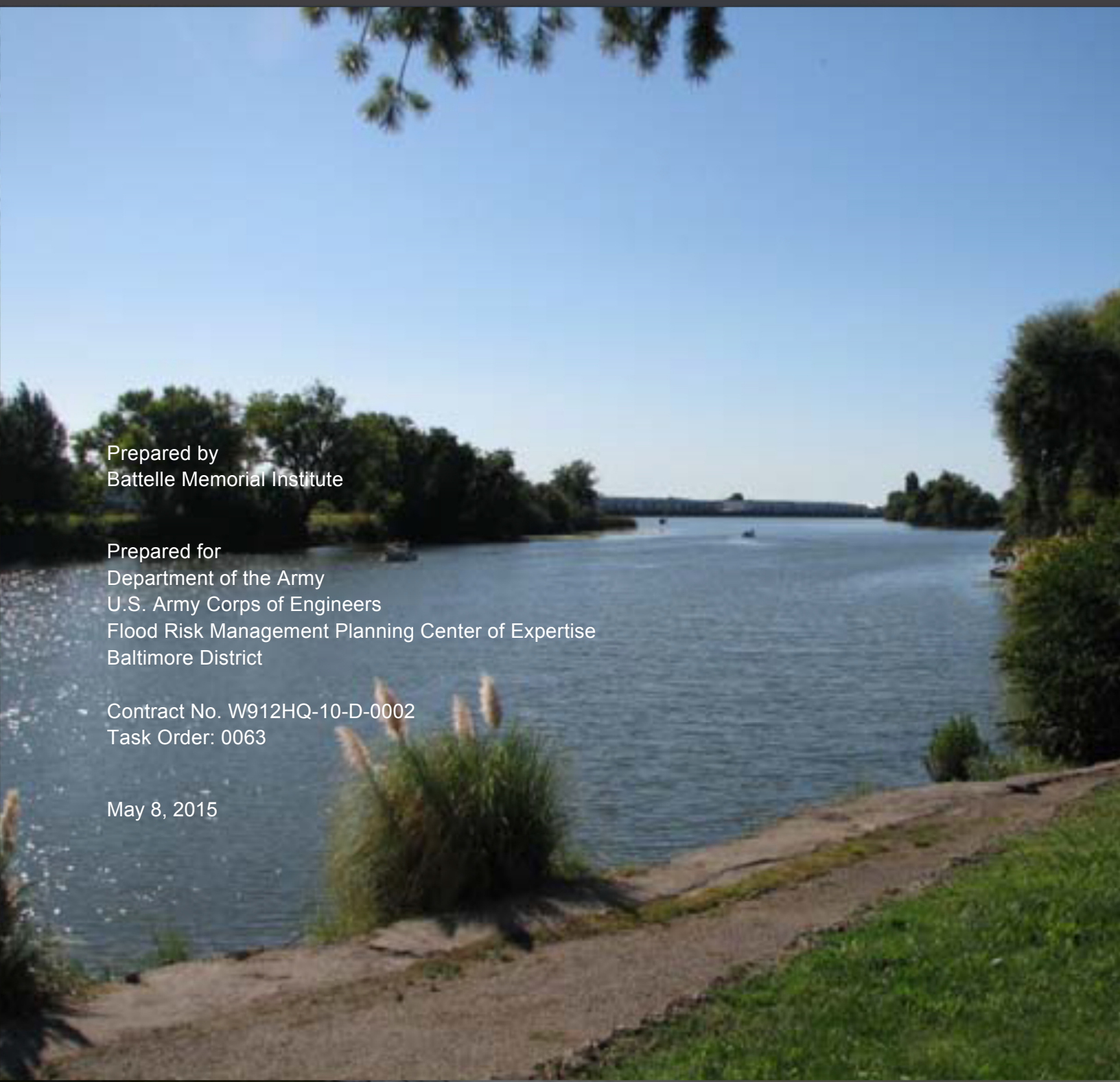
Final Independent External Peer Review Report
Lower San Joaquin River, California
Flood Risk Management Feasibility Study



Prepared by
Battelle Memorial Institute

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

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Executive Summary

PROJECT BACKGROUND AND PURPOSE

There are flood-related and incidental ecosystem-related issues in the Lower San Joaquin River study area. The decision document will be an Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (FR/EIS/EIR) and will present planning, engineering, environmental, and implementation details of the recommended plan to allow final design and construction to proceed subsequent to approval of the recommended plan. Ultimate approval of the study document will be with the Chief of Engineers for recommendation of a project to Congress for authorization. The project is a General Investigations study undertaken to evaluate structural and non-structural flood risk management measures including in-basin storage, re-operation of existing reservoirs, improvements to existing levees, construction of new levees, and other storage, conveyance, and non-structural options.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the Lower San Joaquin River, California Flood Risk Management FR/EIS/EIR (hereinafter: Lower San Joaquin River IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE, and was engaged to coordinate the IEPR of the Lower San Joaquin River FR/EIS/EIR. 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 presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the Lower San Joaquin River review documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: economics/Civil Works planning, hydraulic engineering, biology/ecology, and geotechnical engineering. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of final candidates to confirm that they had no COIs, but Battelle made the final selection of the four-person Panel.

The Panel received an electronic version of the Lower San Joaquin River review documents (2,950 pages in total), along with a charge that solicited comments on specific sections of the documents to be

reviewed. USACE prepared the charge questions included in the charge following guidance provided in USACE (2012) and OMB (2004).

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. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced individual comments in response to the charge questions.

IEPR panel members reviewed the Lower San Joaquin River documents individually. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement, (2) the basis for the comment, (3) the significance of the comment (high, medium/high, medium, medium/low, or low), and (4) recommendations on how to resolve the comment.

Battelle received public comments from USACE on the Lower San Joaquin FR/EIS/EIR (47 written comments totaling 289 pages) and provided them to the IEPR panel members. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the Lower San Joaquin review documents. The Panel identified one new issue and subsequently generated one Final Panel Comment that summarized the concern.

Overall, eight Final Panel Comments were identified and documented. All eight were low significance.

Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the Lower San Joaquin review documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel’s findings.

The documentation in the FR/EIS/EIR and supporting appendices and background information provide considerable analysis and effectively summarize the work conducted for the project. However, the Panel did identify elements of the project that require further documentation and sections of the FR/EIS/EIR that should be clarified or revised.

Economics and Plan Formulation: The Panel noted that the project documents are good examples of SMART Planning and the project is a good example of implementation of the Floodplain Protection Executive Order 11988. However, some information, regarding USACE’s decision on the Tentative Selected Plan (TSP) is necessary to provide a clear picture of the selection process. USACE has provided information on the estimate of net National Economic Development (NED) benefits and benefit cost ratios, however, information on the probability that those estimates are correct (e.g., information on the risks, uncertainties, and standard errors inherent in the evaluation of benefits and costs) are not presented. ER 1105-2-101, Risk Analysis for Flood Damage Reduction Studies, states that this information shall be presented for each alternative. During the Panel’s review of the documents, they also

found that information was lacking regarding how USACE evaluated the other social effects (OSE) account, and which metrics were used.

Engineering: The Panel noted during their review of the hydrologic and hydraulic (H&H) and geotechnical engineering that the proper risks were identified and the appropriate studies were conducted. However, the Panel was not able to follow how some of the H&H modeling interplayed. It was clear that substantive H&H modeling has been conducted. However, to improve the document, the Panel recommends that a road map be included that presents how some of the models work together and how the collected information and identified risks factor into the H&H decision-making process.

In the area of geotechnical engineering, some sections of the report imply that overtopping risk is the primary consideration. Seismic and geotechnical risks are discussed, but clarification of how the major risk categories were combined and how they each contribute to the overall risk is unclear. Clarification is also needed concerning the risk and uncertainties associated with "judgment factors." Judgment factors are defined as non-quantitative factors, such as effects of encroachments, animal burrows, utility penetrations, and surface erosions. Information on what data sources were used to determine the risks and uncertainties, as well as information on site conditions that contribute to the risks and uncertainties, were not fully provided and therefore the risks and uncertainties associated with these factors could not be verified.

Environmental: The Panel noted that the environmental documentation shows that a good assessment of the challenges that could occur during this project has been conducted, and solutions have been identified. The Panel believes that the use of existing data and Google maps was appropriate for this stage in the SMART Planning process.

Table ES-1. Overview of Eight Final Panel Comments Identified by the Lower San Joaquin River IEPR Panel

No.	Final Panel Comment
Significance – Low	
1	The description of the TSP selection process is not consistent throughout the document.
2	The risks, uncertainties, and standard errors inherent in the evaluation of benefits and costs are not presented in a manner consistent with USACE planning guidance documents.
3	The OSE results may not be accurate because the metrics used to calculate the OSE analysis in the FR/EIS/EIR and in the Economics Appendix are not consistent.
4	The discussion of the significance of the judgment factors on potential levee failure, risk, and uncertainty is incomplete.
5	It is unclear what level of uncertainty is considered in the project benefits and residual risk relative to the zero-fragility for the judgment risk factors.
6	The process for combining major risk categories, including seismic risk, and the contribution of the major risks categories to overall risk are unclear.
7	The relative significance of each hydrologic and hydraulic modeling simulation and how it supports the alternatives evaluation has not been discussed.
8	Impacts on groundwater elevations from seepage barriers such as a cutoff wall are possible but are not discussed.

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Table 1. Major Milestones and Deliverables of the Lower San Joaquin River IEPR 2

LIST OF ACRONYMS

ADM	Agency Decision Meeting
ATR	Agency Technical Review
CEQA	California Environmental Policy Act
COI	Conflict of Interest
CWRB	Civil Works Review Board
DrChecks	Design Review and Checking System
EC	Engineer Circular
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
FR	Feasibility Report
H&H	Hydrologic and hydraulic
IEPR	Independent External Peer Review
IWR	Institute of Water Resources
NED	National Economic Development
NEPA	National Environmental Policy Act
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
OSE	Other Social Effects
PCX	Planning Center of Expertise
PDT	Project Delivery Team
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
WRDA	Water Resources Development Act

1. INTRODUCTION

There are flood-related and incidental ecosystem-related issues in the Lower San Joaquin River study area. The decision document will be an Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (FR/EIS/EIR) and will present planning, engineering, environmental, and implementation details of the Recommended Plan to allow final design and construction to proceed subsequent to approval of the recommended plan. Ultimate approval of the study document will be with the Chief of Engineers for recommendation of a project to Congress for authorization. The project is a General Investigations study undertaken to evaluate structural and non-structural flood risk management measures including in-basin storage, re-operation of existing reservoirs, improvements to existing levees, construction of new levees, and other storage, conveyance, and non-structural options.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Lower San Joaquin River, California Flood Risk Management FR/EIS/EIR (hereinafter: Lower San Joaquin River IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB) *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the Lower San Joaquin IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE on March 6, 2015. Appendix D presents the organization conflict of interest form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the Lower San Joaquin IEPR.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (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 engineering, economic, environmental, and plan formulation analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Lower San Joaquin River FR/EIS/EIR was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-

2-214). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. Table 1 presents the major milestones and deliverables of the Lower San Joaquin River IEPR. Due dates for milestones and deliverables are based on the award/effective date of May 9, 2014 and receipt of the review documents on February 27, 2015. Note that the work items listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on June 30, 2015. The actual date for contract end will depend on the date that all activities for this IEPR, including Agency Decision Meeting (ADM) and Civil Works Review Board (CWRB) preparation and participation, are conducted.

Table 1. Major Milestones and Deliverables of the Lower San Joaquin River IEPR

Task	Action	Due Date
1	Award/Effective Date	5/9/2014
	Review documents available	2/27/2015
2	Battelle submits list of selected panel members	6/5/2014
	USACE confirms the panel members have no COI	6/16/2014
3	Battelle convenes kick-off meeting with USACE	5/23/2014
	Battelle convenes kick-off meeting with USACE and panel members	2/25/2015
4	Panel members complete their individual reviews	3/30/2015
	Panel members provide draft Final Panel Comments to Battelle	4/10/2015
5	Battelle submits Final IEPR Report to USACE	5/8/2015
6[a]	Battelle convenes Comment-Response Teleconference with panel members and USACE	6/17/2015
	Battelle submits pdf printout of DrChecks project file to USACE	7/6/2015
3	ADM (Estimated Date)[b]	7/17/2015
	CWRB Meetings (Estimated Date)[b]	2/11/2016
	Contract End/Delivery Date	8/25/2015[c]

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

[b] *The ADM and CWRB meetings were listed in the Performance Work Statement under Task 3 but were relocated in this schedule to reflect the chronological order of activities.*

[c] *A contract extension will be necessary to allow for participation in the Civil Works Review Board.*

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: economics/Civil Works planning, hydraulic engineering, biology/ecology, and geotechnical engineering. The Panel reviewed the Lower San Joaquin River documents and produced eight Final Panel Comments in response to 21 charge questions provided by USACE for the review. This charge included two questions added by Battelle that sought summary information from the IEPR Panel and one question requesting information on the findings of the public comment review. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

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

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

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

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Lower San Joaquin River IEPR review documents. The following summarizes the Panel's findings.

The documentation in the FR/EIS/EIR and supporting appendices and background information provide considerable analysis and effectively summarize the work conducted for the project. However, the Panel did identify elements of the project that require further documentation and sections of the FR/EIS/EIR that should be clarified or revised.

Economics and Plan Formulation: The Panel noted that the project documents are good examples of SMART Planning and the project is a good example of implementation of the Floodplain Protection Executive Order 11988. However, some information, regarding USACE's decision on the Tentative Selected Plan (TSP) is necessary to provide a clear picture of the selection process. USACE has provided information on the estimate of net National Economic Development (NED) benefits and benefit cost ratios, however, information on the probability that those estimates are correct (e.g., information on the risks, uncertainties, and standard errors inherent in the evaluation of benefits and costs) are not presented. ER 1105-2-101, Risk Analysis for Flood Damage Reduction Studies, states that this information shall be presented for each alternative. During the Panel's review of the documents, they also

found that information was lacking regarding how USACE evaluated the other social effects (OSE) account, and which metrics were used.

Engineering: The Panel noted during their review of the hydrologic and hydraulic (H&H) and geotechnical engineering that the proper risks were identified and the appropriate studies were conducted. However, the Panel was not able to follow how some of the H&H modeling interplayed. It was clear that substantive H&H modeling has been conducted. However, to improve the document, the Panel recommends that a road map be included that presents how some of the models work together and how the collected information and identified risks factor into the H&H decision-making process.

In the area of geotechnical engineering, some sections of the report imply that overtopping risk is the primary consideration. Seismic and geotechnical risks are discussed, but clarification of how the major risk categories were combined and how they each contribute to the overall risk is unclear. Clarification is also needed concerning the risk and uncertainties associated with "judgment factors." Judgment factors are defined as non-quantitative factors, such as effects of encroachments, animal burrows, utility penetrations, and surface erosions. Information on what data sources were used to determine the risks and uncertainties, as well as information on site conditions that contribute to the risks and uncertainties, were not fully provided and therefore the risks and uncertainties associated with these factors could not be verified.

Environmental: The Panel noted that the environmental documentation shows that a good assessment of the challenges that could occur during this project has been conducted, and solutions have been identified. The Panel believes that the use of existing data and Google maps was appropriate for this stage in the SMART Planning process.

4.2 Final Panel Comments

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

Final Panel Comment 1

The description of the TSP selection process is not consistent throughout the document.

Basis for Comment

As indicated in the Executive Summary (p. ES-1), the Lower San Joaquin Draft Interim Integrated Feasibility Report/Environmental Impact Statement/Environmental Impact Report (FR/EIS/EIR) was prepared to provide a comprehensive description of the process used to select the Tentatively Selected plan (TSP). However, the process of selecting the TSP is not consistently described. The FR/EIS/EIR (p. ES-5) describes the process as follows:

> "The final array of plans was then compared to tentatively identify the alternative that reasonably maximized net National Economic Development (NED) benefits, consistent with protecting the Nation's environment."

In Section 3.8, Alternative 7A is identified as the NED, and following the logic above is set up to become (and ultimately is selected) the TSP.

However, Section 3.9, Selecting a Tentatively Selected Plan (pp. 3-72 through 3-75), states that the system of accounts (which includes three accounts in addition to the NED account) was used to evaluate the final array of alternatives. Repeating a point made in Section 3.8 that all three alternatives "reasonably maximize net benefits" (p. 3-72), leads the reader to believe that, since the net benefits are all essentially equal, the TSP might be selected based on the results of the other three accounts, or at least the other social effects (OSE) account listed as an objective in Section 2.2.3 (p. 2-10).

Section 3.9 goes on to state (p. 3-72) that "Alternative 8A reasonably maximizes project outputs across all four accounts." It further demonstrates this fact in the presentation of Tables 3-17 and 3-18. Table 3-17 shows that Alternative 8A outperforms the other two alternatives in the OSE account, and Table 3-18 shows that Alternative 8A outperforms the others in five project performance and life safety metrics.

The final sentence of Section 3.9 states without explanation, "Based on the information presented above, Alternative 7A is identified as the NED plan and is selected as the TSP." Yet there has been no discussion of why the NED is selected as the TSP at this point in the section, and instead the reader has been presented with significant information about why Alternative 8A is superior. The information presented in Section 3.9 is important information to present regarding the evaluation of the final array of alternatives. However, it is not directly related to 'Selecting the TSP' as the section title suggests.

Significance – Low

The purpose of the report is to describe the planning process used to evaluate alternatives and identify the TSP, but the process is not described consistently throughout the document.

Recommendations for Resolution

1. Clarify the role of the planning objectives (p. 2-10): state explicitly that in addition to the National Economic Development (NED) objective, the other objectives represent opportunities that may or may not be met by the selected plan. This will reduce the confusion surrounding the apparent superiority of Alternative 8A shown in Tables 3-17 and 3-18.
2. Rename section 3.9, which is currently called "Selecting a Tentatively Selected Plan." This section

is apparently not about selecting the TSP, because it primarily demonstrates the superiority of an alternative that is not selected. It shows the other accounts and results for the other life safety parameters.

3. If there are other reasons for selecting the TSP that are not described in the document, include these additional decision criteria.

Final Panel Comment 2

The risks, uncertainties, and standard errors inherent in the evaluation of benefits and costs are not presented in a manner consistent with USACE planning guidance documents.

Basis for Comment

ER 1105-2-101, Risk Analysis for Flood Damage Reduction Studies, states:

> "The estimate of net NED benefits and benefit cost ratio will be reported both as a single expected value and on a probabilistic basis for each planning alternative. The ***probability*** that net benefits are positive and that the benefit/cost ratio is at or above 1.0 will be presented for each planning alternative." (USACE, 2006, p. 4, Section 7e, emphasis added)

The ER then provides examples of how this can be done by reporting risks, uncertainties, or standard errors along with point values. However, these are not presented for the NED benefits in the FR/EIS/EIR.

The Economics Appendix of the FR/EIS/EIR presents a generic conceptual discussion about uncertainty and probability within the HEC-FDA model results, but does not show the probabilistic outcomes for the alternatives.

Probabilistic results would also provide support to the selection of the NED plan because the current TSP selection hinges on an unsupported statement that there is "no significant difference in net benefits" between the alternatives (p. 3-70, FR/EIS/EIR). Significant difference is a statistical concept that hinges not on single values but on errors in a probabilistic analysis like the calculation of flood damage reduction benefits (USACE, 2006, p. 4).

Significance – Low

Providing this information would help the reader understand the risks, uncertainties, and standard errors involved in each alternative and the differences among them.

Recommendation for Resolution

1. Report the standard errors or some other probabilistic information regarding the benefit calculations of each alternative examined.
2. If the term "significant" is used in a non-technical sense on page 3-70, consider using different language.

Literature Cited:

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

Final Panel Comment 3

The OSE results may not be accurate because the metrics used to measure the OSE analysis in the FR/EIS/EIR and in the Economics Appendix are not consistent.

Basis for Comment

The FR/EIS/EIR (pp. 3-72 to 3-74) describes metrics for OSE that address the fundamental concerns for public health, safety, and life, namely "population remaining at risk and available evacuation routes" (p. 72). Other metrics, included in Table 3-18, also seem relevant to the measurement of public health, safety, and life, such as annual exceedance probability and critical infrastructure at risk. These are evaluated for all alternatives.

However, the OSE report, which is a sub-report within the Economics Appendix, develops a completely separate and different approach to measuring life and safety (p. 11, Other Social Effects, FR/EIS/EIR). This approach assigns a risk level to populations based on the depth of flooding that might occur, and the probability of the event. Data are presented showing the number of people who move from a higher risk category to a lower risk category.

In addition to the apparent discrepancy between the FR/EIS/EIR and the Economics Appendix in how OSE is measured, the approach used in the OSE report may have some shortcomings. For example, the second part of the analysis involves density adjustments, shown in Table 8 of the Economics Appendix, however, no explanation is provided why USACE has added these adjustments. The analysis is already scaled to population and therefore dense areas will show more harm than sparsely populated areas. Additional density adjustments should not be necessary.

The Panel interprets the analysis of life safety hazards in the Economics Appendix to be very different from the one presented in the metrics identified in the FR/EIS/EIR (pp. 3-72 to 3-74) and in particular, the metrics shown in Table 3-18 are not the same as those implied in the Economics Appendix. In addition, the results were only analyzed for Alternative 7a in the Economics Appendix.

Significance – Low

The inconsistencies between the FR/EIS/EIR and the Economics Appendix should be addressed to ensure that OSE metrics are analyzed consistently for the proposed project.

Recommendation for Resolution

1. Select one set of metrics for the OSE analysis and be consistent throughout the document.
2. Report any secondary concerns, and indicate whether they affect the selection of the TSP.
3. Calculate any other metrics for the results of the OSE that are to be developed for the other alternatives.

Final Panel Comment 4

The discussion of the significance of the judgment factors on potential levee failure, risk, and uncertainty is incomplete.

Basis for Comment

Geotechnical information relevant to risk associated with non-quantitative factors such as the effects of encroachments, animal burrows, utility penetrations, and surface erosion are considered collectively as 'judgment' factors. Although Section 3.1 of the Geotechnical Appendix does not mention these factors in the discussion of possible levee failure modes, the performance curves presented in the Geotechnical Appendix typically show judgment as being second only to under-seepage as a factor contributing to the probability of poor performance.

The lack of judgment factors in the discussion of potential failure mechanisms in Section 3.1 of the Geotechnical Appendix can generate confusion as to how risk and uncertainty associated with these judgment issues fit into the overall risk evaluation.

Significance – Low

Understanding the significance of the judgment factors and how they were integrated into the overall geotechnical risk evaluation would improve reader understanding of the report.

Recommendation for Resolution

1. Include a discussion of the risks associated with the judgment issues in Section 3.1 of the Geotechnical Appendix, outlining the potential failure modes considered in the geotechnical evaluation of the levees.

Final Panel Comment 5

It is unclear what level of uncertainty is considered in the project benefits and residual risk relative to the zero-fragility for the judgment risk factors.

Basis for Comment

The with-project performance curves assume zero fragility for fully remediated levees prior to overtopping. This is a reasonable approximation with regard to seepage, stability, and seismic issues. However, as noted in the Geotechnical Appendix (p. 87):

> "The judgment curve component of the fragility curve would be the only curve that likely would not completely flatten out with implementation of template options…Therefore, the assumption of zero-fragility (i.e., flat-line) fragility curve may potentially overestimate with-project benefits and underestimate residual risk."

The judgment curves discussed here refer to risks associated with animal burrows, vegetation, erosion, encroachments, and penetrations. Since the Geotechnical Appendix does not address the extent to which the proposed levee upgrades will mitigate judgment-related risks, it is difficult to get a sense of how much uncertainty this casts on project benefits and residual risk. The degree of residual risk will depend in large part on the percentage of levees for which judgment factor issues such as animal burrows, encroachments, and vegetation will not be remediated by the upgrades. Significant residual risk can impact project benefits.

Based on discussions with USACE during a teleconference facilitated by Battelle between USACE and the Panel, the number of locations at which the levee upgrades will not mitigate the judgment risk factors is relatively small. Some quantitative indication of the portion of the levee system for which encroachments, penetrations, and exposure to animal burrows will be left in place would assist in understanding the potential significance of the residual risk issue.

Significance – Low

Assuming that a relatively minor fraction of the conditions leading to increased risk from the judgment-related issues will not be remediated by the upgrades, the residual risk is not expected to impact project benefits; however, stronger documentation on this point would improve reader understanding of project benefits.

Recommendation for Resolution

1. Provide information in the FR/EIS/EIR on the estimated scale of the portions of the levee system for which conditions that elevate risk associated with the judgment factors (e.g., vegetation, encroachment, utility penetrations, animal burrows) will be left in place following the levee upgrades.

Final Panel Comment 6

The process for combining major risk categories, including seismic risk, and the contribution of the major risks categories to overall risk are unclear.

Basis for Comment

Section 3.6 of the Geotechnical Appendix presents an analysis of the risk of poor performance of the levees for purely geotechnical risks associated with seepage, stability, and judgment factors. However, it is not clear how the geotechnical risks were combined with seismic and overtopping risks in the overall risk and uncertainty evaluation. Section 2.6 of the Economics Appendix seems to assume that the risk of levee failure due to geotechnical and seismic causes is negligible, since no levee failure is assumed to occur prior to overtopping. The risk of failure due to geotechnical or seismic causes may be small relative to the risk of overtopping. However, an assumption of negligible geotechnical risk appears inconsistent with the features of the TSP that are clearly intended to reduce geotechnical and seismic risk, such as cutoff walls and deep soil mixing.

Significance – Low

A more detailed discussion of how geotechnical and seismic risk were integrated into the combined risk model would aid in understanding the decision-making process for the TSP.

Recommendation for Resolution

1. Provide a description in the FR/EIS/EIR of how combined geotechnical, seismic, and overtopping risks were evaluated.

Final Panel Comment 7

The relative significance of each hydrologic and hydraulic modeling simulation and how each supports the alternatives evaluation has not been discussed.

Basis for Comment

A series of H&H model simulations has been used to provide a basis for the statistical analyses of flood risk potential for the project area. The H&H appendices provide a thorough description of each of these model simulations, including the development of modeling input, and the underlying assumptions and boundary conditions including tidal levels. However, the Panel could not locate a summary of the relative significance that each H&H model simulation had on the alternatives evaluation. In addition, a summary of the relative significance of each H&H modeling simulation to the overall project area and the interconnection between each modeling simulation and how each modeling simulation supported the alternatives evaluation would help clarify how each model simulation impacted the overall project determination and any resulting risks. It appears that modeling assumptions and flow inputs could be construed as subjective and could affect one or two of the alternatives more than others (a perceived bias). Since the benefit-cost ratios for several of the alternatives were so close in value, there will undoubtedly be a lot of scrutiny about differentiating the performance of the alternatives, and the subjectivity/objectivity of their evaluations.

For example, the Panel noted that the flow inputs to the hydraulic models are generally the result of two modeling simulations: (1) the reservoir routing, and (2) hydraulic modeling and statistical analysis. The documentation provided suggests that the hydrologic modeling methodology was objectively applied in the simulation of the future without-project conditions and the project alternatives, and therefore introduced no modeling-induced bias. However, the Panel could not find documentation on whether the sensitivity to the downstream boundary conditions were considered when evaluating the performance of the project alternatives, which were modeled using the 1-D and 2-D hydraulic model simulations.

Significance – Low

A description of the relative significance of the various H&H modeling components for the alternatives evaluation would provide a more objective understanding of the future without-project conditions versus each of the considered alternatives.

Recommendation for Resolution

1. Provide a matrix or tabulation of the modeling components with a relative sensitivity (high, medium, low) of that simulation to the flood risk evaluation of the future without-project conditions and the considered alternatives. The output could include each of the major modeling components, such as:
    a. reservoir routing
    b. hydrologic modeling
    c. 1-D hydraulic modeling
    d. 2-D hydraulic modeling
    e. boundary conditions, including tidal levels.

Final Panel Comment 8

Impacts on groundwater elevations from seepage barriers such as a cutoff wall are possible but are not discussed.

Basis for Comment

A technical issue noted during review of the public comments identified that the FR/EIS/EIR does not currently discuss impacts on groundwater elevations from seepage barriers such as a cutoff wall. The Panel believes that the following issue, raised by members of the public, deserves further investigation and documentation within the FR/EIS/EIR. The Panel has summarized below the technical concern identified by the public, however, the public comments should be directly examined regarding the details of the concern. To assist USACE in locating where the concern was noted, the Panel has provided, in parentheses, the submission that identified the concern.

- A concern was raised that a seepage barrier such as a cutoff wall could alter the groundwater level, which could affect root systems in agricultural land. Changes to the groundwater elevation could also impact septic fields and habitat. A long, deep impermeable barrier could in fact affect local groundwater depth, so this issue may require further study. (Neighbors United, Comment Letter #22, p. 2, item #2).

Significance – Low

Addressing the concerns raised throughout the public comments would make the document more complete.

Recommendation for Resolution

1. Assess impacts, conduct additional investigations (if necessary), and provide documentation on the impacts on groundwater from installation of seepage barriers in the project area.

5. REFERENCES

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

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USACE (2012). Water Resources Policies and Authorities: Civil Works Review. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) 1165-2-214. December 15.

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

APPENDIX A

IEPR Process for the Lower San Joaquin River Project

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

Table A-1 presents the schedule followed in executing the Lower San Joaquin River, California Flood Risk Management Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (FR/EIS/EIR) Independent External Peer Review (hereinafter: Lower San Joaquin River IEPR). Due dates for milestones and deliverables are based on the award/effective date of May 9, 2014. The review documents were provided by the U.S. Army Corps of Engineers (USACE) on February 27, 2015. Note that the work items listed under Task 6 occur after the submission of this report. Battelle will enter the eight Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

Table A-1. Lower San Joaquin River Complete IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	5/9/2015
	Review documents available	2/27/2015
	Battelle submits draft Work Plan[a]	6/2/2014
	USACE provides comments on draft Work Plan	6/9/2014
	Battelle submits final Work Plan[a]	3/6/2015
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	5/15/2014
	USACE provides comments on COI questionnaire	5/20/2014
	Battelle submits list of selected panel members[a]	6/5/2014
	USACE confirms the panel members have no COI	6/16/2014
	Battelle completes subcontracts for panel members	2/12/2015
3	Battelle convenes kick-off meeting with USACE	5/23/2014
	Battelle sends review documents to panel members	3/2/2015
	Battelle convenes kick-off meeting with panel members	2/25/2015
	Battelle convenes kick-off meeting with USACE and panel members	2/25/2015
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	3/18/2015
4	Panel members complete their individual reviews	4/6/2015
	Battelle provides panel members with talking points for Panel Review Teleconference	4/8/2015

Table A-1. Lower San Joaquin River Complete IEPR Schedule (continued)

Task	Action	Due Date
4	Battelle convenes Panel Review Teleconference	4/9/2015
	Battelle provides Final Panel Comment templates and instructions to panel members	4/10/2015
	Panel members provide draft Final Panel Comments to Battelle	4/17/2015
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	4/17-28/2015
	Panel finalizes Final Panel Comments	4/28/2015
	Public Comment Period	3/2/2015- 4/13/2015
	USACE provides public comments	4/15/2015
	Battelle sends public comments to Panel	4/16/2015
	Panel completes their review of the public comments	4/20/2015
	Panel drafts Final Panel Comment, if necessary	4/21/2015
	Panel finalizes Final Panel Comment regarding public comments	4/23/2015
5	Battelle provides Final IEPR Report to panel members for review	4/30/2015
	Panel members provide comments on Final IEPR Report	5/4/2015
	Battelle submits Final IEPR Report to USACE[a]	5/8/2015
	USACE PCX provides decision on Final IEPR Report acceptance	5/15/2015
6[b]	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	5/18/2015
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	5/19/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	5/19/2015
	USACE Project Delivery Team (PDT) provides the USACE Planning Center of Excellence (PCX) with draft Evaluator Responses	6/1/2015
	USACE PCX reviewed draft Evaluator Responses and works with USACE PDT regarding clarifications (if necessary)	6/5/2015
	USACE PCX provides reviewed draft Evaluator Responses to Battelle	6/8/2015
	Battelle provides the panel members the draft PDT Evaluator Responses	6/10/2015
	Panel members provide Battelle with draft BackCheck Responses	6/15/2015

Table A-1. Lower San Joaquin River Complete IEPR Schedule (continued)

Task	Action	Due Date
6	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	6/16/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	6/17/2015
	USACE inputs final PDT Evaluator Responses to DrChecks	6/22/2015
	Battelle provides final PDT Evaluator Responses to panel members	6/25/2015
	Panel members provide Battelle with final BackCheck Responses	6/30/2015
	Battelle inputs the Panel's final BackCheck Responses in DrChecks	7/2/2015
	Battelle submits pdf printout of DrChecks project file[a]	7/6/2015
3	ADM Meeting[c]	7/17/2015
	CWRB Meeting (Estimated Date)[c]	2/11/2016
	Contract End/Delivery Date	8/25/2015[d]

[a] *Deliverable.*

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

[c] *The ADM and CWRB meetings were listed in the Performance Work Statement under Task 3 but were relocated in this schedule to reflect the chronological order of activities.*

[d] *A contract extension will be necessary to allow for participation in the Civil Works Review Board*

At the beginning of the Period of Performance for the Lower San Joaquin River IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan. In addition, 21 charge questions were provided by USACE and included in the final Work Plan. Battelle added two questions that seek summary information from the IEPR Panel. The final charge also included general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and within 13 days of their subcontracts being finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received the Lower San Joaquin River review documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- **Draft Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (675 pages)**
- **Appendix A Environmental (215 pages)**
- **Appendix B Civil Engineering (98 pages)**

- **Appendix C Economics (162 pages)**
- **Appendix D Geotechnical (518 pages)**
- **Appendix E Hydraulic (300 pages)**
- **Appendix F Hydrology (748 pages)**
- **Appendix G Real Estate (43 pages)**
- **Public Comments (289 pages)**
- Study Risk Register
- Study Decision Log
- Biological Assessment
- USACE guidance Civil Works Review, (EC 1165-2-214) dated 15 December 2012
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

About halfway through the review of the Lower San Joaquin IEPR 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 nine panel member questions to USACE. USACE was able to provide responses to all of the questions during the teleconference and supplied written responses the following day.

A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response table provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments in a preliminary list of 10 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

A.3 IEPR Panel Teleconference

Battelle facilitated a 2.5-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 significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

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

A.4 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 Lower San Joaquin River IEPR:

- Lead Responsibility: For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed 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/high, medium, medium/low, and low; see description below)
    4. Recommendation(s) for Resolution (see description below).

- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:

    1. **High:** Describes a fundamental issue with the project that affects the current recommendation or justification of the project, and which will affect its future success, if the project moves forward without the issue being addressed. Comments rated as high indicate that the Panel determined that the current methods, models, and/or analyses contain a “showstopper” issue.
    2. **Medium/High:** Describes a potential fundamental issue with the project, which has not been evaluated at a level appropriate to this stage in the SMART Planning process. Comments rated as medium/high indicate that the Panel analyzed or assessed the methods, models, and/or analyses available at this stage in the SMART Planning process and has determined that if the issue is not addressed, it could lead to a “showstopper” issue.
    3. **Medium:** Describes an issue with the project, which does not align with the currently assessed level of risk assigned at this stage in the SMART Planning process. Comments rated as medium indicate that, based on the information provided, the Panel identified an issue that would raise the risk level if the issue is not appropriately addressed.

4. **Medium/Low:** Affects the completeness of the report at this time in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium/low indicate that the Panel does not currently have sufficient information to analyze or assess the methods, models, or analyses.
5. **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 that was mislabeled or incorrect or that certain data or report section(s) were not clearly described or presented.

- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. During the Final Panel Comment development process, the Panel determined that two of the Final Panel Comments could be either dropped or merged into other Final Panel Comments; therefore, the total Final Panel Comment count was reduced to seven. 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 the main report.

A.5 Conduct of the Public Comment Review

Battelle received a PDF file containing 289 pages of public comments on the Lower San Joaquin River FR/EIS/EIR (47 written comments) from USACE on April 16, 2015. Battelle then sent the public comments to the panel members on April 16, 2015 in addition to the charge question below:

1. **Does information or concerns raised in the public comments raise any additional discipline-specific technical concerns with regard to the overall report?**

Near the end of the review period, the Panel produced individual comments in response to the charge question. Each panel member's individual comments were shared with the full Panel via email. Battelle reviewed the comments to identify any new technical concerns that had not been previously identified during the initial IEPR. The panel members confirmed that one new Final Panel Comment would be developed to summarize the additional issue raised by the public. The Final Panel Comment was developed as part of a four-part structure following guidance previously described in the Final IEPR Report.

Battelle reviewed and edited the Final Panel Comment for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that the comment did not make any observations regarding either the appropriateness of the selected alternative or USACE policy. After this Final Panel Comment was prepared, the total Final Panel Comment count was increased to eight. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comment.

APPENDIX B

Identification and Selection of IEPR Panel Members
for the Lower San Joaquin River Project

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B.1 Panel Identification

The candidates for the Lower San Joaquin River, California Flood Risk Management Feasibility Report (hereinafter: Lower San Joaquin River IEPR) Panel were evaluated based on their technical expertise in the following key areas: economics/Civil Works planning, hydraulic engineering, biology/ecology, and geotechnical engineering. These areas correspond to the technical content of the Lower San Joaquin River IEPR review documents and overall scope of the Lower San Joaquin River project.

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

The candidates were screened for the following potential exclusion criteria or COIs.[1] These COI questions 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 Lower San Joaquin River, California Draft Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (EIS/EIR) and associated technical appendices
- Previous and/or current involvement by you or your firm[2] in flood risk management projects in the Central Valley of California.
- Previous and/or current involvement by you or your firm[2] in Lower San Joaquin River-related projects.
- Previous and/or current involvement by you or your firm[2] in the conceptual or actual design, construction, or operation and maintenance of any Lower San Joaquin River, California Feasibility Study-related activities.
- Current employment by USACE.

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

- Previous and/or current involvement with paid or unpaid expert testimony related to the Lower San Joaquin River, California Feasibility Study.
- Previous and/or current employment or affiliation with the non-Federal sponsors or any of the following cooperating Federal, state, county, local and regional agencies, environmental organizations, and interested groups: the State of California Central Valley Flood Protection Board (CVFPB), State of California Department of Water Resources, San Joaquin County, and/or the San Joaquin Area Flood Control Agency (SJAFCA), the following Reclamation Districts, RD 2042, Bishop Tract; RD 2126, Atlas Tract; RD 2115, Shima Tract; RD 1608, Smith Tract; RD 2074, Sargent Barhardt Tract; RD 1614, Smith Tract; RD 828, Weber Tract; RD 404, Boggs Tract; RD 403, Rough and Ready Island; RD 17, Mossdale Tract; RD 2062, Steward Tract, or the cities of Lodi, Stockton, Manteca, and Lathrop (for pay or *pro bono*).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to San Joaquin County, California.
- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Sacramento District.
- Previous or current involvement with the development or testing of models that will be used for, or in support of the Lower San Joaquin River, California Feasibility Study, including HEC-FDA, MCACES or MII, HEC-ResSim, HEC-HMS, HEC-RAS, UNET, and/or TABS.
- Current firm[2] involvement with other USACE projects, specifically those projects/contracts that are with the Sacramento District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Sacramento District. Please explain.
- Any previous employment by USACE as a direct employee, notably if employment was with the Sacramento District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by USACE as a 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 any San Joaquin County or Lower San Joaquin River, California Feasibility Study-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 3 years from contracts with the non-Federal sponsor (State of California Department of Water Resources, San Joaquin County, and/or the San Joaquin Area Flood Control Agency (SJAFCA), the following Reclamation Districts, RD 2042, Bishop Tract; RD 2126, Atlas Tract; RD 2115, Shima

Tract; RD 1608, Smith Tract; RD 2074, Sargent Barhardt Tract; RD 1614, Smith Tract; RD 828, Weber Tract; RD 404, Boggs Tract; RD 403, Rough and Ready Island; RD 17, Mossdale Tract; RD 2062, Steward Tract, or the cities of Lodi, Stockton, Manteca, and Lathrop).

- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Lower San Joaquin River, California Feasibility Study.
- Participation in relevant prior and/or current Federal studies relevant to the Lower San Joaquin River, California Feasibility Study.
- Previous and/or current participation in prior non-Federal studies relevant to the Lower San Joaquin River, California Feasibility Study.
- 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.

Other considerations:

- Participation in previous USACE technical review panels
- Other technical review panel experience.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Three of the four final reviewers are affiliated with consulting companies; the fourth is an independent consultant. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

An overview of the credentials of the final four members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table B-1. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in Section B.3.

Table B-1. Lower San Joaquin River IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Greene	Halverson	Tormey	Aubeny
Economics/Civil Works Planning				
Minimum 10 years of experience in hydraulic engineering with an emphasis on large public works projects	X			
Familiarity with USACE application of risk and uncertainty analyses in flood damage reduction studies	X			
Familiarity with standard USACE hydrologic and hydraulic computer	X			
Active participation in related professional societies	X			
M.S. degree or higher in engineering	X			
Hydraulic Engineering				
Minimum 10 years of experience in hydraulic engineering with an emphasis on large public works projects		X		
Familiarity with USACE application of risk and uncertainty analyses in flood damage reduction studies		X		
Familiarity with standard USACE hydrologic and hydraulic computer models		X		
Active participation in related professional societies		X		
M.S. degree or higher in engineering		X		
Biology/Ecology				
Minimum 10 years of demonstrated experience in habitat evaluation and conducting National Environmental Policy Act (NEPA) impact assessments, including cumulative effects analyses, for complex multi-objective public works projects with competing trade-offs			X	
Familiarity with USACE calculation of evaluation of environmental benefits			X	
Extensive background experience with, and working knowledge of, the implementation of the NEPA compliance process			X	
Experience in California's Central Valley			X	
M.S. degree or higher in an appropriate field of study			X	
Geotechnical Engineering				
Minimum 10 years of experience in geotechnical engineering				X
Demonstrated experience in performing geotechnical evaluation and geo-civil design for flood risk management projects				X
Familiarity with and demonstrated experience related to Corps of Engineers geotechnical practices associated with levee and floodwall design and construction including:				
static and dynamic slope stability				X
seepage through earthen embankments				X
underseepage through the foundation				X
settlement evaluation of flood risk management structures, including levee embankments, floodwalls, closure structures, and other pertinent features of the structures				X

Table B-1. Lower San Joaquin River IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Greene	Halverson	Tormey	Aubeny
Ability to address the USACE Safety Assurance Review (SAR) aspects of all projects				X
Active participation in related professional engineering and scientific societies				X
Experience in California's Central Valley				X
M.S. degree or higher in engineering				X

B.3 Panel Member Qualifications

Gretchen Greene, Ph.D.

Role: Economics and Civil Works planning expert.
Affiliation: Ramboll Environ[3]

Dr. Greene is a senior manager at Ramboll Environ and has 19 years of diverse economics experience in natural resource, agricultural, and community economics, including expertise in natural resource damage assessment and flood damages. She also has Civil Works planning experience on numerous projects related to water resources, including dam feasibility, levee alterations, flood protection, port development, conservation, and ecosystem service payments.

Dr. Greene led a project entitled Dredged Material Management Study: Risk-Based Analysis of the Lewiston Levee, which was part of the Dredged Material Management EIS for the Snake River system. For this project, she estimated flood damage reduction benefits of the Lewiston levee system using the HEC-FDA model consistent with USACE Engineering Manual 1110-2-1619, Risk-Based Analysis for Flood Damage Reduction Studies. She oversaw the development of a socioeconomic analysis of the region, including projections and a regional economic impact analysis. Other experience with HEC-FDA includes reviewing model results for a number of projects and she is currently authoring a paper comparing and contrasting alternative flood damage estimation tools. She has used the USACE plan formulation process as a contractor to USACE, and has studied and debated the process and its merits and shortcomings in a litigation context. The process forms the basis for Benefit-Cost Analysis that she uses every day as an economist.

Her familiarity with USACE structural flood risk management projects includes her experience as an independent external peer reviewer for USACE's Fargo Moorhead Flood Risk Management project, as a peer reviewer for flood retention projects on the Chehalis River in Washington, and her work on the Lewiston Levee system. She used the USACE six-step planning process (following ER 1105-2-100) for a number of projects since 1994, including the Lewiston Levee project, a Water Supply Reallocation Report for the Savannah District, in the analysis of recreational benefits of a Proposed Water Storage Facility on the Fort Apache Indian Reservation in Arizona, also as a reviewer for Fargo Moorhead, the Alton to Gale

[3] ENVIRON International Corporation was purchased by Ramboll during conduct of this IEPR.

Organized Levee Districts, and the Savannah Harbor General Reevaluation Report and EIS. Most of the projects described above also included an element of National Economic Development benefits calculation and review.

Bruce Halverson, P.E.

Role: Hydraulic engineering expert.
Affiliation: Kleinschmidt Associates

Mr. Halverson is currently a senior engineering consultant with Kleinschmidt Associates and specializes in analyses of extreme hydrologic events and the quantification of their effects, risk analyses and the development of hydrologic and hydraulic designs, use of modeling systems, and computer programming related to hydraulic modeling. He earned an M.S. in civil engineering from Louisiana State University, is a registered professional engineer in Illinois and Wisconsin, and is a Certified Floodplain Manager. He is Kleinschmidt's primary Quality Control reviewer and modeling strategist for all hydraulic and hydrologic projects.

He has extensive experience with projects involving risk, uncertainty, frequency, and damage potential assessments, including having conducted hydrologic and hydrodynamic modeling after Hurricane Katrina for the USACE Interagency Performance Evaluation Task Force. This modeling included an HEC-HMS model to compute the runoff from the hurricane's overnight rainfall and a HEC-RAS unsteady-state model that featured 100 storage areas, more than 80 hydraulic structures, 34 miles of interconnected canals, and four pump stations. The end results of the modeling were flood inundation approximations, which will be used to evaluate various remediation plans for dealing with future hurricanes.

Mr. Halverson has experience with many different USACE modeling packages, including HEC-RAS, HEC-HMS, HEC-FDA, HEC-GeoRAS, HEC-GeoHMS, HEC-DSSVue, HEC-SSP and their predecessor models. For the Section 205 Flood Damage Reduction Study for Blacksnake Creek (St. Joseph, MO), Mr. Halverson was responsible for performing hydrologic and hydraulic modeling to determine if there was a reasonable expectation that remedial measures would be cost-effective and warrant Federal interest. The modeling effort included the use of XP-SWMM and HEC-RAS, as well as HEC-FDA in conjunction with the HEC-RAS model results. He also performed flood frequency and flood damage risk assessment for the Belle Isle Flood Damage Reduction Project in Monona, Wisconsin, which included the development of flood risk statistics, as well as annual expected damages and which was used to determine eligibility for Federal Emergency Management Agency flood damage mitigation funding. Mr. Halverson recently served as the Modeling Expert for the Chicago District USACE Technical Review Committee for Lake Michigan Diversion Accounting, for which his primary responsibility was to review procedures and models used to develop flow diversion quantities from Lake Michigan.

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

Daniel Tormey, Ph.D.

Role: Biology/ecology expert.
Affiliation: Ramboll Environ [4]

Dr. Tormey is currently an independent consultant and a recognized expert in National Environmental Policy Act (NEPA) and California Environmental Policy Act (CEQA) analysis. He earned his Ph.D. in geology and geochemistry from the Massachusetts Institute of Technology and is a registered geologist in California.

Dr. Tormey's extensive experience in NEPA includes a NEPA/CEQA review of PacifiCorp's Klamath Hydroelectric Project on behalf of California's State Water Resources Control Board and the U.S Bureau of Reclamation; environmental assessments (EAs) for flood control and sediment/habitat management at Lakes Kaweah and Isabella; an EIS for the Four Corners Power Plant/Navajo Mine Energy Project with habitat evaluation and Section 7 consultation; numerous habitat evaluation and sediment transport/water quality analysis for EISs related to hydroelectric power; an environmental impact report (EIR)/EIS with habitat evaluation for the Interim South Delta Program (ISDP); and an EIR/EIS for a long-term dredge management strategy at the Port of Oakland. Each of these projects involved cumulative effects analysis. In addition, Dr. Tormey has managed many NEPA 'firsts,' including the first EIS/EIR for an offshore liquefied natural gas (LNG) terminal in the United States, the first EIS/EIR for an LNG terminal in offshore California; and the first EIS for the use of Federal Energy Regulatory Commission backstop authority for transmission lines.

He is familiar with USACE methods for calculating environmental benefits and has applied these methods to non-USACE projects, such as a Habitat Equivalency Analysis for calculating environmental benefits of marsh and wetland restoration in San Francisco Bay and a Population Viability Analysis for comparative analysis of different restoration and conservation measures on endangered species. He has extensive experience in California's Central Valley, including conducting habitat evaluations and NEPA/CEQA analyses throughout the Valley, including in tributaries of the San Joaquin River, the Sacramento–San Joaquin River Delta, and Sierra foothills. He developed a dairy approval process EIR for Merced County; worked on fate and transport/sediment issues related to ecosystem quality throughout the Valley; and has experience with contaminated sediment and wetland issues pertaining to habitat suitability related to the Kesterson Reservoir and the Grasslands bypass canal.

Charles Aubeny, P.E., C.E. (CA), Ph.D.

Role: Geotechnical engineering expert.
Affiliation: Independent Consultant

Dr. Aubeny is a professor at Texas A&M University in the Department of Civil Engineering teaching soil mechanics, geotechnical design, geotechnical testing, and numerical methods. He earned his Ph.D. in civil engineering from Massachusetts Institute of Technology in 1992 and is a registered professional

[4] During recruitment, this panel member was an independent consultant. However, the day before the review began he informed us that he had been hired by ENVIRON International Corporation (now Ramboll Environ). Battelle does not normally allow more than one panel member from each company to be on a Panel, but given that he was already scheduled and the review was starting, we did not have time to find a replacement.

engineer in Colorado, Texas, and California. He has 29 years of experience in geotechnical engineering, including 15 years as a professor conducting academic research in such areas as slope stability, retaining structures, and unsaturated soils; eight years with the Embankment Dams Branch of the U.S. Bureau of Reclamation (USBR); and six years as a geotechnical consultant in the Sacramento-San Joaquin area on levee projects and central-northern California dam projects.

Dr. Aubeny has 29 years of experience with static and dynamic stability analyses on dam and levee systems, including embankments on problem soils such as peats and liquefiable sands. He has an in-depth familiarity with the limit equilibrium methods used in stability analyses as well as the commonly used computer codes such as Slope/W, UTexas, and various versions of PCStabl. His work on the Mokelumne Aqueduct levees in the Sacramento-San Joaquin Delta included dynamic analyses of the levees to estimate seismic-induced settlement. He also teaches a graduate course on slope stability and is currently developing a slope stability short course for the Texas Commission for Environmental Quality. Dr. Aubeny also has direct experience with predicting phreatic surface and seepage rates through earthen embankments using hand calculation methods outlined in USACE manuals, as well as with finite element codes such as Seep/W and Plaxis. His experience includes designing seepage barriers and internal drain systems in embankments to control water pressures and prevent internal erosion. He has direct experience with all aspects of under-seepage beneath embankments: conducting site investigations to characterize the hydraulic regime; hand/chart calculations using USACE methods for predicting flow rates, exit gradients, and pore pressures; computer programs for analysis of seepage; construction quality control and monitoring of various seepage cutoff and pressure relief systems; and design and installation of systems for monitoring water pressures and flow rates. He has extensive experience in settlement calculations for embankments and structure foundations, including primary and secondary consolidation of clays and organic soils, immediate settlement of clays, and settlement in sands using various empirical and semi-empirical methods.

In addition, Dr. Aubeny has over six years of experience in California's Central Valley, including work on Delta levee systems including Twitchell Island, Sherman Island and Hotchkiss Tract levee upgrade studies; Sacramento Regional Wastewater Plant levee and North Beach levee in south Sacramento; Los Vaqueros Old River intake; Elkhorn levees in Sacramento; and buffer lands mitigation study in Elk Grove, California. He has experience addressing the Safety Assurance Review (SAR) for projects through his participation in Independent External Peer Reviews on projects involving SARs for flood control systems including the Santa Maria and Bradley Canyon levee system, the Kansas City's Flood Risk Management Project, and the Dallas Floodway Feasibility and Environmental Statement (in progress).

Dr. Aubeny actively participates in related professional engineering and scientific societies including as an Editorial Board Member for ASCE Journal of Geotechnical and Geoenvironmental Engineering and ASTM Geotechnical Testing Journal.

APPENDIX C

Final Charge to the IEPR Submitted to USACE on March 6, 2015 for the Lower San Joaquin River Project

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CHARGE QUESTIONS AND GUIDANCE TO THE PANEL MEMBERS FOR THE IEPR OF THE LOWER SAN JOAQUIN RIVER, CALIFORNIA FLOOD RISK MANAGEMENT FEASIBILITY STUDY

BACKGROUND

There are flood-related and incidental ecosystem-related issues in the Lower San Joaquin River study area. The decision document will be an Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (EIS/EIR) and will present planning, engineering, environmental, and implementation details of the recommended plan to allow final design and construction to proceed subsequent to approval of the recommended plan. Ultimate approval of the study document will be with the Chief of Engineers for recommendation of a project to Congress for authorization. The project is a General Investigations study undertaken to evaluate structural and non-structural flood risk management measures including in-basin storage, re-operation of existing reservoirs, improvements to existing levees, construction of new levees, and other storage, conveyance, and non-structural options.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Lower San Joaquin River, California Flood Risk Management Feasibility Study (hereinafter: Lower San Joaquin River IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [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 Lower San Joaquin River 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 economics/civil works planning, hydraulic engineering, biology/ecology, and geotechnical engineering 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

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

Documents for Review

The following documents are to be reviewed by designated discipline:

Title	Approx. No. of Pages	Required Disciplines
Draft Integrated Feasibility Report and Environmental Impact Statement/Environmental Impact Report (EIS/EIR)	675	All disciplines
Appendix A Environmental	215	Economics/Civil Works planning, biology/ecology
Appendix B Civil Engineering	98	Geotechnical engineering
Appendix C Economics	162	Economics/Civil Works planning
Appendix D Geotechnical	518	Geotechnical engineering
Appendix E Hydraulic	300	Hydraulic engineering
Appendix F Hydrology	748	Hydraulic engineering
Appendix G Real Estate	43	Economics/Civil Works planning, biology/ecology
Public Comments*	50	All disciplines
Total Review Document Page Count	**2,809**	

Supporting Information

- Study Risk register (10 pages)
- Study Decision Log (5 pages)
- Biological Assessment (131 pages)

Documents for Reference

- USACE guidance *Civil Works Review,* (EC 1165-2-214, December 15, 2012)
- USACE ER 1110-1-8159, *Engineering and Design*, DrChecks, May 10, 2001.
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

SCHEDULE

This draft schedule is based on the February 26, 2015 receipt of review documents. The schedule will be revised and finalized upon receipt of final review documents. Note that dates presented in the schedule below could change due to panel member and USACE availability.

Task	Action	Due Date
Conduct Peer Review	Battelle sends review documents to panel members	3/2/2015
	Battelle convenes kick-off meeting with panel members	2/25/2015
	Battelle convenes kick-off meeting with USACE and panel members	2/25/2015
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	3/13/2015
	Panel members complete their individual reviews	3/30/2015
Prepare Final Panel Comments and Final IEPR Report	Battelle provides panel members with talking points for Panel Review Teleconference	4/1/2015
	Battelle convenes Panel Review Teleconference	4/2/2015
	Battelle provides Final Panel Comment templates and instructions to panel members	4/3/2015
	Panel members provide draft Final Panel Comments to Battelle	4/10/2015
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	4/10/2015-4/21/2015
	Battelle finalizes Final Panel Comments	4/21/2015
	USACE provides public comments	4/15/2015
	Battelle sends public comment to Panel	4/16/2015
	Panel completes their review of the public comments	4/20/2015
	Panel drafts Final Panel Comment, if necessary	4/21/2015
	Panel finalizes Final Panel Comment regarding public comments	4/23/2015
	Battelle provides Final IEPR Report to panel members for review	4/28/2015
	Panel members provide comments on Final IEPR Report	5/1/2015
	*Battelle submits Final IEPR Report to USACE	5/7/2015
Comment/ Response Process	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	5/8/2015
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	5/11/2015
	USACE PCX provides reviewed draft Evaluator Responses to Battelle	5/29/2015
	Battelle provides the panel members the draft PDT Evaluator Responses	6/2/2015
	Panel members provide Battelle with draft BackCheck Responses	6/5/2015

Task	Action	Due Date
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	6/8/2015
	Battelle convenes Comment-Response Teleconference with panel members and USACE	6/9/2015
	USACE inputs final PDT Evaluator Responses to DrChecks	6/12/2015
	Battelle provides final PDT Evaluator Responses to panel members	6/17/2015
	Panel members provide Battelle with final BackCheck Responses	6/22/2015
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	6/24/2015
	*Battelle submits pdf printout of DrChecks project file	6/25/2015
Agency Decision Milestone Meeting	Agency Decision Milestone meeting	TBD
Civil Works Review Board (CWRB) Meeting	Panel prepares and/or reviews slides for CWRB	TBD
	Civil Works Review Board meeting	TBD

* Deliverables

CHARGE FOR PEER REVIEW

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

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

General Charge Guidance

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

1. Your response to the charge questions should not be limited to a "yes" or "no." Please provide complete answers to fully explain your response.

2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.

3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.

4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.

5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.

6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.

7. Please focus the review on assumptions, data, methods, and models.

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

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

2. Please contact the Battelle Project Manager (Lynn McLeod, mcleod@battelle.org) or Deputy Program Manager (Rachel Sell (sellr@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 Lynn McLeod, **mcleod@battelle.org**, no later than March 30, 2015, 10 pm ET.

IEPR of the Lower San Joaquin River, California Flood Risk Management Feasibility Study

CHARGE QUESTIONS AND RELEVANT SECTIONS AS SUPPLIED BY USACE

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

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

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

Panel review comments are to be structured to fully communicate the panel’s intent by including the comment, why it is important, any potential consequences of failure to address, and suggestions on how to address the comment. The IEPR Performance Work Statement provides additional details on how comments should be structured.

Broad Evaluation Charge Questions

1. Is the need for and intent of the decision document clearly stated?
2. Does the decision document adequately address the stated need and intent relative to scientific and technical information?
3. Given the need for and intent of the decision document, assess the adequacy and acceptability of the project evaluation data used in the study analyses.
4. Given the need for and intent of the decision document, assess the adequacy and acceptability of the economic, environmental, and engineering assumptions that underlie the study analyses.
5. Given the need for and intent of the decision document, assess the adequacy and acceptability of the economic, environmental, and engineering methodologies, analyses, and projections.
6. Given the need for and intent of the decision document, assess the adequacy and acceptability of the models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives.
7. Given the need for and intent of the decision document, assess the adequacy and acceptability of the methods for integrating risk and uncertainty.
8. Given the need for and intent of the decision document, assess the adequacy and acceptability of the formulation of alternative plans and the range of alternative plans considered.

9. Given the need for and intent of the decision document, assess the adequacy and acceptability of the quality and quantity of the surveys, investigations, and engineering sufficient for conceptual design of alternative plans.
10. Given the need for and intent of the decision document, assess the adequacy and acceptability of the overall assessment of significant environmental impacts and any biological analyses.
11. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
12. Assess the considered and recommended alternatives from the perspective of systems, including systemic aspects being considered from a temporal perspective, including the potential effects of climate change.
13. For the tentatively selected plan, assess whether the models used to assess life safety hazards are appropriate.
14. For the tentatively selected plan, assess whether the assumptions made for the life safety hazards are appropriate.
15. For the tentatively selected plan, assess whether the quality and quantity of the surveys, investigations, and engineering are sufficient for a concept design considering the life safety hazards and to support the models and assumptions made for determining the hazards.
16. For the tentatively selected plan, assess whether the analysis adequately address the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project.

Specific Technical and Scientific Charge Questions

17. Are any additional design assumptions necessary to validate the conceptual design of the primary project components?
18. Are the assumptions used to determine the cost of operations and maintenance for the proposed project reasonable and adequately documented?
19. Have the significant project construction costs, including environmental mitigation costs, been adequately identified and described?
20. Are the assumptions and analysis of seismic impacts on project performance and the associated conceptual design and costs to address those impacts adequate and reasonable?
21. Is the assessment of future without- and with-project development in the floodplain, and the associated residual risks to life and property (such as risks to the population and critical infrastructure, availability and effectiveness of evacuation, etc.), reasonable and does it provide an adequate basis for distinguishing among alternatives?

Summary Questions

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

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

24. Does information or concerns raised in the public raise any additional discipline-specific technical concerns with regard to the overall report?

APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire

[Independent External Peer Review]

[San Joaquin River IEPR]

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

NAME OF FIRM: **Battelle Memorial Institute**
REPRESENTATIVE'S NAME: **Gina M. Crabtree**
TELEPHONE: **614-424-5097**
ADDRESS: **505 King Avenue, Columbus, OH 43201**
EMAIL ADDRESS: **crabtreeg@battelle.org**

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

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

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

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

V. ADDITIONAL INFORMATION. Report relevant aspects of your firm's background or present circumstances not addressed above that might reasonably be construed by others as affecting your firm's judgment. Please include any information that may reasonably: impair your firm's objectivity; skew the competition in favor of your firm; or allow your firm unequal access to nonpublic information. **No additional information to report.**

LaDonna James

Digitally signed by LaDonna James
DN: cn=LaDonna James, o=Battelle Memorial Institute, ou=Contracts, email=jamesl@battelle.org, c=US
Date: 2014.03.25 14:20:18 -04'00'

FOR: Gina Crabtree, Battelle

March 25, 2014
DATE

Battelle
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