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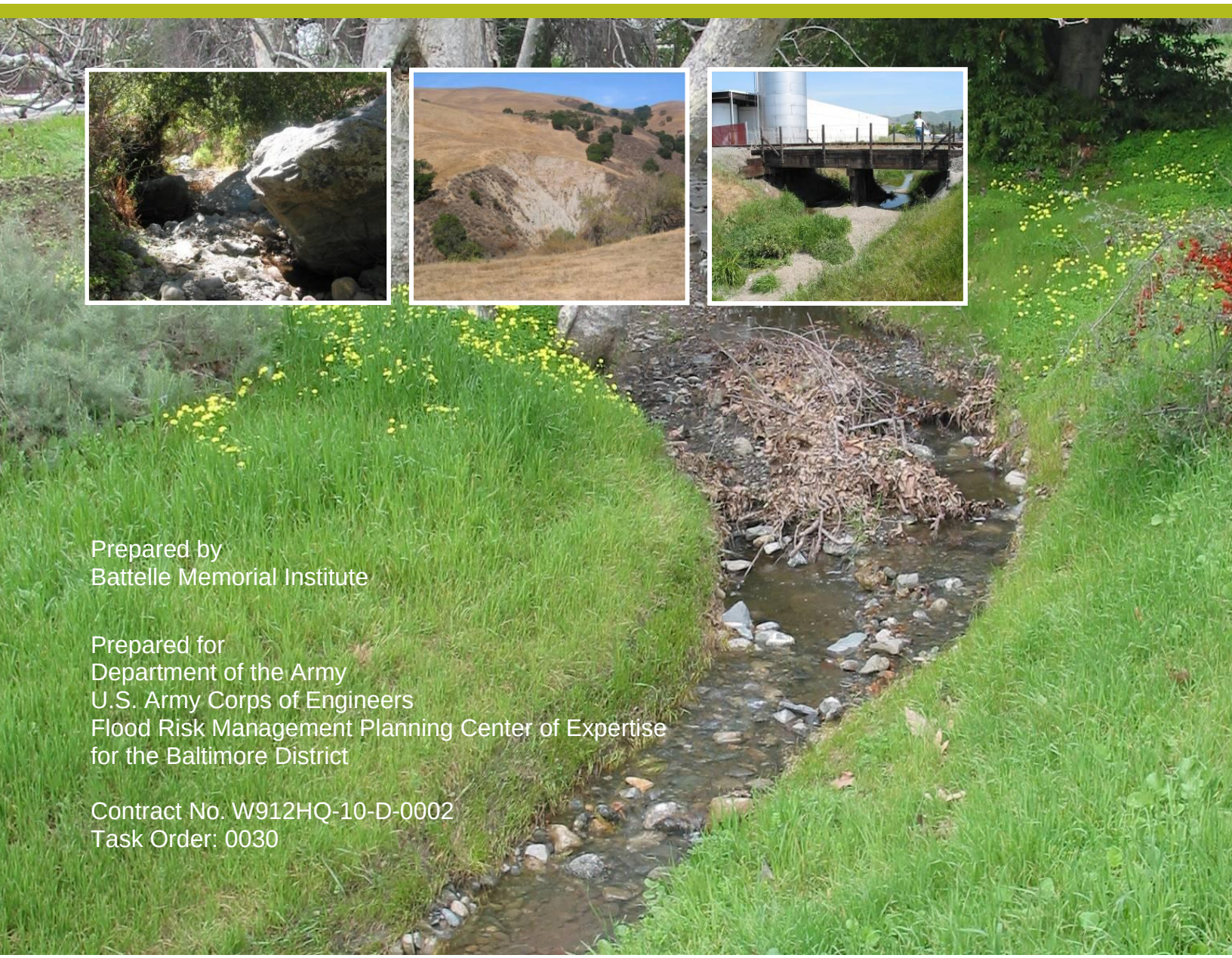
March 6, 2013

Final Independent External Peer Review Report Berryessa Creek, Santa Clara County, California, General Reevaluation Study (GRS) Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report



Prepared by
Battelle Memorial Institute

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

Contract No. W912HQ-10-D-0002
Task Order: 0030

Final Independent External Peer Review Report
Berryessa Creek, Santa Clara County, California, General Reevaluation Study (GRS) Final General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report

by

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for

Department of the Army
U.S. Army Corps of Engineers
Flood Risk Management Planning Center of Expertise
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Final Independent External Peer Review Report for the

Berryessa Creek, Santa Clara County, California, General Reevaluation Study (GRS) Final General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report

EXECUTIVE SUMMARY

Project Background and Purpose

The Berryessa Creek, Santa Clara County, California General Reevaluation Study (GRS) was initiated in 2001 to investigate alternatives to the authorized Berryessa Creek Project in Santa Clara County for the purpose of flood risk management (FRM). The study is considering channel and floodplain terrace excavation, bridge and culvert modifications, levee and floodwall construction, sediment basin modifications, bed and bank armoring, minor recreation improvements, and planting of riparian vegetation.

The study area is along a portion of Berryessa Creek in the Santa Clara Valley of California. Berryessa Creek originates on the western slope of the Diablo Range and emerges from hills in the northeastern part of the city of San Jose. The creek flows west and passes under Interstate 680 before turning north and flowing into lower Penitencia Creek, which is a tributary to lower Coyote Creek, which in turn flows into the south end of San Francisco Bay. The primary study area includes the main stem of Berryessa Creek and its floodplains from upstream of Old Piedmont Road downstream to Calaveras Boulevard. Within the study area, the Berryessa Creek channel is almost entirely channelized and it provides minimal natural values, outside of the well-vegetated "greenbelt reach" adjacent to a schoolyard and park. The overall study area includes those areas adjacent to the primary study area, which could be influenced by potential actions to address the identified problems and needs.

The study will focus on FRM alternatives along Berryessa Creek from above Old Piedmont Road to Calaveras Boulevard. The non-Federal sponsor is interested in reducing flood risks to the existing urbanized areas in the cities of San Jose and Milpitas to remove those areas from the FEMA regulated 1-percent-annual-chance flood floodplain.

The primary flood-related problems in the study area are potential flood damages to existing residential, commercial, and light industrial development in a dense urban area due to limited channel and floodway capacity. The parts of the study that will be most challenging are the need to meet current vegetation-free zone and other design requirements in an acceptable manner despite a constricted right-of-way bordered by dense residential and commercial development. Potential FRM measures include channel and floodplain terrace excavation, bridge and culvert modifications, levee and floodwall construction, sediment basin modification, and bed and bank armoring. Non-structural floodplain management measures will also be addressed. Additional

measures may include minor recreation improvements and planting of riparian vegetation for environmentally sustainable design and/or habitat mitigation.

Independent External Peer Review Process

The U.S. Army Corps of Engineers (USACE) is conducting an independent external peer review (IEPR) of the Berryessa Creek, Santa Clara County, California, General Reevaluation Study (GRS) Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report (hereinafter Berryessa Creek GRS/EIS/EIR). 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 Berryessa Creek GRS/EIS/EIR. 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).

Based on the technical content of the Berryessa Creek GRS/EIS/EIR review documents and the overall scope of the project, Battelle identified candidates for the Panel in the following key technical areas: economics, hydrologic and hydraulic engineering, and biology/ecology. Three panel members were selected for the IEPR from more than 13 candidates identified. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel.

The Panel received an electronic version of the 833-page Berryessa Creek GRS/EIS/EIR IEPR document, 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 USACE Project Delivery Team 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. In addition, a mid-review teleconference was held with the Project Delivery Team and Panel to allow the Panel to ask clarifying questions associated with issues that arose during the document review. Other than these two teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced more than 230 individual comments in response to the 72 charge questions.

IEPR panel members reviewed the Berryessa Creek GRS/EIS/EIR documents individually. The panel members then met via teleconference with Battelle to review key technical comments, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Overall, 15 Final Panel Comments were identified and documented. Of

these, six were identified as having high significance, eight had medium significance, and one had low significance.

Results of the Independent External Peer Review

The panel members agreed among one another 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 Berryessa Creek review documents. The Panel found that, overall, the Berryessa Creek report is well organized and comprehensive. An extensive array of engineering measures was considered in the development of alternatives and the criteria to eliminate plans from future study are well described and logical although the impact of sedimentation on the channel design has not been considered adequately. 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 statements summarize the Panel's findings.

Engineering – The Berryessa Creek GRS/Draft GRR/EIS/EIR contains extensive details on the hydrologic and hydraulic analyses performed. In general, the assumptions that underlie the engineering aspects are technically sound and appropriate. The hydrologic and hydraulic modeling procedures as presented in the report are technically sound and acceptable. Although the report presents overwhelming evidence of sedimentation issues within the project area, neither the impact of sedimentation issues on the channel design nor details on the maintenance activities with relation to sedimentation have been presented. In addition, there are insufficient details on the maintenance activities with relation to sedimentation. The Panel has expressed significant concern about the lack of details on the operation and maintenance (O&M) plan and has identified the need for a detailed O&M plan to ensure the design assumptions concerning sedimentation are valid.

Economics – The Panel determined that the adequacy and acceptability of the structure and content values, total annual costs, and the results of the economic risk analysis could not be determined due to lack of documentation. The report does not describe the methods used to develop the structure inventory, conduct and verify the content survey, and calculate structure values. The Panel was unable to determine if the structure and content data used in the analysis are accurate and if they reflect the current conditions in the study area. Several issues pertaining to the calculation of annual equivalent damages (AED) to structure and content, the unexplained increase in benefits resulting from the incorporation of risk and uncertainty, and the presentation of the results of the economic analysis are identified that could significantly impact the findings of the economic analysis. In addition, the report contains little documentation describing the development of the lands, easements, rights-of-way, relocations, and disposal areas (LERRD) costs and the annual operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs, preventing an accurate assessment of the total annual costs used in estimating the benefit to cost ratios. Based on the analysis presented in the reviewed documents, the Panel cannot accurately assess the economic feasibility of the Recommended Plan.

Environmental – The Berryessa Creek GRS/Draft GRR/EIS/EIR adequately describes existing conditions of vegetation in the project area, but does not include a thorough review of special-

status wildlife that could occur in the area. As such, the impact analysis is not complete. In addition, the mitigation measures do not logically correspond to the impacts as written, which affects the clarity of the document, but also could indicate undisclosed impacts on biological resources. Because of the deficiencies in the impact analysis and mitigation, the GRR EIS/EIR does not comply with the requirements of California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) to describe significant impacts on the physical environment.

Table ES-1. Overview of 15 Final Panel Comments Identified by the Berryessa Creek IEPR Panel.

No.	Final Panel Comment
	Significance – High
1	The impact of sedimentation is not included in the hydraulic modeling aspect of channel design.
2	The operations and maintenance plan does not present sufficient details related to sediment removal and maintenance of clear channel conditions.
3	The National Economic Development benefits cannot be validated due to inconsistencies and incomplete data associated with the calculation of the Annual Equivalent Damages.
4	The National Economic Development benefits cannot be validated due to inconsistencies and incomplete data in the economic risk and uncertainty analysis.
5	The National Economic Development benefits cannot be validated because detailed documentation associated with the development of the structure inventory, content value surveys, and structure valuation is not provided.
6	The FLO-2D boundaries as modeled include artificial barriers that confine water flow within the study area, which could affect the National Economic Development benefit calculations.
	Significance – Medium
7	The use of the current NOAA Atlas 14 Volume 6 precipitation-frequency data could alter hydrological model design discharges and affect the channel design parameters.
8	A clear justification for the elimination of levees from the final array of alternative plans has not been provided.
9	The impact on wetlands and riparian habitat is not described in adequate detail to demonstrate that no net loss would occur.
10	The mitigation measures are not linked to the impact analysis and it is not clear if the mitigation avoids, minimizes, or compensates for the impacts on biological resources.
11	The potential for California red-legged frogs to move accidentally into the project area or be washed downstream from areas of suitable habitat is not evaluated.
12	Several special-status species that have a potential to occur in the study area are not included in the description of threatened and endangered species.
13	The impact analysis does not identify the potential for invasive species to be introduced, spread, or perpetuated by the project as directed by Executive Order 11312: Invasive Species.

No.	Final Panel Comment
14	The basis for estimating lands, easements, rights-of-way, relocations, and disposal areas (LERRD) costs and annual operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs are not provided.
	Significance – Low
15	Certain socioeconomic data are inconsistent, dated, or not provided in the documents, which could lead to misinterpretation of study area conditions.

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LIST OF ACRONYMS

AED	Annual Equivalent Damages
AEP	Annual Exceedance Probability
ATR	Agency Technical Review
CAL-IPC	California Invasive Plant Council
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity DataBase
COI	conflict of interest
CWA	Clean Water Act
DFG	Department of Fish and Game
DrChecks	Design Review and Checking System
ESA	Endangered Species Act
EIS	Environmental Impact Statement
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
ESA	Endangered Species List
FRM	flood risk management
GDM	General Design Memorandum
GRR	General Reevaluation Report
GRS	General Reevaluation Study
HEP	Habitat Evaluation Procedure
IEPR	independent external peer review
IWR	Institute for Water Resources
LERRD	lands, easements, rights-of-way, relocations, and disposal
NED	National Economic Development
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
O&M	operations and maintenance
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
OMRR&R	operation, maintenance, repair, replacement, and rehabilitation
PDT	Project Delivery Team
POP	period of performance
SCVWD	Santa Clara Valley Water District
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WRDA	Water Resources Development Act

1. INTRODUCTION

The Berryessa Creek, Santa Clara County, California General Reevaluation Study (GRS) was initiated in 2001 to investigate alternatives to the authorized Berryessa Creek Project in Santa Clara County for the purpose of flood risk management (FRM). The study is considering channel and floodplain terrace excavation, bridge and culvert modifications, levee and floodwall construction, sediment basin modifications, bed and bank armoring, minor recreation improvements, and planting of riparian vegetation.

The study area is along a portion of Berryessa Creek in the Santa Clara Valley of California. Berryessa Creek originates on the western slope of the Diablo Range and emerges from hills in the northeastern part of the city of San Jose. The creek flows west and passes under Interstate 680 before turning north and flowing into lower Penitencia Creek, which is a tributary to lower Coyote Creek, which in turn flows into the south end of San Francisco Bay. The primary study area includes the main stem of Berryessa Creek and its floodplains from upstream of Old Piedmont Road downstream to Calaveras Boulevard. Within the study area, the Berryessa Creek channel is almost entirely channelized and it provides minimal natural values, outside of the well-vegetated "greenbelt reach" adjacent to a schoolyard and park. The overall study area includes those areas adjacent to the primary study area, which could be influenced by potential actions to address the identified problems and needs.

The study will focus on FRM alternatives along Berryessa Creek from above Old Piedmont Road to Calaveras Boulevard. The non-Federal sponsor is interested in reducing flood risks to the existing urbanized areas in the cities of San Jose and Milpitas to remove those areas from the FEMA regulated 1-percent-annual-chance flood floodplain.

The primary flood-related problems in the study area are potential flood damages to existing residential, commercial, and light industrial development in a dense urban area due to limited channel and floodway capacity. The parts of the study that will be most challenging are the need to meet current vegetation-free zone and other design requirements in an acceptable manner despite a constricted right-of-way bordered by dense residential and commercial development. Potential FRM measures include channel and floodplain terrace excavation, bridge and culvert modifications, levee and floodwall construction, sediment basin modification, and bed and bank armoring. Non-structural floodplain management measures will also be addressed. Additional measures may include minor recreation improvements and planting of riparian vegetation for environmentally sustainable design and/or habitat mitigation.

The objective of the work described here was to conduct an independent external peer review (IEPR) of the Berryessa Creek, Santa Clara County, California, General Reevaluation Study Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report (hereinafter Berryessa Creek GRS/EIS/EIR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE) Engineer Circular *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 Berryessa Creek GRS/EIS/EIR. 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 Berryessa Creek GRS/EIS/EIR IEPR was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-214) under Section 501(c)(3) of the U.S. Internal Revenue Code with experience conducting IEPRs for USACE.

3. METHODS

This section describes the method followed in selecting the members 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 (POP), Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan.

Table 1 presents the schedule followed in executing the IEPR. Due dates for milestones and deliverables are based on the award/effective date of September 21, 2012. The review documents were provided by USACE on January 7, 2013. Note that the work items listed in Task 6 occur after the submission of this report. Battelle will enter the 15 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based

software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle.

Table 1. Berryessa Creek GRS/EIS/EIR IEPR Schedule.

Task	Action	Due Date
1	Award/Effective Date (NTP)	9/21/2012
	Review documents available	1/7/2013
	*Battelle submits draft Work Plan	1/8/2013
	USACE provides comments on draft Work Plan	1/15/2013
	Battelle convenes teleconference (if necessary)	1/11/2013
	*Battelle submits final Work Plan	1/16/2013
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	9/25/2012
	USACE provides comments on COI questionnaire	10/3/2012
	Battelle submits list of selected panel members[a]	12/20/2012
	USACE confirms the Panel has no conflicts of interest	1/3/2013
	Battelle completes subcontracts for panel members	1/9/2013
3	Battelle convenes kick-off meeting with USACE	12/6/2012
	Battelle sends review documents to Panel	1/9/2013
	Battelle convenes Panel kick-off meeting	1/10/2013
	Battelle convenes USACE/Panel kick-off meeting	1/24/2013
4	Panel members complete their individual reviews	2/1/2013
	Battelle provides Panel merged individual comments and talking points for Panel Review Teleconference	2/6/2013
	Battelle convenes Panel Review Teleconference	2/7/2013
	Panel members provide draft Final Panel Comments to Battelle	2/19/2013
	Battelle finalizes Final Panel Comments	2/28/2013
5	Battelle submits Final IEPR Report to USACE[a]	3/6/2013
6[b]	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	3/7/2013
	USACE provides draft PDT Evaluator Responses to Battelle	3/20/2013
	Battelle convenes teleconference with Panel and USACE to discuss Final Panel Comments and draft responses	4/2/2013
	USACE inputs final PDT Evaluator Responses in DrChecks	4/11/2013
	Battelle inputs the Panel's BackCheck Responses in DrChecks	4/17/2013
	Battelle submits pdf printout of DrChecks project file[a]	4/19/2013
	Project Closeout	6/21/2013

[a] *Deliverable*
[b] *Task 6 occurs after the submission of this report.*

3.2 Identification and Selection of IEPR Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: economics, hydrologic and hydraulic engineering, and biology/ecology. These areas correspond to the technical content of the Berryessa Creek GRS/EIS/EIR IEPR and overall scope of the Berryessa Creek GRS/EIS/EIR.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle initially identified more than 13 candidates for the Panel, evaluated their technical expertise, and inquired about potential COIs. Of these, Battelle chose the most qualified candidates and confirmed their interest and availability, and ultimately proposed three experts for the final Panel. Information about the candidate panel members, including brief biographical information, highest level of education attained, and years of experience, was provided to USACE for feedback. The PCX notified Battelle that the PDT recognized the need for a hydrologic and hydraulic engineer with a more robust knowledge of applied FLO-2D and therefore augmented the original SOW requirements with additional technical qualifications for the hydrologic and hydraulic engineer, focusing on more comprehensive FLO-2D expertise. Battelle conducted an extensive search to identify a replacement panel member with the additional technical qualifications, and then made the final selection of panel members according to the selection criteria described in the Work Plan and the additional panel requirements.

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

The candidates were screened for the following potential exclusion criteria or COIs.[1] These COI questions were intended to serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm[2] in the Berryessa Creek, Santa Clara County, California, General Reevaluation Study (GRS), Draft General Reevaluation Report (GRR) and Environmental Impact Statement/Environmental Impact

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

[2] Note: Includes any joint ventures in which the panel member's firm is involved.

Report (EIS/EIR) (hereinafter: Berryessa Creek GRR and EIS/EIR), and/or technical appendices.

- Previous and/or current involvement by you or your firm[2] in flood risk management projects in the greater San Jose, California region.
- Previous and/or current involvement (conceptual or actual design, construction, or O&M) by you or your firm[2] in projects related to the Berryessa Creek GRR and EIS/EIR.
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Previous and/or current involvement in paid or unpaid expert testimony related to the Berryessa Creek GRR and EIS/EIR.
- Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors: the Santa Clara Valley Water District; the City of Milpitas, California; the City of San Jose, California; the Santa Clara Valley Transportation Authority; Central Valley Regional Water Quality Control Board; California Department of Fish and Game; U.S. Fish and Wildlife Service; and/or U.S. Environmental Protection Agency (for pay or pro bono).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the greater San Jose, California area.
- Current personal involvement in other USACE projects, including authorship of any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Sacramento District.
- Previous or current involvement in the development or testing of models that will be used for or in support of the Berryessa Creek GRR and EIS/EIR, including but not limited to HEC-1, HEC-HMS, HEC-2, HEC-RAS, FLO-2D, and HEC-FDA.
- Current firm[2] involvement in 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 USACE as a direct employee or contractor (either as an individual or through your firm[2]) 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 flood risk management and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in the Berryessa Creek GRR and EIS/EIR-related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last 3 years from USACE contracts.

- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last three years from contracts with the non-Federal sponsor (Santa Clara Valley Water District).
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Berryessa Creek project.
- Participation in prior Federal studies relevant to the Berryessa Creek project and/or the Berryessa Creek GRR and EIS/EIR.
- Previous and/or current participation in prior non-Federal studies relevant to the Berryessa Creek project and/or the Berryessa Creek GRR and EIS/EIR.
- 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.

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. The three final reviewers were either affiliated with consulting companies or were independent 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. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning their review and within one 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.

3.3 Preparation of the Charge and Conduct of the IEPR

Charge questions were provided by USACE and included in the draft and final Work Plans. In addition to a list of 72 charge questions/discussion points, the final charge included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report).

Battelle planned and facilitated a kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meeting, the IEPR Panel received an electronic version of the final charge as well as the Berryessa Creek GRS/EIS/EIR documents and reference materials listed below. The documents and files in bold font were those originally provided for review; the other documents were provided for reference or supplemental information only. In addition, throughout the review period, USACE provided additional documents at the request of panel members. These additional documents were provided to Battelle and then disseminated to the Panel as part of the official review. A list of these additional documents requested by the Panel is provided below.

- Draft General Reevaluation Report and Environmental Impact Statement/ Environmental Impact Report (353 pages)

- Appendix B: Engineering and Design Part I: Hydraulic Analysis of Alternatives (109 pages)
- Appendix B: Engineering and Design Part II: Floodplain Development (163 pages)
- Appendix B: Engineering and Design Part III: Geomorphic and Sediment Transport Assessment (76 pages)
- Berryessa Creek Watershed Hydrology Report (60 pages)
- Appendix C: Economics: (72 pages)
- USACE guidance Civil Works Review (EC 1165-2-214, 15 December 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

During the review process, the Panel requested the following additional information from USACE:

- Appendix B: Engineering and Design Part IV: Design and Cost Alternatives (49 pages)
- Real Estate Plan: (15 pages)
- Technical Memorandum: Berryessa Creek Hydraulic Analysis (56 pages)
- Technical Memorandum: Updates to Without-project HECRAS (51 pages)
- Technical Memorandum: Bypass Hydrologic Modeling Basis (5 pages)
- Berryessa Creek Flood Control Santa Clara County, CA Cost Engineering Report Draft Submittal (150 pages)
- Coyote Creek and Berryessa Creek Interim Feasibility Report and Final Environmental Impact Statement (475 pages)
- Lower Berryessa Creek Program Draft EIR (625 pages)
- Sana Clara Valley Water District Californian Tiger Salamander Distribution and Status 1999 (33 pages)
- Habitat Assessment and Surveys for the California Red-Legged Frog (Rana draytonii) and Foothill Yellow-Legged Frog (Rana boylii) on the Upper Berryessa Creek Drainage, San Jose, Californian (40 pages)
- Santa Clara Valley Water District 60% Preliminary Plan and Profile
- Berryessa Creek Project Area Photos (8 photos)
- Summary of FDA model output (3 pages)
- Downstream area 'with project' conditions associated with Tables 6.1, 6.2, and 6.3. (4 pages)
- BER-REF EXTNG Topographic Maps
- Bypass Flow at I680 Hydrograph Charts (2 charts)

About half way through the review of the Berryessa Creek GRS/EIS/EIR 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 13 panel member questions to USACE. USACE was able to provide responses to some of the questions during the teleconference; the remaining panel member questions that required additional coordination within USACE were addressed by USACE by February 12, 2013.

3.4 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle. At the end of the review period, the Panel produced more than 230 individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle summarized the 230 comments into a preliminary list of 21 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 IEPR Panel Teleconference

Battelle facilitated a 3-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance to the Panel.

The Panel also discussed responses to one specific 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. The comment was determined to be a non-significant issue.

At the end of these discussions, the Panel identified 14 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Berryessa Creek GRS/EIS/EIR:

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

distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

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

At the end of this process, 14 Final Panel Comments were prepared and assembled. An additional Final Panel Comment was submitted for consideration after the panel review teleconference, bringing the total from 14 to 15 Final Panel Comments. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

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

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

Table 2. Berryessa Creek GRS/EIS/EIR IEPR Panel: Technical Criteria and Areas of Expertise.

Technical Criterion	Maher	Leeman	Raghavan
Economics			
Minimum 10 years' experience directly related to water resource economic evaluation and review	X		
Minimum 5 years' experience directly working for or with USACE	X		
Familiar with the USACE plan formulation process, procedures, standards, guidance, and economic evaluation techniques	X		
Familiar with the USACE flood risk management analysis and benefit calculations, including the National Economic Development (NED) analysis procedures	X		
Experience working with standard USACE computer programs, including the HEC-FDA and its interface with HEC-RAS and FLO-2D	X		
Minimum M.S. in economics	X		
Biology/Ecology			
Minimum 10 years' experience in evaluation and conducting NEPA impact assessments for complex, multi-objective, public works projects with competing trade-offs		X	
Minimum 10 years' experience in evaluation and conducting NEPA impact assessments for complex, multi-objective, public works projects with cumulative effects analyses		X	
Minimum 10 years' experience in evaluation and conducting NEPA impact assessments for complex, multi-objective, public works projects with environmental regulations compliance and public involvement		X	
Extensive experience working with freshwater fisheries, wetlands, and riparian ecology in the western United States		X	
Minimum M.S. degree in appropriate field of study		X	

Technical Criterion	Maher	Leeman	Raghavan
Hydrologic and Hydraulic Engineering			
Minimum 15 years' experience in hydrologic and hydraulic engineering with an emphasis on large public works projects			X[a]
Experience modeling river systems within confined channels with numerous infrastructure intersections			X
Possesses a thorough understanding of the dynamics of open channel flow systems, floodplain hydraulics, and interior flood control systems			X
Familiar with USACE application of risk and uncertainty in flood risk management studies			X
Familiar with standard USACE hydrologic and hydraulic computer models including HEC-1, HEC-HMS, HEC-2, HEC-RAS, and FLO-2D			X
Capable of addressing the USACE Safety Assurance Review (SAR) aspects of all projects			X
Actively participates in related professional societies			X
Registered professional engineer			X
Minimum M.S. in engineering			X
Familiar with theory and application behind FLO-2D[b]			X
Has experience in running FLO-2D models[b]			X
Understands FLO-2D use and limitations[b]			X
Understands assumptions and input in the development of FLO-2D[b]			X
Has reviewed and interpreted results from FLO-2D model in planning studies[b]			X
Has used results from the FLO-2D model in planning studies[b]			X

[a] *Waiver statement presented to, and approved by, USACE*
[b] *Additional requirements identified by PDT during the recruitment process*

Danny Maher

Role: Economics expertise
Affiliation: DSM Contracting LLC

Mr. Maher is a an independent consultant and senior economist at DSM Contracting, LLC and has 24 years of experience in conducting large water resource/public works planning studies for a variety of USACE districts. He earned his M.S. in agricultural economics from Louisiana State University. He has served as an economist and project manager on over 50 USACE planning studies and has been responsible for assisting in alternative development and screening and conducting economic analysis in accordance with USACE principles and guidelines for flood risk management, ecosystem restoration, navigation, recreation, and water supply studies.

Among the structure inventory and flood risk management projects he has served as economist are Tybee Island Re-Evaluation Study (Savannah District), Section 205 Reconnaissance Report for Flood Damage Prevention- Rio Descalabrado at Santa Isabel, Puerto Rico (Jacksonville District), the Rio Portuguese Flood Control Project, and the Update of Benefits for the Rio Portuguese Dam, Ponce, Puerto Rico. Each of these efforts consisted of estimating flood damage reduction benefits and included conducting structure inventories of all residential, commercial, and industrial structures, including on-site data collection (first floor elevation, square footage, condition, quality, effective age, etc.) for each structure in order to estimate the value of the structures using Marshall & Swift Valuation Service.

Mr. Maher was previously the Senior Economist responsible for the quality assurance/quality control (QA/QC) review of flood risk management studies conducted by another firm. Recently completed review efforts include the Laural Ridge, Louisiana Flood Control Feasibility Study (for a non-Federal sponsor), and the Inundation Mapping and Economic Damage Assessment, Arkansas River and Tributaries in Oklahoma (for the Tulsa District). Mr. Maher has been the economist on numerous structure inventory/flood risk management studies, for which he has been responsible for estimating National Economic Development (NED) flood damages to residential, commercial, industrial, and institutional structures, and infrastructure. He has experience estimating NED benefits of reduced inundation to structures and contents and for reduced emergency costs, and for estimating benefit to cost ratio for each alterative. His experience with review and model output verification includes his use of HEC-FDA and its interface with HEC-RAS.

Linda Leeman

Role: Biologic/ecologic expertise
Affiliation: Ascent Environmental

Ms. Leeman is a senior biologist with Ascent Environmental and has over 18 years of experience in wildlife biology, habitat assessments, restoration and mitigation planning, and endangered species permitting. She earned her M.S. in natural resources from Humboldt State University and is a certified wildlife biologist. Ms. Leeman has extensive experience with California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), and the Federal and California Endangered Species Acts (ESA) compliance for projects throughout northern and central California. Since 2000, she has prepared numerous impact analyses for biological resources and prepared documents in accordance with CEQA and NEPA requirements. These impact analyses include cumulative effects analyses, compliance with other environmental regulations, and public outreach and comment periods.

Ms. Leeman has worked on many complex, multi-objective public works projects with multiple objectives and competing trade-offs including flood protection, flood flow conveyance, water supply reliability, riparian habitat restoration, and sensitive biological resource protection. Her experience working in riparian habitats, fisheries, and wetlands in the western United States includes the San Joaquin River Restoration Program Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) and Endangered Species Act compliance for the U.S. Bureau of Reclamation, the Calaveras Dam Project EIR and ESA compliance for the San

Francisco Public Utilities Commission, and the Putah Creek Watershed Management Action Plan for the Creek Coordinating Committee.

Hari Raghavan, Ph.D., P.E., C.F.M.

Role: Hydrologic and hydraulic engineering expertise
Affiliation: JE Fuller/Hydrology & Geomorphology, Inc.

Dr. Raghavan is a hydraulic and hydrologic engineer at JE Fuller/Hydrology & Geomorphology, Inc. He earned his Ph.D. in Ocean Engineering from the University of Hawaii, is a registered professional engineer in California and Arizona, and a certified floodplain manager. He has more than 12 years of experience in the areas of hydrology, hydraulics, sediment transport, and coastal engineering, specializing in the development of numerical models and their application to a variety of large Civil Works projects. He is experienced in hydrodynamics, wave mechanics, and multidimensional computational fluid dynamics and has been a project engineer for studies involving hydrology, riverine hydraulics, floodplain delineation, sediment transport and bridge scour, bank protection design, lateral channel migration, alluvial fan hydraulics, and sedimentation. He is an expert with the use of standard USACE hydrologic and hydraulic models including HEC-1, HEC-2, HEC-RAS and FLO-2D models as well as other modeling software. He has extensive experience with the development of FLO-2D models and has reviewed and interpreted results from the model as part of area drainage master planning, infrastructure design, and flood hazard delineation projects. For example, as part of the Sun Valley Fan 1 and Fan 2 Alluvial Fan Floodplain Delineation study, Dr. Raghavan developed FLO-2D models to analyze the branching and/or sheet flows in order to providing better approximations of flow distributions. For that project, Dr. Raghavan analyzed flow path uncertainty within active alluvial fan zones by considering conservative flow path scenarios through artificial redirection of flows within the active areas.

Dr. Raghavan was the project engineer responsible for the development of large-scale area drainage master plans that included conceptual drainage infrastructure modeling and design and the development of both hydraulic and sediment transport riverine models. Relevant large-scale studies include Hohokam Area Drainage Master Study (ADMS) and the Mohave Valley Risk MAP Project. The ADMS project area is located within a highly urbanized portion of the City of Phoenix. Through the use of FLO-2D, he identified and characterized major flooding sources and hazards. In addition, he used FLO-2D to model the effectiveness of existing drainage infrastructure and to identify potential drainage problem areas. The Mohave Valley Risk MAP Project entailed detailed re-delineation through FLO-2D modeling of several existing FEMA flood hazard areas. Given the complex watershed characteristics (regional drainage channels, levee-like structures, coalescing alluvial fans, etc.), Dr. Raghavan developed more than 100 FLO-2D model simulation runs to estimate the potential worst case scenario for this project.

Dr. Raghavan possesses a thorough understanding of open channel flow systems, floodplain hydraulics, and interior flood control systems as a result of his extensive academic background in fluid mechanics, flow modeling, numerical model development, and watershed hydrology and open channel hydraulics. He is experienced in the development of riverine systems with confined channels with numerous infrastructure intersections and has developed and analyzed several watershed hydrologic models and riverine flow models. He is familiar with the application of

risk and uncertainty, and has project experience in the identification of the extent, frequency, and magnitude of flood hazards, the determination of risk with known community infrastructure, and is familiar with the application of USACE risk and uncertainty as it applies to levee certification and FEMA accreditation for Digital Flood Insurance Rate Map. In addition, Dr. Raghavan has reviewed several projects involving alluvial fan FLO-2D modeling for FEMA floodplain delineation submittals. As part of these projects, Dr. Raghavan developed unique analytical tools and proprietary code for FLO-2D model construction and review. In addition, he developed the FLO-2D modeling guidelines chapter within the updated Arizona Department of Transportation Hydrology Manual, demonstrating his understanding of FLO-2D's use and limitations.

Dr. Raghavan is capable of addressing safety assurance review (SAR) aspects of projects in accordance with ER 1110-2-1150, including the quality and quantity of the surveys; conceptual design; models use for hazard assessment; assessment of hazard assumptions; and the uncertainty/consequences associated with the potential for loss of life. One example incorporating these aspects was the Piedmont Flood Hazard Assessment Manual – Alluvial Fan Hazard Identification & Mitigation Methods. He is an active participant in related professional societies including the Arizona Floodplain Management Association.

5. SUMMARY OF FINAL PANEL COMMENTS

The panel members agreed among one another 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 Berryessa Creek review documents. The Panel found that, overall, the Berryessa Creek report is well organized and comprehensive. An extensive array of engineering measures was considered in the development of alternatives and the criteria to eliminate plans from future study are well described and logical although the impact of sedimentation on the channel design has not been considered adequately. 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 statements summarize the Panel's findings.

Engineering – The Berryessa Creek GRS/Draft GRR/EIS/EIR contains extensive details on the hydrologic and hydraulic analyses performed. In general, the assumptions that underlie the engineering aspects are technically sound and appropriate. The hydrologic and hydraulic modeling procedures as presented in the report are technically sound and acceptable. Although the report presents overwhelming evidence of sedimentation issues within the project area, neither the impact of sedimentation issues on the channel design nor details on the maintenance activities with relation to sedimentation have been presented. In addition, there are insufficient details on the maintenance activities with relation to sedimentation. The Panel has expressed significant concern about the lack of details on the operation and maintenance (O&M) plan and has identified the need for a detailed O&M plan to ensure the design assumptions concerning sedimentation are valid.

Economics – The Panel determined that the adequacy and acceptability of the structure and content values, total annual costs, and the results of the economic risk analysis could not be determined due to lack of documentation. The report does not describe the methods used to

develop the structure inventory, conduct and verify the content survey, and calculate structure values. The Panel was unable to determine if the structure and content data used in the analysis are accurate and if they reflect the current conditions in the study area. Several issues pertaining to the calculation of annual equivalent damages (AED) to structure and content, the unexplained increase in benefits resulting from the incorporation of risk and uncertainty, and the presentation of the results of the economic analysis are identified that could significantly impact the findings of the economic analysis. In addition, the report contains little documentation describing the development of the lands, easements, rights-of-way, relocations, and disposal areas (LERRD) costs and the annual operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs, preventing an accurate assessment of the total annual costs used in estimating the benefit to cost ratios. Based on the analysis presented in the reviewed documents, the Panel cannot accurately assess the economic feasibility of the Recommended Plan.

Environmental – The Berryessa Creek GRS/Draft GRR/EIS/EIR adequately describes existing conditions of vegetation in the project area, but does not include a thorough review of special-status wildlife that could occur in the area. As such, the impact analysis is not complete. In addition, the mitigation measures do not logically correspond to the impacts as written, which affects the clarity of the document, but also could indicate undisclosed impacts on biological resources. Because of the deficiencies in the impact analysis and mitigation, the GRR EIS/EIR does not comply with the requirements of California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) to describe significant impacts on the physical environment.

Table 3. Overview of 15 Final Panel Comments Identified by the Berryessa Creek GRS/EIS/EIR IEPR Panel.

No.	Final Panel Comment
Significance – High	
1	The impact of sedimentation is not included in the hydraulic modeling aspect of channel design.
2	The operations and maintenance plan does not present sufficient details related to sediment removal and maintenance of clear channel conditions.
3	The National Economic Development benefits cannot be validated due to inconsistencies and incomplete data associated with the calculation of the Annual Equivalent Damages.
4	The National Economic Development benefits cannot be validated due to inconsistencies and incomplete data in the economic risk and uncertainty analysis.
5	The National Economic Development benefits cannot be validated because detailed documentation associated with the development of the structure inventory, content value surveys, and structure valuation is not provided.
6	The FLO-2D boundaries as modeled include artificial barriers that confine water flow within the study area, which could affect the National Economic Development benefit calculations.

No.	Final Panel Comment
	Significance – Medium
7	The use of the current NOAA Atlas 14 Volume 6 precipitation-frequency data could alter hydrological model design discharges and affect the channel design parameters.
8	A clear justification for the elimination of levees from the final array of alternative plans has not been provided.
9	The impact on wetlands and riparian habitat is not described in adequate detail to demonstrate that no net loss would occur.
10	The mitigation measures are not linked to the impact analysis and it is not clear if the mitigation avoids, minimizes, or compensates for the impacts on biological resources.
11	The potential for California red-legged frogs to move accidentally into the project area or be washed downstream from areas of suitable habitat is not evaluated.
12	Several special-status species that have a potential to occur in the study area are not included in the description of threatened and endangered species.
13	The impact analysis does not identify the potential for invasive species to be introduced, spread, or perpetuated by the project as directed by Executive Order 11312: Invasive Species.
14	The basis for estimating lands, easements, rights-of-way, relocations, and disposal areas (LERRD) costs and annual operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs are not provided.
	Significance – Low
15	Certain socioeconomic data are inconsistent, dated, or not provided in the documents, which could lead to misinterpretation of study area conditions.

6. REFERENCES

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USACE (1988). National Economic Development Procedures Manual, Urban Flood Damage. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Institute of Water Resources (IWR) Report 88-R-2, March.

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APPENDIX A

Final Panel Comments

on the

Berryessa Creek GRS/EIS/EIR

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Final Panel Comment 1

The impact of sedimentation is not included in the hydraulic modeling aspect of channel design.

Basis for Comment:

The Main Report and Appendices provide overwhelming evidence of active sediment transport throughout the project reach as explained below:

- Appendix B, Part III, Section 2.2.1 describes the presence of a high sediment production zone in the upper watershed with erosive soils/landslides and steep channels capable of transporting the large quantities of sediment to the downstream watershed.
- Appendix B, Part III, Section 2.2.1.4 (p. 2-17) states that HEC-6T sediment modeling results indicate "a mixture of aggradation and degradation scattered throughout the project area."
- Main Report, Section 2.2.1.1 presents the results of sediment yield analysis showing estimated sediment delivery as:
  1. Berryessa Creek at Old Piedmont Road = 9,900 tons/year
  2. Sweigert, Crosley, and Sierra Creeks = 1,900 tons/year
  3. Piedmont Creek = 700 tons/year
  4. Arroyo de los Coches = 3,200 tons/year.
- Appendix B, Part III, Section 2.2.2 presents the sediment removal history based on Santa Clara Valley Water District (SCVWD) maintenance records. These records show sediment removal occurring throughout the project area.
- Appendix B, Part III, Section 2.2.2 (p. 2-21) describes the possibility of sediment being transported through the project area to the reach downstream of Calaveras Boulevard.
- Main Report, Section 2.4.1 states, "Winter flows tend to be turbid, due to sediment loading from the surrounding foothills and from bank erosion along the creek."
- Appendix B, Part I, Section 5.3.2 states, "Based on the observations of David Adams of the SCVWD, sediment removed in the maintenance reaches upstream of Calaveras Boulevard is approximately uniformly distributed within each channel reach (rather than concentrated at bridge locations)."

Although there is overwhelming evidence that sedimentation occurs throughout the project reach, according to Main Report, Section 4.4.2.6, "For the hydraulic analysis, it was assumed that the channel is in its maintained state with the sedimentation basin downstream of Piedmont-Cropley cleaned out and the invert of bridges the same as those in the USACE model."

The hydraulic modeling performed in the study assumed clear channel conditions and did not analyze the potential reduction in channel capacity due to sediment deposition in the channel bed. In addition, high sediment concentrations can create "bulking" (Mussetter et al., 1994) of the flows, where the sediment volume becomes significant compared to water volume so that higher water surface elevations may result due to the presence of suspended sediment load. The impact due to "bulking" of flows is not considered as part of the hydraulic (HEC-RAS and FLO-2D) modeling. The design discharges were not adjusted to accommodate "bulking" of the flows due to sediment load.

Significance – High:

Reduction in channel capacity due to sediment deposition and bulking can impact the flow containment and extent of flooding, which will affect the project objective of reducing flood damages and the level of risk reduction achieved can be less than the project objective of 90-95 assurance for the 1-percent flood event.

Recommendations for Resolution:

1. Investigate post-sedimentation within the channels using post-sedimentation cross-sections from the sediment transport model.
2. Adjust design discharges to accommodate bulking of the flows due to sediment load.

Literature Cited:

Mussetter, R. A., P.F. Lagasse and M. D. Harvey (1994). Sediment Erosion and Design Guide. Prepared for the Albuquerque Metropolitan Arroyo Flood Control Authority by Resource Consultants and Engineers, Inc., Fort Collins, CO.

Final Panel Comment 2

The operations and maintenance plan does not present sufficient details related to sediment removal and maintenance of clear channel conditions.

Basis for Comment:

Sediment management is key to the success of the project as the project design is developed on the assumption of clear channel conditions. It is critical to ensure that the operations and maintenance (O&M) plan contains adequate details describing the process that will be adopted to maintain the channel through sediment removal. However, the O&M plan as presented in the Main Report Section 7.4 consists of only a single paragraph and does not provide sufficient details on the sediment removal process, sediment removal locations, or sediment removal frequency.

There are other sections of the Main Report that discuss the need for sediment removal through maintenance:

- Main Report (p. 2-17) describes the significant blockage of the Cropley and Piedmont Culvert.
- Both the Authorized Plan and the National Economic Development (NED) Plan identified removal of sediment at the downstream face of I-680 as a project task.
- Appendix B, Part III, Section 3.1.1 describes the need for sediment removal maintenance to preserve adequate flood conveyance capacity.
- Appendix B, Part III, Section 3.1.4 describes the need for identifying and creating designated locations for sedimentation-related maintenance activities.
- Appendix B, Part III, 3.1.5.2 describes the need to maintain vegetation growth within the channels so that sediment can effectively be conveyed by the channel.

In addition, the hydraulic analysis presented in Main Report, Section 4.4.2.6 assumes clear channel conditions without sediment depositions in the channel bed. The Authorized Plan had identified a primary sediment basin near Old Piedmont. In comparison, the NED Plan does not include any improvements upstream of I-680 and therefore does not include a sediment basin to capture the sediment from the upper watershed. As a result, sediment deposition can occur at various locations within the project study area. This section of the report, as well as the Section 7.4 on operations and maintenance, does not clearly describe how the sediment maintenance will be performed or identify all the locations where sediment removal will be performed.

One of the statements presented in Appendix B, Part III explains that existing deposition trends will be exacerbated due to design modifications. The with-project conditions are expected to worsen the sediment deposition, so additional maintenance efforts may be required to counter the increased sedimentation. No details on additional maintenance requirements are presented in this appendix.

Appendix B, Part III (p. 2-21) discusses the possibility of increased deposition in the reach below Calaveras Boulevard. The main report does not present any discussion on downstream impacts and mitigation needed to reduce the amount of sediment carried to downstream reaches outside the project study area.

Significance – High:

The project objective of flood damage reduction will not be adequately achieved if sufficient sediment removal and maintenance are not performed.

Recommendations for Resolution:

1. Develop a detailed O&M plan to ensure that the design assumptions of channels clear of sediment are valid.
2. Describe how the sediment maintenance will be conducted and identify all the locations where sediment removal will be performed. Details on maintenance frequency should be included as part of the O&M plan.
3. Describe impacts and mitigation needed to reduce sediment carried to downstream reaches outside the project study area.

Final Panel Comment 3

The National Economic Development benefits cannot be validated due to inconsistencies and incomplete data associated with the calculation of the Annual Equivalent Damages.

Basis for Comment:

The Panel identified several issues pertaining to the calculation of Annual Equivalent Damages (AED, the key component of National Economic Development [NED] benefits) and the presentation of the results of the economic analysis that could significantly impact the findings and understanding of the economic analysis.

The total damages for Economic Impact Areas E and F are inconsistent with the total expected annual damages for these areas. Economic Impact Area E incurred damages at lower frequency events and incurred significantly higher total damages at each frequency event than Area F (Appendix C, Table 6.1), indicating that Area E would incur higher total expected annual damages than Area F. However, total expected annual damages are reported as being higher in Area F ($6.566M) than in Area E ($5.127M) (Appendix C, Table 6.2, p. 6-3).

The analysis indicated significant increases in structure and content damages resulting from only slight increases in stages. In Table 4.5 (Appendix C), a stage difference of only 0.06 foot between the 0.005 and 0.002 events in Area E results in an increase in damages of $23.6M. The difference in stage between the 0.040 and 0.002 events is only 0.57 foot, but increases damages from $8.57M to $94.06M. For Area F (Appendix C, Table 4.6), a change in stage of only 0.22 foot between the 0.040 and 0.002 events results in damages of $98.31M. Based on the depth damage curves used in the analysis, slight increases in stage should not result in significant increases in structure and content damages.

Advance bridge replacement benefits are included in the NED benefit calculations based on extending the remaining life of four existing bridges. No data are provided on how the remaining life of the bridges was estimated or how the benefits were calculated. The report indicates that these benefits were calculated following procedures of the Institute for Water Resources (IWR) Report 88-R-2 (USACE, 1988). The guidance used to calculate these benefits is out of date. The updated IWR manual (USACE, 2010b), and Engineer Regulation 1105-2-100 (USACE, 2000 are silent on advanced bridge replacement benefits.

Certain results of the analysis are presented inconsistently, or are not presented at all:

- Table 6.1 (Appendix C) presents damages for exceedance probability events that were not cited as being modeled for this analysis.
- Tables 4.1 - 4.6 (Appendix C, pp. 4-3 to 4-5) exclude damages for the events between the non-damaging and the 0.040 event. As a result, the extent of expected damages for each alternative are not adequately described.
- The supporting data used to develop the with-project equivalent annual damages in Table 7.1 (App. C) are not provided.

To allow a comprehensive understanding of the NED benefits and project justification, the results of the economic analysis should be presented in a consistent and complete manner.

Significance – High:

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

Recommendations for Resolution:

1. Ensure consistency in reported damages in Tables 6.1 and 6.2 (Appendix C).
2. Explain the significant increases in structure and content damages resulting from slight increases in stage.
3. Describe the method used to calculate the advance bridge replacement benefits.
4. Present damages in Table 6.1 (Appendix C) by exceedance probability events that are consistent with the remainder of the report.
5. Revise Tables 4.1 - 4.6 (Appendix C) to include damages for the events between the non-damaging and the 0.040 exceedance probability events.
6. Provide the supporting data used to develop the with-project equivalent annual damages in Table 7.1 (Appendix C).

Literature Cited:

USACE (1988). National Economic Development Procedures Manual, Urban Flood Damage. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Institute of Water Resources (IWR) Report 88-R-2, March.

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

USACE (2010). Institute of Water Resources (IWR) National Economic Development (NED) Procedures Manual for Flood Risk Management (online manual). Department of the Army, U.S. Army Corps of Engineers, Washington, D.C, August 18.

Final Panel Comment 4

The National Economic Development benefits cannot be validated due to inconsistencies and incomplete data in the economic risk and uncertainty analysis.

Basis for Comment:

Review of the General Reevaluation Report (GRR) and Appendix C of the GRR identified several issues pertaining to the incorporation of risk and uncertainty into the calculation of the Annual Equivalent Damages (AED) that could significantly affect the findings of the economic analysis.

The reported risks associated with implementing Alternatives 2B/d and 4/d are inconsistent with EM 1110-2-1619 (USACE, 1996) and statements in the GRR. Table 6-11 (GRR, p. 6-24) indicates Alternatives 2B/d and 4/d have no with-project residual damages, residual risk of annual exceedance probability (AEP), chance of flooding in any year, or long-term risk, and 100% conditional non-exceedance. Alternatives 2B/d and 4/d result in no residual damages (GRR, p. 3-50), indicating that the probability of capacity exceedance is zero. In accordance with EM 1110-2-1619, however, the probability of capacity exceedance is never zero and the performance of any measure is never a certainty. Furthermore, the GRR (p. 3-71) states, "There is always the risk of residual flooding regardless of how large a project is built."

The introduction of risk and uncertainty into the analysis results in significant increases in total damages. There is a significant increase in total damages, by event (up to nearly 7 times increase for certain events), presented in Table 6.1 (p. 6-2 of Appendix C), which includes the incorporation of risk and uncertainty, compared to damages presented in Tables 4.1 through 4.5 (pp. 4-3 to 4-5 of Appendix C), which were estimated prior to the incorporation of risk and uncertainty into the economic analysis. In Table 4.5, the 0.002 event results in damages equivalent to 6.5% of the inventory for Area E, compared to 31% of the inventory in Table 6.1. For Area F, Table 4.6 indicates 0.002 event damages equivalent to 16% of the inventory, compared to 49% in Table 6.1. The incorporation of risk and uncertainty should provide additional information on the overall range of potential results, but not result in a significant change in the mean value of total damages.

The mean benefits for Alternatives 2A and 5 are inconsistent with the probability distribution describing those benefits. In Table 7.3 (Appendix C, p.7-4), the mean benefits of Alternative 2A are reported as $10.93M, with only a 50% chance that benefits will exceed $3.337M, and only a 25% chance that benefits will exceed $8.068M. The mean benefits of Alternative 5 are reported as $11.5M, with only a 50% chance that benefits will exceed $3.71M, and only a 25% chance that benefits will exceed $8.359M. The 50% probability value would be expected to more closely align with the mean value, and the 25% probability value should significantly exceed the mean value, as is the case with Tables 18 and 19 (Appendix C, pp. C-4 and C-5) and examples presented in ER 1105-2-101.

Risk and uncertainty are not incorporated into the future economic development conditions (Appendix C, Chapter 5 and Section 6.3).

To allow a comprehensive understanding of the National Economic Development (NED) benefits and project justification, the results of the risk and uncertainty analysis should be presented in

accordance with guidance. Net NED benefits, benefit-to-cost ratios, inundation maps showing flood depths (should the project be exceeded), and a narrative scenario for events that exceed the project design are not presented, as required in ER 1105-2-101 (USACE, 2006).

Significance – High:

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

Recommendations for Resolution:

1. Report the risk associated with implementing Alternatives 2B/d and 4/d to ensure compliance with EM 1110-2-1619 and resolve conflicting statements in the GRR.
2. Verify the significant increase in mean benefit without and with incorporating risk and uncertainty, and explain how the mean benefits increased significantly due to incorporation of risk and uncertainty.
3. Verify the reported single expected value and probabilistic net benefits for Alternatives 5 and 2A, or explain how the mean benefits can be greater than 75% of the values in the probability distribution.
4. Incorporate risk and uncertainty into the development of future conditions.
5. Present the results of the risk-based analysis in accordance with ER 1105-2-101.

Literature Cited:

USACE (1996). Risk-Based Analysis for Flood Damage Reduction Studies. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Manual 1110-2-1619. August.

USACE (2006). Risk Analysis for Flood Damage Reduction Studies. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Regulation 1105-2-101. 3 January.

Final Panel Comment 5

The National Economic Development benefits cannot be validated because detailed documentation associated with the development of the structure inventory, content value surveys, and structure valuation is not provided.

Basis for Comment:

Appendix C of the General Reevaluation Report (GRR) lacks (1) information on the methods used to develop the structure inventory and conduct and verify the content survey, (2) a detailed description of the calculation of structure values, and (3) the dates that the structure inventory, the site visits, and the content survey were conducted. The Panel is thus unable to determine if the structure and content data used in the analysis are accurate and if they reflect the current conditions in the study area, which could affect the calculation of the National Economic Development (NED) benefits.

The Panel was unable to determine if all structures and content in the study area are included in the analysis. A portion of the study area bounded by Economic Impact Area E, Economic Impact Area F, and Berryessa Creek is excluded from an Economic Impact Area (Appendix C, Figure 2.1, p. 2-2). The rationale for excluding this area from an Economic Impact Area is not provided. Excluding structures subject to inundation from the study area could result in the underestimation of NED benefits.

The following details are not found in the documentation of the development of the structure inventory:

- The date of the "previously completed" structure inventory. There is no indication that the characteristics of the structure inventory were verified in recent years (Appendix C, Section 2.2, p. 2-4).
- The date of the "on-site inspection of all the structures within the floodplain" (Appendix C, Section 2.2, p. 2-4).
- A description of how the structure inventory was developed, in accordance with Section 308 of WRDA 1990, or how structures built after July 1, 1991 were identified (Appendix C, p. 2-4).
- The portion of the additional 1,000 structures at risk since the conduct of the 1987 Feasibility study, which were constructed after July 1, 1991 (Appendix C, p. 2-5).
- The date and source of the structure data used to develop the Marshall & Swift Valuation Service structure valuations (Appendix C, p. 2-6).
- The method for valuing structures built since the conduct of the "previously completed" structure inventory (Appendix C, p. 2-6).
- The basis for estimating the effective age of structures to determine depreciation factors for use in developing structure valuations in Marshall & Swift (Appendix C, p. 2-6).
- The impact, if any, of the 2008-2009 U.S. economic recession on housing values, and labor and construction costs in the area. (Appendix C, Section 2.3, p. 2-5 to 2-6)
- Detailed content surveys conducted for the 1992 General Design Memorandum (GDM) to determine content percentages were not confirmed nor values adjusted for this analysis (Appendix C, Section 2.4, p. 2-7 of App. C and p. 2-22 of GRR). Use of content data from

1992 for technology industries may underestimate actual values.

- No known flood events have occurred in the study area that have resulted in non-residential damages; therefore, non-residential content values and estimated loss for various flood events are based on best-guess estimates of respondents. The reasonableness of the best guess estimates used in the 1992 GDM appear to be based on the best-guess estimates themselves (Appendix C, Section 2.4, p. 2-7). Survey data on contents value and estimated loss for various flood events for non-residential content value are not independently verified.
- The total value of structures within the floodplain is given as over eight times the value found in the 1987 Feasibility study. The factors leading to the increase in valuation are cited as additional structures, general increases in valuation from 1986 to 2011, improvements in existing structures, and increased labor and construction costs in the area (Appendix C, p. 2-8). The portion of the increase attributable to each factor is not provided.
- The date and methods used during field visits to establish first floor structure elevations (Appendix C, Section 3.1, p. 3-1).
- Industrial content depth damage curves used in the original Corps study were modified based on the current survey responses (Appendix C, p. 3-2). No data were provided on the current survey responses or how the depth damage curves were modified.

Significance – High:

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

Recommendations for Resolution:

1. Provide the rationale for excluding a portion of the study area from an Economic Impact Area and indicate if structure and content values in that area are included in the analysis.
2. Provide the date that the "previously completed" structure inventory was performed. If the inventory is dated, describe any verification undertaken during this analysis to update the inventory.
3. Provide date of on-site inspection of structures.
4. Describe how the structure inventory was developed in accordance with Section 308, and how structures built after July 1, 1991 were identified.
5. Indicate the portion of the structure inventory constructed after July 1, 1991.
6. Provide the date and source of the structure data used to develop the Marshall & Swift Valuation Service structure valuations.
7. Indicate the method used to value structures built since the conduct of the "previously completed" structure inventory.
8. Provide the basis for estimating the effective age of structures.
9. Indicate the impact, if any, of the 2008-2009 U.S. economic recession on housing values, and labor and construction costs in the area.
10. Provide the rationale for not confirming content percentages or adjusting content values developed for the 1992 GDM for use in this analysis.
11. Provide the rationale for not independently verifying the best-guess estimates from survey content data and estimated loss for various flood events for non-residential content value.

12. Indicate the portion of the increase in total value of structures within the floodplain since the 1987 Feasibility study that is attributable to each factor.
13. Provide the date and methods used during field visits to establish first floor structure elevations.
14. Provide data on the current survey responses that were used to modify the industrial content depth damage curves used in the original USACE study and how the depth damage curves were modified.

Final Panel Comment 6

The FLO-2D boundaries as modeled include artificial barriers that confine water flow within the study area, which could affect the National Economic Development benefit calculations.

Basis for Comment:

The FLO-2D boundaries as presented in the study (Appendix B, Part II, Section 2.1.3) are bounded by I-680 to the west, Capital Avenue to the south, Abel Street (Penitencia Creek Floodwall) to the east, and extend along Berryessa Creek from Calaveras Boulevard to the confluence with Penitencia Creek. Appendix B, Part II, Section 1.2.1.2 (p. 1-7) presents lower model boundaries as follows: "The barriers for the Lower Model watershed include the I-680 embankment, the Penitencia Creek floodwall, and levees downstream of the study area along the lower Berryessa Creek." Figure 2-1 (Appendix B, Part II, p. 2-3) also displays the FLO-2D modeling boundaries. However, the report does not describe the reasoning as to why the south-west boundary was placed along Capitol Avenue.

Capitol Avenue at this location appears to consist of an elevated lightrail. While the elevated lightrail may act as a barrier to flows, there are several locations where the flows could get under the elevated lightrail. For example, it appears the flow can clearly cross over Capitol Ave at some major road crossings. The FLO-2D flow-depth results presented in Figure 3-7 (Appendix B, Part II, p. 3-16) indicate flow-depths of up to 1 to 3 feet along the Capitol Avenue boundary. The FLO-2D lower model includes artificial barriers along Capitol Avenue that confine water flow to the area north of Capitol Avenue, potentially resulting in increased depth of flooding in the study area and preventing flows beyond the study area to the south of Capitol Avenue.

FLO-2D Data Input Manual (2012) recommends the following: "The inflow and outflow nodes should be considered as non-essential nodes (sources and sinks) and these should be located away from the project area." Therefore, it is necessary to extend the FLO-2D model boundary to include all areas of potential impact as part of this study so that the computed water surface elevations north of Capitol Avenue are not artificially increased by the model boundary acting as a virtual barrier.

Significance – High:

Artificial barriers in the FLO-2D model prevent an accurate depiction of flow depths within and outside of the study area which could impact National Economic Development (NED) benefits.

Recommendations for Resolution:

1. Eliminate artificial barriers along Capitol Avenue within the FLO-2D model and rerun the model; revise the economic analysis accordingly.

Final Panel Comment 7

The use of the current NOAA Atlas 14 Volume 6 precipitation-frequency data could alter hydrological model design discharges and affect the channel design parameters.

Basis for Comment:

The National Weather Service has recently updated the NOAA Atlas precipitation-frequency estimates to incorporate data collected up to May 2010 (NOAA, 2012). NOAA Atlas 14, Volume 6 now supersedes NOAA Atlas 2, Volume 11 (Section 3.1, NOAA, 2012). Section 2.3 of the Berryessa Creek Watershed Hydrology Report, however, bases the hydrologic and hydraulic analysis on the precipitation estimates given in NOAA Atlas 2, Volume 11. The report does not address the use of obsolete NOAA 2 rainfall estimates in lieu of the more current NOAA 14 rainfall estimates.

If changes in the precipitation frequency data result in greater discharge estimates, channel design capacities may be inadequate. If the estimated discharges are lower, oversized channel designs may lead to higher project costs.

Significance – Medium:

The use of the more current precipitation-frequency estimates presented in NOAA Atlas 14 could affect the design discharges estimated by hydrological models and, in turn, affect the channel design parameters.

Recommendations for Resolution:

1. Evaluate the impact on channel design of the latest precipitation-frequency estimates presented in NOAA Atlas 14.

Literature Cited:

NOAA (2012). NOAA Atlas14: Precipitation-Frequency Atlas of the United States. Volume 6, Version 2.1: California. U.S. Department of Commerce. National Oceanic and Atmospheric Administration, National Weather Service. 2011, revised 2012.

Final Panel Comment 8

A clear justification for the elimination of levees from the final array of alternative plans has not been provided.

Basis for Comment:

The alternative analysis process presented in the study includes levees in all the previous screenings of the alternatives. The Panel therefore finds it unclear why the levees were eliminated from the final alternatives.

The Main Report presents a detailed description of the selection of the Final Array of Alternative Plans (Section 3.7.5, p. 3-48). The description contains justifications for screening of the alternatives based on benefits derived using incremental analysis. The key factors considered as part of the screening process are the level of flood protection and environmental and economic benefits. The five final alternatives identified as a result of this screening process are presented in Table 3-14 and described in Sections 3.7.5.3 through 3.7.5.7. Floodwalls are used in all the alternatives except the No Action alternative. There is no explanation why levees were eliminated from the final array of alternatives.

Significance – Medium:

The use of floodwalls instead of levees could have various implications related to hydraulics, environmental, and economic aspects of the design.

Recommendations for Resolution:

1. Present a clear rationale for selecting floodwalls as opposed to levees for the final project alternatives.

Final Panel Comment 9

The impact on wetlands and riparian habitat is not described in adequate detail to demonstrate that no net loss would occur.

Basis for Comment:

The Environmental Setting for biological resources in the Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report (GRR EIS/EIR, Section 4.5.2.1, Vegetation and Wildlife) describes wetlands and riparian habitat in the project area. According to this section, less than one acre of low quality riparian habitat is within the project area (p. 5-22) and 0.79 acres of wetland vegetation is in the project area (p. 5-27). The impact analysis states that wetland vegetation would be expected to return naturally within 1 to 3 years and is not a significant impact. Loss of wetlands is required to be mitigated to a "no-net-loss" standard under Section 404 of the Clean Water Act (CWA) and loss of riparian habitat typically follows the same mitigation requirement under California Fish and Game Code Section 1600.

Typically, when loss of wetlands and riparian habitat is expected to occur as a result of project activities, even if the impact is temporary, the impact is considered significant under California Environmental Quality Act (CEQA) thresholds (see sample questions in Appendix G of the CEQA Guidelines, CCR Section 15000). Indeed, the GRR EIS/EIR uses the CEQA Guidelines to formulate the Basis for Significance listed on page 5-21:

> "The alternatives under consideration were determined to result in a significant impact related to biological resources if they would: have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the Department of Fish and Game (DFG) or U.S. Fish and Wildlife Service (USFWS);… and have a substantial adverse effect on Federally and State protected wetlands as defined by Section 404 of the Clean Water Act and as protected under the Porter-Cologne Water Quality Control Act…through direct removal, filling, hydrological interruption, or other means."

In addition, USACE and the Environmental Protection Agency (EPA) adopted a national goal of no net loss of wetlands through a Final Compensatory Mitigation Rule (USACE and EPA, 2008), which establishes regulations governing compensatory mitigation under CWA Section 404 permits. This no-net-loss standard affirms the requirement to avoid, minimize, and compensate for impacts by improving wetland restoration and protection policies. All appropriate and practicable steps must be taken to avoid and minimize impacts on aquatic resources. For unavoidable impacts, compensatory mitigation is required to replace the loss of wetland, stream, and/or other aquatic resource functions. Methods of providing compensatory mitigation to achieve this no-net-loss standard include aquatic resource restoration, establishment, enhancement, and in certain circumstances, preservation.

Under Section 1600 of the California Fish and Game Code, DFG determines if a proposed activity that would divert or obstruct natural flow of any river, stream, or lake, or substantially change the bed, channel, or bank of any river, stream, or lake may substantially affect existing fish and wildlife resources. DFG may require measures to protect fish and wildlife resources in a Lake and Streambed Alteration Agreement. Often the protection measures require that loss of

riparian habitat be replaced or restored to provide habitat for fish and wildlife resources.

Significance – Medium:

The project's impact on Federally protected wetlands and riparian habitat is identified as a threshold of significance and needs to be clearly evaluated for compliance with CEQA and in accordance with the requirements of the CWA and California Fish and Game Code.

Recommendations for Resolution:

1. Describe in the Impact and Mitigation Section (Section 5.5.3) how wetland and riparian habitat would be affected by the project, including which activities would result in loss, under what conditions it would be feasible to avoid the impact, and whether the impact would be considered a one-time loss of habitat or would be the result of repeated maintenance and operation activities.
2. Develop a mitigation measure in the GRR EIS/EIR (Section 5.5.3.6) to demonstrate how a no-net-loss standard would be achieved and what actions would be implemented if the expected natural revegetation of wetland and riparian habitat is not met.
3. Elaborate on the statement "… the Corps would replant cattails and/or other wetland vegetation upon completion of the project…." to include details of which species would be planted, how many acres would be restored, and what monitoring would occur. The measure should include performance criteria to determine if the habitat replacement is successful and should comply with USACE and EPA 2008 Mitigation Guidance.

Literature Cited:

California Code of Regulations (CCR). Title 14. Division 6, Chapter 3: Guidelines for the Implementation of CEQA Guidelines. Section 15000. Appendix G. Sample Questions in the Environmental Checklist Form.

USACE and EPA (2008). Compensatory Mitigation for Losses of Aquatic Resources; Final Rule. Department of the Army, Corps of Engineers, and Environmental Protection Agency. Federal Register 73: 19594-19705. April 10. Available on line: http://water.epa.gov/lawsregs/guidance/wetlands/upload/2008_04_10_wetlands_wetlands_mitigation_final_rule_4_10_08.pdf

Final Panel Comment 10

The mitigation measures are not linked to the impact analysis and it is not clear if the mitigation avoids, minimizes, or compensates for the impacts on biological resources.

Basis for Comment:

The impact analysis in the Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report (GRR EIS/EIR) (Section 5.5.3, pp. 5-21 through 5-28) does not identify any significant impacts on biological resources from the alternatives. However, Berreyssa Creek GRR EIS/EIR Section 5.5.3.6 (p. 5-34) and summary Table 7 (p. PAC-14) identify mitigation measures to avoid or minimize effects on western pond turtle, bat roosts, nesting raptors, and listed species. The measures resulted from discussions with the U.S. Fish and Wildlife Service (USFWS) during the Habitat Evaluation Procedure (HEP) analysis, but the reasons for the measures are not explained, nor are the details of the HEP analysis provided. Adoption of mitigation measures is appropriate when impacts are significant; adoption of mitigation measures is not required by the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) when impacts are not significant (CCR, Section 15126.4 (a)(3), and CEQ, 2011). Presentation of mitigation measures for impacts that have not been described indicates that either the impact section is not complete or the mitigation measures are unnecessary.

Significance – Medium:

The GRR and EIS/EIR do not clearly describe the impacts on biological resources or demonstrate why the mitigation measures are necessary.

Recommendations for Resolution:

1. Provide explanation for the HEP analysis and details of which species models were used in the impact analysis section. Describe how the HEP model was used to determine the biological impacts (GRR EIS/EIR, Section 5.5.1, p. 5-21).
2. Re-examine the impact analysis section to determine if additional impacts on biological resources need description. Impacts on the western pond turtle, bat roosts, nesting raptors, and listed species should be evaluated because mitigation measures for these species are included in Section 5.5.3.6 and Table 7. The listed species should be identified by species name.
3. Revise the mitigation measures in Section 5.5.3.6 to clearly demonstrate how the measures would avoid, minimize, or compensate for the impacts described in Section 5.5.3. The responsible party and performance criteria for the measures should be included, as well as remedial actions if the performance criteria are not met.

Literature Cited:

California Code of Regulations (CCR). Title 14, Division 6, Chapter 3: Guidelines for Implementation of CEQA, Section 15126.4, Consideration and Discussion of Mitigation Measures Proposed to Minimize Significant Effects. Section 15126.4 (a)(3).

CEQ (2011). Memorandum for Heads of Federal Departments and Agencies on the Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact. Council on Environmental Quality. January 14. Available on line at: http://ceq.hss.doe.gov/current_developments/new_ceq_nepa_guidance.html

Final Panel Comment 11

The potential for California red-legged frogs to move accidentally into the project area or be washed downstream from areas of suitable habitat is not evaluated.

Basis for Comment:

California red-legged frogs may have essentially disappeared from the urbanized lowland areas of Santa Clara County, and riparian habitats within this region are largely channelized or contain a wide variety of introduced predatory fishes and bullfrogs (ICF, 2012a). However, California red-legged frogs are known to occur in artificial or modified habitats (USFWS, 2010), and breeding populations are recorded in several locations in the foothills of Santa Clara County (ICF, 2012a). Dismissing potential impacts on California red-legged frogs from project activities based on lack of suitable habitat seems premature because they are known to move or disperse between breeding locations or can be washed downstream during high water or flood events.

No detail has been provided to explain why the California red-legged frog is not likely to occur in the project area. Failing to evaluate the potential for California red-legged frogs to occur in the project area temporarily could result in project activities unintentionally injuring or killing California red-legged frog, which would constitute "take" under the Federal Endangered Species Act (ESA) and would be a significant impact under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Providing more information about the potential for California red-legged frog to occur in the area would demonstrate whether project activities could result in take of a Federally listed species.

Significance – Medium:

Because a potential take of California red-legged frog would be a significant impact under CEQA and NEPA and a violation of the Federal ESA, the Berryessa Creek Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report (GRR and EIS/EIR) should provide a more detailed discussion of why it is not likely for California red-legged frog to occur in the project area.

Recommendations for Resolution:

1. Describe in detail in the environmental setting section (GRR EIS/EIR, Section 4.5.2.2, Special Status Species) the surveys that have been conducted for California red-legged frog in the project area, upstream in Berryessa Creek, and the surrounding watershed. In addition, describe known occurrences of California red-legged frogs in the region and evaluate the potential for California red-legged frogs to move from these areas into the project area. Also identify if Federally designated critical habitat for California red-legged frog is in the project area. If there are substantial barriers to their occurrence in the project area, provide details to support the conclusion that they are not likely to occur.
2. Include additional descriptions to support that project activities are not likely to adverse affect California red-legged frog.
3. Analyze the impact of the California red-legged frog potentially moving through the project area temporarily or accidentally being washed down from upstream areas.
4. Include mitigation measures to avoid or minimize the impacts if the California red-legged

frog could be adversely affected (include examples of avoidance and minimization measures for California red-legged frog as found in the Santa Clara Valley Habitat Plan (ICF, 2012b). If adverse effects may occur, consultation with U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA would be required.)

Literature Cited:

ICF (2012a). Final Habitat Plan for the Santa Clara Valley. Appendix D, Species Account for California Red-legged Frog. Prepared for City of Gilroy, City of Morgan Hill, City of San José, County of Santa Clara, Santa Clara Valley Transportation Authority, Santa Clara Valley Water District. Prepared by ICF International, San Francisco. August. Available on line at: http://www.scv-habitatplan.org/www/Portals/_default/images/default/Final%20Habitat%20Plan/App_D_Species Accounts.pdf

ICF (2012b). Final Habitat Plan for the Santa Clara Valley. Chapter 6: Conditions on Covered Activities and Application Process. Prepared for City of Gilroy, City of Morgan Hill, City of San José, County of Santa Clara, Santa Clara Valley Transportation Authority, Santa Clara Valley Water District. Prepared by ICF International, San Francisco. August. Available on line at: http://www.scv-habitatplan.org/www/Portals/_default/images/default/Final%20Habitat%20Plan/Ch_06_Conditions.pdf

USFWS (2010). Revised Designation of Critical Habitat for California Red-Legged Frog. Final Rule. Federal Register 75:12816-12959, March 17.

Final Panel Comment 12

Several special-status species that have a potential to occur in the study area are not included in the description of threatened and endangered species.

Basis for Comment:

The Environmental Setting in the Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report (GRR EIS/EIR, Section 4.5.2.2, p. 4-44) concludes that there is no suitable habitat for listed or special-status species in the project area. However, several special-status species known to occur in the region are not evaluated for their potential to occur.

The California Natural Diversity DataBase (CNDDB) and U.S. Fish and Wildlife Service (USFWS) species list were used to identify special status species that may occur in the project area. The USFWS species list only included species protected or considered for protection under the Federal Endangered Species Act (ESA). The CNDDB includes a broader range of species that are considered "special-status" (i.e., includes species which may not be formally protected under ESA but which are experiencing population declines). However, the CNDDB is a "positive sighting" only database; absence of a species record does not mean that the species does not have potential to occur in the area. Other special-status species that may occur in the area include, but are not limited to, western burrowing owl, white-tailed kite, tricolored blackbird, and San Francisco dusky-footed woodrat. Mitigation measures are described for impacts on western pond turtle and bat species, but are not included in the Environmental Setting (GRR EIS/EIR, Section 4.5.2) or Table-4-14 (GRR EIS/EIR, pp. 4-44 and 4-45); however, they are mentioned in Table 7 (GRR EIS/EIR, p. PAC-14). The potential for these species to occur in the project area is not described in the Environmental Setting and the potential impact of the project on these species is also not described in the Impact and Mitigation Section of the GRR EIS/EIR (Section 5.3.3).

If these species were to be adversely affected by project activities, significant undisclosed and unmitigated impacts could result from implementation of the project. The California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) require that all significant impacts be identified during the environmental review process (CCR Section 15002(a), 15126, 15151, 15162, 15163, 15164 and CEQ, 2011).

Significance – Medium:

The potential for several special-status species to occur in the project area and possibly be affected by project activities is not described in the GRR and EIS/R. The project therefore may have undisclosed significant environmental impacts and does not meet the requirements for CEQA and NEPA.

Recommendations for Resolution:

1. Expand the list of special-status species evaluated beyond the CNDDB and USFWS species list references and provide detailed methodology for how the list of special-status species was generated in Section 4.5.2 and Table 4-14. Other useful sources for species to consider include the Programmatic EIR (ESA, 2011) and Santa Clara Valley Habitat Plan (ICF, 2012). Include discussion in Environmental Setting about burrowing owl, western pond turtle, white-

tailed kite, tricolored blackbird, San Francisco dusky-footed woodrat, Townsend's big eared bat, and pallid bat as mentioned elsewhere in the GRR EIS/EIR (e.g., Table 7, Comparison of Environmental Effects of Authorized Project and NED Plan, p. PAC-14, and Section 5.5.3.6, Mitigation Measures).

2. Re-examine potential impacts from the project on each of these species, including the potential for burrowing owls to be affected by activities in grasslands or earthen banks of creek and bat roosts or swallow nesting colonies to be affected by bridge replacement, repairs, or redesign. Consider if other special-status species would be adversely affected by project alternatives and include a description of how the project would affect these species in Section 5.5.3.
3. Develop mitigation measures to reduce the severity, intensity, or duration of the impact to demonstrate how the impact would be avoided, minimized, or compensated in Section 5.5.3.6. The mitigation measures developed during the Habitat Evaluation Procedure (HEP) analysis may provide the basis for the measures, but additional detail should be provided that clearly explains how the measures would mitigate for a specific impact.

Literature Cited:

ESA (2011). Lower Berryessa Creek Program Environmental Impact Report. SCH #2007092084. Prepared for the Santa Clara Valley Water District. Prepared by Environmental Science Associates. June.

ICF (2012c). Final Habitat Plan for the Santa Clara Valley. Appendix C. Evaluation of Special-Status Species for Coverage in the Santa Clara Valley HCP/NCCP. Prepared for: City of Gilroy, City of Morgan Hill, City of San José, County of Santa Clara, Santa Clara Valley Transportation Authority, Santa Clara Valley Water District. Prepared by: ICF International, San Francisco. Available on line at: http://www.scv-habitatplan.org/www/Portals/_default/images/default/Final%20Habitat%20Plan/App_C_CoveredSpeciesEval.pdf

California Code of Regulations (CCR). Title 14, Division 6, Chapter 3: Guidelines for Implementation of CEQA, Section 15000. Available on line at: http://www.pclfoundation.org/publications/ceqaguidelines/Article-1.html

CEQ (2011). Memorandum for Heads of Federal Departments and Agencies on the Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact. Council on Environmental Quality. January 14. Available on line at: http://ceq.hss.doe.gov/current_developments/new_ceq_nepa_guidance.html

Final Panel Comment 13

The impact analysis does not identify the potential for invasive species to be introduced, spread, or perpetuated by the project as directed by Executive Order 11312: Invasive Species.

Basis for Comment:

Executive Order 11312 directs Federal agencies to prevent and control introductions of invasive non-native species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. The GRR and EIS/R do not discuss the potential for invasive species to be introduced or spread by the project.

Many riparian areas and waterways in California are infested with species that are categorized as "invasive non-native plants that threaten wildlands." Some examples are giant reed (*Arundo donax*), pampasgrass (*Coraderia selloana*), yellow starthistle (*Centaurea solstitalis*), Uruguay water-primrose (*Ludwigia hexapetala*), parrotfeather (*Myriophyllum aquaticum*), and Himalaya blackberry (*Rubus armeniacus*).

Of concern are "invasive non-native plants that threaten wildlands" because these plants are not native to, yet can spread into, wildland ecosystems, and because they can also displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes.

Significance – Medium:

Because the setting and impact analysis does not address invasive weeds, the environmental review could be considered incomplete.

Recommendations for Resolution:

1. Describe any invasive species with potential to occur in the project area. Refer to the California Invasive Plant Council's (CAL-IPC) website for the list of plants considered invasive in California.
2. Describe the potential for the project to introduce invasive species into the project area. If invasive species have the potential to occur in the project area, evaluate whether the project could spread or perpetuate invasive species.
3. Identify minimization measures or best management practices to prevent weed introduction and spread if the project has the potential to introduce, spread, or perpetuate invasive weeds.

Literature Cited:

CAL-IPC. California Invasive Plant Council. <www.cal-ipc.org/ip/inventory>

Final Panel Comment 14

The basis for estimating lands, easements, rights-of-way, relocations, and disposal areas (LERRD) costs and annual operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs are not provided.

Basis for Comment:

Accurate and documented LERRD and OMRR&R costs are essential to calculate the benefit-to-cost ratio and select the National Economic Development (NED), or recommended plan. The method for estimating LERRD and OMRR&R costs are not documented. Given the scope of the alternatives, the OMRR&R costs (as presented in the General Reevaluation Report [GRR], Section 7.4) seem low. A detailed Operations and Maintenance (O&M) Plan was not provided for review. There could be significant costs in maintaining the bridges, levees, channels, vegetated floodplain benches (terraces), floodwalls, and access road proposed for the various alternatives. In addition, the basis for differences in per acre and total land values for the various alternatives is not provided, nor is the rationale for assuming constant LERRD administrative costs for all alternatives.

The basis for developing the annual OMRR&R costs, including annual sediment removal costs, is not provided. In addition, maintenance activities after significant events (such as sediment removal) that are needed to maintain channel conveyance per design assumptions are not described. The annual OMRR&R costs presented in Table 8.1 (Appendix C, p. 8-2) appear low for all alternatives, ranging from $63,071 for Alternative 2A to $128,141 for Alternative 5. This equates to annual OMRR&R costs of between 0.19% to 0.68% of the total construction costs, and 0.10% to 0.23% of the total first costs (including LERRDS) for the respective alternatives.

The basis for developing the LERRD costs is not provided in the GRR or the Real Estate Plan (Appendix E). The Panel was unable to determine the extent to which real estate assumptions and data sources used in the analyses were adequate and acceptable. In Table 8.1 (Appendix C, p. 8-2), which presents summary construction costs by alternative, LERRD acquisition costs range from $9.8M (36.91 acres of land) for Alternative 2A to $46.2M (62.14 acres of land) for Alternative 5, whereas LERRD administrative costs are constant, at $750,000, for each alternative. The basis for estimating LERRD acquisition and administrative costs is not given.

There are also inconsistencies in the presentation of total and annual costs of alternatives:

- The total annual economic cost for Alternative 2A/d presented in Table 6-8 (GRR, p. 6-19), $1.231M, differs from the $1.336M presented in Table 6-6 (GRR, p. 6-18) and Table 6-9 (GRR, p. 6-20).
- In Table 8.3 (Appendix C, p. 8-3), total costs for each alternative are not consistent with total costs presented in Table 8.1 (Appendix C, p. 8-2), so the Panel cannot determine if accurate total costs were used in the development of the benefit-to-cost ratios.

Significance – Medium:

Inaccurate OMRR&R and LERRD costs could have implications for the calculation of benefit-to-cost ratios and the selection of the National Economic Development (NED) or recommended

plan; and therefore, the adequacy and acceptability of the of the economic analysis cannot be determined.

Recommendations for Resolution:

1. Provide the basis for developing the annual OMRR&R costs for each alternative.
2. Provide the basis for developing costs of anticipated maintenance after significant events (such as sediment removal) that is needed to maintain channel conveyance per design assumptions.
3. Provide the basis for LERRD acquisition and administrative costs for each alternative.
4. Ensure consistency between total annual economic cost for Alternative 2A/d in Tables 6-6, 6-8, and 6-9.
5. Ensure consistency between total costs for each alternative in Tables 8.1 and 8.3.

Final Panel Comment 15

Certain socioeconomic data are inconsistent, dated, or not provided in the documents, which could lead to misinterpretation of study area conditions.

Basis for Comment:

Accurate and current socioeconomic data are needed in order to develop a comprehensive understanding of the socioeconomic resources within the study area. The Panel identified the following issues pertaining to inconsistent, dated, and incomplete socioeconomic data in the documents, which prevented the Panel from determining whether the socioeconomic resources are accurately portrayed and if they reflect the current study area conditions:

- A reported occupancy rate of 100% of housing units within the six census tracts in the study area (General Reevaluation Report [GRR], Table 4-3, p. 4-4) requires verification.
- Employment data from various sources are inconsistent (GRR, p. 4-5). December 2008 California Employment Development Department data for Santa Clara County describe a labor force of 887,000, unemployment of 68,200, and an unemployment rate of 7.7 percent. December 2008 Economagic.com data give unemployment rates of 7.9 and 7.8 percent for the cities of Milpitas and San Jose, respectively. The 2010 Census data (GRR, Table 4-4, p. 4-5) indicate a civilian labor force of 878,106, with 34,194 unemployed, which yields an unemployment rate of 3.90%.
- The column heading titled "Percent" in Table 4-4 (GRR, p. 4-5) is misleading, suggesting an unemployment rate of 2.6 percent.
- Vehicle counts per housing unit and occupants per residential unit (Appendix C, p. 4-2) and population living within one mile of the project (Appendix C, p. 7-9) are based on dated data (2000 Census).
- Data on the population in the study area, in the various floodplains, and the population at risk under with- and without-project conditions are not given.
- The impact of the 2008-2009 U.S. economic recession on the local and state economies and its impact on the socioeconomic resources, including employment, labor, and construction costs, and housing values in the study area are not addressed.

Significance – Low:

Consistent, current, and complete socioeconomic data are needed to add to the overall understanding of the study area and to the understanding of the significance of the impacts resulting from implementation of the recommended plan.

Recommendations for Resolution:

1. Verify housing counts and occupancy rate for the six census tracts in the study area.
2. Eliminate inconsistencies/conflicts between employment data sources and use most recent data available.
3. Revise column heading in Table 4-4 of GRR to eliminate confusion in the unemployment rate.
4. Update socioeconomic data to the most recent data sources available.

5. Identify the population in the study area, in the various floodplains, and the population at risk in each reach under with- and without-project conditions.
6. Describe the impact of the 2008-2009 U.S. economic recession on the local and state economies and its impact on the socioeconomic resources, including employment, labor, and construction costs, and housing values in the study area.

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APPENDIX B

Final Charge to the Independent External Peer Review Panel as Submitted to USACE on January 16, 2013

on the

Berryessa Creek GRS/EIS/EIR

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Charge Questions and Guidance to the Peer Reviewers for the Independent External Peer Review of the Berryessa Creek GRS/EIS/EIR

BACKGROUND

The Berryessa Creek, Santa Clara County, California General Reevaluation Study (GRS) was initiated in 2001 to investigate alternatives to the authorized Berryessa Creek Project in Santa Clara County for the purpose of flood risk management (FRM). The study is considering channel and floodplain terrace excavation, bridge and culvert modifications, levee and floodwall construction, sediment basin modifications, bed and bank armoring, minor recreation improvements, and planting of riparian vegetation.

The study area is along a portion of Berryessa Creek in the Santa Clara Valley of California. Berryessa Creek originates on the western slope of the Diablo Range and emerges from hills in the northeastern part of the city of San Jose. The creek flows west and passes under Interstate 680 before turning north and flowing into lower Penitencia Creek, which is a tributary to lower Coyote Creek, which in turn flows into the south end of San Francisco Bay. The primary study area includes the main stem of Berryessa Creek and its floodplains from upstream of Old Piedmont Road downstream to Calaveras Boulevard. Within the study area, the Berryessa Creek channel is almost entirely channelized and it provides minimal natural values, outside of the well-vegetated "greenbelt reach" adjacent to a schoolyard and park. The overall study area includes those areas adjacent to the primary study area, which could be influenced by potential actions to address the identified problems and needs.

The study will focus on FRM alternatives along Berryessa Creek from above Old Piedmont Road to Calaveras Boulevard. The non-Federal sponsor is interested in reducing flood risks to the existing urbanized areas in the cities of San Jose and Milpitas to remove those areas from the FEMA regulated 1-percent-annual-chance flood floodplain.

The primary flood-related problems in the study area are potential flood damages to existing residential, commercial, and light industrial development in a dense urban area due to limited channel and floodway capacity. The parts of the study that will be most challenging are the need to meet current vegetation-free zone and other design requirements in an acceptable manner despite a constricted right-of-way bordered by dense residential and commercial development. Potential FRM measures include channel and floodplain terrace excavation, bridge and culvert modifications, levee and floodwall construction, sediment basin modification, and bed and bank armoring. Non-structural floodplain management measures will also be addressed. Additional measures may include minor recreation improvements and planting of riparian vegetation for environmentally sustainable design and/or habitat mitigation.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Berryessa Creek, Santa Clara County, California, General Reevaluation Study (GRS), Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report (hereinafter: Berryessa Creek 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 Berryessa Creek 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 hydrologic and hydraulic engineering, economics, and biology/ecology issues relevant to the project. They will also have experience applying their subject matter expertise to flood risk management.

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

DOCUMENTS PROVIDED

- Draft General Reevaluation Report and Environmental Impact Statement/ Environmental Impact Report (353 pages)
- Appendix B: Engineering and Design Part I: Hydraulic Analysis of Alternatives (109 pages)
- Appendix B: Engineering and Design Part II: Floodplain Development (163 pages)
- Appendix B: Engineering and Design Part III: Geomorphic and Sediment Transport Assessment (76 pages)
- Appendix C: Economics: (72 pages)
- Berryessa Creek Watershed Hydrology Report (60 pages)

Documents for Reference

- USACE guidance Civil Works Review (EC 1165-2-214, 15 December 2012)
- CECW-CP Memorandum (March 31, 2007)
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review (December 16, 2004).

SCHEDULE

This final schedule is based on the January 7, 2013 receipt of the final review documents.

Task	Action	Days to Complete Action	Due Date
Conduct Peer Review	Battelle sends review documents to Panel	Within 1 day of Panel being under subcontract or submission of final Work Plan, whichever is later	1/9/2013
	Battelle convenes kickoff meeting with Panel	Within 2 days of Panel being under subcontract or submission of final Work Plan, whichever is later	1/10/2013
	USACE/Battelle convenes kickoff meeting with Panel	Within 2 days of Panel being under subcontract or submission of final Work Plan, whichever is later	1/10/2013
	Battelle convenes mid-review teleconference for Panel to ask clarifying questions of USACE	At the halfway point of Panel review	1/24/2013
	Panel participates in In-Progress Review Meeting (this activity is an Option that has not been awarded)	TBD	NA
	Panel members complete their individual reviews	Within 7 days of Battelle/Panel kick-off meeting	2/1/2013
Prepare Final Panel Comments and Final IEPR Report	Battelle provides Panel merged individual comments and talking points for Panel Review Teleconference	Within 4 days of panel members completing their review	2/6/2013
	Battelle convenes Panel Review Teleconference	Within 5 days of panel members completing their review	2/7/2013
	Battelle finalizes Final Panel Comments	Within 5 days of receipt of draft Final Panel Comments	2/27/2013
	Battelle provides Final IEPR Report to Panel for review	Within 2 days Final Panel Comments being finalized	2/28/2013
	Panel provides comments on Final IEPR Report	Within 2 days of receipt of Final IEPR Report	3/1/2013
	*Battelle submits Final IEPR Report to USACE	Within 14 days of panel members providing draft Final Panel Comments to Battelle	3/6/2013

Task	Action	Days to Complete Action	Due Date
Comment/ Response Process	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	Within 2 days of submittal of Final IEPR Report	3/8/2013
	USACE provides draft PDT Evaluator Responses to Battelle	Within 10 days of receipt of Final IEPR Report	3/20/2013
	Battelle provides the Panel the draft PDT Evaluator Responses	Within 2 days of receipt of draft PDT Evaluator Responses	3/21/2013
	Panel members provide Battelle with draft comments on draft PDT Evaluator Responses (i.e., draft BackCheck Responses)	Within 3 days of receipt of draft PDT Evaluator Responses from Battelle	3/28/2013
	Battelle convenes teleconference with Panel to discuss draft BackCheck Responses	Within 1 day of receipt of draft BackCheck Responses	3/29/2013
	Battelle convenes teleconference with Panel and USACE to discuss Final Panel Comments and draft responses	Within 5 days of USACE providing draft PDT Evaluator Responses	4/2/2013
	USACE inputs final PDT Evaluator Responses in DrChecks	Within 2 days of Final Panel Teleconference	4/11/2013
	Battelle provides PDT Evaluator Responses to Panel	Within 3 days of final PDT Evaluator Responses being available	4/11/2013
	Panel members provide Battelle with final BackCheck Responses	Within 3 days of receipt of final PDT Evaluator Responses	4/16/2013
	Battelle inputs the Panel's BackCheck Responses in DrChecks	Within 10 days of notification that USACE final PDT Evaluator Responses have been posted in DrChecks	4/17/2013
	*Battelle submits pdf printout of DrChecks project file	Within 1 day of DrChecks closeout	4/19/2013

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Berryessa Creek 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 Berryessa Creek 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 Independent Technical Review.
2. Please contact the Battelle Project Manager (Richard Uhler, uhlerr@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.

Please submit your comments in electronic form to Richard Uhler, uhlerr@battelle.org, no later than February 1, 2013, 5:00 pm EST.

Independent External Peer Review of the

Berryessa Creek, Santa Clara County, California, General Reevaluation Study (GRS), Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report

Charge Questions and Relevant Sections as Supplied by USACE

General Questions

1. 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. Are the engineering, and environmental methods, models, and analyses used adequate and acceptable?
4. Were all models in the analyses used in an appropriate manner with assumptions appropriately documented and explained?
5. Were risk and uncertainty sufficiently considered?
6. Was the process used to select the recommended alternative rationale and was the process implemented in a reasonable manner given the project constraints?
7. Does the environmental assessment satisfy the requirements of NEPA? Were adequate considerations given to significant resources by the project?
8. Do the recommended alternatives include systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

Safety Assurance Review Questions

9. Were the methods used to evaluate the condition of the structure adequate and appropriate given the circumstances?
10. Have the appropriate alternatives been considered and adequately described for this project and do they appear reasonable?
11. Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?
12. Are the quality and quantity of the surveys, investigations, and engineering sufficient to assess expected risk reduction?
13. Have the hazards that affect the structures been adequately documented and described?

14. Are the models used to assess hazards appropriate?

15. Are the assumptions made for the impacts appropriately documented and explained?

16. Is there sufficient information presented to identify, explain, and comment on the assumptions that underlie the engineering analyses?

17. Are there any additional analyses or information available or readily obtainable that would affect decisions regarding the structures?

18. Do the physical data and observed data provide adequate information to characterize the structures and their performance?

19. 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?

20. Does the analysis adequately address the uncertainty, given the consequences associated with the potential loss of life for this type of project?

21. From a public safety perspective, is the proposed alternative reasonably appropriate or are there other alternatives that should be considered?

22. Has anything significant been overlooked in the development of the assessment of the project or the alternatives?

23. Do the alternatives and their associated costs appear reasonable? Do the benefits and consequences appear reasonable?

Specific Charge Questions for the Berryessa Creek, Santa Clara County, California General Reevaluation Study General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report Independent External Peer Review

Objectives

24. Is the purpose of the project adequately defined? If not, why?

25. Has the project need been clearly described?

26. Have the public concerns been identified and adequately described?

27. Are the specific objectives adequately described?

28. In your opinion, are there any other issues, resources, or concerns that have not been identified and/or addressed?

Alternatives

29. Have the criteria to eliminate plans from further study been clearly described?

30. Is each of the different alternative plans clearly described?

31. Were the assumptions made for use in developing the future with-project conditions for each alternative reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent across the range of alternatives and/or adequately justified where different?

32. Are the changes between the without- and with-project conditions adequately described for each alternative?

33. Have comparative impacts been clearly and adequately described?

34. Are future Operation, Maintenance, Repair, Replacement, and Rehabilitation efforts adequately described and are the estimated cost of those efforts reasonable for each alternative?

35. Are there any unmitigated environmental impacts not identified and if so could they affect project designs?

36. Please comment on the likelihood that the recommended alternative will achieve the expected outputs.

37. Are residual risks adequately described and is there a sufficient plan for communicating the residual risk to affected populations?

38. Have the impacts on the existing infrastructure, including the existing flood risk management project, utilities, and transportation infrastructure, been adequately addressed?

Affected Environment

39. Is the description of the climate in the study area sufficiently detailed and accurate?

40. Is the description of wetland resources in the project area complete and accurate?

41. Is the description of aquatic resources in the project area complete and accurate?

42. Is the description of threatened and endangered species resources in the study area complete and accurate?

43. Is the description of the historical and existing recreational resources in the study area complete and accurate?

44. Is the description of the cultural resources in the study area complete and accurate?

45. Is the description of the historical and existing socioeconomic resources in the study area complete and accurate? Were specific socioeconomic issues not addressed?

Environmental Consequences

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

47. To what extent have the potential impacts of the alternatives on significant resources been addressed and supported?

48. Are the scope and detail of the potential adverse effects that may arise as a result of project implementation sufficiently described and supported?

49. Have impacts from borrow areas been adequately and clearly described?

Cumulative Impacts

50. Are cumulative impacts adequately described and discussed? If not, please explain.

Mitigation

51. Are mitigation measures adequately described and discussed? If not, please explain.

Traffic

52. Were mitigation measures proposed during construction adequately described and discussed? If not, please explain why.

Hydrology and Hydraulics

53. Was the hydrology discussion sufficient to feasibility scope to characterize current baseline conditions and to allow for evaluation of how forecasted conditions (with- and without-proposed actions) are likely to affect hydrologic conditions?

Geotechnical Engineering

54. Is the description of the geomorphic and physiographic setting of the proposed project area accurate and comprehensive?

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

Design

56. Have the design and engineering considerations presented been clearly outlined and will they achieve the project objectives?

57. Are any additional design assumptions necessary to validate the preliminary design of the primary project components?

58. Are the assumptions used to determine the cost of operations and maintenance for the proposed project adequately documented and explained?

Real Estate Plan

59. Comment on the extent to which assumptions and data sources used in the economics analyses are clearly identified and the assumptions are justified and reasonable.

60. Does the Real Estate Plan adequately address all real estate interests (public and private)?

Relocations

61. Have potential relocations as a result of the project been adequately addressed?

Hazardous, Toxic, and Radioactive Waste

62. Comment on the extent to which the alternatives may impact hazardous, toxic, and radioactive waste issues.

Cost Estimates and Economics

63. Were the benefit categories used in the economic analysis adequate to calculate a benefit-to-cost ratio for each of the project alternatives?

64. Was the methodology used to determine the characteristics and corresponding value of the structure inventory for the study area adequate?

65. Were the methods used to develop the content-to-structure value ratios appropriate and were the generated results applicable to the study area?

66. Were the methods to develop the depth-damage relationships appropriate and were the generated results applicable to the study area?

67. Have the economic analyses addressed the issue of repetitive flood damages and the subsequent extent of rebuild/repair by property owners as it relates to annual damage estimation?

68. Were risk and uncertainty sufficiently considered in relation to the future development process?

69. To what extent have significant project construction costs been adequately identified and described?

70. Are the costs adequately justified?

Public Involvement and Correspondence

71. 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 QUESTION

72. 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?