions. If these existing benefits are included, then the benefits of the FSP would be reduced accordingly.

Based on calculations by the Panel, the annual net benefits of the FSP would not be economically justified if the existing flood protection system were to provide approximately 15% of the estimated average annual damages (AAD) of the less than 0.01 exceedance probability event. These calculations were developed from the EAD for the reaches protected by the FSP (Appendix B, Table B-17).

Significance – Medium:

Including the benefits of the existing flood control system for the 'future without project' condition, or providing reasons why not, would strengthen the report and clarify the justification for the FSP.

Recommendations for Resolution:

1. Clarify or justify why the benefits of the existing flood protection system were not considered in the 'future without project' conditions.
2. Evaluate the benefits of the existing flood protection system and recalculate the 'future without project' conditions for EAD and BCR for alternatives 1, 1A, 4, and 10.

Comment 8:
The potential for erosion and sedimentation in the Cedar River due to project implementation needs to be addressed.
Basis for Comment:
When the flow is constricted due to the east side levees and floodwalls, such as the FSP (Alternative 4C) produces, the Cedar River channel flow velocity and discharge in the constricted area may be greater than upstream and downstream. The flow constriction could cause erosion in the levee reach and sediment deposition downstream of the levee reach. The erosion and deposition may potentially have an adverse environmental impact.
Significance – Medium:
The potential for erosion and deposition in the Cedar River during flood events was not addressed in the Cedar Rapids Flood Risk Management Feasibility Study and affects the completeness of the analysis of potential environmental impact.
Recommendations for Resolution:
1. Include a review of the HEC-RAS results to compare FSP channel flow velocity to the 'without project' channel flow velocity throughout the reach. This comparison should be performed for the full range of flows from Table 18 (page 93). If channel flow velocities are very similar, then an additional discussion should indicate that erosion and sedimentation within the reach are not expected to pose an environmental impact. 2. Include the use of HEC-RAS sediment transport functionality to estimate quantities of channel erosion and deposition to assess potential environmental impact, if channel flow velocities are appreciably different between the FSP and the 'without project' condition.

Comment 9:
A summary of the justification to lower the contingency cost from 25 to 20% (Appendix B of the Study) and why it should be this low for this project should be presented in the Main Report.
Basis for Comment:
A contingency of 25% was used initially, which has been the historical percentage used by USACE. Cost engineering was completed including MCACESII and risk analysis was conducted using Monte Carlo simulation. A contingency of 17.23% was derived from the cost engineering and risk analyses, and a 20% contingency was recommended by the Cost Engineering Directorate of Expertise for Civil Works (Walla Walla District). The recommendation of 20%, even though the analysis indicated 17.23%, seems prudent. The contingency evaluation for other USACE projects, mostly those with greater risk, have developed contingencies greater than 25%, some in the 30+% range.
Significance – Low:
Summarizing the justification for the recommended contingency from the appendix and why the contingency should be this low for this project would strengthen the Main Report.
Recommendations for Resolution:
1. Add text to the Main Report of the Cedar Rapids Flood Risk Management Feasibility Study to briefly summarizing the analysis that recommended a 20% contingency. 2. Add text to Section 4.6 (page 205) to support why this project has such a low contingency, especially since it is below 25%.

Comment 10:
Additional text is needed to clarify the hydrology of the subwatersheds on the protected side of the watershed, which have to be pumped during a flood event.
Basis for Comment:
The impervious area was determined from 2008 aerial photography and ranged from 35 to 96% for sub-basins on the east side (page A-16, Table A-14). Future changes to hydrology were considered for the upstream Cedar River basin as a whole; this area is expected to be reasonably stationary. For sub-basins protected by the FSP (Alternative 4C), listed in Table A-14, the pump station and coincident frequency analyses do not appear to account for potential changes in impervious area for some of the sub-basins. Specifically, sub-basins 50, 60, and 70 appear to have future development potential based on low impervious area (35 to 63%). Should there be additional development in these sub-basins, interior drainage requirements may have been underestimated. Recommendation E (Recommendation Section) requires the "non-Federal interest to prepare a floodplain management plan within 1 year after the date of signing a project cooperation agreement, and to implement such plan not later than 1 year after completion of construction of the FRM features." Based on this recommendation, future basin development would need to be addressed in the floodplain management plan.
Significance – Low:
Sub-basins 50, 60, and 70 could be impacted by possible future development, which could result in minor changes in pumping requirements on the protected side of the watershed.
Recommendations for Resolution:
1. Include additional discussion that future development potential in sub-basins 50, 60, and 70 is unlikely and that the development that may occur would be built such that the benefits of the recommended plan are not reduced. 2. Evaluate the sensitivity of pumping requirements for a potentially increased impervious area. 3. Confirm that the floodplain management plan addresses future basin development.

Comment 11:
Section 3 of the Study contains potentially contradictory statements pertaining to watershed planning and flood risk for the future 'without project' conditions.
Basis for Comment:
There seems to be a minor conflict among Sections 3.2.3.3 (page 129), 3.2.3.5 (page 135), and 3.2.7 (page 139). Section 3.2.3.3 concludes that the discharge-frequency would not change over the period of study. Section 3.2.3.5 discusses all the watershed planning that would occur to reduce risk and improve water quality. Section 3.2.7 states that there are no plans to alleviate flooding without this project (i.e., future 'without project' conditions). The watershed planning aims to at least "hold your own" on the flooding and likely improve water quality. It should be made clear whether the planning includes the entire Cedar Rapids watershed, or just those subwatersheds in Linn County that may need to be pumped during a flood event.
Significance – Low:
Clarification among these sections would help the reader understand the issues involved in watershed planning and flood risk.
Recommendations for Resolution:
1. Revise Section 3.2.3.3 to specifically refer to the Cedar River and the watershed above Cedar Rapids, assuming that is the case. Also, include a statement that this section is not addressing the subwatersheds that have to be pumped during a flood event on the Cedar River. 2. Clarify text in Section 3.2.7 to possibly state that while the planning may help "hold our own" or create some improvements, there would still be a substantial flood risk for the future without a substantial structural plan.

Comment 12:

The Study could be strengthened by incorporating some of the material from the appendices into the Main Report.

Basis for Comment:

While many good points, supporting data, and conclusions are presented in the appendices and can be referenced, adding some of the following information and supporting data to the Main Report would strengthen it.

- Executive Summary:
  Recommend adding language to state how the measures were developed and screened. The Panel does not recommend listing them all; a summary would be sufficient. Summarize as either text, graphics, or table the four iterations (as presented in the Study) of the alternative screening that was conducted and the resulting final array. Suggest that the costs, benefits, and BCR of the final array be listed. It must be made clear that Alternatives 1A and 1A-C are not economically justified, since this finding is the key to the recommended plan. This should be explained such that it can be understood by outside audiences.
- Main Report:
  The screening of measures described in Appendix O (Planning Formulation) should be restated in the Main Report. For example, a brief bullet as to why each measure was dropped from the analysis could be added to Table 30.

  All specific areas for features, such as McCloud Run, Five-in-One Dam, etc. should be shown on a map when first introduced in the text. For example, McCloud Run was mentioned several times in the text of the Main Report, many pages before it was shown on a map on page 133. The Panel suggests that a location map could be added very early in the report to show these areas.
- Minor Comments on Main Report:
  Page 23. Second bullet has an extra "$"
  Page 31, Figure 12. The topo lines are hard to read; recommend that they be bolded or made wider so they will show up better.
  Page 52, Table 12. Should this be reach "4A" instead of "2D"?
  Page 93, Table 18. Suggest including 140,000 cfs (2008 event discharge) in table with estimated exceedance probability (approximately 0.0008?) (Also Table A5 on page A7).
  Page 140. Next to last paragraph needs a space before it.
  Page 145, Figure 59. Suggest adding arrows between Iteration 2 to 3; 4 and Final, like the ones between Iteration 1 to 2, and 3 to 4.
  Page 149, Section 4.2.1.3. Third bullet needs a closing ")".
  Page 151, Table 30. Suggest adding word "Boundary" to end S6 and S7 descriptions.
  Page 183. Summary of results bullet. Replace "reasonable" with "reasonably."
  Page 188, Table 39. Recommend adding "protected" after the Acres in the title.
  Page 192, Table 41. Construction costs for 4C are missing. Footnotes 1 and 2 are not referenced in the table, but the table lists 3, 4, and 5 but there is not a number 5 footnote.

Page 206, Table 46. Long-term risk for 30-year period is 0.0178, not 0.0148. This error is repeated wherever this information is presented (i.e., Tables A-41, B-57 and B-59).

Page 208. Recommend the figure be zoomed in more to show features more clearly.

Page 216, Section 4.7.1.7, next to last line. There is a "-"between the $ and the number.

Page 221. Table 50 is fuzzy and hard to read.

Page 233,Section 5.1.9, third paragraph, next to last sentence. Is there a missing word? "…these cost will up to 1 percent…"

Page 243, Section5.1.10. Natural Resources, third paragraph, first sentence. "…although none have been relocated [located?]…"

Page 244, Section 5.1.11.1. The first paragraph, Community and Regional Growth, should be rewritten. Its conclusions are probably correct, but the tone comes across like a preachy editorial rather than an objective analysis. It is presumptive and draws a conclusion without having established a foundation for the conclusion.

Page 244, Alternatives 1 and 1A. Define "revitalize."

Page 244, Alternative 4C. Define "revitalize."

Page 245, Sections 5.1.11.2. Community Cohesion. Define "socially vulnerable."

Page 245, Alternatives 1 and 1A. Define "social sustainability."

Page 256, Table 53. Non sequitur: Under Households, "Possible Homeless" are listed as 23 for the Study Area, but none are listed for Cedar Rapids.

Page 262, Floodplain Management Plan. The sentence "The intent of a FPMP is … from being diminished" is indecipherable. Suggest rewriting it as two or three simple, intelligible sentences.

Page 263. Flood rick [sic] should be flood risk.

Page 272? (No page numbers in this section), Recommendations Section. 1st paragraph, suggest adding the word "Plan" after "Supportable."

Page 242. 1st paragraph refers to a State Historical Society of Iowa (SHSI) letter dated March 22, 2010, but there is no letter dated as such in Appendix L. The Panel assumes this is the letter dated March 17, 2010.

Page 250. Last paragraph refers to the letter by the National Trust for Historic Preservation letter dated July 9, 2009. The Panel assumes this should be the letter dated July 29, 2009.

- Appendices

  Appendix A (Hydrology and Hydraulics) has the following suggested minor revisions:

  Page A-29 (3rd paragraph) and page A-32 (Inundation Maps). Suggest replacing the term "ineffective flow area" with "flood fringe area." This is not a standard use of this term. "Ineffective flow area" implies that flow is not being conveyed in this area.

  Page A-30. Table A-30 is missing the number of bridges.

  Page A-41. Second paragraph: replace "exiting" with "existing."

  Page A-45. Long Term Risk for Left Reach 5C 50-year period is 0.9575, not 0.0957. This typo is repeated wherever the information is presented (i.e., Tables B-18 and B-56).

  Appendix B (Economics) has the following minor suggested revisions:

  Page B-iii. Table B-15 Title is incomplete.

Page B-???. Table B-56 is a repeat of Table B-18. Pages B-???. Tables B-25 and B-26 are repeats of Tables B-15 and B-16. Appendix O (Planning Formulation) has the following suggested revisions: Page O-1, Section III Paragraph A, third line. Should "O&G" be "P&G"? Add one or more maps in Appendix O to help the reader know where these features are in the study area. Add more detail on the reasons that measures were eliminated, stating the exact reason why. For example, if there are other more cost-effective measures that would have less environmental impact than a reservoir, then state as such. A clear stated reason should be provided why measures were eliminated. A table might be an easy way to convey this message.
Significance – Low:
Incorporation of some of the main points from the appendices to the Cedar Rapids Flood Risk Management Feasibility Study and minor revisions would strengthen the report.
Recommendations for Resolution:
1. Incorporate revisions to the Executive Summary, Main Report, and Appendices as indicated in the Basis for Comment.

APPENDIX B

Final Charge to the Independent External Peer Review Panel
as
Submitted to USACE on September 8, 2010

on the

Cedar Rapids Flood Risk Management Feasibility Study

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Final Charge Questions and Guidance to the Peer Reviewers
for the
Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study with Integrated Environmental Assessment.

BACKGROUND

The Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study is a Congressionally-authorized study undertaken by the U.S. Army Corps of Engineers (USACE) together with the non-Federal sponsor, the City of Cedar Rapids, to investigate and evaluate flood risk management options within the City.

The study area for the Cedar Rapids Flood Risk Management Feasibility Study is located in Linn County, Iowa. Downtown Cedar Rapids is on the east descending bank of the Cedar River, and much of the downtown area lies within the 100-year floodplain. Historically, major floods in this area have been caused by a combination of rainfall and snowmelt or by heavy rainfall alone. On the Cedar River, the flood of record is the June 2008 event. In Cedar Rapids, the river crested above the 500-year flood stage. During this flood, 9 square miles of the City, including the entire downtown and nearby neighborhoods, were inundated and 20% of the City's population was evacuated.

The project area consists of two main areas: east and west sides of the Cedar River. The east side starts on the north end of town at J Avenue NE (just north of Water Treatment Plant) and proceeds through downtown to Cargill on the south end of town. The east side also includes (south and downstream of Cargill) the Cedar Valley neighborhood and the Water Pollution Control Facility. The west side starts above the Edgewood Bridge to the north of town in what is referred to as the "Edgewood Neighborhood" and progresses downstream to the Time Check Neighborhood (Ellis Park) and ends at the A Street Landfill.

The study is authorized by House Resolution adopted April 5, 2006, by the Committee on Transportation and Infrastructure of the U.S. House of Representatives.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study with Integrated Environmental Assessment ("Cedar Rapids Flood Risk Management Feasibility Study") in accordance with the Department of the Army, U.S. Army Corps of Engineers, Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010, and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released 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.

This purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-209; p. D-4) for the Cedar Rapids Flood Risk Management Feasibility Study. 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 engineering, economics, environmental, and plan formulation issues relevant to the project. They should also have experience applying their subject matter expertise to flood risk management.

The IEPR Panel will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-209, 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 and reference materials that will be provided for the review. **The documents and files presented in bold font are to be reviewed**. All other documents are provided for reference.

- **Cedar River, Cedar Rapids, Iowa, Flood Risk Management Project, Feasibility Study with Integrated Environmental Assessment Main Report**
    - **Appendix A: Hydrology and Hydraulics**
    - **Appendix B: Economics**
    - **Appendix C: Programmatic Agreement**
    - **Appendix D: U.S. Fish and Wildlife Service Draft Coordination Act Report**
    - **Appendix E: Real Estate**
    - **Appendix F: Hazardous, Toxic, and Radioactive Waste**
    - **Appendix G: Geotechnical Engineering**
    - **Appendix H: Structural Engineering**
    - **Appendix I: Cost Estimate**
    - **Appendix J: Public Involvement**
    - **Appendix K: Distribution List**
    - **Appendix L: Pertinent Correspondence**
    - **Appendix M: Recreational Facilities**
    - **Appendix N: Clean Water Act 404(b)(1) Evaluation**
    - **Appendix O: Planning Formulation**
    - **Appendix P: Nonstructural Measures**

- **Appendix Q: The City of Cedar Rapids' Other Social Effects Report**
- **Appendix R: The City of Cedar Rapids' Regional Economic Development Report**

- USACE guidance *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010
- CECW-CP Memorandum dated March 31, 2007
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

SCHEDULE

TASK	ACTION	DUE DATE
Conduct Peer Review	Battelle sends review documents to panel members	9/16/2010
	Battelle/IEPR Panel kick-off meeting	9/17/2010
	USACE/Battelle/Panel kick-off meeting	9/17/2010
	USACE/Battelle/Panel mid-review meeting	9/28/2010
	Panel members complete their review	10/5/2010
Prepare Final Panel Comments and Final IEPR Report	Battelle provides Panel merged individual comments and talking points for Panel review teleconference	10/7/2010
	Convene Panel review teleconference	10/7/2010
	Battelle provides Final Panel Comments directive to Panel	10/12/2010
	Panel members provide draft Final Panel Comments to Battelle	10/15/2010
	Battelle provides feedback to Panel members on draft Final Panel Comments; Panel provides revised draft Final Panel Comments per Battelle feedback (iterative process)	10/16/2010-10/20/2010
	Final Panel Comments finalized	10/21/2010
	Battelle provides Final IEPR Report to Panel for review	10/22/2010
	Panel provides comments on Final IEPR Report	10/25/2010
	*Battelle submits Final IEPR Report to USACE	10/28/2010
Comment/ Response Process	Battelle inputs Final Panel Comments to DrChecks; Battelle provides Final Panel Comment response template to USACE	10/29/2010
	USACE provides draft Evaluator Responses and clarifying questions to Battelle	11/5/2010
	Battelle provides the Panel the draft Evaluator Responses and clarifying questions	11/8/2010
	Panel members provide Battelle with draft comments on draft Evaluator Responses (i.e., draft BackCheck Responses)	11/12/2010
	Teleconference with Battelle and Panel to discuss draft BackCheck Responses	11/12/2010
	Teleconference between Battelle, Panel, and USACE to discuss Final Panel Comments, draft responses, and clarifying questions	11/15/2010
	USACE inputs final Evaluator Responses in DrChecks	11/23/2010
	Battelle provides Evaluator Responses to Panel	11/24/2010
	Panel members provide Battelle with final BackCheck Responses	11/30/2010
	Battelle inputs the Panel's BackCheck Responses in DrChecks	11/30/2010
	*Battelle submits pdf printout of DrChecks project file	12/1/2010

Deliverables are noted with an asterisk (*)

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Cedar Rapids Flood Risk Management Feasibility Study are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, 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 Cedar Rapids Flood Risk Management Feasibility Study. Please focus on your areas 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 1165-2-209; 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 evaluation of 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 Independent Technical Review.
2. Please contact the Battelle deputy project manager (Dick Uhler, uhlerr@battelle.org) or project manager (Karen Johnson-Young, johnson-youngk@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle project manager 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 Dick Uhler, uhlerr@battelle.org, no later than October 5, 2010, 10 pm EDT.

Independent External Peer Review
Cedar River-Cedar Rapids, Iowa, Flood Risk Management Feasibility Study with Integrated Environmental Assessment

Final Charge Questions

GENERAL QUESTIONS

1. To what extent has it been shown that the project is technically sound, environmentally acceptable, and economically justified?
2. Are the assumptions that underlie the economic, engineering, and environmental analyses sound?
3. Are the economic, engineering, and environmental methods, models, and analyses used adequate and acceptable?
4. In general terms, are the planning methods sound?
5. Are the interpretations of analysis and conclusions based on the analysis reasonable?
6. What sections of the report are well written and do not require further revision?

SECTION I - General

7. Were all models used in the analyses used in an appropriate manner?
8. Are the models used sufficiently discriminatory to support the conclusions drawn from them (i.e., identify meaningful differences between alternatives)?
9. Were risk and uncertainty sufficiently considered?
10. Are potential life safety issues accurately and adequately described under existing, future without project, and future with project conditions?
11. In your opinion, are there sufficient analyses upon which to base the recommendation?

SECTION II - Problem, Needs, Constraints, and Opportunities

12. Are the problems, needs, constraints, and opportunities adequately and correctly defined?
13. Do the identified problems, needs, constraints, and opportunities reflect a systems, watershed, and/or ecosystem approach, addressing a geographic area large enough to ensure that plans address the cause and effect relationships among affected resources and activities that are pertinent to achieving the study objectives? (i.e., evaluate the resources and related demands as a system.)
14. Did the study address those resources identified during the scoping process as important in making decisions relating to the study?

SECTION III - Existing and Future Without Project Resources

15. Has the character and scope of the study area been adequately described and is the identified study area appropriate in terms of undertaking a systems/watershed/ecosystem-based investigation?

16. Do you agree with the general analyses of the existing socio-economic, cultural and natural resources within the study area?
17. For your particular area of expertise, provide an in-depth review of whether the analyses of the existing socio-economic, cultural and natural resources within the project area are sufficient to support the estimation of impacts of the array of alternatives.
18. Given your area of expertise, does this section appropriately address the existing conditions of all resources pertinent to the study?
19. Were the surveys conducted to evaluate the existing socio-economic, cultural and natural resources adequate? If not, what types of surveys should have been conducted?
20. Were socioeconomic conditions adequately addressed? Were specific socioeconomic issues not addressed?
21. Was the hydrology discussion sufficient to characterize current baseline conditions and to allow for evaluation of how forecasted conditions (with and without proposed actions) are likely to affect hydrologic conditions? Please comment on the completeness of the discussion on the relationship between subsurface hydrology and the hydrodynamics of the project area.
22. Was the discussion of natural resources sufficient to characterize current baseline conditions and to allow for evaluation of forecasted conditions (with and without proposed actions)?
23. Were the assumptions used as the basis for developing the most probable future without project conditions reasonable?
    a. Were adequate scenarios effectively considered (applied during analyses where relevant and/or reasonably investigated)?
    b. Were the potential effects of climate change addressed?
24. Are the future conditions expected to exist in the absence of a Federal project logical and adequately described and documented?
25. Please comment on the conclusion of the most probable future without project condition. Do you envision other potential probable outcomes?

SECTION IV - Plan Formulation / Evaluation

26. Was a reasonably complete array of possible measures considered in the development of alternatives?
27. Did the formulation process follow the requirement to avoid, minimize, and then mitigate adverse impacts to resources?
28. Does each alternative meet the formulation criteria of being effective, efficient, complete and acceptable?
29. Were the assumptions made for use in developing the future with project conditions for each alternative reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent across the range of alternatives and/or adequately justified where different?
30. Are the changes between the without and with project conditions adequately described for each alternative?

31. Are the uncertainties inherent in our evaluation of benefits, costs, and impacts, and any risk associated with those uncertainties, adequately addressed and described for each alternative?
32. Are future Operation, Maintenance, Repair, Replacement, and Rehabilitation efforts adequately described and are the estimated cost of those efforts reasonable for each alternative?
33. Please comment on the screening of the proposed alternatives.
    a. Are the screening criteria appropriate?
    b. In your professional opinion are the results of the screening acceptable?
    c. Were any measures or alternatives screened out too early?
34. Were the engineering, economic, and environmental analyses used for this study consistent with generally accepted methodologies? Why or why not?
35. Does any alternative include identified separable elements (a portion of a project that is physically separable, and produces hydrologic effects or physical or economic benefits that are separately identifiable from those produced by other portions of the project)? If so, is each identified separable element independently justified and are the benefits, costs, and effects of the separable elements correctly divided?

SECTION V - Recommended Plan

36. Comment on whether you agree or disagree with how the selected alternative was formulated and selected.
37. Comment on the plan formulation. Does it meet the study objectives and avoid violating the study constraints?
38. Are there any unmitigated environmental impacts not identified and if so could they impact plan selection?
39. Please comment on the likelihood of the recommended plan to achieve the expected outputs.
40. Please comment on the completeness of the recommended plan, i.e., will any additional efforts, measures, or projects be needed to realize the expected benefits?
41. Please comment on the appropriateness of location, sizing and design of plan features.

SECTION VI - Flood Risk Management (Primary Goal of Project)

42. Are residual risks adequately described and is there a sufficient plan for communicating the residual risk to affected populations?
43. Are the magnitudes and timeframes assumed for damages related to expected future losses reasonable?
44. Is there sufficient information presented to identify, explain, and comment on assumptions that underlie engineering analyses. Why or why not?
45. Does the physical data and observed data provide adequate information to characterize the project and its performance?
46. Have all characteristics, conditions, and scenarios leading to failure, along with the potential consequences, been identified?

47. Have all pertinent factors, including population at risk, been considered in the estimation of risk for the baseline condition?
48. Have the potential impacts of each alternative been clearly and adequately presented, including expected risk reduction, residual risk, changes in existing outputs of the project, potential mitigation, implementation schedules and costs?

SECTION VII - Ecosystem

49. Are the required long-term commitments (both Federal and non-Federal) to sustaining the ecological resource quality adequately described and adequately demonstrated?

FINAL OVERVIEW QUESTION

50. What is the most important concern you have with the document or its appendices that was not covered in your answers to the questions above?