

August 22, 2013

Final Independent External Peer Review Report General Reevaluation Report (GRR) for the Truckee Meadows Flood Control Project, Nevada



Prepared by
Battelle Memorial Institute

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

Contract No. W912HQ-10-D-0002
Task Order: 0044

Photo by Michael J. Nevins

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Truckee Meadows Flood Control Project, Nevada**

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505 King Avenue
Columbus, OH 43201

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EXECUTIVE SUMMARY

Project Background and Purpose

The Truckee Meadows Flood Control Project was authorized under the Water Resources Development Act (WRDA) of 1988 (Public Law 100-676). The study area includes the Truckee River in Washoe County, Nevada, within and below Reno, Sparks, and Truckee Meadows, extending east forming a border between Washoe County (on the north) and Storey County (on the south) and onto the Pyramid Lake Paiute Tribal lands to the river's terminus at Pyramid Lake. Because of the expanse of land area and length of river miles, the study area was divided into three general reaches: downtown Reno, Truckee Meadows, and downstream Truckee River.

The 1997 flood event is the flood event of record for the Truckee River. It caused over \$500 million in flood-related damages in the Truckee Meadows area alone. Much of the damages occurred in the industrial areas of the cities of Sparks and Reno and at the Reno-Tahoe International Airport. Flooding in downtown Reno in 1997 caused roughly \$200 million in damages and inundated many bridges.

A 2011 draft Truckee Meadows General Reevaluation Report (GRR) analyzed the flood and ecosystem problems, and developed alternatives to reduce flood risks, restore environmental resources, and increase recreational opportunities in the study area. An Independent External Peer Review (IEPR) was initiated in 2011 to review the Truckee Meadows Flood Control Project Draft GRR (hereinafter 2011 GRR) that contained a tentatively recommended plan. A site visit was also conducted in August 2011. The IEPR Panel completed its review of the 2011 GRR, and Battelle delivered the IEPR Final Report in October 2011. Subsequent to submission of the report, Battelle was notified by the Flood Risk Management (FRM) Planning Center of Expertise (PCX) Project Manager that the Sacramento District Project Delivery Team (PDT) had requested that the IEPR be terminated. Battelle immediately notified the Panel and terminated all IEPR activities.

Subsequent to terminating the IEPR for the 2011 GRR, Sacramento District prepared a revised GRR (hereinafter Truckee Meadows Revised GRR). The extent and focus of the Truckee Meadows project was reduced in scope. The project footprint, which had once encompassed close to 60 miles of river, was reduced to approximately 6 miles. The 2011 GRR considered FRM and fish/wildlife enhancement, but the Truckee Meadows Revised GRR focuses specifically on FRM. All ecosystem restoration and fish passage restoration was removed with the exception of plantings to stabilize the project site post-construction. Information about fish passage plans is still included in the report for use by other agencies, but was not recommended for U.S. Army Corps of Engineers (USACE) implementation. There is no locally preferred plan;

therefore, nothing is proposed for the downtown Reno reach. Benching of the Vista Reefs is no longer part of the recommended plan. Recreation remains in the Truckee Meadows reach on a modest scale similar to the 2011 Recommended Combined Plan.

Sacramento and Baltimore Districts negotiated with the FRM PCX regarding another IEPR and determined in February 2013 that an IEPR would have to be restarted. However, would be limited to changes to the project and the formulation strategy documented in the Truckee Meadows Revised GRR since the initial IEPR was conducted. Reviewers would also check issues remaining from the 2011 IEPR comments.

Independent External Peer Review Process

USACE is conducting an IEPR of the Truckee Meadows Revised GRR. As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the Truckee Meadows Revised GRR. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012) and OMB (2004). This final report describes the IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

USACE requested that, to the extent possible, the previous panel members for the 2011 Truckee Meadows GRR IEPR be recruited. The previous Panel included experts in the following key areas: hydraulics/hydrologic engineering, biology/ecology, civil/construction engineering, geotechnical engineering, economics, and Civil Works planning. These areas correspond to the technical content of the Truckee Meadows Revised GRR and overall scope of the Truckee Meadows project. Battelle contacted the original six selected reviewers who constituted the final 2011 Panel and determined that they were available and willing to conduct the review. However, shortly after the Panel started their 2013 review, Battelle was informed that the Civil Works planning panel member had passed away. Battelle immediately contacted USACE and inquired if Battelle should identify a replacement Civil Works planner. The USACE PDT informed Battelle that it was not essential to replace the planner since the IEPR for the 2011 GRR had been completed and the plan formulation process had not changed. Thus, the final Panel for the Truckee Meadows Revised GRR IEPR consisted of five panel members.

The Panel received an electronic version of the 881 pages of Truckee Meadows Revised GRR documents, along with a charge that solicited comments on specific sections of the documents to be reviewed. USACE prepared the charge questions following guidance provided in USACE (2012) and OMB (2004), which were included in the draft and final Work Plans.

The PDT briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to 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 Truckee Meadows Revised GRR documents individually. The Panel produced individual comments in response to the charge questions and draft Final Panel Comments as part of their review. Preparation of draft Final Panel Comments during the Panel's response to charge questions is not a normal part of the IEPR process. The normal process was slightly altered, moving development of the Final Panel Comments earlier in the IEPR process, because of the PDT's request for an accelerated schedule and the Panel's availability. This was feasible because all of the panel members were familiar with the project, and had experience conducting IEPRs with Battelle and developing Final Panel Comments. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. The panel members then met via teleconference with Battelle to review the draft Final Panel Comments, discuss other key technical comments, discuss charge questions for which there were conflicting responses, and finally to reach agreement on the Final Panel Comments to be provided to USACE. Overall, 10 Final Panel Comments were identified and documented. Of these, three were identified as having high significance, six had medium significance, and one had low significance.

Results of the Independent External Peer Review

The panel members agreed among themselves on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Truckee Meadows Revised GRR 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 Appendix A of this report. The following summarizes the Panel's findings.

Based on the Panel's review, the documents include all the components of a thorough report associated with the preliminary design of the proposed improvements. The documents demonstrate that the project is well supported by the geotechnical engineering and environmental impact analyses. The Panel agreed that USACE made use of appropriate methods and models in their analysis and provided adequate detail in their description of the processes followed throughout the project. While the Panel deemed the report comprehensive with robust documentation in many areas, it identified areas of inconsistencies attributed to recent updates to the report and a few areas where additional clarification is warranted.

Engineering – The geotechnical aspects of the project are logical applications of standard USACE design elements. However, the effects of liquefaction on the design and performance of the flood wall and levee structures have not been considered. The Panel recommends that (1) a preliminary assessment of the potential for and consequences of liquefaction on the proposed flood containment structures be conducted, and (2) the seismic performance criteria for the levees be determined. This information should then be used to inform preliminary emergency and post-earthquake response planning and associated costs. In addition, the basis for selection of various seepage control measures is not well documented. In particular, seepage berms and

relief wells are proposed along the same reach. It is unclear how the location and details of these features were selected.

Due to the change from the 1% annual chance of exceedance (ACE) (100-year event) to a 2% ACE (50-year event), the Panel noted that some statements within the Truckee Meadows Revised GRR were no longer applicable. For example, in some instances the document called for “controlled overtopping,” but based on discussions with the USACE PDT, FRM PCX Project Manager, and Battelle during the mid-review teleconference, the Panel was informed that overtopping was not an issue for a 50-year event (2% ACE design). These statements caused confusion regarding the overall project design and expected level of FRM. Given the change from a 100-year event to the 50-year event, the Panel believes the document needs to be thoroughly reviewed for statements that are no longer applicable. The Panel also believes that a plan to communicate to the public the changes in level of FRM made to the project and any new or remaining risks due to this change should be developed and presented.

The general narrative for the cost analysis was an excellent introduction into the methods used to develop the estimate and a very good starting point for understanding the assumptions used. However, a list of all assumptions used to develop the cost estimate and a detailed list of those items covered by the 25% contingency was not included. Since the Panel was not provided the actual Micro-Computer Aided Cost Estimating System (MCACES) Cost Estimate during this review, it is unknown what assumptions and contingency items were included in that part of the report. The Panel suggests that the lists be included in the report. Further, there were inconsistencies between the Truckee Meadows Revised GRR and the Project Cost and Schedule Risk Analysis Report regarding the construction cost contingency rates applied that need to be addressed.

Economics – The Panel recognized that many of the recommendations from the IEPR of the 2011 GRR were considered and addressed as necessary in the Truckee Meadows Revised GRR. Section 2 of the Economics Appendix was noted as providing a better understanding of the flooding addressed by the proposed project by focusing only on damages resulting from riverine flooding instead of the composite “deeper of the two” of riverine and interior drainage flooding that was addressed in the 2011 GRR. However, the Panel is concerned about the risk and uncertainty associated with the small sample size used to develop the Industrial-Distribution Center content-to-structure value ratio (CSV) and the method used to update residential structure values, both of which impact the calculation of the National Economic Development (NED) benefits.

FRM Alternatives 1 and 2 for the Truckee Meadows Reach were not evaluated using the same criteria as Alternate 3 and may have been eliminated prematurely based on “flawed” hydraulic¹ and inaccurate economic modeling². Given the large number of changes that have been made to the project, including the change from providing 1% ACE to 2% ACE FRM, the identification of

¹ The Revised GRR stated on page 5-5 “After consultation with the vertical team and project proponents, it was decided to reconstruct the hydraulic model rather than attempt to fix the flawed model.”

² The Revised GRR stated on page 5-5 “A data-transfer error was discovered for Alternative 3d which had caused an underestimation of residual damages for that plan. ... The problem with the economic model was corrected prior to the hydraulic model and resulted in a substantial reduction in the benefits for all levels of performance, but particularly that for Alternative 3d.”

hydraulic and economic modeling errors, and the addition of a structural FRM measure after Alternatives 1 and 2 were eliminated from consideration, it is suggested that the nature and extent of the problems in the hydraulic and economic modeling be described and additional justification for the elimination of Alternatives 1 and 2 be provided.

The Panel is also concerned that the annual operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) costs seem very low given the scope of the NED plan. A description of the method used to estimate OMRR&R costs and the components included in the estimate was not provided in the review documents. Certain components of OMRR&R appear to have been excluded from the analysis. A description of how the OMRR&R cost estimate was developed and the components included in the estimate should be included in the documentation.

Environmental – The Panel recognizes that considerably more environmental assessment was conducted for the original project than is necessary for the current project plan. However, much of the current environmental assessment appears to be buried in the background documents; therefore, a review of the Truckee Meadows Revised GRR itself does not highlight some important aspects of the project. For example, there is no discussion of chronic effects on the aquatic ecosystem. At least a summary of the chronic aspect of in-stream and near-stream construction and earthwork impacts, especially sedimentation, should be described. In addition, information on the potential impacts on the stream from the use of chemicals for levee maintenance and management should be provided. Clarification of these issues will lead to a more thorough discussion of all impacts.

Table ES-1. Overview of 10 Final Panel Comments Identified by the Truckee Meadows Revised GRR IEPR Panel.

No.	Final Panel Comment
Significance – High	
1	The economic benefits of the Truckee Meadows project cannot be validated due to incomplete economic risk and uncertainty analysis.
2	Truckee Meadows Reach Alternatives 1 and 2 were not evaluated using the same criteria as Alternative 3 and may have been eliminated prematurely.
3	The estimated annual costs of operating and maintaining project components seem very low given the scope of the National Economic Development (NED) plan.
Significance – Medium	
4	The net benefits for the National Economic Development (NED) plan cannot be validated due to inconsistencies in construction cost contingency rates for the project confidence level in the General Reevaluation Report (GRR) and the Project Cost and Schedule Risk Analysis Report.

Table ES-1. Overview of 10 Final Panel Comments Identified by the Truckee Meadows Revised GRR IEPR Panel. (continued)

No.	Final Panel Comment
5	A plan to communicate to the public the change in residual risks associated with the revised project from a 1% annual chance of exceedance (ACE) level of flood risk management (FRM) to a 2% ACE level of FRM has not been presented.
6	Potential chronic impacts to the aquatic ecosystem due to sedimentation over the extended period of project construction and bank stabilization have not been described.
7	The vegetation management requirements and maintenance of earthen structures in the project area are not presented in sufficient detail to adequately analyze impacts and assess costs.
8	The effects of liquefaction on the design and performance of the flood wall and levee structures have not been considered.
9	The basis for selecting alternative seepage control measures is not clearly defined, potentially affecting the extent and cost of the recommended features.
Significance – Low	
10	Language regarding the 1% annual chance of exceedance (ACE) associated with the 2011 National Economic Development (NED) plan no longer applies under the 2% ACE associated with the 2013 NED plan.

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Appendix A. Final Panel Comments on the Truckee Meadows Revised GRR

Appendix B. Final Charge to the Independent External Peer Review Panel on the Truckee Meadows Revised GRR

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LIST OF ACRONYMS

ACE	Annual Chance of Exceedance
ASCE	American Society of Civil Engineers
ATR	Agency Technical Review
BC	Benefit/Cost
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
COI	Conflict of Interest
CSVR	Content-to-Structure Value Ratio
DrChecks	Design Review and Checking System
EC	Engineer Circular
EIS	Environmental Impact Statement
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
FRM	Flood Risk Management
GRR	General Reevaluation Report
HEC-DSS	Hydrologic Engineering Center – Data Storage System
HEC-FDA	Hydrologic Engineering Center – Flood Damage Reduction Analysis
HEC-HMS	Hydrologic Engineering Center – Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center – River Analysis System
IEPR	Independent External Peer Review
MCACES	Micro-Computer Aided Cost Estimating System
NED	National Economic Development
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFS	Non-federal Sponsor
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
OMRR&R	Operation, Maintenance, Repair, Rehabilitation, & Replacement
PCX	Planning Center of Expertise
PDT	Project Delivery Team
SAR	Safety Assurance Review

SWS Society of Wetland Scientists
USACE United States Army Corps of Engineers
WRDA Water Resources Development Act

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1. INTRODUCTION

The Truckee Meadows Flood Control Project was authorized under the Water Resources Development Act (WRDA) of 1988 (Public Law 100-676). The study area includes the Truckee River in Washoe County, Nevada, within and below Reno, Sparks, and Truckee Meadows, extending east forming a border between Washoe County (on the north) and Storey County (on the south) and onto the Pyramid Lake Paiute Tribal lands to the river's terminus at Pyramid Lake. Because of the expanse of land area and length of river miles, the study area was divided into three general reaches: downtown Reno, Truckee Meadows, and downstream Truckee River.

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A 2011 draft Truckee Meadows General Reevaluation Report (GRR) analyzed the flood and ecosystem problems, and developed alternatives to reduce flood risks, restore environmental resources, and increase recreational opportunities in the study area. An Independent External Peer Review (IEPR) was initiated in 2011 to review the Truckee Meadows Flood Control Project Draft GRR (hereinafter 2011 GRR) that contained a tentatively recommended plan. A site visit was also conducted in August 2011. The IEPR Panel completed its review of the 2011 GRR, and Battelle delivered the IEPR Final Report in October 2011. Subsequent to submission of the report, Battelle was notified by the Flood Risk Management (FRM) Planning Center of Expertise (PCX) Project Manager that the Sacramento District Project Delivery Team (PDT) had requested that the IEPR be terminated. Battelle immediately notified the Panel and terminated all IEPR activities.

Subsequent to terminating the IEPR for the 2011 GRR, Sacramento District prepared a revised GRR (hereinafter Truckee Meadows Revised GRR). The extent and focus of the Truckee Meadows project was reduced in scope. The project footprint, which had once encompassed close to 60 miles of river, was reduced to approximately 6 miles. The 2011 GRR considered FRM and fish/wildlife enhancement, but the Truckee Meadows Revised GRR focuses specifically on FRM. All ecosystem restoration and fish passage restoration was removed with the exception of plantings to stabilize the project site post-construction. Information about fish passage plans is still included in the report for use by other agencies, but was not recommended for U.S. Army Corps of Engineers (USACE) implementation. There is no locally preferred plan; therefore, nothing is proposed for the downtown Reno reach. Benching of the Vista Reefs is no longer part of the recommended plan. Recreation remains in the Truckee Meadows reach on a modest scale similar to the 2011 Recommended Combined Plan.

Sacramento and Baltimore Districts negotiated with the FRM PCX regarding another IEPR and determined in February 2013 that an IEPR would have to be restarted. However, would be limited to changes to the project and the formulation strategy documented in the Truckee

Meadows Revised GRR since the initial IEPR was conducted. Reviewers would also check issues remaining from the 2011 IEPR comments.

The objective of the work described here was to conduct an IEPR of the Truckee Meadows Revised GRR in accordance with procedures described in the Department of the Army, USACE Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the existing environmental, economic, and engineering analyses contained in the Truckee Meadows Revised GRR. The full text of the Final Panel Comments is presented in Appendix A.

2. PURPOSE OF THE IEPR

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

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

In this case, the IEPR of the Truckee Meadows Revised GRR was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) as defined by EC No. 1165-2-214. Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS

This section describes the method followed in selecting the members for the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described by USACE (2012) and in accordance with OMB (2004) guidance. Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

At the beginning of the Period of Performance, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the

schedule were submitted as part of the final Work Plan. In addition, 30 charge questions were provided by USACE and included in the draft and final Work Plans. The final charge also included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report).

Table 1 presents the schedule followed in executing the IEPR. Due dates for milestones and deliverables are based on the award/effective date of July 11, 2013. The review documents were provided by USACE on July 15, 2013. Note that the work items listed in Task 6 occur after the submission of this report. 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.

In addition, due to the accelerated review schedule, USACE requested that Battelle submit interim (working draft) panel comments. Although interim comments are not part of the normal IEPR process (i.e., they are not included in the original scope and are not a deliverable), Battelle provided these to the USACE to allow the PDT to begin developing the draft Evaluator Responses in order to meet the accelerated schedule. Battelle informed USACE that the interim panel comments could be revised or deleted, or that new comments could be added as the Final Panel Comments were finalized. In addition, the PDT was informed that they should not provide comments or revisions on these interim comments to ensure that no bias or influence enters the process before the Final IEPR Report is submitted.

Table 1. Truckee Meadows Revised GRR IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	7/11/2013
	Review documents available	7/15/2013
	Battelle submits draft Work Plan ^a	7/17/2013
	USACE provides comments on draft Work Plan	7/19/2013
	Battelle submits final Work Plan ^a	7/23/2013
2	Battelle requests input from USACE on the COI questionnaire	7/12/2013
	USACE provides comments on COI questionnaire	7/15/2013
	Battelle submits list of selected panel members ^a	7/17/2013
	USACE confirms the panel members have no COI	7/19/2013
	Battelle completes subcontracts for panel members	7/23/2013

^a Deliverable.

Table 1. Truckee Meadows Revised GRR IEPR Schedule (Continued)

Task	Action	Due Date
3	Battelle convenes kick-off meeting with USACE	7/19/2013
	Battelle sends review documents to panel members	7/24/2013
	Battelle convenes kick-off meeting with panel members	7/24/2013
	Battelle convenes kick-off meeting with USACE and panel members	7/24/2013
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	7/31/2013
4	Panel members complete their individual reviews and supply their draft Final Panel Comments	8/9/2013
	Battelle provides panel members consolidated draft Final Panel Comments and charge question responses	8/12/2013
	Battelle convenes Panel Review Teleconference	8/13/2013
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	8/13-16/2013
	Battelle finalizes Final Panel Comments	8/16/2013
	Battelle provides interim panel comments per USACE request	8/19/2013
5	Battelle provides Final IEPR Report to panel members for review	8/19/2013
	Panel members provide comments on Final IEPR Report	8/20/2013
	Battelle submits Final IEPR Report to USACE ^a	8/22/2013
6 ^b	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	8/23/2013
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	8/26/2013
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	8/26/2013
	USACE provides draft PDT Evaluator Responses to Battelle	8/27/2013
	Battelle provides the panel members the draft PDT Evaluator Responses	8/28/2013
	Panel members provide Battelle with draft BackCheck Responses	8/30/2013
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	9/3/2013
	Battelle convenes Comment-Response Teleconference with panel members and USACE	9/4/2013
	USACE inputs final PDT Evaluator Responses to DrChecks	9/6/2013
	Battelle provides final PDT Evaluator Responses to panel members	9/9/2013
	Panel members provide Battelle with final BackCheck Responses	9/11/2013
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	9/13/2013
	*Battelle submits pdf printout of DrChecks project file	9/13/2013
	CWRB	Civil Works Review Board meeting
	Contract End/Delivery Date	7/10/2014

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

3.2 Identification and Selection of IEPR Panel Members

USACE requested that, to the extent possible, the previous panel members for the 2011 Truckee Meadows GRR IEPR be recruited. The previous Panel included experts in the following key areas: hydraulics/hydrologic engineering, biology/ecology, civil/construction engineering, geotechnical engineering, economics, and Civil Works planning. These areas correspond to the technical content of the Truckee Meadows Revised GRR and overall scope of the Truckee Meadows project.

Battelle contacted the original six selected reviewers who constituted the final 2011 Panel and determined that they were available and willing to conduct the 2013 review. The candidates were screened for the following potential exclusion criteria or COIs³. These COI questions were intended to ensure that COIs had not arisen during the time between the original review and this review. 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.

- Previous and/or current involvement by you or your firm⁴ in the GRR for the Truckee Meadows Flood Control Project, Nevada.
- Previous and/or current involvement by you or your firm⁴ in flood control or ecosystem restoration projects in Washoe County, Nevada, including (but not limited to) the Truckee River within and below Reno, Sparks and Truckee Meadows, Pyramid Lake Paiute Tribal lands and Pyramid Lake.
- Previous and/or current involvement by you or your firm⁴ in the GRR for the Truckee Meadows Flood Control Project, Nevada, related projects.
- Current employment by USACE.
- Previous and/or current involvement with paid or unpaid expert testimony related to GRR for the Truckee Meadows Flood Control Project, Nevada.
- Previous and/or current employment or affiliation with the non-federal sponsors or any of the following cooperating federal, state, county, local, and regional agencies, including Truckee River Flood Management Authority, Truckee River Basin Water Group, Truckee River Community Coalition, Washoe County Water Resources Department, Truckee River Flood Project Coordination Committee, Truckee River Flood Protection Project Executive Committee or Truckee Meadows Water Authority (for pay or pro bono).

³ Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

⁴ Includes any joint ventures in which a panel member's firm is involved and if the firm serves as a prime or as a subcontractor to a prime.

- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or children related to Washoe County, Nevada, including (but not limited to) Truckee River within and below Reno, Sparks and Truckee Meadows, Pyramid Lake Paiute Tribal lands, and Pyramid Lake.
- 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 Sacramento District.
- Current firm⁴ involvement with other USACE projects, specifically those projects/contracts that are with the Sacramento 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 Sacramento District. Please explain.
- Any previous employment by the USACE as a direct employee, notably if employment was with the Sacramento District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by the USACE as a contractor (either as an individual or through your firm⁴) within the last 10 years, notably if those projects/contracts are with the Sacramento District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning FRM and ecosystem restoration and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in GRR for the Truckee Meadows Flood Control Project, Nevada, related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm⁴ revenues within the last 3 years came from USACE contracts.
- A significant portion (i.e., greater than 50%) of personal or firm⁴ revenues within the last 3 years from contracts with the non-federal sponsor: Truckee River Flood Management Authority.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to GRR for the Truckee Meadows Flood Control Project, Nevada.
- Participation in relevant prior federal studies relevant to this project.
- Previous and/or current participation in non-federal studies relevant to this project.
- 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.

The six final reviewers were either affiliated with consulting companies or were independent engineering consultants. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed

COI form. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel.

However, shortly after the Panel started their review, Battelle was informed that the Civil Works planning panel member had passed away. Battelle immediately contacted USACE and inquired if Battelle should identify a replacement Civil Works planner. The USACE PDT informed Battelle that it was not essential to replace the planner since the IEPR for the 2011 GRR had been completed and the plan formulation process had not changed. Thus, the final Panel for the Truckee Meadows Revised GRR IEPR consisted of five panel members. Section 4 of this report provides names and biographical information on the remaining panel members.

3.3 Conduct of the IEPR

Prior to beginning their review and within 1 day of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented details to the Panel regarding changes made to the project since 2011 and how the Panel's previous comments on the 2011 GRR were addressed. Before the meetings, the IEPR Panel received an electronic version of the final charge as well as the Truckee Meadows Revised GRR review documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- **Revised Post-Authorization Change Decision Document (Revised GRR) (211 pages)**
- **Revised Economics Appendix (including Regional Economic Development and Other Social Effects attachments) (135 pages)**
- **Public Comments (6 pages)**
- **Revised Engineering Appendix (529 pages) includes:**
 - **Engineering appendix summary (52 pages);**
 - **Hydrology report (228 pages);**
 - **Hydraulic report (169 pages);**
 - **Geotechnical summary (33 pages);**
 - **Engineering plans (47 pages);**
- Revised GRR Appendix A – Historic Photos
- Revised GRR Appendix B – Real Estate
- Cost Estimate (Attachment C to Engineering Report)
- Truckee Meadows Draft Environmental Impact Statement (EIS) Volume 1
- Truckee Meadows Draft EIS Volume 2
- IEPR Final Panel Comments regarding the 2011 GRR

- USACE guidance Civil Works Review, (EC 1165-2-214) dated 15 December 2012
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

In addition, throughout the review period, USACE provided documents at the request of panel members. These documents were provided to Battelle and then disseminated to the Panel as additional information only and were not part of the official review. A list of these additional documents requested by the Panel is provided below.

- Micro-Computer Aided Cost Estimating System (MCACES) Cost Estimate⁵ and Cost Risk Analysis
- Appendix C – Economics Truckee Final
- Truckee Construction Schedule

About half-way through the review of the Truckee Meadows Revised GRR review documents, a teleconference was held with USACE, the Panel, and Battelle so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 28 panel member questions to USACE. USACE was able to provide responses to all of the questions during the teleconference. One additional question was asked by the Panel during the call, and two questions were asked during the weeks that followed but prior to finalization of the Final Panel Comments. These questions were addressed by USACE via email.

3.4 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response table 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. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 Preparation of Final Panel Comments

In addition to answering the charge questions, the Panel was asked to prepare draft Final Panel Comments relating to those issues they believed should be communicated to USACE in the final report. Preparation of draft Final Panel Comments during the Panel's response to charge questions is not a normal part of the IEPR process. The normal process was slightly altered, moving development of the Final Panel Comments earlier in the IEPR process, because of the PDT's request for an accelerated schedule and the Panel's availability. This was feasible because all of the panel members were familiar with the project, and had experience conducting IEPRs with Battelle and developing Final Panel Comments. The following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Truckee Meadows Revised GRR was supplied with the review documents:

⁵ The actual MCACES Cost Estimate was not provided to the Panel, only a summary report.

- Directive to the Panel Member: To assist each panel member in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

Each panel member was encouraged to communicate directly with other panel members as needed and to contribute to a particular Final Panel Comment. After the panel teleconference, 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, 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: Describes a fundamental problem with the project that could affect the recommendation, success, or justification of the project. Comments rated as high indicate that the Panel analyzed or assessed the methods, models, and/or analyses and determined that there is a “showstopper” issue.
 2. Medium: Affects the completeness of the report in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium indicate that the Panel does not have sufficient information to analyze or assess the methods, models, or analyses.
 3. Low: Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information (tables, figures, equations, discussions) that was mislabeled or incorrect or data or report sections that were not clearly described or presented.
- Guidance 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 then compared these findings to the Final Panel Comments developed by the Panel (see Section 3.5). Any items identified by Battelle as possible issues that did not have a Final Panel Comment already developed were reviewed during the Panel teleconference to ensure a Final Panel Comment was not necessary. As a result of the review, Battelle summarized the Final Panel Comments and individual comments into a preliminary list of 13 overall comments and discussion points for the Panel teleconference.

3.6 IEPR Panel Teleconference

Battelle facilitated a 2-hour teleconference with four of the five panel members⁶ so that the panel members could exchange technical information. The main goal of the teleconference was to discuss the issues being carried forward as Final Panel Comments in the Final IEPR Report and determine if any additional Final Panel Comments were necessary. 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 draft Final Panel Comments, and identified additional issues of high-level importance. In addition, Battelle confirmed each Final Panel Comment's level of significance with the Panel.

The Panel also discussed responses to a charge question where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be conflicting. Each comment was determined to be consistent with other Final Panel Comments already developed.

3.7 Finalization and Review of Final Panel Comments

At the end of these discussions, the Panel confirmed that the eight draft Final Panel Comments that they had developed during the review should be brought forward as Final Panel Comments and identified two additional Final Panel Comments for a total of 10.

During the Final Panel Comment development process, the Panel determined that one of the Final Panel Comments could be dropped because it no longer met the criteria for a Final Panel Comment. However, another Final Panel Comment was identified, so the total Final Panel Comment count remains at 10. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 10 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

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

⁶ The fifth panel member was not able to attend because he had been evacuated from his home due to a wildfire in Idaho. Battelle discussed the panel members' concerns with him once he was able to access his charge question responses and other review information and obtained cell phone reception.

Table 2. Truckee Meadows Revised GRR IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Freeman	Newling	Fowler	Rudolph	Maier
Hydraulics/Hydrologic Engineering					
Professional engineer with a minimum of 15 years of demonstrated experience in hydrologic and hydraulic engineering studies and large public works projects, including the dynamics of open-channel flow systems, floodplain hydraulics, and interior flood control systems	X				
Experience modeling water surface profiles for FRM projects	X				
Familiar with USACE application of risk and uncertainty analyses in FRM studies	X				
Familiar with standard USACE hydrologic and hydraulic computer models: Hydrologic Engineering Center-1 (HEC-1), HEC-Hydrologic Modeling System (HEC-HMS), HEC-2, HEC-River Analysis System (HEC-RAS), FLO-2D, HEC-Flood Damage Reduction Analysis (HEC-FDA), and HEC-Data Storage System (HEC-DSS)	X				
Active participation in related professional engineering and scientific societies	X				
Minimum M.S. degree or higher in engineering	X				
Biology/Ecology					
Minimum 10 years of demonstrated experience in evaluating and conducting National Environmental Policy Act (NEPA) impact assessments for complex multi-objective public works projects with competing trade-offs		X			
Experience in performing cumulative effects analyses for complex multi-objective public works projects with competing trade-offs		X			
Experience working with western United States coldwater or trout fisheries		X			
Familiar with USACE calculation of evaluation of environmental benefits		X			
Experience with implementation of NEPA compliance process		X			
M.S. degree or higher in appropriate field of study		X			

Table 2. Truckee Meadows Revised GRR IEPR Panel Technical Criteria and Areas of Expertise (Continued)

Technical Criterion	Freeman	Newling	Fowler	Rudolph	Maier
Civil/Construction Engineering					
Professional engineer with a minimum of 10 years of demonstrated experience in civil or construction engineering			X		
Experience performing cost engineering/construction management for all phases of FRM			X		
Experience related to levee and flood wall design and construction			X		
Capable of addressing USACE Safety Assurance Review (SAR) aspects of projects with emphasis on dam safety and flood control improvements			X		
Active participation in related professional engineering and scientific societies			X		
Geotechnical Engineering					
Registered Professional engineer with a minimum of 10 years of demonstrated experience in geotechnical engineering				X	
Experience performing cost engineering/construction management for all phases of FRM				X ^a	
Familiar with geotechnical practices associated with design and construction of flood walls				X	
Capable of addressing USACE SAR aspects of projects				X	
Active participation in related professional engineering and scientific societies				X	

^a Waiver statement presented as part of Task 2 deliverable and approved by USACE

Table 2. Truckee Meadows Revised GRR IEPR Panel Technical Criteria and Areas of Expertise (Continued)

Technical Criterion	Freeman	Newling	Fowler	Rudolph	Maier
Economics					
Minimum of 10 years of water resource economic evaluation or review work experience					X
At least 5 years of experience directly working for or with USACE (highly recommended)					X
Minimum of 5 years of experience in directly working with USACE planning processes as outlined in Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook (USACE, 2000), especially with regard to FRM studies, outlined in Appendix E					X
M.S. degree or higher in economics					X

Gary Freeman, P.E., Ph.D.

Role: Hydraulics/Hydrologic engineering experience and expertise.

Affiliation: River Research and Design, Inc.

Gary Freeman is a principal and majority owner of River Research and Design with more than 20 years of experience with water-related engineering issues. He received his Ph.D. in civil engineering from Texas A&M University in 1992, is a registered civil engineer in seven states, and has taught stream restoration courses for the American Society of Civil Engineers (ASCE). With a wide range of experience in water resources engineering, Dr. Freeman has been deeply involved in performing and directing hydraulics, hydrology, sediment transport, and geomorphology studies across the United States and internationally. He has experience modeling water surface profiles for FRM projects, having participated in numerous studies submitted to Federal Emergency Management Agency for large rivers and smaller streams often involving complex areas with tributary inflow or complex flow problems. Dr. Freeman spent more than 7 years with the USACE Waterways Experiment Station in Vicksburg, Mississippi, as a Research Hydraulic Engineer. While at USACE, Dr. Freeman modified and applied the USACE RMA-2 hydrodynamic model to a wide variety of projects and helped train USACE personnel in the use of two-dimensional hydrodynamic and sediment transport models, including SED2D. Dr. Freeman has used Hydrologic Engineering Center-1 (HEC-1) for studies in Idaho and Arizona to determine peak flow and is familiar with HEC-Hydrologic Modeling System (HEC-HMS), FLO-2D, HEC-Flood Damage Reduction Analysis (HEC-FDA), and HEC-Data Storage System (HEC-DSS). He has modeled open-channel hydraulics since 1988 and is familiar with interior drainage of flood control systems. He has performed numerous complex floodplain delineation studies in Arizona using both 1D and 2D modeling techniques and has used HEC-River Analysis System (HEC-RAS) for numerous projects to model and delineate floodplains.

He served as principal investigator on several large research projects, including the development of stage-discharge uncertainty methodology for the risk and uncertainty approach to flood damage reduction studies (used in HEC-FDA), hydraulic roughness of floodplains due to shrubs and other woody vegetation, and the modeling of sediment transport in bottomland hardwood wetlands. Dr. Freeman is a member of ASCE and served as chair on the task committee charged with developing guidelines for stream restoration.

Charles Newling

Role: Biology/Ecology experience and expertise.

Affiliation: Wetland Science Applications, Inc.

Charles Newling is a Senior Wetland Regulatory Scientist and Senior Vice-President of Wetland Science Applications, Inc. and the Wetland Training Institute, Inc. He earned his M.S. in zoology/wildlife ecology with heavy emphasis in fisheries and botany from Southern Illinois University Carbondale in 1975. He holds certifications as a Professional Wetland Scientist, Certified Wildlife Biologist, Certified Wetland Delineator, and Qualified Wetland Specialist. He has over 37 years of experience in water resources and wetlands for both public- and private-sector projects. Mr. Newling has more than 13 years of experience working with USACE, having worked for both the USACE New England Division Regulatory Branch and the USACE Waterways Experiment Station Environmental Laboratory. He participated in the preparation of an EIS for the St. Louis District and has implemented various aspects of the National Environmental Policy Act (NEPA) compliance process both as a biologist working for USACE (1975-1978 with the New England Division, then 1978-1989 with the USACE Waterways Experiment Station) and subsequently as a private-sector consultant. His NEPA experience involved projects with competing trade-offs and the analysis of cumulative effects, both of which are an ever-present aspect of his private-sector permit work. His research for USACE involved evaluation and long-term monitoring of habitat development projects. He also participated in the development of the USACE Wetland Delineation Manual and assisted in efforts to develop and standardize the monitoring and evaluation of wetlands and related habitat. He has a strong knowledge of the ecology of wetlands, prairies, streams, and interconnected habitat, having conducted functional analyses of these environs since 1975. He served as national in-house troubleshooter and consultant to the USACE Regulatory Program on matters of wetland delineation and wetland development/restoration. As coordinator for the USACE wetland training program, he organized, conducted, and served as primary instructor in a wide variety of wetland-related training courses, including courses on the evaluation of wetland functions and values. He also has considerable experience working in the western United States on permitting and mitigation projects in Washington, Idaho, and Montana, with each project containing cold-water and/or anadromous fish habitat components. His consulting expertise has focused on wetland delineation, wetland construction and restoration, the assessment of wetland functions and values, mitigation monitoring, and wetland mitigation banking. He has provided rapid response assistance to USACE District offices nationwide on technical matters of wetland delineation and restoration, including providing expert testimony when necessary. This work has continued in his private-sector consulting. Mr. Newling is familiar with USACE calculation and application of environmental impacts and benefits and is well-versed in various assessments models, including HGM, WET, HEP, and WFAM. He has written over 20 publications and has contributed to several state and federal publications. He has participated in IEPRs for the Rock

Island and Chicago District. He is a member of the Society of Wetland Scientists (SWS), The Wildlife Society, the Association of State Wetland Managers, the Society of Ecological Restoration, and the Wisconsin Wetlands Association. He organized and petitioned for charter of the SWS South Central Chapter, serving as its first president; was the original chairman of the SWS Professional Certification Committee; and served on the SWS international Board of Directors as Liaison to the SWS Professional Certification Program.

C. Deane Fowler, P.E., PgMP, CCM

Role: Civil/Construction engineering experience and expertise.

Affiliation: Independent Contractor

C. Deane Fowler specializes in program, project, facilities, and construction contract management. He earned his M.S. in Construction Management from the University of Florida in 1986. He has over 30 years of experience in civil engineering and construction contract management. His service with the USACE between 1976 and 1998 included an appointment as Deputy Commander, Jacksonville District, USACE; he is also a licensed professional engineer in Florida and Virginia. He has both national and international experience with large Civil Works projects and has been the project manager on numerous USACE civil and construction engineering and FRM projects such as the Morganza to the Gulf of Mexico Hurricane Protection Project, East Baton Rouge Parish Flood Control Project, St. Charles Parish Flood Risk Reduction Project, and St. John the Baptist Flood Risk Reduction Project. He has extensive experience with cost engineering and construction management practices of the coastal environment of the southeastern United States. Mr. Fowler was the lead (Senior Engineer) on five levee inspection teams performing safety and design criteria reviews for 43 miles of levees along the Columbia River for Portland District in 2009/2010. He has been involved with project design review, oversight of hydraulic and wave modeling analysis, and review of economic storm damage analysis and projections, including coordination between in-house and outside design organizations and sponsors. Mr. Fowler is familiar with the USACE Safety Assurance Review (SAR) process and has performed dam safety inspections for 43 miles of Columbia River levees in support of the Levee Protection Program for the USACE Portland District. He is familiar with the IEPR process, having participated on previous team reviews for two USACE Jacksonville District projects as a civil design/cost engineering panel member, one IEPR for Savannah District, and another for Sacramento District (Success Dam) as a cost engineer panel member. He is a Life Member and Fellow of Society of American Military Engineers, a Life Member of Chi Epsilon, a Program Management Professional (Project Management Institute), a Certified Construction Manager, and a National Construction Documents Technologist.

R. William Rudolph, P.E.

Role: Geotechnical engineering experience and expertise.

Affiliation: Independent Contractor

R. William Rudolph, P.E., is an independent consultant with over 30 years of experience as a principal engineer and project manager on a wide variety of geotechnical engineering projects. He earned his M.S. degree in geotechnical engineering from Berkeley, California, in 1978 and is a registered civil engineer and geotechnical engineer in California. He has served as principal geotechnical consultant for numerous new and retrofit bridge projects, including the seismic

retrofit of the Golden Gate Bridge (San Francisco, California) and the Hercules Rail (City of Hercules, California) and Transit Center Loop Bridges (Union Pacific Railroad). His experience with water conveyance projects includes the Conn Creek Improvement Project (Napa Valley, California) and A-Canal Improvements (USACE Klamath Falls, Oregon). These projects included management of geotechnical investigation, site characterization, and geotechnical analysis of slope stability, scour, shallow and deep foundations, and retaining wall design. Mr. Rudolph's experience with FRM design and with flood control/FRM planning, design, and construction includes participation in IEPRs where these issues were key. Representative projects include the America River Common Features Project (Sacramento, California) and the East Saint Louis Flood Protection Project (East St. Louis, Illinois). He has served as principal geotechnical consultant for several ecosystem restoration projects, including the Hamilton Wetland Project (USACE Novato, California) and Diamond Creek Restoration Project (Oakland, California), which involved the beneficial use of dredge material for ecosystem restoration, slope stabilization with natural material, and geotechnical design of levees and drop structures. He has been involved with the design, construction, and monitoring of over 100 small water-detention facilities, including earth fill dams, lined reservoirs, and flood detention basins and other flood control structures, and has evaluated slope stability, seepage, internal drainage, spillway design and flood control walls for such projects as the Redwood Shores Levee Evaluation (Redwood City, California) and Levee Assessment, Bel Marin Keys Unit V, Marin County, California. His experience includes bridge foundations and abutments, ancillary flood control structures, and stream/river restoration. Mr. Rudolph served as a panel member for the IEPR of the Dam Safety Assurance Program Letter Report for Remediation of Success Dam (Porterville, California). Mr. Rudolph is an active member of the ASCE; the Coasts, Oceans, Ports and Rivers Institute; and the Geo-institute. He is a corresponding member of the ASCE 7-10 Seismic Subcommittee.

Danny Maher

Role: Economics experience and expertise.

Affiliation: DSM Contracting, LLC

Daniel Maher is a senior economist and project manager with 24 years of experience conducting large water resource/public works planning studies. He received his M.S. in agricultural economics from Louisiana State University in 1988. Mr. Maher has served as a project manager and economist on numerous incremental analysis, regional economic impact, navigation, water supply, recreation, flood control, and ecosystem restoration projects. Mr. Maher has developed benefits and costs for National Economic Development (NED) analyses of large water resource planning efforts, including the following: Water Supply Demand Analysis, Pine Mountain Study Area, Arkansas; East Baton Rouge Parish Alternative Industrial Water Supply Study Market Demand Analysis; Economic Feasibility Report, San Diego Harbor, San Diego, California; Rock Removal Interim Report, Initial Appraisal; and Forecast of Commodity Flows, Northern Sea Route Reconnaissance Study, Alaska. Mr. Maher has conducted numerous FRM studies for various USACE Districts, including the Tybee Island Re-Evaluation Study, Tybee Island, Georgia; Section 205 Reconnaissance Report for Flood Damage Prevention - Rio Descalabrado at Santa Isabel, Puerto Rico; the Rio Portugues Flood Control Project, Ponce, Puerto Rico; and the Update of Benefits for the Rio Portugues Dam, Ponce, Puerto Rico. Ongoing or recently completed review efforts include the Laurel Ridge, Louisiana Flood Control Feasibility Study (being conducted for a non-federal sponsor), and the Inundation Mapping and Economic

Damage Assessment, Arkansas River and Tributaries in Oklahoma. Mr. Maher has also been responsible for cost-effectiveness/ incremental cost analysis (CE/ICA) for several USACE ecosystem restoration projects, including the Canonsburg Lake Ecosystem Restoration Project (Pittsburg District); Licking River Watershed and Dillon Lake Ecosystem Restoration Project (Huntington District); and Big Sunflower Ecosystem Restoration Feasibility Study (Vicksburg District). For each of these projects, Mr. Maher worked with biologists and ecologists to define appropriate metrics for measuring environmental benefits and converting benefits to an average annual basis for each alternative considered. He also reviewed construction costs and operations and maintenance costs associated with each alternative and conducted CE/ICA analysis using IWR-PLAN. Mr. Maher has experience with numerous economic computer programs, including IMPLAN Economic Impact Software, IWR-Planning Suite, and IWR-MAIN Water Use Forecast System.

5. SUMMARY OF FINAL PANEL COMMENTS

The panel members agreed among themselves on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the Truckee Meadows Revised GRR document. Table 3 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel’s findings.

Based on the Panel’s review, the documents include all the components of a thorough report associated with the preliminary design of the proposed improvements. The documents demonstrate that the project is well supported by the geotechnical engineering and environmental impact analyses. The Panel agreed that USACE made use of appropriate methods and models in their analysis and provided adequate detail in their description of the processes followed throughout the project. While the Panel deemed the report comprehensive with robust documentation in many areas, it identified areas of inconsistencies attributed to recent updates to the report and a few areas where additional clarification is warranted.

Engineering – The geotechnical aspects of the project are logical applications of standard USACE design elements. However, the effects of liquefaction on the design and performance of the flood wall and levee structures have not been considered. The Panel recommends that (1) a preliminary assessment of the potential for and consequences of liquefaction on the proposed flood containment structures be conducted, and (2) the seismic performance criteria for the levees be determined. This information should then be used to inform preliminary emergency and post-earthquake response planning and associated costs. In addition, the basis for selection of various seepage control measures is not well documented. In particular, seepage berms and relief wells are proposed along the same reach. It is unclear how the location and details of these features were selected.

Due to the change from the 1% annual chance of exceedance (ACE) (100-year event) to a 2% ACE (50-year event), the Panel noted that some statements within the Truckee Meadows Revised GRR were no longer applicable. For example, in some instances the document called for “controlled overtopping,” but based on discussions with the USACE PDT, FRM PCX Project

Manager, and Battelle during the mid-review teleconference, the Panel was informed that overtopping was not an issue for a 50-year event (2% ACE design). These statements caused confusion regarding the overall project design and expected level of FRM. Given the change from a 100-year event to the 50-year event, the Panel believes the document needs to be thoroughly reviewed for statements that are no longer applicable. The Panel also believes that a plan to communicate to the public the changes in level of FRM made to the project and any new or remaining risks due to this change should be developed and presented.

The general narrative for the cost analysis was an excellent introduction into the methods used to develop the estimate and a very good starting point for understanding the assumptions used. However, a list of all assumptions used to develop the cost estimate and a detailed list of those items covered by the 25% contingency was not included. Since the Panel was not provided the actual Micro-Computer Aided Cost Estimating System (MCACES) Cost Estimate during this review, it is unknown what assumptions and contingency items were included in that part of the report. The Panel suggests that the lists be included in the report. Further, there were inconsistencies between the Truckee Meadows Revised GRR and the Project Cost and Schedule Risk Analysis Report regarding the construction cost contingency rates applied that need to be addressed.

Economics – The Panel recognized that many of the recommendations from the IEPR of the 2011 GRR were considered and addressed as necessary in the Truckee Meadows Revised GRR. Section 2 of the Economics Appendix was noted as providing a better understanding of the flooding addressed by the proposed project by focusing only on damages resulting from riverine flooding instead of the composite “deeper of the two” of riverine and interior drainage flooding that was addressed in the 2011 GRR. However, the Panel is concerned about the risk and uncertainty associated with the small sample size used to develop the Industrial-Distribution Center content-to-structure value ratio (CSV) and the method used to update residential structure values, both of which impact the calculation of the National Economic Development (NED) benefits.

FRM Alternatives 1 and 2 for the Truckee Meadows Reach were not evaluated using the same criteria as Alternate 3 and may have been eliminated prematurely based on “flawed” hydraulic⁷ and inaccurate economic modeling⁸. Given the large number of changes that have been made to the project, including the change from providing 1% ACE to 2% ACE FRM, the identification of hydraulic and economic modeling errors, and the addition of a structural FRM measure after Alternatives 1 and 2 were eliminated from consideration, it is suggested that the nature and extent of the problems in the hydraulic and economic modeling be described and additional justification for the elimination of Alternatives 1 and 2 be provided.

The Panel is also concerned that the annual operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) costs seem very low given the scope of the NED plan. A description of the method used to estimate OMRR&R costs and the components included in the estimate was

⁷ The Revised GRR stated on page 5-5 “After consultation with the vertical team and project proponents, it was decided to reconstruct the hydraulic model rather than attempt to fix the flawed model.”

⁸ The Revised GRR stated on page 5-5 “A data-transfer error was discovered for Alternative 3d which had caused an underestimation of residual damages for that plan. ...The problem with the economic model was corrected prior to the hydraulic model and resulted in a substantial reduction in the benefits for all levels of performance, but particularly that for Alternative 3d.”

not provided in the review documents. Certain components of OMRR&R appear to have been excluded from the analysis. A description of how the OMRR&R cost estimate was developed and the components included in the estimate should be included in the documentation.

Environmental – The Panel recognizes that considerably more environmental assessment was conducted for the original project than is necessary for the current project plan. However, much of the current environmental assessment appears to be buried in the background documents; therefore, a review of the Truckee Meadows Revised GRR itself does not highlight some important aspects of the project. For example, there is no discussion of chronic effects on the aquatic ecosystem. At least a summary of the chronic aspect of in-stream and near-stream construction and earthwork impacts, especially sedimentation, should be described. In addition, information on the potential impacts on the stream from the use of chemicals for levee maintenance and management should be provided. Clarification of these issues will lead to a more thorough discussion of all impacts.

Table 3. Overview of 10 Final Panel Comments Identified by the Truckee Meadows GRR IEPR Panel

No.	Final Panel Comment
Significance – High	
1	The economic benefits of the Truckee Meadows project cannot be validated due to incomplete economic risk and uncertainty analysis.
2	Truckee Meadows Reach Alternatives 1 and 2 were not evaluated using the same criteria as Alternative 3 and may have been eliminated prematurely.
3	The estimated annual costs of operating and maintaining project components seem very low given the scope of the National Economic Development (NED) plan.
Significance – Medium	
4	The net benefits for the National Economic Development (NED) plan cannot be validated due to inconsistencies in construction cost contingency rates for the project confidence level in the General Reevaluation Report (GRR) and the Project Cost and Schedule Risk Analysis Report.
5	A plan to communicate to the public the change in residual risks associated with the revised project from a 1% annual chance of exceedance (ACE) level of flood risk management (FRM) to a 2% ACE level of FRM has not been presented.
6	Potential chronic impacts to the aquatic ecosystem due to sedimentation over the extended period of project construction and bank stabilization have not been described.
7	The vegetation management requirements and maintenance of earthen structures in the project area are not presented in sufficient detail to adequately analyze impacts and assess costs.

Table 3. Overview of 10 Final Panel Comments Identified by the Truckee Meadows GRR IEPR Panel (Continued)

No.	Final Panel Comment
8	The effects of liquefaction on the design and performance of the flood wall and levee structures have not been considered.
9	The basis for selecting alternative seepage control measures is not clearly defined, potentially affecting the extent and cost of the recommended features.
Significance – Low	
10	Language regarding the 1% annual chance of exceedance (ACE) associated with the 2011 National Economic Development (NED) plan no longer applies under the 2% ACE associated with the 2013 NED plan.

6. REFERENCES

NBMG (1995). Planning scenario for a major earthquake, Reno-Carson urban corridor, western Nevada, phase I, the scenario earthquake and associated hazards. Nevada Bureau of Mines and Geology Open-file Report 95-2. C.M. dePolo, G.L. Johnson, S.L. Jacobson, J.G. Rigby, J. Anderson, and T.J. Wythes. 36 pp.

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 (2000). Planning Guidance Notebook. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) No. 1105-2-100. April 22.

USACE (2003). Planning Civil Works Projects Under the Environmental Operating Principles. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) No. 1105-2-404. May 1.

USACE (2006). Risk Analysis for Flood Damage Reduction Studies. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) No. 1105-2-101. January 3.

USACE (2011). Guidelines for Seismic Stability Evaluation of USACE Levees. Draft. U.S. Army Corps of Engineers, Sacramento District. December 2.

USACE (2012). Water Resources Policies and Authorities: Civil Works Review. Department of the Army, US Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) No. 1165-2-214. December 15.

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APPENDIX A

Final Panel Comments

on the

Truckee Meadows Revised GRR

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Final Panel Comment #1

The economic benefits of the Truckee Meadows project cannot be validated due to incomplete economic risk and uncertainty analysis.

Basis for Comment

Review of the General Reevaluation Report (GRR) and Appendix C of the GRR identified issues pertaining to (1) the incorporation of risk and uncertainty in the calculation of National Economic Development (NED) benefits, and (2) the documentation of that risk and uncertainty. These issues could affect the findings of the economic analysis and the interpretation of those findings.

Incorporation of risk and uncertainty into the analysis

The content-to-structure value ratio (CSV) is applied to structure values to estimate the value of the contents of a structure. Excessively high CSVs could result in overestimation of NED benefits. The CSV for Industrial-Distribution Centers and Storage Warehouses developed for this analysis was estimated at 558%, based on a 2001 survey of 10 distribution centers in the Sparks industrial area. Field work in 2009 used to verify the 2001 survey results included tours of only four distribution centers. As a result of the CSV, industrial content values accounted for 70% of all content value in the Truckee Meadows Reach, while industrial structure values accounted for only 31% of all structure values in the reach. The risk associated with this CSV is amplified because Alternative 3 – Floodplain Terrace, which was identified as the NED plan, was incrementally reformulated by focusing on flood damage prevention to the high-value structures in the East Sparks and Airport industrial areas. The small sample size used to develop the Industrial-Distribution Center CSVs and the resulting large CSV and content values for industrial sector structures were not specifically addressed in the risk analysis.

The structure inventory was based on Geographic Information System parcel data provided by Washoe County in 2001. The structure values were updated in 2007 and 2011 based on the results of regression analysis of appraised values of a sample of structures. For the 2007 update, it was determined that based on the regression analysis, residential structure values should be increased by 1.1191 and 1.9311 of residential structures in the downtown and the I-395 to Vista area, respectively. The linear regression analysis for residential structures yielded R^2 values of 0.74 and 0.79 for the two areas, and non-residential structures yielded R^2 values of 0.94 and 0.95 for the two areas. The risk associated with the discrepancy between observed residential values and the values predicted by the regression model (the accuracy of the regression models at estimating actual residential values) was not addressed in the analysis.

Documentation of risk and uncertainty

Maps of the residual floodplains for the NED plan for the 1% annual chance of

exceedance (ACE) (100-year event) and 2% ACE (50-year event) were provided in the GRR, and residual risk, annual exceedance probability, assurance, and long-term risk are described. However, the population at risk of flooding under with- and without-project conditions was not provided.

The benefit/cost (BC) ratio is reported in the GRR only as a single expected value for the NED plan, and not on a probabilistic basis for each planning alternative. The probability that net benefits are positive and that the BC ratio is at or above 1.0 are not presented for each planning alternative, as prescribed in the U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1105-2-101 (USACE, 2006).

The magnitude of risk associated with the NED benefits that was incorporated into the analysis is illustrated by the variability in the probability distribution of equivalent annual damages (benefits) for the NED plan (as presented in Table 6-8 of the GRR). The NED plan has an average (mean) benefit of \$24.522 million, resulting in a BC ratio of 1.31. However, there is only a 50% chance that benefits will be greater than \$22.894 million, a 75% confidence that benefits will be greater than \$14.521 million, and a 25% chance that benefits will exceed \$33.609 million. This range of benefits represents the uncertainty in the benefit estimates associated with hydrology, hydraulics, and economics evaluated within the Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA) model. The wider the range of benefits, the more uncertain (and the less confidence associated with) the results. The implications of these findings are not adequately communicated in the GRR.

To allow a comprehensive understanding of the NED benefits and project justification, the major sources of risk and uncertainty must be addressed and the results of the risk and uncertainty analysis should be presented in accordance with USACE guidance.

Significance – High

The inability to validate the NED benefits affects the calculation of the BC ratio and the selection of the NED, or recommended plan.

Recommendations for Resolution

1. Quantify or qualify the risk and uncertainty associated with the small sample size used to develop the Industrial-Distribution Center CSVs.
2. Quantify or qualify the risk and uncertainty associated with the discrepancy between observed residential values and the values predicted by the regression model (R^2 values) associated with estimating the factors to be used in the 2007 structure value update.
3. Describe the population at risk of flooding under with- and without-project conditions for each alternative.
4. Present the results of the risk-based analysis in accordance with ER 1105-2-101.
5. Describe the risk and uncertainty in the findings of the analysis as illustrated by the distribution of net benefits and BC ratios for each alternative.

Literature Cited:

USACE (2006). Risk Analysis for Flood Damage Reduction Studies. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) No. 1105-2-101. January 3.

Final Panel Comment #2

Truckee Meadows Reach Alternatives 1 and 2 were not evaluated using the same criteria as Alternative 3 and may have been eliminated prematurely.

Basis for Comment

In accordance with the Plan Formulation Process (Section 4.1 of the General Reevaluation Report [GRR]) and Engineer Circular (EC) 1105-2-404 (USACE, 2003), Alternative 3d was identified as the optimal plan for the Truckee Meadows Reach. Flood risk management (FRM) Alternatives 1 and 2 of the Truckee Meadows Reach were screened from further consideration during the preliminary National Economic Development (NED) analysis due to unfavorable economic justification. Problems in the hydraulic and economic modeling were discovered after the initial screening of alternatives. The nature and extent of those problems were not described. The economic modeling corrections resulted in substantial reductions in FRM benefits, particularly to Alternative 3d, invalidating its identification as the optimal plan (p. 5-5). Alternative 3d was particularly impacted by the economic modeling corrections, which implies that the impacts of the modeling errors on benefits may not be consistent across alternatives. The results of the revised economic modeling were not provided. Cumulative errors in the hydraulic modeling were substantial and required the hydraulic modeling to be reconstructed. The GRR states that the hydraulic and economic modeling errors “affected all other alternatives in a relatively consistent manner” and that Alternatives 1 and 2 were therefore not re-evaluated (p. 5-5). No data are provided to support this assumption, and the impact of these modeling errors on Alternatives 1 and 2 is not quantified.

Upon correction of the hydraulic and economic modeling, no single-purpose FRM plan was economically justified. An FRM structural measure that was not considered in the preliminary analysis (capping outlets of the People’s Drain at the North Truckee Drain) was added, and Alternative 3 was incrementally reformulated, to provide 50-year event FRM, focusing on providing FRM to the areas generating the greatest damages (approximately 34% of net benefits accruing to the reformulated Alternative 3 resulted from the inclusion of the new FRM measure to cap the People’s Drain outlets). Design adjustments were made to the reformulated Alternative 3 to improve performance at minimal additional costs. The reformulated Alternative 3 resulted in induced inundation/damages. Mitigation costs for induced damages were not economically justified, but National Flood Insurance Program (NFIP) compliance costs of \$195 million, to be borne by the non-federal sponsor (NFS), were included in the NED plan. It appears that NFIP compliance costs were not considered when identifying the NED plan. Policy/guidance for inclusion of NFIP compliance costs as a NFS cost and exclusion of the compliance cost in the identification of the NED plan was not documented in the report or provided to the panel. The reviewed documents did not indicate the extent of induced damages under Alternatives 1a and 2a, or the need for mitigation or NFIP compliance costs for these alternatives.

Screening of alternatives using economic and hydraulic modeling that was subsequently revised may have resulted in the premature elimination of alternatives. The justification for selecting the reformulated Alternative 3 without re-evaluating the previously screened alternatives was not provided.

Significance – High

The results of the revised models and the impact on estimating the NED benefits of Alternatives 1a and 2a were not documented, making the analysis of alternatives incomplete.

Recommendations for Resolution

1. Describe the nature and extent of the problems in the hydraulic and economic modeling.
2. Describe the results of the revised economic modeling and compare them to the results that were used during the initial screening.
3. Evaluate the impact of incorporating the additional FRM measure (capping the outlets of the People's Drain) on the performance of Alternatives 1 and 2.
4. Evaluate Alternatives 1 and 2 using the revised economic and hydraulic models; or explain why the modeling corrections did not impact the screening of Alternatives 1 and 2.
5. Describe induced inundation and damages for Alternatives 1a and 2a and estimate mitigation or NFIP compliance costs for each alternative.
6. Consider NFIP compliance cost when identifying the NED plan, or provide USACE guidance for excluding its consideration.

Literature Cited:

USACE (2003). Planning Civil Works Projects Under the Environmental Operating Principles. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation (ER) No. 1105-2-404. May 1.

Final Panel Comment #3

The estimated annual costs of operating and maintaining project components seem very low given the scope of the National Economic Development (NED) plan.

Basis for Comment

The Panel could not find a discussion in the review documents indicating the components included in the annual operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) costs or explaining how those costs were estimated. The estimated first cost of the NED plan is \$260,660,000, while the estimated average annual OMRR&R cost is only \$429,000, which equates to only 0.16% of estimated first costs. The OMRR&R costs are presented in the review documents as lump-sum values. Detailed cost estimates or a maintenance, repair, rehabilitation, and replacement schedule were not provided. Given the scope of the NED plan, the annual costs seem very low. There could be significant costs in maintaining the levees, flood walls, and terraced areas proposed for the plan. The review documents state that these costs will be determined in an operation and maintenance manual upon project completion. One of the Panel's major concerns was levee maintenance over the life of the project. There is a high potential for seismic damage due to liquefaction in the Truckee Meadows Reach. While this type of event will happen infrequently, it is reasonable to assume that a significant earthquake will occur during the life of the project, possibly causing extensive damage and requiring costly remediation.

No OMRR&R costs were included for National Flood Insurance Program (NFIP) compliance, which includes the construction of a 400-cubic-foot-per-second pump station.

Significance – High

Additional OMRR&R costs could result in reduced net NED benefits and benefit/cost ratio, which could impact the identification of the NED plan and ultimate project justification.

Recommendations for Resolution

1. Provide the documented basis for OMRR&R costs.
2. Provide OMRR&R costs associated with NFIP compliance.

Final Panel Comment #4

The net benefits for the National Economic Development (NED) plan cannot be validated due to inconsistencies in construction cost contingency rates for the project confidence level in the General Reevaluation Report (GRR) and the Project Cost and Schedule Risk Analysis Report.

Basis for Comment

The GRR states that the NED plan provides 90% assurance of safely passing the 2% annual chance of exceedance (ACE) in major damage areas and includes basic recreation features that are compliant with U.S. Army Corps of Engineers (USACE) policy. Section 4.6.1, page 4-21 of the GRR further states:

“Assumptions made during the development of these cost estimates included standard methods of construction, a five year construction period, and a 25 percent contingency.”

However, the Project Cost and Schedule Risk Analysis Report, page ES-2 states:

“Based on the results of the analysis, Sacramento District recommends a contingency value of \$50.7M or approximately 28.5% of base project cost. This contingency includes a separate \$14.3M for Real Estate, another \$29.4M for constructions costs, and \$7M for design and construction management.”

The Project Cost and Schedule Risk Analysis Report, page 7 further states:

“The scope of the risk analysis report is to identify cost and schedule risks with a resulting recommendation for contingencies at the 80 percent confidence level using the risk analysis processes, as mandated by U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works.”

Since the GRR is recommending a 2% ACE level of flood risk management with a 90% level of confidence, the Project Cost and Schedule Risk Analysis Report should have a contingency that matches the level of confidence: namely, 31.3% (Table 1, p. 14 of Project Cost and Schedule Risk Analysis Report). The current cost estimate is based on a 28.5% contingency. Contingency costs have a direct impact on the Total Project Cost Estimate, and any increase will impact the benefit/cost ratio of the project.

Significance – Medium

Statements concerning level of confidence and assumed cost contingency rates in the GRR are in conflict with the recommended level of confidence and contingency rate found in the Project Cost and Schedule Risk Analysis Report for Alternative 3 and will change the Total Project Cost Estimate.

Recommendations for Resolution

1. Review the Revised GRR and the Project Cost and Schedule Risk Analysis Report and reconcile inconsistencies in the stated level of confidence and construction cost contingency rates.
2. Adjust the Total Project Cost for the Sacramento District's recommended contingency rate and change the project reports to eliminate any ambiguity.

Final Panel Comment #5

A plan to communicate to the public the change in residual risks associated with the revised project from a 1% annual chance of exceedance (ACE) level of flood risk management (FRM) to a 2% ACE level of FRM has not been presented.

Basis for Comment

The draft General Reevaluation Report (GRR), Executive Summary, Summary of Post-Authorization Changes, Section 4 (page S-12), states the following:

“FRM project performance has been reduced from 1% ACE with freeboard to greater than 90% assurance of safely conveying a 2% ACE flood event for the primary damage areas. The reduction in FRM project performance was driven by the need to identify an economically justified plan that reasonably maximized net economic benefits.”

The 2% ACE (50-year event) level of flood risk management currently provided under the revised National Economic Development (NED) plan would not prevent the damages that would occur if another 1997-type storm event hit the project area. Specifically, the project as currently planned would not prevent floodwaters from causing damage to Downtown Reno, Truckee Meadows, and the Lower Reach of Truckee River, with the potential loss of life if a storm event of a magnitude equal to or greater than the 1997 storm should impact the river basin.

The current plan provides limited flood risk management (up to the 2% ACE level) to businesses in the Truckee Meadows area, apparently at the cost of increasing damages for the events larger than the 2% ACE to individual homeowners and businesses in other areas of the surrounding floodplains. This information needs to be clearly presented to those potentially impacted by the project, as well as to project sponsors, through clear documentation. The information should show the tradeoff that is involved to provide flood risk management for more frequent floods which results in higher damages and more homes and businesses impacted by larger 1% ACE (100-year) events.

The National Flood Insurance Program (NFIP) compliance costs of \$195 million under the 2% ACE level of flood risk management contains residual risks that should be thoroughly conveyed to the public. The GRR did not state the compliance costs for meeting NFIP requirements under a 1% ACE (100-year event) level of flood risk management; however, any reduction in flood risk management coupled with an increase in local costs for compliance from previous versions of the GRR should be clearly communicated to the public along with the increased risk of flooding.

Significance – Medium

A definitive communication plan is needed to ensure the public is provided the necessary information to understand the level of residual risk remaining in parts of the project area after implementation of the revised NED plan.

Recommendations for Resolution

1. Develop an extensive public outreach program to ensure that the level of flood risk management (residual risk) provided by the project is communicated to local community leaders and their constituents.
2. Develop a communication plan that involves the public in the process and provides up-to-date information on the progress during planning, design, and construction (public access website) to promote shared community responsibility.

Final Panel Comment #6

Potential chronic impacts to the aquatic ecosystem due to sedimentation over the extended period of project construction and bank stabilization have not been described.

Basis for Comment

The Truckee Meadows project cannot be constructed without some in-water and near-stream construction and earthwork. Impacts will occur repeatedly over a definable duration annually for several years (in the case of construction activities) and continuously (in the case of earthwork) until the new features have stabilized. Furthermore, an unusual and unpredictable adverse storm could substantially aggravate such impacts. These impacts could adversely affect fish populations (e.g., by silting in spawning beds) and under certain circumstances are visually observable.

Although the potential impacts of sedimentation and turbidity from in-channel and near-channel construction are considered and evaluated, most of the impacts discussion is contained in the background documentation, and the chronic aspect of the impacts—their recurrence and duration—does not seem to be specifically addressed. The documentation recognizes that this project cannot be completed without some in-water and near-stream construction and earthwork, and it appears from the background information that every opportunity to minimize potential impacts on the aquatic ecosystems has been considered and will be implemented. Except for its chronic aspect, as explained in the Environmental Impact Statement, this issue has been considered fairly thoroughly, and efforts are planned to minimize potential adverse impacts that are unavoidable. However, more of that information should be brought forward and included in the General Reevaluation Report (GRR).

Significance – Medium

Providing additional information on the potential for chronic impacts to aquatic resources in the GRR would improve the impacts analysis and emphasize the significance of such impacts.

Recommendations for Resolution

1. Briefly summarize the chronic (i.e., recurrence and duration) aspect of in-stream and near-stream construction and earthwork impacts regarding sedimentation and the significance of its potential impact, including the effects of an unusual and unpredictable storm.
2. In the GRR, explicitly state the findings from the evaluation of chronic project-related sedimentation and the plans to minimize it.

Final Panel Comment #7

The vegetation management requirements and maintenance of earthen structures in the project area are not presented in sufficient detail to adequately analyze impacts and assess costs.

Basis for Comment

There is potential for impacts to the aquatic ecosystem resulting from near-stream vegetation management and maintenance of earthen structures, particularly the use of herbicides (to control unwanted vegetation) and pesticides (to control rodents that might undermine earthen structures). These chemicals potentially could impact the aquatic ecosystem. The use of chemicals and the implementation of “best management practices” for maintenance and management are briefly mentioned in the Environmental Impact Statement; however, the information was minimal from the viewpoint of evaluating potential impacts and estimating ongoing costs. It appears that opportunities to minimize potential impacts on the aquatic ecosystems have been considered and will be implemented. However, more description of the proposed management methods plus the precautions and mitigation measures that will be used should be included in the General Reevaluation Report (GRR). The description should specifically identify the “best management practices” that are likely to be employed and explain why they are considered the best.

Significance – Medium

Including more information in the GRR on the specific vegetation management requirements and maintenance of earthen structures in the project area would facilitate the evaluation of impacts from these activities and the assessment of ongoing costs.

Recommendations for Resolution

1. Provide more detail in the GRR on procedures, methods, and costs of near-stream vegetation management and anticipated maintenance needs for earthen structures.
2. In the GRR, explicitly state the findings from the evaluation of the proposed management and maintenance and the means that will be employed to avoid or minimize potential adverse impacts on the aquatic ecosystem, focusing on the use of chemicals. If “best management practices” will be employed, explain briefly what they are and why they are considered the best practices at this time).

Final Panel Comment #8

The effects of liquefaction on the design and performance of the flood wall and levee structures have not been considered.

Basis for Comment

The Revised Engineering Appendix (Appendix D) of the Truckee Meadows General Reevaluation Report (GRR) references a Geotechnical Summary Report as Attachment D. The report concludes that the area is underlain by floodplain and lake deposits that are subject to liquefaction. Nevada Bureau of Mines and Geology (NBMG) open-file report 95-2 (NBMG, 1995) shows portions of the project alignment within Truckee Meadows as having moderate to high liquefaction potential. Boring logs previously provided for the Panel's review suggest that there are extensive deposits of loose to medium dense sands in the Truckee Meadows Reach, which likely have high liquefaction potential. The geotechnical summary report for the Truckee Meadows project does not provide a preliminary quantitative assessment of liquefaction potential or its consequences on the project features. The GRR Revised Engineering Appendix briefly mentions liquefaction relative to flood wall seismic design and recommends that a liquefaction assessment be conducted prior to final wall design.

Liquefaction-related deformations could potentially impact the performance of levees and flood walls in the Truckee Meadows Reach. The seismic performance of levees and flood walls has generally not been considered in design criteria, except for levees/flood walls with a high potential of having coincident high water and earthquake loading. The Sacramento District has developed draft guidelines for the seismic stability evaluation of USACE levees (USACE, 2011).

The GRR does not discuss post-earthquake remediation plans addressing potential liquefaction damage and associated impacts on project planning and costs. Current practice is to evaluate levees, which infrequently experience high water levels using typical water surface elevations and address flood risk with emergency response and interim and long-term repairs following a significant earthquake. This analysis can then be used to evaluate whether seismic remediation prior to an earthquake and/or following an earthquake as part of emergency response is warranted. Generally, a post-earthquake remediation plan may contain provisions for emergency preparations, mobilization, data gathering, actions, interim repairs, long-term repairs, and public notifications. The plan would include an estimate of the amount and extent of damage that might be sustained following an earthquake, and the general magnitude of earth and other materials that would be required to restore a modest level of flood risk management within 8 weeks.

Significance – Medium

Liquefaction hazards have not been fully described, which affects the completeness of the report relative to potential future post-earthquake response and remediation planning and associated costs.

Recommendations for Resolution

1. Conduct a preliminary assessment of liquefaction potential and its consequences on the proposed flood containment structures.
2. Clearly describe the seismic performance criteria for levees and the strategy for mitigating potential earthquake-related deformation.
3. In the GRR, discuss the potential consequences of liquefaction and associated post-earthquake emergency response and remediation plans.

Literature Cited

NBMG (1995). Planning scenario for a major earthquake, Reno-Carson urban corridor, western Nevada, phase I, the scenario earthquake and associated hazards. Nevada Bureau of Mines and Geology Open-file Report 95-2. C.M. dePolo, G.L. Johnson, S.L. Jacobson, J.G. Rigby, J. Anderson, and T.J. Wythes. 36 pp.

USACE (2011). Guidelines for Seismic Stability Evaluation of USACE Levees. Draft. U.S. Army Corps of Engineers, Sacramento District. December 2.

Final Panel Comment #9

The basis for selecting alternative seepage control measures is not clearly defined, potentially affecting the extent and cost of the recommended features.

Basis for Comment

The Truckee Meadows engineering plans show a variety of seepage control measures along the flood wall and levee alignments. The Geotechnical Summary, Section 6.2 (Foundation Seepage Control), states the following:

“The typical methods of foundation seepage control measures used by the Sacramento District are slurry cutoff walls, seepage berms / drain blankets, and relief wells. Given that the Meadows area is in a diverse area with roads, business, light industrial zoning to the North and open farm land to the south that are near the levee and flood wall alignments, an emphasis was placed on selecting seepage control measures that require a minimal amount of real estate acquisition. Floodwalls are recommended on much of the north bank and a mixture of new levee construction, benching, seepage berms, and relief wells were selected for the south bank.”

In addition, Table 10, Recommended Seepage Control Measures for Truckee Meadows, summarizes general seepage control measure recommendations by reach. Comparing the recommendations in Table 10 to the engineering plans, it is difficult to assess both the justification for the seepage control measure and the lateral extent/limits of the various control measures. For example, seepage berms and relief wells are both used along portions of Reach 4. It is unclear if the selection of these features is based on subsurface conditions or real estate acquisition concerns.

Generally, seepage berms are preferred to relief wells, given that relief wells require more maintenance, have high initial costs, and require drainage features to collect outflow. Hence, they may be less reliable and/or have higher operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs.

Significance – Medium

The selection of seepage control features impacts both initial construction and OMRR&R costs, as well as seepage control reliability.

Recommendations for Resolution

1. Provide additional information regarding the rationale associated with the selection of various seepage control features along the alignment. Include both technical and real estate acquisition considerations.
2. Include the seepage analysis calculations supporting the recommendations summarized in Table 10 of the Geotechnical Summary.
3. Provide interpretative subsurface profiles along the alignment which support the selection of cross-sections used in seepage analyses.

Final Panel Comment #10

Language regarding the 1% annual chance of exceedance (ACE) associated with the 2011 National Economic Development (NED) plan no longer applies under the 2% ACE associated with the 2013 NED plan.

Basis for Comment

The 2013 General Reevaluation Report (GRR) contains language that does not apply to the current NED plan since the level of flood risk management (FRM) was changed from 1% ACE (100-year event) to 2% ACE (50-year event). Specifically, Section 1.5.1 states:

“The project features were designed to allow for controlled overtopping when the design capacity had been exceeded. The controlled overtopping would prevent levee failure, and route the excess floodwaters to the same areas would have flooded without the project, using variable freeboard heights and side spilling weirs. Interior flood control features were included to evacuate and/or accommodate any excess ponding behind protective works.”

Based on discussions with the USACE Project Delivery Team, FRM Planning Center of Expertise Project Manager and Battelle during the mid-review teleconference, the Panel was informed that overtopping of a 50-year event would not be an issue with the 2% ACE design. If the design has included this change, then statements regarding overtopping need to be removed from the report.

The 2013 report made no apparent changes to the analysis of the Upper and Lower Reaches of Truckee River as contained in the previous version, although some project features were dropped.

Significance – Low

Statements in the GRR that are not germane to the current NED plan will cause confusion regarding the project's elements, goals, and purpose.

Recommendations for Resolution

1. Review the Revised GRR and eliminate language that no longer applies to the current NED plan.

APPENDIX B

**Final Charge to the Independent External Peer Review Panel
as Submitted to USACE on July 23, 2013**

on the

Truckee Meadows Revised GRR

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**Charge Questions and Guidance to the Peer Reviewers
for the
Independent External Peer Review
of the**

General Reevaluation Report for the Truckee Meadows Flood Control Project, Nevada

BACKGROUND

The Truckee Meadows Flood Control Project was authorized under the Water Resources Development Act (WRDA) of 1988 (Public Law 100-676). However, the project was deferred during the preconstruction engineering and design (PED) phase when changes in real estate costs made the project economically infeasible. In 1996, the local communities requested that flooding problems in Truckee Meadows be reevaluated, and the decision was also made to expand the study area beyond Truckee Meadows downstream to Pyramid Lake and consider ecosystem restoration as a project purpose. Since the addition of a project purpose is not within the approval authority of the District Commander, a post-authorization General Reevaluation Report must be prepared.

The study area includes the Truckee River in Washoe County, Nevada, within and below Reno, Sparks, and Truckee Meadows, extending east forming a border between Washoe County (on the north) and Storey County (on the south) and onto the Pyramid Lake Paiute Tribal lands to the river's terminus at Pyramid Lake. Because of the expanse of land area and length of river miles, the study area was divided into three general reaches: downtown Reno, Truckee Meadows, and downstream Truckee River.

The 1997 flood event is the flood event of record for the Truckee River and caused over \$500 million in flood-related damages in the Truckee Meadows area alone. Much of the damages occurred in the industrial areas of the cities of Sparks and Reno, and at the Reno-Tahoe International Airport. Flooding in downtown Reno in 1997 caused roughly \$200 million in damages and inundated many bridges.

The Truckee River suffers from persistent water quality problems. Flows entering the study area have a high nutrient content largely from treated sewage effluent, agricultural runoff, and urban stormwater runoff. High nutrient levels accelerate algae growth and other indicators of water pollution, including physical and biological changes such as elevated aquatic temperatures and total dissolved solids, lowered dissolved oxygen levels, and modified existing biota towards pollution-tolerant species. Tertiary treated sewage enters the Truckee River from many treatment facilities throughout the system.

High instream temperatures are another significant water quality problem. Many factors influence instream temperature within the downstream reach of the Truckee River: loss of overstory shading through direct and indirect removal of riparian vegetation; lower than normal water flow levels due to diversions of naturally occurring thermal springs (upstream on Steamboat Creek); natural and human-induced surface runoff including agricultural flows; and decomposition of organic materials.

High water temperatures result in less than optimum habitat conditions for cold water fish species including the cui-ui lake sucker and the Lahontan cutthroat trout, and allow for the introduction of warm water species (native and nonnative) in their place. The water quality of the Truckee River affects Pyramid Lake; water quality within Pyramid Lake has been degrading along with that of the river. Poor water quality has led to large blue-green algae "blooms" within Pyramid Lake that then further decrease water quality for the species present.

The 2011 draft GRR analyzed the flood and ecosystem problems, and developed alternatives to reduce flood risks, restore environmental resources, and increase recreational opportunities in the study area. The alternatives include the no action plan and various combinations of structural and non-structural measures. The engineering, economic, and environmental feasibility of the alternatives was evaluated, and the optimal alternative was identified. It was expected that if the optimal alternative was found to be feasible and comparable to the plan authorized by WRDA 1988, the alternative would be recommended and carried forward for continued PED and construction. If the recommended plan was not consistent with the authorized plan, the plans would need to be compared, and the plan would likely need to be reauthorized by Congress. An IEPR was initiated in 2011 on a draft report for the Truckee Meadows Flood Control Project GRR that contained a tentatively recommended plan. A site visit was conducted in August 2011. The IEPR Panel completed its review of the 2011 report documentation, and Battelle delivered the IEPR Final Report in October 2011.

Baltimore District received a request from Sacramento District to terminate the IEPR effort in October 2011. Sacramento District informed Baltimore District that USACE Headquarters submitted comments that would require report documentation to change and possibly affect the recommended plan. Accordingly, Baltimore District forwarded a request to IWR to terminate the IEPR effort. IWR accepted the request and terminated the task order in November 2011. Subsequent to termination of the initial IEPR, Sacramento District prepared a revised GRR.

The extent and focus of the Truckee Meadows project has been reduced in scope. The project footprint, that had once extended close to 60 miles of river, has now been focused to approximately 6 miles. The previous report considered flood risk management and fish/wildlife enhancement, but now focuses specifically on flood risk management. All ecosystem restoration and fish passage restoration has been removed with the exception of plantings to stabilize the project site post-construction. Information about fish passage plans is still included in the report for use by other agencies, but it is not recommended for USACE implementation. There is no locally preferred plan, therefore nothing is proposed for the downtown Reno reach. Benching of the Vista Reefs is no longer part of the recommended plan. Recreation remains in the Truckee Meadows reach on a modest scale similar to the 2011 plan

- There is no change to the following: Hydrology did not change, however there was a sensitivity assessment performed to assess impacts due to climate change. The 50-yr NED risk and uncertainty values (previous analysis) were used for the Recommended Plan. The channel stability analysis has not been revised.
- Primary changes: All documentation has been revised to focus on the new project area and flood risk reduction. The Vista Reefs has been removed and the outflows from the Truckee

Meadows have been reduced. This has slightly increased water surface elevation in some parts of Truckee Meadows reach. The top of levee determination has been revised. Cost estimates are now feasibility (MII) level costs. A sensitivity analysis has been performed to assess cumulative impacts of a proposed local transit project.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the General Reevaluation Report for the Truckee Meadows Flood Control Project, Nevada (hereinafter: Truckee Meadows IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (EC 1165-2-214, December 15, 2012), and the Office of Management and Budget'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, engineering, and environmental methods, models, and analyses used” (EC 1165-2-214; p. D-4) for the Truckee Meadows documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in hydraulic/hydrologic engineering, civil/construction engineering, geotechnical engineering, biology/ecology, economics, and Civil Works planning issues relevant to the project. They will also have experience applying their subject matter expertise to flood risk management.

The Panel will be “charged” with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation. The Panel should focus their review on the project as it stands now, rather than the original project that was reviewed back in 2011.

DOCUMENTS PROVIDED

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

Documents for Review

The following documents are to be reviewed by designated discipline:

Title	Approx. No. of Pages	Required Disciplines
Revised Post-Authorization Change Decision Document (Revised GRR)	211	All Disciplines
Revised Economics Appendix (including Regional Economic Development and Other Social Effects attachments)	135	Economist
Public Comments	6	All Disciplines
Revised Engineering Appendix includes: Engineering appendix summary (52 pages); Hydrology report (228 pages); Hydraulic report (169 pages); Geotechnical summary (33 pages); Engineering plans (47 pages);	529	Hydraulic/hydrologic engineer, Civil/construction engineer, and geotechnical engineer
Total Page Count	881	

Supporting Information

- GRR Appendix A – Historic Photos
- GRR Appendix B – Real Estate
- Cost Estimate (Attachment C to Engineering Report)
- Truckee Meadows Draft EIS Volume 1
- Truckee Meadows Draft EIS Volume 2
- Previous IEPR Comments

Documents for Reference

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

SCHEDULE

This final schedule is based on the July 15, 2013 receipt of the final review documents. The schedule will be revised upon receipt of final review documents.

Task	Action	Due Date
Conduct Peer Review	Battelle sends review documents to panel members	7/24/2013
	Battelle convenes kick-off meeting with panel members	7/24/2013
	Battelle convenes kick-off meeting with USACE and panel members	7/24/2013
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	7/31/2013
	Panel members complete their individual reviews and supply their draft Final Panel Comments	8/9/2013
Prepare Final Panel Comments and Final IEPR Report	Battelle provides panel members feedback on draft Final Panel Comments	8/12/2013
	Battelle convenes Panel Review Teleconference	8/13/2013
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	8/13-16/2013
	Battelle finalizes Final Panel Comments	8/16/2013
	Battelle provides Final IEPR Report to panel members for review	8/19/2013
	Panel members provide comments on Final IEPR Report	8/20/2013
	*Battelle submits Final IEPR Report to USACE	8/22/2013
Comment/Response Process	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	8/23/2013
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	8/26/2013
	USACE provides draft PDT Evaluator Responses to Battelle	8/27/2013
	Battelle provides the panel members the draft PDT Evaluator Responses	8/28/2013
	Panel members provide Battelle with draft BackCheck Responses	8/30/2013
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	9/3/2013
	Battelle convenes Comment-Response Teleconference with panel members and USACE	9/4/2013
	USACE inputs final PDT Evaluator Responses to DrChecks	9/6/2013
	Battelle provides final PDT Evaluator Responses to panel members	9/9/2013
	Panel members provide Battelle with final BackCheck Responses	9/11/2013
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	9/13/2013
*Battelle submits pdf printout of DrChecks project file	9/13/2013	
Civil Works Review Board (CWRB)	Panel prepares and/or reviews slides for CWRB	9/10/2013
	Civil Works Review Board	9/19/2013

CHARGE FOR PEER REVIEW

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

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

General Charge Guidance

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

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

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

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager (Lynn McLeod, mcleod@battelle.org) or Program Manager (Karen Johnson-Young (johnson-youngk@battelle.org)) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@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.

Preparation of Draft Final Panel Comments

Upon completion of your responses to the charge questions, please develop a draft Final Panel Comments on each **technical** issue you believe should be included in the Final Report. With the documents provided at the beginning of the review we included a file with guidance on completing your Final Panel Comments and a table you can use when preparing your Final Panel Comments. Please copy the table for each Final Panel Comment you prepare and number each with your Last Name and consecutive numbers. That way when we compile them, we will be able to determine which panel member developed each Final Panel Comment. Please address all four parts of the table including the significance level using the definitions in the Final Panel Charge Guidance. These draft Final Panel Comments will be turned in with your charge question responses and discussed on the Panel Teleconference on August 13, 2013.

Please submit your responses to the charge questions and your draft final panel comments in electronic form to Lynn McLeod, mcleod@battelle.org, no later than August 9, 2013, 10 pm ET.

**Independent External Peer Review
of the
General Reevaluation Report for the Truckee Meadows
Flood Control Project, Nevada
Charge Questions and Relevant Sections as Supplied by USACE**

General Questions

1. Within the context of risk-informed decision-making, to what extent has it been shown that the project is technically sound?
2. Are the assumptions that underlie the engineering, and environmental analyses sound?
3. Within the context of risk-informed decision-making, are the engineering, and environmental methods, models, and analyses used adequate and acceptable?
4. Were all the models in the analyses used in an appropriate manner with assumptions appropriately documented and explained?
5. Were risk and uncertainty sufficiently considered?
6. Does the environmental assessment satisfy the requirements of NEPA? Were adequate considerations given to significant resources by the project?

Safety Assurance Review Questions

7. Within the context of risk-informed decision-making, were the methods used to evaluate the condition of the structural features adequate and appropriate given the circumstances?
8. Have the appropriate alternatives been considered and adequately described for this project and do they appear reasonable?
9. Within the context of risk-informed decision-making, do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?
10. For the current design developed using limited detailed information, are the quality and quantity of the surveys, investigations, and engineering sufficient to assess expected risk reduction?
11. Are the assumptions made for the impacts appropriately documented and explained in the report documentation and/or risk register?

12. Have all characteristics, conditions, and scenarios leading to potential failure, along with the potential impacts and consequences, been clearly identified and described? Have all pertinent factors, including but not necessarily limited to population-at-risk, been considered?
13. Do the alternatives and their associated costs appear reasonable? Do the benefits and consequences appear reasonable?

Alternatives

14. Have the criteria to eliminate plans from further study been clearly described?
15. Have comparative impacts been clearly and adequately described?
16. Are residual risks adequately described and is there a sufficient plan for communicating the residual risk to affected populations?

Environmental Consequences

17. Have impacts on significant resources been adequately and clearly described?

Economics Appendix

18. Were the benefit categories used in the economic analysis adequate to calculate a benefit-to-cost ratio for each of the project alternatives?
19. Were the methods to calculate structure and content values appropriate and adequately described?
20. Were the methods used to develop the content-to-structure value ratios (CSVs) appropriate and were the generated results applicable to the study area?

Geotechnical Engineering

21. Were the geotechnical analyses adequate and appropriate for the current level of design as presented in the report documentation?

Civil Design

22. Have the design and engineering considerations presented been clearly outlined and will they achieve the project objectives?
23. Are any additional design assumptions necessary to validate the preliminary design of the primary project components?
24. Are the assumptions used to determine the cost of operations and maintenance for the proposed project adequately documented and explained?

Cost

25. Are the costs adequately justified?

Public Involvement and Correspondence

26. Based on your experience with similar projects, has adequate public, stakeholder, and agency involvement occurred to determine all issues of interest and to ensure that the issues have been adequately addressed to the satisfaction of those interested parties? Should additional public outreach and coordination activities be conducted?

Final Overview Questions

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

28. Have any of your opinions/analyses changed concerning the components of the study that were retained from the previous incomplete IEPR?

Summary Questions

29. 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.

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