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U.S. ARMY CORPS OF ENGINEERS
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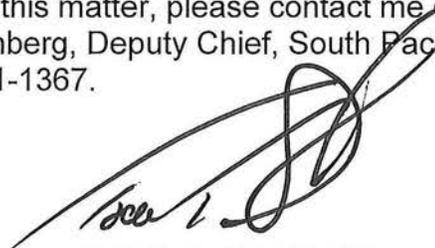
JUL 31 2018

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Lower San Joaquin River Feasibility Report, California Final Integrated Interim Feasibility Report/Environmental Impact Statement/Environmental Impact Report – Final USACE Response to Independent External Peer Review

1. An Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, Engineering Circular (EC) 1165-2-214, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004).
2. The IEPR was conducted by Battelle Memorial Institute (Battelle). Battelle consulted with the Flood Risk Management Planning Center of Expertise to select panel members. The IEPR panel consisted of four panel members with technical expertise in civil works planning, biological resources and environmental law compliance, hydrology and hydraulics, and geotechnical engineering.
3. The enclosed document contains the approved final written responses of the Chief of Engineers to the issues raised and the recommendations contained in the IEPR report. The IEPR Report and the USACE responses have been coordinated with the vertical team and will be posted on the internet, as required by EC 1165-2-214.
4. If your staff have any questions on this matter, please contact me or have a member of your staff contact Bradd Schwichtenberg, Deputy Chief, South Pacific Division Regional Integration Team, at 202-761-1367.

Encl



TODD T. SEMONITE
Lieutenant General, USA
Commanding

Lower San Joaquin River Feasibility Study, California
Final Integrated Interim Feasibility Report/Environmental Impact Statement/Report
U.S. Army Corps of Engineers Response to Independent External Peer Review
August 2017

Independent External Peer Review (IEPR) was conducted for the subject study in accordance with Section 2034 of the Water Resources Development Act of 2007, Engineering Circular 1165-2-214, and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (2004).

The goal of the U.S. Army Corps of Engineers (USACE) Civil Works program is to provide scientifically sound, sustainable water resource solutions for the nation. The USACE review processes are essential to ensure project safety and quality of the products USACE provides to the American people. Battelle Memorial Institute (Battelle), a non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to conduct the IEPR of the Lower San Joaquin Flood Risk Management Feasibility Study Report/Environmental Impact Statement/Environmental Impact Report (FR/EIS/EIR, or Report).

Based on the technical content of the study documents and the overall scope of the project, Battelle identified candidates for the panel in the field of Civil Works Planning, National Environmental Policy Act (NEPA), Biology, Hydrology, and Hydraulics Engineering, and Geotechnical Engineering. Four Panel members were selected for the IEPR.

The Battelle IEPR Panel reviewed the draft feasibility report and supporting documentation. The Final IEPR Battelle Report was issued on May 8, 2015. According to the Battelle report, the documentation in the Report, supporting appendices, and background information provide considerable analysis and effectively summarized the work conducted for the project. However, the Panel did identify elements of the project that require further documentation and sections of the Report that should be clarified or revised. Overall, eight comments were identified and documented; all were identified as having low significance. The following discussions present the Final Agency Response to the comments:

1. IEPR Comment #1: *Low Significance*: The description of the Tentatively Selected Plan selection process is not consistent throughout the document.

The comment details that the purpose of the report is to describe the planning process used to evaluate alternatives and identify the Tentatively Selected Plan (TSP), but the process is not described consistently throughout the document. The comment includes three recommendations for resolution, two of which were adopted and one not adopted.

Recommendation 1 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report clarify the role of the planning objectives by stating 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. Section 2.2.3, Planning Objectives, was modified to clarify that the planning objectives, in addition to the NED objective, represent opportunities that may or may not be fully met by a selected plan.

Recommendation 2 – USACE Response: Not Adopted

Action Taken: The IEPR Panel recommended that the Report rename Section 3.9, Selecting the Tentatively Selected Plan, because it demonstrates the superiority of an alternative that is not selected. The Report follows the plan formulation process in disclosing preliminary alternatives during early plan formulation that are refined in the final array, and ultimately the Recommended Plan.

Recommendation 3 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report include additional decision criteria, if applicable, selecting the Tentatively Selected Plan (TSP). Changes have been made to Sections 2.2.3, Planning Objectives, and Section 3.9, Selecting a Recommended Plan, to clarify the decision making process and fully describe the decision criteria for selection of the TSP and Recommended Plan.

- 2. Comment – *Low Significance*: 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.**

The comment details that providing the information would help the reader understand the risks, uncertainties, and standard errors involved in each alternative and the differences among them. The comment also details that “significant differences” is a statistical concept that hinges not on single values but on errors in probabilistic analysis, such as the calculation of flood damage benefits. The comment includes two recommendations for resolution, both of which were adopted.

Recommendation 1 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report include standard errors or other probabilistic information regarding the benefit calculations of each alternative examined. As a result of the recommendation, a probabilistic discussion of net benefits and damages, including uncertainties and standard errors, was added to both the Economics Appendix and Chapter 3, Plan Formulation, of the main report.

Recommendation 2 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report consider using different language regarding the term "significant" when used in a non-technical sense. The text has been revised for clarification and appropriate presentation. A discussion of Engineering Regulation 1105-2-100, *Planning Guidance Notebook*, Appendix G has been added to Section 3.8, Identification of the NED Plan, of the main report, regarding the required selection of the least cost plan when benefits of additional increments are marginal has been added to more clearly define the use of the term “significant” in a technical manner.

- 3. Comment – *Significance Low*: 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.**

The comment details inconsistencies between the Report and the Economics Appendix should be addressed to ensure that Other Social Effects (OSE) metrics are analyzed consistently for the proposed

project. The comment includes three recommendations for resolution, all of which were adopted.

Recommendation 1 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report present the set of metrics used for OSE analysis consistently throughout the document. USACE reviewed the FR/EIS/EIR and ensured that the OSE detailed analysis was presented consistently in the revised document, adding information within the document where necessary (as seen in Section 3.9, Selecting a Recommended Plan, of the main report, and Section 4.6 of the Economics Appendix).

Recommendation 2 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report describe any secondary concerns related to OSE, and indicate whether they affect the selection of the Recommended Plan. The Recommended Plan selection has not changed due to additional evaluation in the OSE account analysis, but secondary concerns are included in the final report in Section 3.9 as a result of the recommendation.

Recommendation 3 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report calculate any other metrics for the results of the OSE that are to be developed for the other alternatives. The analysis of OSE, using consistent metrics, have been included for each alternative in the final report in Table 3-11: Comparison of Alternatives to Principles and Guidelines System of Accounts, and the preceding paragraph in Section 3.9.

4. Comment – *Low Significance*: The discussion of the significance of the judgment factors on potential levee failure, risk, and uncertainty is incomplete.

The comment details that 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. The comment includes one recommendation, which was adopted.

Recommendation 1 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report include a discussion of the risks associated with the judgment issues in Section 3.1 of the Geotechnical Addendum outlining the potential failure modes considered in the geotechnical evaluation of the levees. Section 3.1 has been revised to include a complete discussion of the judgment curve methodology, failure modes considered, performance indicators used to assess each component of the judgment curve, and the impact on fragility for each mode based on criteria for the performance indicators.

5. Comment – *Low Significance*: 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.

The comment details that stronger documentation of residual risk associated with judgment-related issues and its impact to project benefits would help ensure that issues not being remediated from the project upgrades is relatively minor, as documented in the report. The comment includes one recommendation, which was adopted.

Recommendation 1 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report provide information on the estimated scale of the portions of the levee system for which conditions that elevate risk associated with judgment factors (e.g., vegetation, encroachment, utility penetrations, animal burrows) will be left in place following the levee upgrades. An informal HEC-FDA sensitivity analysis was conducted using with-project fragility curves that included the judgment portion of the without-project curves. Benefit reductions were relatively insignificant (less than 10 percent) given the high benefit-to-cost ratios and the ranking of the alternatives were not changed. It was concluded that the NED was unchanged, and no further action was taken.

6. Comment – *Low Significance*: The process for combining major risk categories, including seismic risk, and the contribution of the major risks categories to overall risk are unclear.

The comment details that the Report is not clear how the geotechnical risks were combined with seismic and overtopping risks in the overall risk and uncertainty evaluation. The comment includes one recommendation, which was adopted.

Recommendation 1 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report provide a description of how combined geotechnical, seismic, and overtopping risks were evaluated to aid in understanding the decision-making process for the TSP. The report has been revised to clarify how the combined geotechnical, seismic, and overtopping risks were evaluated in the existing and future without project levee conditions. Additional information is provided in the Section 2.4.5 of the Economic Appendix describing the geotechnical performance relationship curve which represents the most likely levee failure mode for a given breach location.

7. Comment – *Low Significance*: The relative significance of each hydrologic and hydraulic modeling simulation and how each supports the alternatives evaluation has not been discussed.

The comment details that a description of the relative significance of the various hydrologic and hydraulic modeling components for the alternatives evaluation would provide a more objective understanding of the future without-project conditions versus each of the considered alternatives. The comment includes one recommendation, which was adopted.

Recommendation 1 – USACE Response: Adopted

Action Taken: The IEPR Panel recommended that the Report 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: reservoir routing, hydrologic modeling, 1-D hydraulic modeling, 2-D hydraulic modeling, and boundary conditions, including tidal levels. In response to the recommendation, Flood Damage Reduction Analysis (FDA) model uncertainties were reviewed. FDA is a Monte-Carlo simulation based model and the H&H uncertainties input into the model were consistent across all alternatives and without-project conditions. The probabilistic FDA model results therefore incorporate the relative uncertainty for key hydrologic and hydraulic

simulations based on high, medium, and low (25% confidence, 50% confidence, and 75% confidence intervals, respectively) uncertainty conditions. It was concluded that relative ranking of alternatives and identification of the NED plan was not changed under high, medium, or low conditions. No further action was taken.

8. Comment – *Low Significance*: Impacts on groundwater elevations from seepage barriers such as a cutoff wall are possible but are not discussed.

The comment details additional documentation of concerns raised during public review related to groundwater impacts related to cutoff walls in order to make the document more complete. The comment includes one recommendation, which was adopted.

Recommendation 1 – USACE Response: Adopted

Action To Be Taken: The IEPR Panel recommended that the report reflect an assessment of impacts, conduct additional investigations (if necessary), and provide documentation on the impacts on groundwater from installation of seepage barriers in the project area to address concerns raised throughout the public comments to make the document more complete. Chapter 5, Affected Environment and Environmental Consequences of the main report discusses feasibility level studies of groundwater impacts (Section 5.6) for each alternative. An appropriate level of evaluation will be performed in Preconstruction Engineering and Design to assess the potential impacts to the groundwater basin.