

Final Independent External Peer Review Report Adams and Denver Counties, Colorado, General Investigation Study

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Ecosystem Restoration Planning Center of Expertise
Mississippi Valley District

Contract No. W912HQ-15-D-0001
Task Order: W912HQ18F0080

October 9, 2018

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

The U.S. Army Corps of Engineers (USACE) has undertaken a study along the South Platte River through Denver, Colorado to provide a functioning habitat corridor for migratory birds and wetland and aquatic species, and to address flood risk issues along the Harvard Gulch and Weir Gulch tributaries to the river.

The study area is located in Adams County and Denver, Colorado. The area has a population of approximately 600,000, comprising urban residential, suburban, commercial, and industrial areas. The entire metropolitan area of Denver has a population of about 2.4 million. The study area extends approximately 10 miles along the South Platte River and tributaries. Priority reaches for the study area have been identified as:

- South Platte River – 6th Avenue to 58th Avenue
- Harvard Gulch – Colorado Boulevard to the confluence of the South Platte River.
- Weir Gulch – Just west of Sheridan Boulevard to the confluence of the South Platte River, including 1st Avenue and Dakota Avenue tributaries.

Along the South Platte River, there is a need to provide a functioning habitat corridor through Denver for migratory birds, as well as wetland and aquatic species. The purpose of the study in the South Platte River portion of the project is to identify an ecosystem restoration plan that reasonably maximizes National Ecosystem Restoration (NER) benefits, provides secondary flood risk reduction benefits, and improves recreation opportunities in accordance with the USACE's Environmental Operating Principles.

The purpose of the study in the Harvard Gulch and Weir Gulch portions of the project is to identify a flood risk management plan that reasonably maximizes National Economic Development (NED) benefits, reduces life safety risks, restores ecosystem habitat, and improves recreation opportunities in accordance with the USACE's Environmental Operating Principles. Based on the conditions identified in the study areas, planning objectives were established for the duration of the 50-year period of analysis (2019-2069).

A variety of management measures were developed that would address one or more of the planning objectives. These measures were evaluated and then screened. Alternative plans were then developed comprising one or more of the management measures. Ecosystem restoration alternatives were developed for the South Platte River, while structural and non-structural flood risk management alternatives were developed for the Weir and Harvard Gulches. An ecosystem restoration plan was selected as the tentatively selected plan (TSP) for the South Platte River, a structural flood risk

management plan was selected as the TSP for Weir Gulch, and a non-structural flood risk management plan was selected as the TSP for the Harvard Gulch.

Independent External Peer Review Process

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

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

The Panel received electronic versions of the decision documents (1,565 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

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

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

Battelle received public comments from USACE on the Denver GI Study (approximately 18 letters/emails, totaling 34 pages of comments) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the Denver GI Study review

documents. After completing its review, the Panel confirmed that no issues or concerns were identified other than those already covered in the Final Panel Comments.

Results of the Independent External Peer Review

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

Based on the Panel’s review, the project is well thought out and the analyses presented are thorough. The project report is well-written, clearly states the purpose and need for the project, and documents the presented analysis in clear and understandable writing. Methods are clearly presented, and illustrations are comprehensive and effectively convey concepts. However, the Panel determined that several elements of the analyses should be clarified, revised, or expanded.

Engineering: The Panel found the H&H and engineering analyses to be suitable and consistent with generally accepted methodologies, and the design features in the TSP appropriate. The geotechnical analyses of the alternatives or Recommended Plan have not been completed, but the report acknowledged the geotechnical data collection and analysis have been delayed. While significant effort has gone into quantifying the economic damages, the report does not present an analysis of life-safety improvement as required by ER 1105-2-100. In addition, inadequate consideration of the headgate operations in Reach 2 of the project could influence sedimentation and may affect project maintenance and costs. The Panel stated that the formal delineation of the life safety risk reduction factors could be conducted as part of the upcoming planning, engineering, and design (PED) phase of work, and completion of the geotechnical analyses would provide the data and information needed to evaluate the methods, models, and assumptions. The Panel also suggested that a memorandum of understanding with the ditch company that controls the headgate operations could help address the concerns related to sedimentation.

Economics/Plan Formulation: The Panel found that recreational access and quality improvements alternatives are not well-integrated into the project evaluation or selection process, and that recreation costs and benefits are not treated consistently in the report, which is a major concern considering their magnitude in the project. The Panel also determined that real estate values and costs associated with excavated materials may have been underestimated in portions of the project and that uncertainty magnitudes are not included in the benefit-cost ratios presented. The Panel noted that an unsupported assumption is made in the report, that future with-project recreation visitation is assumed to be 5% greater than future without-project visitation. The Panel recommends better integrating and more consistently handling recreation benefits and costs in the project benefit-cost ratio (BCR) calculations. The Panel also recommends real estate appraisals on the Recommended Plan footprint and documenting the basis for any assumptions about recreation visitation.

Environmental: The Panel could not determine whether the habitat units used in the South Platte reach eco-restoration analysis (NER Plan) were correctly calculated, which could influence the selection of the correct “Best Buy” alternative. The Panel also found that the Cumulative Effects Analysis is not NEPA-compliant because only a limited suite of impacts was considered, and that the Draft Denver GI Study and Appendix E do not sufficiently address the effects of the potential lack of NER project maintenance or

of reasonably foreseeable development activities. The Panel recommends clarification of the procedure used to develop function capacity index values used in the Institute for Water Resources (IWR) analysis. The Cumulative Effects Analysis should include a more comprehensive list of foreseeable future actions and a more complete forecast and description of actions and cumulative effects. The Panel suggests that a memorandum of understanding with the local sponsor would establish and document a commitment to ongoing project monitoring and maintenance.

Table ES-1. Overview of 10 Final Panel Comments Identified by the Denver GI Study IEPR Panel

No.	Final Panel Comment
Significance – Medium/High	
1	Uncertainty magnitudes are not presented throughout the analyses to delineate the degree of “certainty” in the benefit-cost ratios for the presented alternatives and Recommended Plan.
2	Recreational access and quality improvement alternatives are not well-integrated into the project evaluation or selection process.
3	It is not clear the habitat units used in the South Platte reach eco-restoration analysis (NER Plan) were correctly calculated and that the correct “Best Buy” alternative was selected.
Significance – Medium	
4	The assumption that the future with-project recreation visitation will be 5% greater than future without-project visitation is not supported.
5	Geotechnical analyses of the alternatives or Recommended Plan have not been completed.
6	The life safety risk reduction objective for the Harvard and Weir Gulch Plans does not identify specific, flexible, measurable, realistic, and attainable factors as required by ER 1105-2-100.
7	Real estate values in all portions of the project and testing and disposal costs of material excavated in the vicinity of Reaches 1, 2, and 3 of the South Platte River portion of the project may have been underestimated, which could affect project costs.
Significance – Medium/Low	
8	Inadequate consideration of the headgate operations and their possible influence on sedimentation in Reach 2 of the project may affect project maintenance and costs.
9	The Cumulative Effects Analysis is not NEPA-compliant.
10	The Draft Denver GI Study and Appendix E do not sufficiently address the effects of the potential lack of NER project maintenance or of reasonably foreseeable development activities.

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LIST OF ACRONYMS

ADM	Agency Decision Milestone
BCR	Benefit-Cost Ratio
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
COI	Conflict of Interest
DrChecks	Design Review and Checking System
EC	Engineer Circular
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ER	Engineer Regulation
FACStream	Functional Assessment of Colorado Streams
FACWet	Functional Assessment of Colorado Wetlands
FCI	Function Capacity Index
GI	General Investigation
HU	Habitat Unit
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
MCDA	Multicriteria Decision Analysis
NED	National Economic Development
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PDT	Project Delivery Team
PED	Planning, engineering, and design
USACE	United States Army Corps of Engineers
TSP	Tentatively Selected Plan

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) has undertaken a study along the South Platte River through Denver, Colorado to provide a functioning habitat corridor for migratory birds, and wetland and aquatic species, and to address flood risk issues along the Harvard Gulch and Weir Gulch tributaries to the river.

The study area is located in Adams County and Denver, Colorado. The area has a population of approximately 600,000, comprising urban residential, suburban, commercial, and industrial areas. The entire metropolitan area of Denver has a population of about 2.4 million. The study area extends approximately 10 miles along the South Platte River and tributaries. Priority reaches for the study area have been identified as:

- South Platte River – 6th Avenue to 58th Avenue
- Harvard Gulch – Colorado Boulevard to the confluence of the South Platte River.
- Weir Gulch – Just west of Sheridan Boulevard to the confluence of the South Platte River, including 1st Avenue and Dakota Avenue tributaries.

Along the South Platte River, there is a need to provide a functioning habitat corridor through Denver for migratory birds, as well as wetland and aquatic species. The purpose of the study in the South Platte River portion of the project is to identify an ecosystem restoration plan that reasonably maximizes National Ecosystem Restoration (NER) benefits, provides secondary flood risk reduction benefits, and improves recreation opportunities in accordance with the USACE's Environmental Operating Principles. These objectives apply to the South Platte River between 6th Avenue and 58th Avenue for the duration of the 50-year period of analysis (2019 - 2069):

- **Objective 1:** Restore riparian and wetland habitat quantity, quality and connectivity in the South Platte River for migratory birds protected under the Migratory Bird Treaty Act and native species of plants and animals.
- **Objective 2:** Restore in-channel habitat complexity and connectivity in the South Platte River for native aquatic species.
- **Objective 3:** Reduce flood damages along the South Platte as an incidental benefit of ecosystem restoration measures.
- **Objective 4:** Improve public recreation opportunities, connectivity, and accessibility along the South Platte River.

The purpose of the study in the Harvard Gulch and Weir Gulch portions of the project is to identify a flood risk management plan that reasonably maximizes NED benefits, reduces life safety risks, restores ecosystem habitat, and improves recreation opportunities in accordance with the USACE's Environmental Operating Principles. Based on the condition identified in the study area, the following planning objectives were established. These objectives apply to the Weir Gulch between Sheridan Boulevard to the South Platte River confluence (and includes 1st Avenue and Dakota Avenue tributaries) and the Harvard Gulch between Colorado Boulevard and the South Platte River confluence for the duration of the 50-year period of analysis (2019-2069):

- **Objective 1:** Reduce flood risks to life, safety, property, and critical infrastructure in the Harvard Gulch and Weir Gulch basins.

- **Objective 2:** Restore, where economically feasible, in-channel, riparian and wetland habitat quantity, quality, and connectivity in and along Harvard Gulch and Weir Gulch as a secondary benefit to flood risk reduction measures for migratory birds and native species of plants, animals, and fish.
- **Objective 3:** Improve public recreation opportunities, connectivity, and accessibility along the Harvard Gulch and Weir Gulch.

A variety of management measures were developed that would address one or more of the planning objectives. These measures were evaluated and then screened. Alternative plans were then developed comprising one or more of the management measures. Ecosystem restoration alternatives were developed for the South Platte River, while structural and non-structural flood risk management alternatives were developed for the Weir and Harvard Gulches. An ecosystem restoration plan was selected as the tentatively selected plan (TSP) for the South Platte River, a structural flood risk management plan was selected as the TSP for Weir Gulch, and a non-structural flood risk management plan was selected as the TSP for the Harvard Gulch.

This study is being conducted to reflect the USACE modernized planning initiative, in which project studies use a risk-informed assessment, generally with only enough detail developed for each alternative to allow relative comparison, to determine the appropriate information to identify a TSP. Although this new process has altered the milestones and evaluation procedures in a feasibility study, the manner in which alternatives are developed from problems, opportunities, measures, and constraints remains the same.

Under the SMART Planning paradigm, the Independent Expert Peer Review (IEPR) occurs during concurrent review of the Decision Document, between the TSP Milestone meeting and the Agency Decision Milestone (ADM) meeting. To help explain the results of the risk-informed assessment and alternative evaluation, a risk register and other risk management documentation will accompany the feasibility study decision documents. A primary objective of an IEPR is to evaluate whether adequate information was available and appropriate technical analyses were completed to support selection of a TSP within the context of the risk-informed decision-making process.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an IEPR of the Denver Urban Waterways Restoration Study (Denver GI Study) Feasibility Study and Environmental Impact Statement, Adams & Denver Counties, Colorado (hereinafter: Denver GI Study IEPR) in accordance with procedures described in the Department of the Army, USACE, Engineer Circular (EC) *Review Policy for Civil Works* (EC 1165-2-217) (USACE, 2018) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

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

presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Denver GI Study IEPR.

2. PURPOSE OF THE IEPR

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

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

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

3. METHODS FOR CONDUCTING THE IEPR

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

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: Civil Works planning/economics, biological resources and environmental law compliance, hydraulic and hydrology (H&H) engineering, and geotechnical engineering. The Panel reviewed the Denver GI Study documents and produced 10 Final Panel Comments in response to 33 charge questions provided by USACE for the review. The charge also included two overview questions and two public comment questions added by Battelle. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

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

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

4. RESULTS OF THE IEPR

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

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2018; p. D-4) in the Denver GI Study IEPR review documents.

Based on the Panel's review, the project is well thought out and the analyses presented are thorough. The project report is well-written, clearly states the purpose and need for the project, and documents the presented analysis in clear and understandable writing. Methods are clearly presented, and illustrations are comprehensive and effectively convey concepts. However, the Panel determined that several elements of the analyses should be clarified, revised, or expanded.

Engineering: The Panel found the H&H and engineering analyses to be suitable and consistent with generally accepted methodologies, and the design features in the TSP appropriate. The geotechnical analyses of the alternatives or Recommended Plan have not been completed, but the report acknowledged the geotechnical data collection and analysis have been delayed. While significant effort has gone into quantifying the economic damages, the report does not present an analysis of life-safety improvement as required by ER 1105-2-100. In addition, inadequate consideration of the headgate operations in Reach 2 of the project could influence sedimentation and may affect project maintenance and costs. The Panel stated that the formal delineation of the life safety risk reduction factors could be conducted as part of the upcoming planning, engineering, and design (PED) phase of work, and completion of the geotechnical analyses would provide the data and information needed to evaluate the methods, models, and assumptions. The Panel also suggested that a memorandum of understanding with the ditch company that controls the headgate operations could help address the concerns related to sedimentation.

Economics/Plan Formulation: The Panel found that recreational access and quality improvements alternatives are not well-integrated into the project evaluation or selection process, and that recreation costs and benefits are not treated consistently in the report, which is a major concern considering their magnitude in the project. The Panel also determined that real estate values and costs associated with excavated materials may have been underestimated in portions of the project and that uncertainty magnitudes are not included in the benefit-cost ratios presented. The Panel noted that an unsupported assumption is made in the report, that future with-project recreation visitation is assumed to be 5% greater than future without-project visitation. The Panel recommends better integrating and more consistently handling recreation benefits and costs in the project benefit-cost ratio (BCR) calculations. The Panel also recommends real estate appraisals on the Recommended Plan footprint and documenting the basis for any assumptions about recreation visitation.

Environmental: The Panel could not determine whether the habitat units used in the South Platte reach eco-restoration analysis (NER Plan) were correctly calculated, which could influence the selection of the correct "Best Buy" alternative. The Panel also found that the Cumulative Effects Analysis is not NEPA-compliant because only a limited suite of impacts was considered, and that the Draft Denver GI Study and Appendix E do not sufficiently address the effects of the potential lack of NER project maintenance or

of reasonably foreseeable development activities. The Panel recommends clarification of the procedure used to develop function capacity index values used in the Institute for Water Resources (IWR) analysis. The Cumulative Effects Analysis should include a more comprehensive list of foreseeable future actions and a more complete forecast and description of actions and cumulative effects. The Panel suggests that a memorandum of understanding with the local sponsor would establish and document a commitment to ongoing project monitoring and maintenance.

4.2 Final Panel Comments

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

Final Panel Comment 1

Uncertainty magnitudes are not presented throughout the analyses to delineate the degree of “certainty” in the benefit-cost ratios for the presented alternatives and Recommended Plan.

Basis for Comment

SMART Planning (USACE, 2014; p. 1)

“...reorients the planning process away from simply collecting data or completing tasks and refocuses it on doing the work required to reduce uncertainty to the point where the team can make an iterative sequence of planning decisions required to complete a quality study in full compliance with environmental laws and statutes.”

USACE Principles and Guidelines (USACE, 2000; p. v) require that

“Planners shall identify areas of risk and uncertainty in their analysis and describe them clearly, so that decisions can be made with knowledge of the degree of reliability of the estimated benefits and costs and of the effectiveness of alternative plans.”

The Draft Denver GI Study (p. 325) discusses uncertainty analysis focused on cost risks, schedule risks, and policy risks, but it does not treat uncertainties associated with projected benefits.

Uncertainty magnitudes (e.g., coefficient of variation via explicit parameter distributions such as triangular, rectangular, and/or high-low-expected) would greatly aid in identifying how “certain” presented benefit-cost ratios (BCR) and assumptions are. Uncertainty magnitudes would also help identify areas where additional data collection/refinement would be warranted to reduce the uncertainty associated with the BCR estimates and improve decision-making.

Listing the low-bound and high-bound margins of the BCR satisfies the requirement from SMART Planning and USACE Principles and Guidelines to identify associated uncertainty to inform responsible planning decisions. Delineating and documenting the low-bound, best-guess, and high-bound of BCRs at the planning stage will allow USACE to subsequently compare/contrast actual (as-constructed) costs of projects in relation to the estimate to determine “model bias” and the degree to which the perceived uncertainty magnitudes capture the extent of the actual benefits and costs extents. This can then be used to improve/refine the SMART planning process for future projects.

Significance – Medium/High

The overall project benefits and costs for the Alternative Plans and the Recommended Plan may be overestimated or underestimated because the full magnitude of uncertainty associated with the alternatives has not been characterized.

Recommendations for Resolution

1. Leverage existing analyses/judgments to include a range for the presented BCRs that identifies the low bound, best guess, and high-bound for each alternative including the TSP.
2. Document the low bound, best guess, and high-bound margins in the Draft Denver GI Study.

Literature Cited:

USACE (2014). Planning SMART Guide. Planning Bulletin (PB) 2012-02, Reissue #2. Issuing Office: CECW-P. Reissued March 4, 2014.

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

Final Panel Comment 2

Recreational access and quality improvement alternatives are not well-integrated into the project evaluation or selection process.

Basis for Comment

At the currently reported values in the Draft Denver GI Study, recreation benefits represent a substantial proportion of the TSP benefits. However, recreation benefits do not appear to be well-integrated in the BCR and in selecting the TSP and alternatives. In addition, the recreation costs and benefits are not treated consistently within the Draft EIS.

The Economics Guidance Memorandum 16-03 (USACE, 2015b), used in the Draft EIS, Appendix N to derive unit-day values for recreation, suggests that recreation cost and benefits be included as NED project costs and benefits. The costs for recreational access and improvements do appear to have been included in the project costs for the TSP and alternatives, but the benefits have not been included in the BCR (Draft Denver GI Study main report, Table 72, p. 205).

The recreation costs and benefits are omitted in Table 72 for Harvard Gulch. The recreation costs and benefits reported in that table do not agree with the recreation costs and benefits reported in the BCR summary in Appendix N, Table 5 (p.10).

The method for screening and selecting recreation alternatives is not clearly specified in the Draft Denver GI Study (main report) or Appendix N. If recreation alternatives were selected after the structural and non-structural alternatives were screened and selected, it is not clear that the procedure for selecting the TSP is optimal.

Significance – Medium/High

Considering the magnitude of both the costs and the benefits of recreation, it is possible that the TSP might not have been selected if recreational cost and benefits were integrated in the project selection process.

Recommendation for Resolution

1. Consider integrating the benefits and cost of recreation into the project BCR calculations.
2. Resolve the inconsistencies between the Draft Denver GI Study (main report) Table 72 and Appendix N, Table 5.
3. Justify the selection of recreation components compared with other recreation development alternatives.
4. Consider reevaluating the project selection process to integrate recreation as a project purpose.

Literature Cited:

USACE (2015b). Economics Guidance Memorandum, 16-03, Unit Day Values for Recreation for Fiscal Year 2016. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. October 16. Available online at: <https://planning.erdc.dren.mil/toolbox/library/EGMs/EGM16-03.pdf>

Final Panel Comment 3

It is not clear the habitat units used in the South Platte reach eco-restoration analysis (NER Plan) were correctly calculated and that the correct “Best Buy” alternative was selected.

Basis for Comment

Appendix C (p. 17) explains the derivation of the function capacity index (FCI) used in the selection of South Platte Study area alternatives as follows:

“A composite function capacity index (FCI) was developed for both the wetland area and the stream area. The wetland FCI was multiplied by the wetland assessment area acres, while the stream FCI was multiplied by the river area (area within the ordinary high water mark for each reach). These two values, wetland FCI times acres plus stream FCI time river area, were added together to estimate existing and without and with project Conditions habitat units (HUs).”

Addition of the in-stream and wetland FCI-acres implicitly assumes that wetland HUs (FCI times acres) are equal to instream HUs. No rationale is provided to substantiate this assumption. It is generally understood that wetlands are more robust than streams in terms of their functions and values (EPA, 2016; USACE, 2015a). If the greater contribution of wetlands is considered, wetland HUs (FCI-acres) should be given greater weight than stream FCI-acres. In addition, stream area at the high water mark is used to weight instream FCIs. No documentation is provided to justify why the high water mark area is the appropriate numeraire. FCI-acre values were then input into the Institute for Water Resources (IWR) Planning Suite 2 to determine the combination of alternatives that provide “Best Buy” solutions. (Appendix C, Section 5.5.1).

According to Dr. Brad Johnson, one of the developers of the Functional Assessment of Colorado Wetlands (FACWet) and Functional Assessment of Colorado Streams (FACStream) models (used to derive the FCIs), the HU model outputs for each assessed area should be weighted with respect to wetlands and streams and then averaged for a given reach. Then, the HU model outputs should be multiplied by the total wetland-riverine area. It is not clear from the project documentation that this procedure was the one used.

Significance – Medium/High

It is unclear whether stream and wetland HUs were individually weighted by acreages in accordance with the accepted use of these models and whether weighting the HUs according to wetlands values and stream values would have resulted in selection of a different TSP.

Recommendation for Resolution

1. Clarify the procedure that was used to develop the FCI values used in the IWR analysis.
2. Provide justification for the use of FCI as defined in the Draft EIS.
3. Document why the PDT determined that wetland and in-stream HUs (FCI-acres) are functionally equivalent.
4. Apply an expert elicitation process to derive a weighted FCI that does not implicitly assume the instream and wetland HUs are exactly equivalent.

Final Panel Comment 3

5. Consider using the multicriteria decision analysis module (MCDA) in IWR Planning Suite 2 to accomplish weighting of instream and wetland HUs to derive the “Best Buy” alternatives.
6. Incorporate the results of the revised analysis into the project selection process used to select and optimize the TSP for the South Platte planning area.

References:

Johnson, Brad (2018). Personal Communication (emails), September 20 and 27, 2018. ¹

EPA (2016). Wetland Functions and Values. Available online at:

<https://www.epa.gov/sites/production/files/2016-02/documents/wetlandfunctionsvalues.pdf>

USACE (2015a). The Highway Methodology Workbook Supplement: Wetland Functions and Values, A Descriptive Approach. April 6. Available online at:

<http://www.nae.usace.army.mil/Portals/74/docs/regulatory/Forms/HighwaySupplement6Apr2015.pdf>

¹ These emails were facilitated through Battelle. No direct communications between the Panel and Dr. Johnson occurred. The questions asked were generic regarding the overall models themselves, not on the project related modeling that occurred.

Final Panel Comment 4

The assumption that the future with-project recreation visitation will be 5% greater than future without-project visitation is not supported.

Basis for Comment

Draft Denver GI Study Appendix N, Table 4 shows that with-project recreation quality points are much higher than without-project points. For the South Platte reach, the value is 88% higher. For the Harvard and Weir Gulch reaches the values are 155% and 236%, respectively. While these higher values are reflected in the unit-day recreation values used to calculate benefits, the with-project visitation rate is estimated to be exactly 5% higher in all three planning areas. Appendix N (p. 5) states:

“To estimate with project visitation, it was assumed that implementation of the CRP at each study area would result in a 5% bump in baseline visitation at the beginning of the period of analysis as compared to the without project condition.”

Based on the 5% with-project increase visitation, the total annual recreation benefit for the three planning areas is \$3.3 million (based on Appendix N, Table 5). No documentation is provided to support this assumption in Appendix N or the Draft Denver GI Study. Considering the much higher recreation quality points, this visitation estimate appears low. Furthermore, no documentation is provided justifying that the 5% visitation increase will be identical for all three reaches.

Significance – Medium

Because recreation benefits represent a sizeable proportion of the quantified project benefits, there is a possibility of this issue affecting the selection or justification of the selected plan.

Recommendations for Resolution

1. Document the basis for estimating that visitation with-project will be 5% higher than without-project visitation in each planning area,
2. Consider applying more rigorous site-specific methods for estimating recreation visitation as a function of improved recreational access and attractiveness.

Final Panel Comment 5

Geotechnical analyses of the alternatives or Recommended Plan have not been completed.

Basis for Comment

Appendix B (Geotechnical Engineering, Soils, and Geology) presents basic geologic information and highlights sources of subsurface information to be used to inform design. It does not, however, provide any preliminary geotechnical analyses as required by Engineer Circular (EC) 1165-2-217 (USACE, 2018). The report acknowledges a delay in geotechnical data collection and analyses.

Section 3 of Appendix B notes the following fundamental geotechnical activities will be completed during the planning, engineering, and design (PED) phase: subsurface explorations and laboratory testing, underground conduit and channel culverts foundation design analyses, excavation for construction of underground conduit and channel culverts, and other design analyses consisting of foundation seepage, slope stability, and control of erosion.

Significance – Medium

Without sufficient geotechnical analyses, the methods, models, assumptions, and analyses used cannot be fully evaluated as required by USACE (2018) guidance.

Recommendations for Resolution

1. For the upcoming PED, identify which failure mode(s) are being analyzed for the Recommended Plan and perform analyses. Document results in the Design Documentation Report.

Literature Cited

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

Final Panel Comment 6

The life safety risk reduction objective for the Harvard and Weir Gulch Plans does not identify specific, flexible, measurable, realistic, and attainable factors as required by ER 1105-2-100.

Basis for Comment

The reduction of life safety risk is identified as an objective for both the Harvard and Weir Gulch Plans (Draft Denver GI Study, pp. iv, 22, 24). Engineer Regulation (ER) 1105-2-100 (USACE, 2000) states that “objectives are to be specific, flexible, measurable, realistic, attainable, and acceptable.” While significant effort has gone into quantifying the economic damages, the report does not present an analysis of life-safety improvement.

Significance – Medium

To ensure the intended outcomes are being achieved, the design development of the PED phase should include formal delineation of life safety risk reduction factors that satisfy ER 1105-2-100.

Recommendation for Resolution

1. As part of the upcoming PED phase, include formal delineation of life safety risk reduction factors (specific, flexible, measurable, realistic, and attainable) that satisfy ER 1105-2-100 to ensure the intended outcomes are being achieved.

Literature Cited:

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

Final Panel Comment 7

Real estate values in all portions of the project and testing and disposal costs of material excavated in the vicinity of Reaches 1, 2, and 3 of the South Platte River portion of the project may have been underestimated, which could affect project costs.

Basis for Comment

The Denver real estate market is currently experiencing a boom; real estate values are increasing rapidly, which may affect project costs. In addition, the Asarco Superfund site is near Reaches 1, 2, and 3 of the South Platte River. Testing and subsequent disposal of contaminated excavated materials as required by the State Health Department and the U.S. Environmental Protection Agency (EPA) could add to project cost since the quantity of contaminated soil is only estimated at this time. Detailed soils analyses have not yet been performed within the footprint of the disturbed area for this proposed project.

Based on the Panel's direct experience working in reaches 1, 2, and 3, soils testing performed for final design may identify more contaminated soils than anticipated.

Significance – Medium

Uncertainty in real estate values and the extent of contaminated soils that need special testing and disposal requirements may affect project costs.

Recommendations for Resolution

1. Conduct appraisals on the recommended plan footprint to get the most accurate picture of real estate values.
2. Perform soils testing for contaminated soils to better define the amount of soil that needs to be tested and disposed of at the Denver Arapahoe disposal site.

Final Panel Comment 8

Inadequate consideration of the headgate operations and their possible influence on sedimentation in Reach 2 of the project may affect project maintenance and costs.

Basis for Comment

Although sedimentation was addressed, sedimentation in Reach 2 of the South Platte River will be influenced by the operation of the canal headgates at Franklin Street. Since the operation of the canal headgates is controlled by the ditch company, the extent of maintenance activities will be determined by the company. Therefore, continued sedimentation and related maintenance activities will be necessary.

Significance – Medium/Low

If the ditch company operations necessitate more maintenance activities than assumed in the study, this could affect project costs.

Recommendation for Resolution

1. Enter into a memorandum of understanding with the ditch company regarding the operation of the headgates to minimize sedimentation of Reach 2 of the South Platte River.

Final Panel Comment 9

The Cumulative Effects Analysis is not NEPA-compliant.

Basis for Comment

The government defines cumulative effects (40 CFRE 1508.7) as

“The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions.”

Cumulative impacts can result from individually minor, but collectively significant, actions performed by other agencies or individuals taking place over a period of time.

“The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions” (40 CFR 1508.7).

Cumulative impacts can result from individually minor, but collectively significant, actions performed by other agencies or individuals taking place over a period of time.

The environmental analyses in Appendix E (Environmental Assessment) and the Draft Denver GI Study consider a limited range of cumulative effects related to the National Ecosystem Restoration (NER) and National Economic Development (NED) plans, as well as planned or ongoing development projects near the restoration segment of the South Platte River. However, they do not fully consider broader past, present, and future actions as required by the National Environmental Policy Act (NEPA). The socio-economic analysis predicts higher-than-average growth for the Denver region, but the combined effects of this growth along with past and present actions are not thoroughly analyzed.

The Panel did not find a NEPA-compliant discussion of the cumulative effects of the NER and NED plans combined with projected, predictable future development in the documentation. The cumulative effects analysis mandated by NEPA requires a more comprehensive, “hard look” at a list of predictable actions that may be undertaken by others, including USACE, the local sponsor, and private developers.

The cumulative effects analysis requires envisioning of future actions that may be undertaken in the project area unrelated to, but affected or even spurred by, the project(s). Anticipating activities undertaken in the future that could be adverse to the project itself is also part of this analysis.

Finally, perceived protection from flood risk due to implementation of the NED plan may result in a misunderstanding on the part of local residents and businesses that they are fully protected, potentially resulting in the unintended consequence of greater loss of life and property. This is a potentially significant and adverse socioeconomic cumulative effect.

Significance – Medium/Low

The cumulative effects analysis put forward in the Draft Denver GI Study and Appendix E does not comply with NEPA and therefore could render the project susceptible to future litigation.

Recommendations for Resolution

Final Panel Comment 9

1. Include a more comprehensive list of reasonably foreseeable future actions (based on known future projects, planned and proposed projects, and past/predicted regional and local patterns in the fast-growing region) that may be undertaken in the project area.
2. Forecast and describe the cumulative effects, both adverse and positive, that the NER and NED plans may have on these activities, describe the combined effects of all known and projected activities, and describe the potential effects that these activities may have on the NER and NED plans themselves.
3. Address socioeconomic effects associated with residual risk and potential induced flooding.
4. Describe any anticipated measures to mitigate adverse cumulative effects.

Literature Cited:

40 CFR §1508.7. Cumulative Impact. July 1, 2012. Available online at:
<https://www.gpo.gov/fdsys/granule/CFR-2012-title40-vol34/CFR-2012-title40-vol34-sec1508-7>

Final Panel Comment 10

The Draft Denver GI Study and Appendix E do not sufficiently address the effects of the potential lack of NER project maintenance or of reasonably foreseeable development activities.

Basis for Comment

Ongoing maintenance of the NER project is critical to the success of this Federal TSP, and the local sponsor is responsible for this maintenance over time. The adaptive management plan only addresses adaptive maintenance for 10 years into the future. The risk that required maintenance measures after that time will not be evaluated or implemented is not documented.

The Draft Denver GI Study and Appendix E do not sufficiently describe commitments on the part of the local sponsor to maintain the NER project over an extended period of time, what regulatory measures relating to floodplain management and/or limitations on adjacent development will be put into place, and whether, in the event of a catastrophic rainfall, the local sponsor is prepared to re-construct certain features of the eco-restoration project.

Unexpectedly high maintenance costs, uncertainties in the local economy, and financial commitments on the part of the local sponsor are significant risks to the planned NER project.

Significance – Medium/Low

Without documentation of commitments by the local sponsor for ongoing monitoring and maintenance and locally enforced development limitations near the NER project, the risks to the project cannot be fully assessed.

Recommendations for Resolution

1. Develop a written agreement between USACE and the local sponsor, such as a Memorandum of Understanding, that commits the City of Denver to adaptive monitoring and maintenance activities over the expected life of the NER project.
2. Request that the City of Denver provide documentation on the adoption of enforceable local regulations limiting development and other activities adjacent to, or otherwise having the potential to adversely affect, the NER project.

5. REFERENCES

40 CFR §1508.7. Cumulative Impact. July 1, 2012. Available online at:

<https://www.gpo.gov/fdsys/granule/CFR-2012-title40-vol34/CFR-2012-title40-vol34-sec1508-7>

EPA (2016). Wetland Functions and Values. Available online at:

<https://www.epa.gov/sites/production/files/2016-02/documents/wetlandfunctionsvalues.pdf>

Johnson, Brad (2018). Personal Communication (emails), September 20 and 27, 2018.

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

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

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

USACE (2015a). The Highway Methodology Workbook Supplement: Wetland Functions and Values, A Descriptive Approach. April 6. Available online at:

<http://www.nae.usace.army.mil/Portals/74/docs/regulatory/Forms/HighwaySupplement6Apr2015.pdf>

USACE (2015b). Economics Guidance Memorandum, 16-03, Unit Day Values for Recreation for Fiscal Year 2016. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. October 16.

Available online at: <https://planning.erdc.dren.mil/toolbox/library/EGMs/EGM16-03.pdf>

USACE (2014). Planning SMART Guide. Planning Bulletin (PB) 2012-02, Reissue #2. Issuing Office: CECW-P. Reissued March 4, 2014.

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

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APPENDIX A

IEPR Process for the Denver GI Study Project

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

Table A-1 presents the major milestones and deliverables of the Denver GI Study IEPR. Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on August 8, 2018. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on December 7, 2018. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table A-1. Major Milestones and Deliverables of the Denver GI Study IEPR

Task	Action	Due Date
1	Award/Effective Date	8/8/2018
	Review documents available	8/8/2018
	Public comments available	9/4/2018
	Battelle submits draft Work Plan ^a	8/15/2018
	USACE provides comments on draft Work Plan	8/15/2018
	Battelle submits final Work Plan ^a	8/22/2018
2	Battelle submits list of selected panel members ^a	8/20/2018
	USACE confirms the panel members have no COI	8/22/2018
3	Battelle convenes kick-off meeting with USACE	8/15/2018
	Battelle convenes kick-off meeting with panel members	8/31/2018
	Battelle convenes kick-off meeting with USACE and panel members	8/31/2018
4	Panel members complete their individual reviews	9/18/2018
	Panel members provide draft Final Panel Comments to Battelle	9/26/2018
	Battelle sends public comments to panel members for review	9/17/2018
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	9/19/2018
	Panel finalizes Final Panel Comments	10/1/2018
5	Battelle submits Final IEPR Report to USACE ^a	10/9/2018
6 ^b	Battelle convenes Comment Response Teleconference with panel members and USACE	11/20/2018
	Battelle submits pdf printout of DrChecks project file ^a	12/7/2018
	Agency Decision Milestone (ADM) meeting ^c	10/17/2018
	Contract End/Delivery Date	8/16/2019

^a Deliverable.

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

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

At the beginning of the Period of Performance for the Denver GI Study IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 33 charge questions provided by USACE, two overview questions and two public comment question added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

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

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

Review Documents	No. of Review Pages	Subject Matter Experts			
		Civil Works Planner/ Economics (Dual Role)	Biological Resources and Environmental Law Compliance	Hydrology and Hydraulic Engineer	Geotechnical Engineer
Integrated Feasibility Study and Draft Environmental Impact Statement	350	350	350	350	350
Appendix A. Hydrologic Analysis and Climate Change	80 (1,550 data sheets ^a)		80 (1,550 data sheets ^a)	80 (1,550 data sheets ^a)	
Appendix B. Geotechnical Engineering, Soils, and Geology	80 (50 data sheets ^a)				80 (50 data sheets ^a)
Appendix C. Economics	140	140			
Appendix E. Environmental Compliance and Ecological Modeling (review sections listed below)	80 (2,000 data sheets ^a)		80 (2,000 data sheets ^a)		
Section E3 - South Platte River FACWet and FACStream Alternative Evaluation - NARRATIVE ONLY. Section E4 - Harvard and Weir Gulch FACWet and Alternative Evaluation - NARRATIVE ONLY. Section E5 - FACWet and FACStream model approval documentation Section E6 - Section 404(b)(1) Analysis Section E7 - Mitigation, Monitoring, and Adaptive Management Plan Section E8 - Agency Coordination Record					
Appendix F. Hydraulic Analysis	470 (220 data sheets ^a)			470 (220 data sheets ^a)	
Appendix G. Flood Risk and Floodplain Management	40	40	40	40	40
Appendix H. Nonstructural Implementation Plan	12				12
Appendix I. Cost Estimate	25	25			
Appendix J. Structural Engineering	10			10	
Appendix K. Cultural Resources Analysis	38		38		
Appendix L. HTRW Reconnaissance Report	50 (150 data sheets ^a)		50 (150 data sheets ^a)		
Appendix M. Public Engagement ^{a,b}	150	150	150	150	150
Appendix N. Recreation Plan	40		40		
Total Number of Review Pages (Total Number with Data Sheets)	1,565 (5,535)	705	828 (3,700)	1,100 (1,770)	632 (50)

^a For reference only. These documents are not for Panel review and should be used as information sources only. They are not included in the total number of pages to be reviewed.

^b Page count for public comments is approximate. USACE will submit public comments to Battelle, and Battelle will in turn submit the comments to the IEPR Panel.

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

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

About halfway through the review, a teleconference was held with USACE, Battelle, and the Panel so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 14 panel member questions to USACE. USACE was able to provide responses to all the questions during the teleconference, or was able to provide written responses to all the questions prior to the end of the review.

A.2 Review of Individual Comments

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

A.3 IEPR Panel Teleconference

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

A.4 Preparation of Final Panel Comments

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

- **Lead Responsibility:** For each Final Panel Comment, one panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and

submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see description below)
 4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.
 5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.
- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

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

A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received a PDF file containing 34 pages of public comments on the Denver GI Study (approximately 18 written comments) from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

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

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

A.6 Final IEPR Report

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

A.7 Comment Response Process

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

APPENDIX B

Identification and Selection of IEPR Panel Members for the Denver GI Study Project

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B.1 Panel Identification

The candidates for the Denver Urban Waterways Restoration Study (Denver GI Study) Feasibility Study and Environmental Impact Statement, Adams & Denver Counties, Colorado (hereinafter: Denver GI Study IEPR) Panel were evaluated based on their technical expertise in the following key areas: Civil Works planning / economics; biological resources and environmental law compliance; hydraulic and hydrology (H&H) engineering; and geotechnical engineering. These areas correspond to the technical content of the review documents and overall scope of the Denver GI Study project.

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

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

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

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Denver GI Study

1. Previous and/or current involvement by you or your firm in the Denver Urban Waterways Restoration Study (Denver GI Study) Feasibility Study and Environmental Impact Statement (FS/EIS), Adams & Denver Counties, Colorado, and related projects.
2. Previous and/or current involvement by you or your firm in flood control or ecosystem restoration in Adams & Denver Counties, Colorado.
3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&M) of any projects in the Denver GI Study FS/EIS and related projects.
4. Current employment by the U.S. Army Corps of Engineers (USACE).

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Denver GI Study

5. Previous and/or current involvement with paid or unpaid expert testimony related to the Denver GI Study FS/EIS.
6. Previous and/or current employment or affiliation the non-Federal sponsors or any of the following cooperating Federal, state, county, local, and regional agencies, environmental organizations, and interested groups (*for pay or pro bono*):
 - City and County of Denver (single entity)
 - Urban Drainage and Flood Control District
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to Adams & Denver Counties, Colorado.
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Omaha District.
9. Previous or current involvement with the development or testing of models that will be used for, or in support of the Denver GI Study FS/EIS.

Note. The following models are called out in the FS/EIS: Functional Assessment of Colorado Wetlands (FACWet); Functional Assessment of Colorado Streams (FACStream); Digital Elevation Model (DEM); cost effectiveness/incremental cost analysis (CE/ICA) model for the South Platte River – utilizes IWR Planning Suite model.
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Omaha District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Omaha District. Please explain.
11. Any previous employment by USACE as a direct employee, notably if employment was with the Omaha District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
12. Any previous employment by USACE as a contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the Omaha District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood management or ecosystem restoration review and include the client/agency and duration of review (approximate dates).

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Denver GI Study

14. Pending, current, or future financial interests in contracts/awards from USACE related to the Denver GI Study FS/EIS.
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.
16. Significant portion of your personal or office's revenues within the last three years came from City and County of Denver or Urban Drainage and Flood Control District contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Denver GI Study FS/EIS?
18. Participation in relevant prior and/or current Federal studies related to the Denver GI Study FS/EIS.
19. Previous and/or current participation in prior non-Federal studies related to the Denver GI Study FS/EIS.
20. Has your research or analysis been evaluated as part of the Denver GI Study FS/EIS?
21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.

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

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member's affiliation, location, education, and overall years of experience. One panel member held a dual role serving as both the Civil Works planning and economics expert.

Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. Denver GI Study IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Civil Works Planning / Economics (Dual Role)					
Marvin Feldman	Resource Decisions	San Francisco, CA	Ph.D., Natural Resource Economics	No	38
Biological Resources and Environmental Law Compliance					
Greg Crouch	Crouch Environmental Services, Inc.	Houston, TX	M.S., Biology/Ecology	No	41
H&H Engineering					
David Love	Independent consultant	Boulder, CO	B.S., Engineering Physics	Yes	45
Geotechnical Engineering					
Rune Storesund	Independent consultant	Kensington, CA	Dr.Eng., Civil Engineering	Yes	18

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

Table B-2. Denver GI Study IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Feldman	Crouch	Love	Storesund
Civil Works Plan Formulator / Economist (Dual Role)				
Minimum 10 years of demonstrated experience in public works planning.	X			
Expert in the U.S. Army Corps of Engineers (USACE) plan formulation process, procedures, and standards.	X			
Experienced in the evaluation of alternative plans for ecosystem restoration and flood risk management, including structural and nonstructural flood risk management efforts (elevation of buildings, wet and dry flood proofing).	X			
Extensive experience related to evaluating traditional Civil Works plan benefits associated with ecosystem restoration, to include experience with wetland mitigation planning, the Institute for Water Resources (IWR) Planning Suite model for cost effectiveness and incremental cost analysis (CE/ICA), and the methodology for determining the cost effectiveness of alternative evaluations.	X			
Minimum 10 years of experience directly related to water resource economic evaluation and review.	X			
Experience in reviewing Federal water resource economic documents justifying construction efforts.	X			
Experience related to evaluating traditional National Ecosystem Restoration (NER) plan benefits associated with ecosystem projects, to include experience in USACE methodologies for performing CE/ICA analysis, Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA), and the methodology for determining the cost effectiveness of ecosystem restoration and flood risk management actions.	X			
Biological Resources and Environmental Law Compliance				
Minimum of 10 years of experience directly related to water resource environmental evaluation or review and National Environmental Policy Act (NEPA) compliance.		X		
Familiar with the habitat, fish and wildlife species, and tribal cultures and archeology that may be affected by the project alternatives in this study area (i.e., Front Range, South Platte River).		X		
Familiar with Front Range biology, wetlands, and riparian habitats, with knowledge of riverine systems.		X		
Expert in compliance with additional environmental laws, policies, and regulations, including compliance with the Fish and Wildlife Coordination Act and Endangered Species Act, and familiar with ecological models.		X		

Table B-2. Denver GI Study IEPR Panel: Technical Criteria and Areas of Expertise (continued).

Technical Criterion	Feldman	Johnson	Love	Storesund
Hydraulic and Hydrology (H&H) Engineer				
Registered professional engineer			X	
Minimum of 10 years of experience in H&H engineering, with an emphasis on urban river engineering, large public works projects associated with ecosystem restoration and natural channel design.			X	
Familiar with HEC-River Analysis System (HEC-RAS) 4.0 and similar USACE H&H computer models.			X	
Familiar with the modeling necessary for compliance with Executive Order 11988 (Floodplain Management).			X	
Experienced with both computer simulation and physical modeling of urban river systems			X	
Geotechnical Engineer				
Registered professional engineer				X
Minimum of 15 years of experience in engineering or architecture.				X
Experience in performing geotechnical evaluation and geo-civil design for all phases of flood risk management and ecosystem restoration projects.				X
Familiar with and have demonstrated experience related to USACE geotechnical practices associated with flood risk management construction and soil engineering.				X
Demonstrated experience in structural flood risk management actions such as levee creation or setbacks.				X

B.3 Panel Member Qualifications

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

Name	Marvin Feldman, Ph.D.
Role	Civil Works Planner / Economist (Dual Role)
Affiliation	Resource Decisions

Dr. Feldman, an independent consultant and principal economist at Resource Decisions, has more than 38 years of experience in water resource and environmental economics. He earned his M.S. in water resource management in 1969 and a Ph.D. in natural resource economics in 1979 from the University of Wisconsin.

Dr. Feldman is experienced in the evaluation and conduct of complex multi-objective public works projects with high public and interagency interests, including flood risk analysis. As a senior economist at Dames & Moore under contract to the U.S. Department of Energy, he worked on developing a multi-attributable site selection model for evaluating risks of alternative sites for the Preliminary Nevada High-level Nuclear Waste Siting Analysis. For the Smith Lake Improvement and Stakeholder Association (SLISA), Alabama, he provided economic evaluation of alternative costs and benefits of municipal and industrial, navigation, recreation, and hydroelectric water uses and non-power evaluations for recreation, property values flood control, navigation, and erosion control to support SLISA's negotiations with the Federal Energy Regulatory Commission and Alabama Power. For the Alaska Department of Natural Resources, he applied risk/cost/benefit analysis to environmental protection methods for petroleum exploration in the Beaufort Sea. As a member of IEPR teams (under contract to Battelle), he reviewed flood Civil Works planning and economic issues related to the Ala Wai Canal in Hawaii, Mamaroneck River in Connecticut, and Moose Creek in Alaska. Dr. Feldman is familiar with the USACE plan formulation process, procedures, and standards as they relate to flood risk management and has more than 10 years of demonstrable experience dealing directly with the USACE Six-Step Planning Process, governed by Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook. Most notably, he applied the Six-Step Process to his work on the USACE/Bureau of Reclamation Central Arizona Water Control Study.

Dr. Feldman has experience related to the economic evaluation of traditional National Economic Development (NED) plans, including his participation in the University of Wisconsin test team that helped develop the original U.S. Water Resources Council Principles and Guidelines. In conjunction with the USACE/Bureau of Reclamation Central Arizona Water Control Study, he designed a multi-attribute utility analysis framework for selecting preferred alternatives. This framework included flood risk management and National Ecosystem Restoration (NER) attributes and structured the tradeoffs among hundreds of alternative plans with regard to these and other attributes. The framework allowed the specification of minimum and maximum acceptable attribute values. Identification of attributes and the importance of weighting these attributes was a key aspect of the public involvement program. By focusing the public involvement on NER and flood control, as well as other key attributes, the plan selection process was more cooperative and less competitive. While working as a consultant to the USACE Sacramento District, he developed and applied a methodology for the cost effectiveness and incremental analysis (CE/ICA) of alternative mitigation measures to enhance the habitat of the endangered winter-run salmon on the Sacramento River.

Dr. Feldman has a strong working knowledge of USACE economic benefit calculations. Throughout his career, he has conducted studies requiring economic benefit analysis for flood risk management. For example, he evaluated the state-of-the-art municipal and industrial water conservation benefit evaluation techniques for the California Urban Water Conservation Council (CUWCC) and identified promising methods for application by CUWCC member water agencies in evaluating their conservation options. His advanced expertise and extensive experience in flood damage analysis and risk and decision analysis is reflected in his work on such studies as the Smith Lake-Black Warrior River (Alabama) benefit-cost analysis of lake levels, studies of cost-benefit tradeoffs for the North Fork of the Feather River (Pacific Gas and Electric, California), and an economic analysis of agricultural diversion alternatives for the Glenn-Colusa Irrigation District (California).

Dr. Feldman is also familiar with methodologies for estimating damages, including the Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA) software. His familiarity with HEC-

FDA includes his knowledge of inputs, assumptions, calculations, and results attributed to the program. He has applied his knowledge of USACE flood risk management and damage calculations/analysis in his work as economist/planner on the USACE/Bureau of Reclamation Central Arizona Water Control Study. This study was a flood control and dam safety study involving the consideration of feasibility alternatives and the selection of preferred alternatives. Other studies requiring the assessment of risk and damage included the aforementioned Preliminary Nevada High-level Nuclear Waste Siting Analysis and the SLISA studies.

Dr. Feldman has participated on a previous USACE IEPR (model certification review) panel as an economics expert for the Institute for Water Resources (IWR) Planning Suite Model II Review.

Name	Greg Crouch
Role	Biological Resources and Environmental Law Compliance
Affiliation	Crouch Environmental Services, Inc.

Mr. Crouch is Vice-Chair of Crouch Environmental Services, Inc. specializing in NEPA analysis and document preparation, permitting and mitigation, environmental site assessment and public involvement for projects with high public and interagency interests. He earned his M.S. in biology/ecology in 1977 from Steven F. Austin State University, and has received additional academic training in the NEPA process from the Duke University Nichols School of Environmental and Earth Sciences (2004-05). He has over 41 years of nationwide experience in environmental site assessment and inventories, permitting, and evaluation and in conducting NEPA impact assessments for complex multi-objective public works projects with competing trade-offs. His NEPA-related experience includes development of the Environmental Impact Statement (EIS) for the Bayport Container Terminal and NEPA documentation for evaluation and effects analysis for offshore platforms, pipelines and federal leases, nuclear power plants, coal-fired power plants, parks, highways, pipelines, transmission lines, dredged material placement areas, and liquefied natural gas facilities. He is experienced with the U.S. Fish and Wildlife Service (USFWS) Habitat Evaluation Procedures HEP Handbook, Clean Water Act, and Endangered Species Act, having procured over 100 404/401 permits for a variety of infrastructure projects as well as for private developers, performed more than 100 endangered species surveys (as well as USFWS Section 7 consultations), and performed dozens of quantitative habitat surveys using HEP, hydrogeomorphic (HGM), and other survey methods.

Mr. Crouch has completed over 200 Phase I Environmental Site Assessments nationwide for a variety of private and public clients and has experience evaluating and creating sensitive habitats, including streams and wetlands. Mr. Crouch is most well-known for his creation of the Baytown Nature Center in Baytown Texas. This nature center was developed as mitigation for a Superfund site. The initial project created over 60 acres of new salt marsh habitat as well as some forested and brackish water wetlands. Since the initial creation of the Superfund mitigation site, Mr. Crouch has built hundreds of additional acres of both forested and non-forested wetlands habitats within its surrounding area. Mr. Crouch has also created in excess of 30 other sensitive habitats, primarily as a mitigation for wetland losses and for endangered species. Habitat types include upland forest, native prairie, freshwater wetlands, salt and brackish water wetlands, sea grass beds, bottomland forest and open water habitat.

Mr. Crouch lives most of his year in Santa Fe, New Mexico which has given him direct experience with the Colorado Front Range and understands its habitat types and other concerns. He has also performed

numerous environmental site assessments, wetland delineations, and endangered species surveys in the region.

Mr. Crouch routinely performs cumulative effects analyses on public works projects with high public and interagency interests as part of his extensive NEPA practice and has substantial experience working with USACE on flood damage reduction projects (including dam safety). Specific projects include the Clear Creek Flood Damage Reduction Project, the Sims Bayou Hike and Bike Trail, Greens Bayou Flood Damage Reduction Project, Addicks and Barker Dam Safety Public Involvement, compliance audits, and the Jacintoport Dredged Material Placement Area. Recently, Mr. Crouch worked on the biological sections of an EIS for a major container terminal on Galveston Bay (Texas) and managed the environmental investigations and permitting for 43,000 acres of planned development on the Texas coast. He also was a peer reviewer on the Melvin Price-Wood River Underseepage Design Deficiency Report IEPR in 2011. Mr. Crouch is a member of the Society of Wetland Scientists.

Name	David Love, P.E.
Role	Hydraulic and Hydrology (H&H) Engineering
Affiliation	Independent Consultant

Mr. David Love has more than 45 years of experience in civil and water resource engineering specializing in drainage and flood control projects. He holds a B.S. in engineering physics from the Colorado School of Mines and has completed graduate coursework in hydraulics at the University of Colorado. He is also certified as a P.E. in Colorado.

Mr. Love has completed dozens of floodplain and major drainageway masterplans, all of which have included H&H engineering related to flood risk. The South Platte River Flood Control Improvement project in Denver, Colorado, is an example of many large, complex projects with multiple project stakeholders on which he has worked. Mr. Love was the Engineer of Record for the 2009 South Platte River Globeville and North Areas Flood Control & Greenways Project, which is located within the IEPR study reach upstream of 58th Avenue. This project was the single largest flood control project undertaken by either the Urban Drainage and Flood Control District or the City and County of Denver. It included master planning, final design, construction oversight, hydraulic modeling, and floodplain remapping for the project and obtained a Letter of Map Revision (LOMR) from the Federal Emergency Management Agency. This project removed more than 300 acres of land within Denver from the 100-year floodplain while improving fish passage and constructing greenway trails and aquatic and terrestrial habitats. As a result, the project was named the Outstanding Flood Control Project constructed in 2009 by the Colorado Association of Stormwater and Floodplain Managers. He has also performed a LOMR for Weir Gulch within the IEPR study reach.

Mr. Love is familiar with contracting procedures through his project experience working with local municipalities, special districts, various state and Federal agencies, and private-sector clients. Approximately half of Mr. Love’s project history has been related to the design and preparation of construction documents, followed by a quality assurance role (QA) during construction activities. The QA experience has ranged from periodic site visits to observe construction activities to full-time construction management.

Mr. Love has been a featured speaker at several professional conferences and has given multiple engineering-related lectures at the University of Colorado’s Schools of Engineering and Environmental

Design at Boulder, Colorado. He has also taught construction inspection courses to multiple public works employees. Mr. Love is a member of the American Society of Civil Engineers (ASCE), American Council of Engineering Consultants, Colorado Association of Stormwater and Floodplain Managers, Association of State Floodplain Managers, and National Society of Professional Engineers, and was past president of the Professional Engineers of Colorado, Boulder Chapter.

Name	Rune Storesund, D.Eng, P.E., G.E.
Role	Geotechnical Engineering
Affiliation	Independent Consultant

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

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

Dr. Storesund has experience related to the design of flood risk management projects associated with levee and flood risk management structures' design and construction, including static and dynamic slope stability, seepage through earthen embankments, and underseepage. He has been an active participant in ASCE committees on the local and national level since 1998.

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

and the National Science Foundation-sponsored Resilient and Sustainable Infrastructures project, evaluating interconnected, interrelated, interactive critical infrastructures in the California Delta.

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

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APPENDIX C

Final Charge for the Denver GI Study IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Denver Urban Waterways Restoration Study (Denver GI Study) Feasibility Study and Environmental Impact Statement, Adams & Denver Counties, Colorado

This is the final Charge to the Panel for the Denver GI Study IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on August 22, 2018. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

The study area is located in Adams County and Denver, Colorado. The metro area has a population of approximately 600,000, comprising urban residential, suburban, commercial, and industrial areas. The entire metro area of Denver, Colorado, is approximately 2.4 million.

The study area extends approximately 10 miles along the South Platte River and tributaries. Priority reaches for the study area have been identified as:

- South Platte River – 6th Ave. to 58th Ave.
- Harvard Gulch – Colorado Blvd. to the confluence of the South Platte River.
- Weir Gulch – Just west of Sheridan Blvd to the confluence of the South Platte River, including 1st Ave. and Dakota Ave. tributaries.

Along the South Platte River, there is a need to provide a functioning habitat corridor through Denver for migratory birds, as well as wetland and aquatic species. The purpose of the project along the Harvard Gulch and Weir Gulch tributaries to the South Platte River is to address flood risk issues in order to reduce flood and life safety risks along each stream. Urban development within the floodplain in both gulches consists of approximately 1,700 structures and an associated 5,000 people at risk of flooding. Components of ecosystem restoration were also included in these study reaches but were proven not to be cost effective prior to detailed alternative analysis.

The goal of the study in the South Platte River portion of the project is to identify an ecosystem restoration plan that reasonably maximizes National Ecosystem Restoration (NER) benefits, provides secondary flood risk reduction benefits, and improves recreation opportunities in accordance with the USACE's Environmental Operating Principles. These objectives apply to the South Platte River between 6th Ave and 58th for the duration of the 50-year period of analysis (2019 - 2069).

- **Objective 1:** Restore riparian and wetland habitat quantity, quality and connectivity in the South Platte River for migratory birds protected under the Migratory Bird Treaty Act and native species of plants and animals.
- **Objective 2:** Restore in-channel habitat complexity and connectivity in the South Platte River for native aquatic species.
- **Objective 3:** Reduce flood damages along the South Platte as an incidental benefit of ecosystem restoration measures
- **Objective 4:** Improve public recreation opportunities, connectivity, and accessibility along the South Platte River.

The goal of the study in the Harvard Gulch and Weir Gulch portions of the project is to identify a flood risk management plan that reasonably maximizes NED benefits, reduces life safety risks, restores ecosystem habitat, and improves recreation opportunities in accordance with the USACE's Environmental Operating Principles. Based on the problems identified in the study area, the following planning objectives were established. These objectives apply to the Weir Gulch between Sheridan Blvd to the South Platte River confluence (and includes 1st Ave and Dakota Ave tributaries) and the Harvard Gulch between Colorado Blvd and the South Platte River confluence for the duration of the 50-year period of analysis (2019 - 2069).

- **Objective 1:** Reduce flood risks to life, safety, property, and critical infrastructure in the Harvard Gulch and Weir Gulch basins.
- **Objective 2:** Restore, where economically feasible, in-channel, riparian and wetland habitat quantity, quality, and connectivity in and along Harvard Gulch and Weir Gulch as a secondary benefit to flood risk reduction measures for migratory birds and native species of plants, animals, and fish.
- **Objective 3:** Improve public recreation opportunities, connectivity, and accessibility along the Harvard Gulch and Weir Gulch.

A variety of management measures were developed that would address one or more of the planning objectives. These measures were evaluated and then screened. Alternative plans were then developed which comprised of one or more of the management measures. Ecosystem restoration alternatives were developed for the South Platte River, while structural and non-structural flood risk management alternatives were developed for the Weir and Harvard Gulches. An ecosystem restoration plan was selected as the tentatively selected plan (TSP) for the South Platte River, a structural flood risk management plan was selected as the TSP for Weir Gulch, and a non-structural flood risk management plan was selected as the TSP for the Harvard Gulch.

OBJECTIVES

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

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

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

DOCUMENTS PROVIDED

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

Review Documents	No. of Review Pages	Subject Matter Experts			
		Civil Works Planner/ Economics (Dual Role)	Biological Resources and Environmental Law Compliance	Hydrology and Hydraulic Engineer	Geotechnical Engineer
Integrated Feasibility Study and Draft Environmental Impact Statement	350	350	350	350	350
Appendix A. Hydrologic Analysis and Climate Change	80 (1,550 data sheets ^a)		80 (1,550 data sheets ^a)	80 (1,550 data sheets ^a)	
Appendix B. Geotechnical Engineering, Soils, and Geology	80 (50 data sheets ^a)				80 (50 data sheets ^a)
Appendix C. Economics	140	140			
Appendix E. Environmental Compliance and Ecological Modeling (review sections listed below)	80 (2,000 data sheets ^a)		80 (2,000 data sheets ^a)		
Section E3 - South Platte River FACWet and FACStream Alternative Evaluation - NARRATIVE ONLY. Section E4 - Harvard and Weir Gulch FACWet and Alternative Evaluation - NARRATIVE ONLY. Section E5 - FACWet and FACStream model approval documentation Section E6 - Section 404(b)(1) Analysis Section E7 - Mitigation, Monitoring, and Adaptive Management Plan Section E8 - Agency Coordination Record					
Appendix F. Hydraulic Analysis	470 (220 data sheets ^a)			470 (220 data sheets ^a)	
Appendix G. Flood Risk and Floodplain Management	40	40	40	40	40
Appendix H. Nonstructural Implementation Plan	12				12
Appendix I. Cost Estimate	25	25			
Appendix J. Structural Engineering	10			10	
Appendix K. Cultural Resources Analysis	38		38		

Review Documents	No. of Review Pages	Subject Matter Experts			
		Civil Works Planner/Economics (Dual Role)	Biological Resources and Environmental Law Compliance	Hydrology and Hydraulic Engineer	Geotechnical Engineer
Appendix L. HTRW Reconnaissance Report	50 (150 data sheets ^a)		50 (150 data sheets ^a)		
Appendix M. Public Engagement ^{a,b}	150	150	150	150	150
Appendix N. Recreation Plan	40		40		
Total Number of Review Pages (Total Number with Data Sheets)	1,565 (5,535)	705	828 (3,700)	1,100 (1,770)	632 (50)

^a For Reference Only. These documents are not for Panel review and should be used as information sources only. They are not included in the total number of pages to be reviewed.

^b Page count for public comments is approximate. USACE will submit public comments to Battelle, and Battelle will in turn submit the comments to the IEPR Panel.

Documents for Reference

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

SCHEDULE & DELIVERABLES

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

Task	Action	Due date
3	Subcontractors complete mandatory Operations Security (OPSEC) training	9/28/2018
	Battelle sends review documents to panel members	8/30/2018
	Battelle convenes kick-off meeting with panel members	8/31/2018
	Battelle convenes kick-off meeting with USACE and panel members	8/31/2018

Task	Action	Due date
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	9/10/2018
4	Panel members complete their review of the documents	9/18/2018
	Battelle provides talking points to panel members for Panel Review Teleconference	9/19/2018
	Battelle convenes Panel Review Teleconference	9/20/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	9/20/2018
	Panel members provide draft Final Panel Comments to Battelle	9/26/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	9/27/2018 - 10/02/2018
	Panel finalizes Final Panel Comments	10/3/2018
4**	Battelle receives public comments from USACE	9/4/2018
	Battelle sends public comments to Panel	9/20/2018
	Panel members complete their review of the public comments	9/25/2018
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	9/26/2018
	Panel drafts Final Panel Comment on public comments, if necessary	9/28/2018
	Panel finalizes Final Panel Comment regarding public comments, if necessary	10/2/2018
5	Battelle provides Final IEPR Report to panel members for review	10/4/2018
	Panel members provide comments on Final IEPR Report	10/5/2018
	Battelle submits Final IEPR Report to USACE*	10/10/2018
6	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	10/19/2018
	Battelle convenes teleconference with Panel to review Comment Response process	10/19/2018
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	11/2/2018
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	11/8/2018
	USACE PCX provides draft PDT Evaluator Responses to Battelle	11/9/2018
	Battelle provides draft PDT Evaluator Responses to panel members	11/13/2018
	Panel members provide draft BackCheck Responses to Battelle	11/16/2018
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/19/2018

Task	Action	Due date
	Battelle convenes Comment Response Teleconference with panel members and USACE	11/20/2018
	USACE inputs final PDT Evaluator Responses to DrChecks	11/29/2018
	Battelle provides final PDT Evaluator Responses to panel members	11/30/2018
	Panel members provide final BackCheck Responses to Battelle	12/5/2018
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	12/6/2018
	Battelle submits pdf printout of DrChecks project file*	12/7/2018
ADM Meeting	Battelle participates in the ADM Meeting (Lead Panel Member Only)	10/17/2018
	Contract End/Delivery Date	8/16/2019

* Deliverables

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

CHARGE FOR PEER REVIEW

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

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

General Charge Guidance

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

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

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

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

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

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

Independent External Peer Review of the Denver Urban Waterways Restoration Study (Denver GI Study) Feasibility Study and Environmental Impact Statement, Adams & Denver Counties, Colorado

Charge Questions and Relevant Sections as Supplied by USACE

The following Charge to Reviewers outlines the objectives of the Independent External Peer Review (IEPR) for the subject study and identifies specific items for consideration for the IEPR Panel.

The objective of the IEPR is to obtain an independent evaluation of whether the interpretations of analysis and conclusions based on analysis are reasonable for the subject study. The IEPR Panel is requested to offer a broad evaluation of the overall study decision document in addition to addressing the specific technical and scientific questions included in the Charge. The Panel has the flexibility to bring important issues to the attention of decision makers, including positive feedback or issues outside those specific areas outlined in the Charge. The Panel can use all available information to determine what scientific and technical issues related to the decision document may be important to raise to decision makers. This includes comments received from agencies and the public as part of the public review process.

The Panel review shall focus on scientific and technical matters, leaving policy determinations for USACE. The Panel should not: 1) make recommendations on whether a particular alternative should be implemented, 2) present findings that become “directives” in that they call for modifications or additional studies, or 3) suggest new conclusions and recommendations. In such circumstances, the Panel may have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide an objective review.

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

The Panel is asked to consider the following items as part of its review of the decision document and supporting materials.

General Review Considerations:

1. Are the need for and intent of the decision document clear?
2. Does the decision document adequately address the stated need and intent relative to scientific and technical issues?
3. Were all models in the analysis used in an appropriate manner?
4. Were risk and uncertainty sufficiently considered?
5. Are potential life safety issues accurately and adequately described?
6. Were economic, environmental, and engineering analyses used for this study consistent with generally accepted methodologies?

Existing and Future Without-Project Resources:

7. Have the character and scope of the study area been adequately described and is the identified study area appropriate in terms of undertaking a systems-based investigation?
8. Given your area of expertise, are current baseline and forecasted conditions (without proposed actions) adequately characterized to allow for evaluation of pertinent without-project conditions?
9. Are the future conditions expected to exist in the absence of a Federal project logical and adequately described in the document?
10. Do you agree with the general analyses of the existing natural resources within the study area?
11. Was the discussion of natural resources sufficient to characterize current baseline conditions and to allow for evaluation for forecasted conditions (with and without proposed actions)?

Plan Formulation:

12. Was a reasonably complete array of possible measures that address ecosystem restoration and flood risk management considered in the development of alternatives?
13. Did the formulation process follow the requirement to avoid, minimize, and then mitigate adverse impacts on resources?
14. Were the assumptions made for use in developing the future with- and future without-project conditions for each alternative reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent across the range of alternatives and/or adequately justified when different?
15. 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?
16. Are future Operation, Maintenance, Repair, Replacement, and Rehabilitation efforts adequately described, and are the estimated cost of those efforts reasonable for each alternative?
17. Please comment on the screening of the proposed measures and alternatives. Are the screening criteria appropriate? In your professional opinion, are the results of the screening acceptable? Were any measures or alternatives screened out too early?
18. Do the cost effectiveness/incremental cost analysis (CE/ICA) results support the screening and refinement of the initial and final array of alternatives as well as the selection of the National Ecosystem Restoration (NER) plan for the South Platte River? Do the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA) results support the same findings for the selection of the National Economic Development (NED) plan for the Weir and Harvard Gulches?

Tentatively Selected Plan:

19. Please comment on the completeness of the tentatively selected plan (i.e., will any additional efforts, measures, or projects be needed to realize the expected benefits).

20. Please comment on the effectiveness of the tentatively selected plan (i.e., to what extent does the recommended plan alleviate the specified problems and realize the specified opportunities).
21. From a public safety perspective, is the tentatively selected plan reasonable and appropriate, or should other alternatives be considered?
22. Please comment on the appropriateness of location, sizing, and design of plan features.
23. Please comment on the constructability of each tentatively selected plan. Were proper considerations made to the project to allow the project to be constructed within the costs estimated? Were proper considerations made for excavation to prevent damage to adjacent structures? Did the cost estimate accurately cover the difficulty of construction in a highly developed area?

Ecosystem Restoration:

24. Please comment on the reasonableness of the quantifications of project benefits using the environmental outputs model. Are the expected changes in the quality and abundance of desired ecological resources clearly and precisely specified in justifying the ecosystem restoration habitat?
25. Do the ecological models (FACWet and FACStream) clearly link habitat improvements to the needs of the targeted ecological resources?
26. Does the economic model (IWR-PLAN) appropriately present the results of the CE/ICA? Do the inputs, outputs, and technical assumptions of this model appear reasonable?
27. Are proposed measures consistent for providing quality habitat in an urban habitat?
28. Is it clear that restoration of the desired ecological resource quality is a function of improvements in habitat quality or quantity?
29. Is it clear that the restored ecological resource quality will be sustainable over the long run?
30. Are the required long-term commitments (both Federal and non-Federal) to sustaining the restored ecological resource quality adequately described and adequately demonstrated?

Flood Risk Management:

31. Do formulated alternatives actively address the problems of sedimentation, unforeseen design difficulties, or potential construction limitations?
32. Have structural flood risk management measures been considered in conjunction with ecosystem restoration measures to ensure a synergistic effect whereby one measure will not undermine the other?
33. Have future with-project conditions been appropriately applied regarding the long-term sustainability and resilience of flood risk management measures?

Summary Questions:

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

Public Comment Questions (provided to the Panel separately for their review of the public comments):

36. Does the public raise any additional discipline-specific technical concerns with regard to the overall project?
37. Has adequate stakeholder involvement occurred to identify issues of interest and to solicit feedback from interested parties?

APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire

Independent External Peer Review

Denver Urban Waterways Restoration Study Feasibility Study and Environmental Impact Statement, Adams and Denver Counties, Colorado

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

NAME OF FIRM: **Battelle Memorial Institute Corporate Operations**

REPRESENTATIVE'S NAME: **Jason Jenkins**

TELEPHONE: **614-424-4873**

ADDRESS: **505 King Avenue, Columbus, Ohio 43201**

EMAIL ADDRESS: **jenkinsj@battelle.org**

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

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

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

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

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

No additional information to report.



Jason Jenkins

7/31/2018

Date

BATTELLE

It can be done