

REVIEW PLAN

**Lower San Joaquin River, California
Integrated Feasibility Study and EIS/EIR**

Sacramento District



**US Army Corps
of Engineers®**

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1. PURPOSE AND REQUIREMENTS

- a. **Purpose.** This Review Plan defines the scope and level of peer review for the Lower San Joaquin River, California, Flood Risk Management Feasibility Study. The review plan addresses the implementation of Planning Modernization Guidelines (SMART Planning/3x3x3) to the study. This feasibility study process is anticipated to cumulate in a decision document to Congress for potential authorization of a new project.
- b. **References**
- (1) Engineering Circular (EC) 1165-2-214, Civil Works Review , 15 DEC 2012
 - (2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
 - (3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
 - (4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
 - (5) Lower San Joaquin River, California Feasibility Study Project Management Plan, 17 Nov 2008
 - (6) CESP-D-1110-1-8, Appendix C, Quality Management of Planning Documents, 20 Sep 2004
- c. **Requirements.** This review plan was developed in accordance with EC 1165-2-214, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-214) and planning model certification/approval (per EC 1105-2-412).

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the peer review effort described in this Review Plan is the Flood Risk Management (FRM) PCX.

The RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies. Appropriate coordination with the Risk Management Center (RMC) will be conducted by the FRM PCX for life-safety components of the study.

3. STUDY INFORMATION

- a. **Decision Document.** The purpose of the study is to identify 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 FRM 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. The feasibility phase of this project is cost shared 50 percent Federal, 50 percent non-Federal with the project sponsors, the San Joaquin Area Flood Control Agency (SJAFC), and the State of California Central Valley Flood Protection Board (CVFPB).

- b. Study/Project Description.** The study area is along the lower (northern) portion of the San Joaquin River system in the Central Valley of California (see Figure 1). The San Joaquin River originates on the western slope of the Sierra Nevada and emerges from the foothills at Friant Dam. The river flows west to the Central Valley, where it is joined by the Fresno, Chowchilla, Merced, Tuolumne, Stanislaus and Calaveras rivers, and smaller tributaries as it flows north to the Sacramento-San Joaquin Delta (Delta), which in turn flows into the San Francisco Bay en route to the Pacific Ocean (See Figure 2). The primary study area includes the main stem of the San Joaquin River and its floodplains from the Mariposa Bypass downstream to and including the city of Stockton. This includes the distributor channels of the San Joaquin River in the southernmost reaches of the Delta: Paradise Cut and Old River as far north as Tracy Boulevard; Little Johns Creek and Farmington Dam areas southeast of Stockton; and north of Stockton including the Lodi Waste Water Treatment Plant at Thornton Road and Interstate 5. The overall study area includes those areas adjacent to the primary study area which could be influenced by potential actions to address the identified problems and needs. The study will focus on FRM and ER alternatives along the Lower San Joaquin River from the Mariposa Bypass to and including the city of Stockton. The non-Federal sponsors are interested in reducing flood risk to the existing urbanized areas in the city of Stockton, and parts of Tracy and Manteca, and the public infrastructure outside the city of Lodi (See Figure 3). They are interested in accomplishing ecosystem restoration within this area of primary interest for FRM.

There is an area to the south of Stockton that has been subject to repeated attempts for urbanization. The area, referred to as River Islands, has been the focus of negotiations between the CVFPB (a non-Federal sponsor for the feasibility study), development interests, the Natural Resources Defense Counsel and the Natural Heritage Institute. As a result of those negotiations, the CVFPB has indicated that they would like the feasibility study to include consideration of a high flow bypass channel as a FRM measure. Local interests are pursuing a study resolution to direct the study to include that measure. Inclusion of such a measure is consistent with the flood-related problems, objectives, and potential solutions that will be under consideration as part of the feasibility study.

Figure 1. Project Study Area

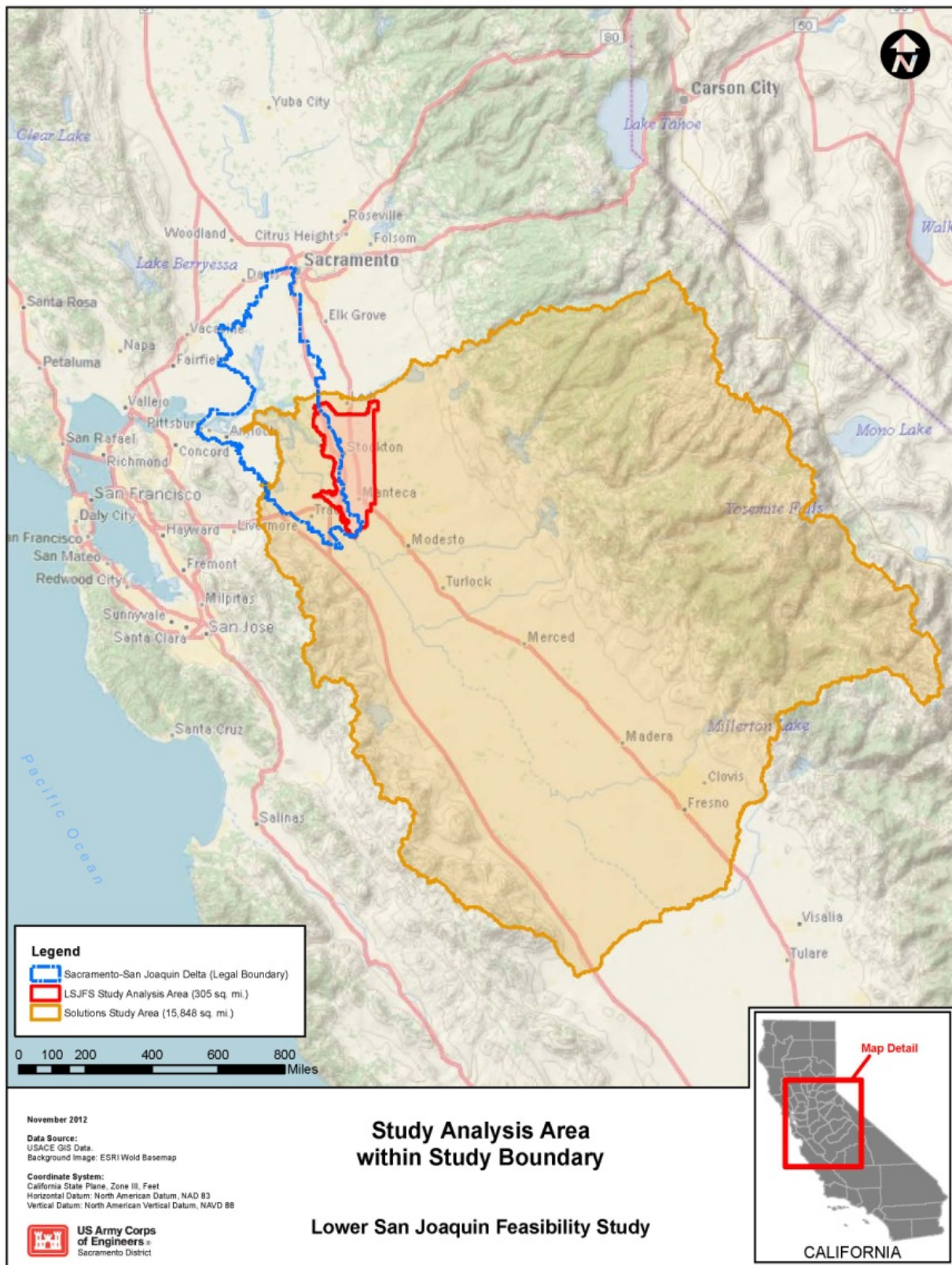


Figure 2: San Joaquin River Basin Reservoirs

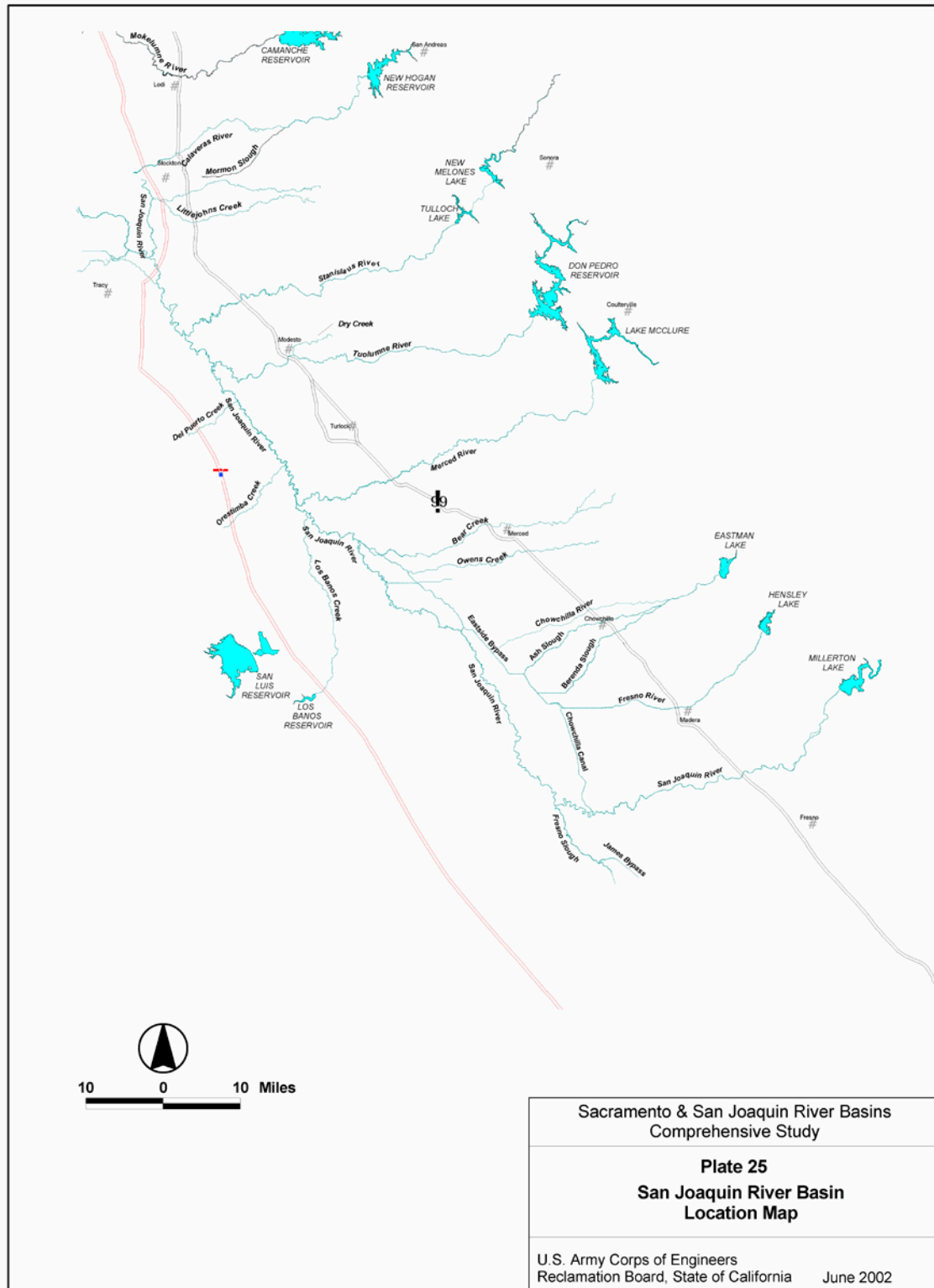
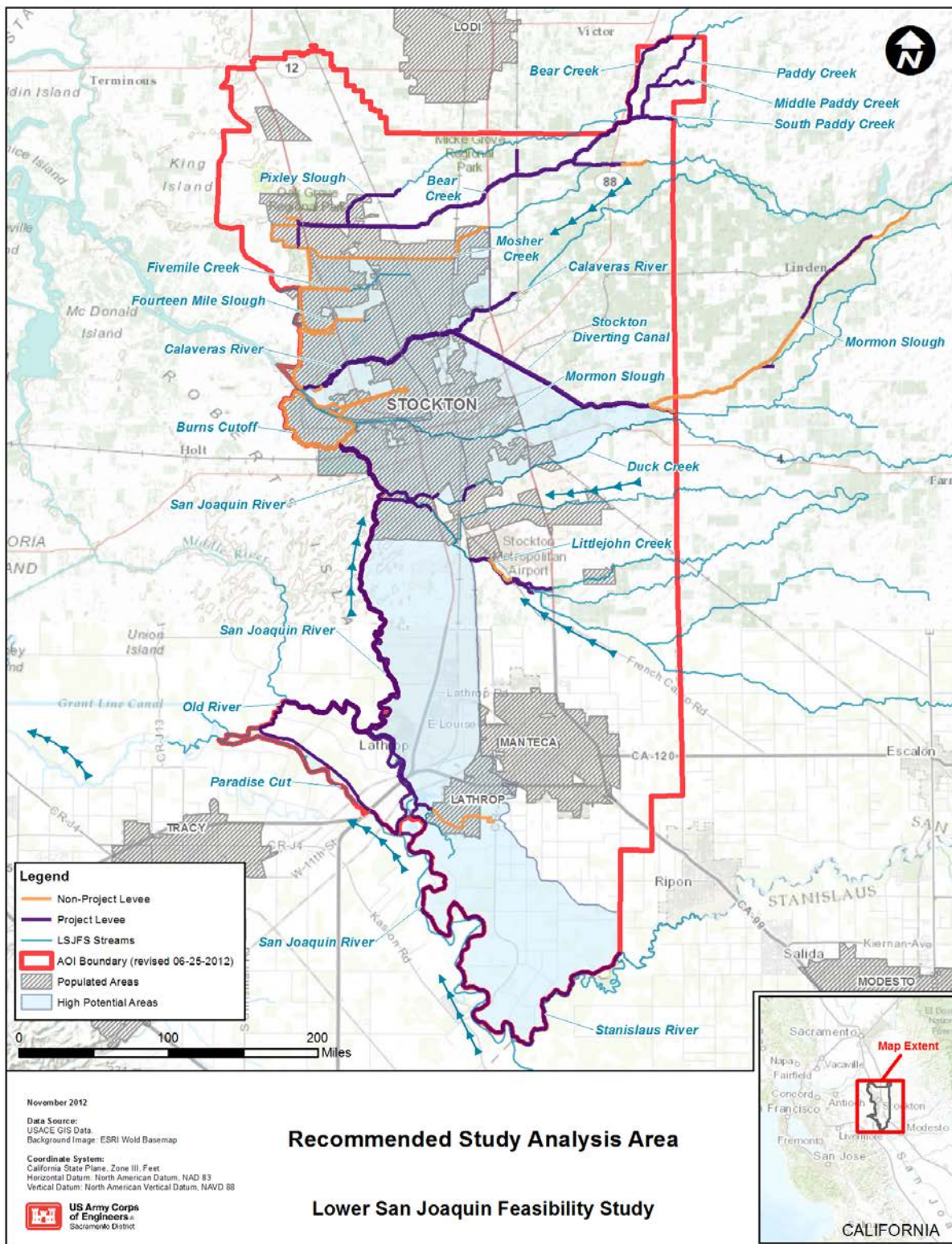


Figure 3: Refined Study Area



c. Factors Affecting the Scope and Level of Review. This section discusses the factors affecting the risk informed decisions on the appropriate scope and level of review. The project risk register is provided as Attachment 5.

- The Governor has not requested a peer review by independent experts;
- Public and agency input will be sought in order to minimize the potential for controversy.
- Uncertainty related to success of the project ultimately will be low to moderate – if the proposed review processes are implemented - because the methods used for evaluating the project are standard and the concept of implementing proposed project features is not innovative;
- The information in the decision document and the anticipated project design is not likely to be based on novel methods, involve the use of innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices.

There is significant risk to public health, safety and property in the project area associated with flooding. The existing levee system within the project area protects over 71,000 acres of mixed-use land with a current population estimated at 250,000 residents and an estimated \$9.8 billion in damageable property. The study area has experienced flooding events in 1955, 1958, and 1997. The 1955 and 1958 events resulted in areas of Stockton and surroundings being inundated for several weeks. Flooding in 1997 occurred in upstream areas which probably reduced the failures in the system downstream, but flood fighting occurred in the study area.

Project non-performance has the potential to impact not only the population and infrastructure noted above, but also regional and national level commerce. The study area is traversed by Interstate 5 and Highway 99, two major north-south corridors for movement of goods. There is potential for interruption of transit of goods from Mexico to Canada should either of these corridors be impacted by flooding events. There are also two main railroad lines that could be similarly impacted by non-performance of the flood risk reduction system.

The study is one of the first to implement the Planning SMART guidance; therefore, the PDT and reviewers will be involved in a new process which will require a change from business as usual. This will be especially challenging for reviewers as they will have to manage and balance an adequate level of detail and uncertainty throughout the pre-authorization planning process, eliminating unnecessary data collection and analyses while maintaining quality of analysis and outcome.

d. In-Kind Contributions. Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, IEPR, and Type II IEPR, Safety Assurance Review (SAR). The in-kind products and analyses to be provided by the non-Federal sponsor include: Hydraulic modeling of study area streams and preliminary civil design of alternatives for analysis and screening toward selection of the Tentatively Selected Plan.

4. DISTRICT QUALITY CONTROL (DQC)

All decision documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan

(PMP). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

- a. **Documentation of DQC.** DQC will be documented in Microsoft Word files which include the original comment, response and back-check of the comment. After back-check is completed, the files will be provided to the ATR team prior to review at each milestone.
- b. **Products to Undergo DQC.** All interim documents, vertical team read ahead documents, milestone presentations, technical appendices, draft and final report documentation will undergo DQC.
- c. **Required DQC Expertise.** The DQC will be performed by District staff with expertise in the specific field, including regional technical specialists and supervisory staff.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is managed within USACE by the designated RMO and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC.

- a. **Products to Undergo ATR.** The Lower San Joaquin River Feasibility Report will be an integrated document which includes all of the analysis necessary to satisfy NEPA and CEQA requirements. The Feasibility report and all of the Appendices will undergo ATR review. ATR review of the Hydrologic modeling will begin prior to initiation of ATR review for the other technical elements in order to verify assumptions from the modeling that are used in development of the hydraulic, economic, environmental and plan formulation analysis. The following products will have ATR conducted:

Hydrologic Appendix
Draft Integrated Feasibility Report
Final Integrated Feasibility Report

Should other products or documents have the need for ATR identified, the PDT will coordinate with the PCX and ATR Lead at least four weeks in advance to prepare for the review of those products.

- b. **Required ATR Team Expertise.** The ATR team shall be comprised of members with the following expertise:

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).

ATR Team Members/Disciplines	Expertise Required
Planning	The Planning reviewer should be a senior water resources planner with experience in civil works process, watershed level projects, current flood risk management planning and policy guidance, and have experience in plan formulation for multipurpose projects, specifically integrating measures for flood risk management, ecosystem restoration, recreation, watersheds, and planning in a collaborative environment.
Economics	Team member will be experienced in civil works and related flood risk reduction projects, and have a thorough understanding of HEC-FDA.
Environmental Resources	Team member will be experienced in NEPA/CEQA process and analysis, and have a biological or environmental background that is familiar with the project area and ecosystem restoration.
Cultural Resources	Team member will be experienced in cultural resources and tribal issues, regulations, and laws.
Hydrology	The reviewer should be familiar with the computation of frequency curves using conditional probability methods and development of hydrographs. The team member should have an understanding and expertise in water management, particularly reservoir operation and re-operation. The team member will have an understanding of computer modeling techniques that will be used for this project (HEC-HMS, HEC-ResSim).
Hydraulic Engineering	The hydraulic engineering reviewer should be an expert in the field of urban hydrology & hydraulics, geomorphology/sediment transport, have a thorough understanding of the dynamics of the both open channel flow systems, enclosed systems, application of detention / retention basins, effects of best management practices and low impact development on hydrology, approaches that can benefit water quality, application of levees and flood walls in an urban environment with space constraints, non-structural measures especially as related to multipurpose alternatives including ecosystem restoration, non-structural solutions involving flood warning systems, and non-structural alternatives related to flood proofing. The team member will have an understanding of computer modeling techniques that will be used for this project (HEC-HMS, HEC-RAS, UNET, and TABS).
Geotechnical Engineering	Team member will be experienced in levee & floodwall design, post-construction evaluation, and rehabilitation. A certified professional engineer is recommended.
Civil Engineering	Team member will have experience in utility relocations, positive closure requirements and internal drainage for levee construction, and application of non-structural flood damage reduction, specifically flood proofing. A certified professional engineer is suggested. Team member will also have a thorough understanding of non-structural measures, levee, flood wall, and retaining wall design, and structures typically associated with

ATR Team Members/Disciplines	Expertise Required
	levees (pump stations, gate well structures, utility penetrations, stop log & sandbag gaps, and other closure structures). Team member will also have expertise and understanding of vertical datum compliance to assure appropriate basis of design. A certified professional engineer is recommended though not required.
Cost Engineering	This reviewer will be familiar with cost estimating for similar civil works projects using MCACES. Team member will be a Certified Cost Technician, Certified Cost Consultant, or Certified Cost Engineer. A separate process and coordination is also required through the Walla Walla District DX for cost engineering.
Real Estate	The reviewer will be experienced in federal civil work real estate laws, policies and guidance. Members shall have experience working with respective sponsor real estate issues.
Risk Analysis	The risk analysis reviewer will be experienced with performing and presenting risk analyses in accordance with ER 1105-2-101 and other related guidance, including familiarity with how information from the various disciplines involved in the analysis interact and affect the results.

c. Documentation of ATR. DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

- (1) The review concern – identify the product’s information deficiency or incorrect application of policy, guidance, or procedures;
- (2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not be properly followed;
- (3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
- (4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist.

The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved

concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- Identify the document(s) reviewed and the purpose of the review;
- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions;
- Identify and summarize each unresolved issue (if any); and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the AFB, draft report, and final report. A sample Statement of Technical Review is included in Attachment 2.

d. ATR Strategy

(1) The ATR's will be numbered chronologically based on their intended purpose.

- ATR #1 is the ATR of the detailed Hydrology Report.
- ATR #2 is the ATR for the Draft Integrated Report.
- ATR #3 will be the ATR for the Final Integrated Report.
- Additional ATRs will be numbered sequentially and titled appropriately as needed.

The PDT and ATRT will provide descriptive titles for the reviews as they are coordinated with the vertical team and PCX in addition to the numbering scheme discussed above. Should other products or documents have the need for ATR identified; the PDT will coordinate with the PCX and ATR Lead at least four weeks in advance to prepare for the review of those products.

(2) Reviews of technical documents will be conducted seamlessly:

NOTE: For ATRs of major documents, such as the Draft and Final Reports, the following will ensure collaboration between all ATRT and PDT members.

- #1 PDT and ATR Lead develop “Instructions for ATR”, which includes short, summary ATR information for the whole ATR process and specific information covering the technical document under review.
- #2 PDT submits documentation to ATRT member(s) with “Instructions for ATR” (to Lead and members of the ATR team appropriate for the given technical document).
- #3a ATRT member(s) review(s) materials and records initial comments and/or clarifying questions in ATR #X Comment-Response spreadsheet provided with the “Instructions for ATR” package.
- #3b Concurrently with step #3a, ATRT members contact appropriate PDT members independently to discuss clarifying questions, potentially causing the comment to be withdrawn and deleted from the spreadsheet or modified to better address the concern.
- #4a After discussion with appropriate PDT members, ATRT members submit their minor, less significant (e.g. editorial, clarifying, etc.) comments in the Comment-Response spreadsheet to the ATR Lead who will collect and consolidate as needed. The ATR Lead will compile comments into one spreadsheet which will be entered into DrChecks as an attachment to a single comment.
- #4b ATRT members enter significant comments into DrChecks. ATR members flag comments they feel are critical. Comments entered into Dr. Checks will follow the 4-part format identified in paragraph 3.i(1) of Appendix c to EC 1165-2-214.
- #5a OPTIONAL: Teleconference with appropriate ATRT and PDT members will be conducted at this point for technical document comments, if resolution of comment(s) and agreement on needed PDT actions cannot be achieved through step #3b.
- #5b In the event a teleconference is conducted the PDT will prepare an MFR of the teleconference and include it as one comment in DrChecks.
- #6a Appropriate PDT member(s) will enter the “evaluation” for specific comments into Dr. Checks and respond to all comments contained in spreadsheet.
- #6b Depending on the significance of the concern and the agreed to PDT action determined in steps #3b or #5b and documented in step #6a, PDT may be required to prepare and provide to the ATRT revised documents and/or portions of documents for the ATRT to confirm that the agreed changes have been accomplished before the ATRT member closes the backcheck in DrChecks.
- #6c Appropriate ATR members will backcheck PDT responses and any revised documentation in DrChecks and closeout the comment.
- #6d **NOTE:** If PDT and ATRT were not able to agree upon the resolution of a comment during the teleconference this will be noted in DrChecks and appropriate procedures

identified in EC 1165-2-214, Appendix C, paragraphs 3j(3)-(6), pages C-7/8 undertaken to resolve the impasse.

- #7 ATR Lead will create the Interim Review Report for ATR#X in accordance with paragraph 4.k(13) and 4.k(14) of Appendix B of EC 1165-2-214, covering the items specified therein. NOTE: For draft/final reviews of the Cost Estimate Appendix, the cost estimate certification must be prepared by the Cost Engineering Directory of Expertise in Walla Walla District and provided to the ATR Lead for inclusion in the Interim Review Report.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR may be required for decision documents under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-214, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR:

- **Type I IEPR.** Type I IEPR reviews are managed outside the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-214.
 - **Type II IEPR.** Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.
- a. Decision on IEPR.** Type I IEPR will be conducted for the Feasibility Study and a Type II Safety Assurance Review (SAR) will be conducted during the PED and construction phases of the project. Safety Assurance will also be addressed during the Type I IEPR per Paragraph 2.c. (3) of Appendix D of EC 1165-2-214. This section documents the risk informed decision on the conduct of IEPR for the Lower San Joaquin River Feasibility Study. The decision has been based on the criteria in EC 1165-2-214 and the discussion in Section 3 – Factors Affecting the Scope and Level of Review. The following issues were considered as part of the risk informed decision:

- The estimated Total Project Cost may be above the \$45 million trigger amount; therefore, the PDT will assume IEPR will take place.
- The Sacramento District has not received a request to conduct IEPR from a head of a Federal or state agency charged with reviewing the project.
- The proposed project meets the criteria for conducting Type II IEPR described in Paragraph 2 of Appendix E of EC 1165-2-214, including:
 - The Federal Action is justified partially by that fact the Chief of Engineering has determined there is a life safety risk.
 - Redundancy, resiliency, and robustness will be considered during project formulation and design.

EC 1165-2-214 Criteria	Lower San Joaquin River Feasibility Study
Is there significant threat to human life?	There are urbanized areas within the study area that have experienced fatalities in past flood events; thus there is a threat to human life/safety. The Sacramento District Chief of Engineering concurs with the assessment of life safety described in this Review Plan.
Is the total project cost more than \$45 million?	It can be assumed that the ultimate cost associated with a recommended plan is likely to be in excess of the \$45 million threshold.
Has the Governor of California requested a Type I IEPR?	The Governor has not requested a Type I IEPR.
Has the head of a Federal or state agency charged with reviewing the project study requested a Type I IEPR?	No requests have been received for a Type I IEPR for this study.
Will there be significant public controversy as to size, nature, or effects of the project?	The project has potential for public controversy. Depending on measures selected to meet planning objectives, there may be significant real estate takings to implement a project including set-back or adjacent levees. Should flood walls be implemented, there may be controversy over reduced access to river-based recreational activities.
Will there be significant public controversy as to the economic or environmental cost or benefit of the project?	The project has potential for public controversy. The City of Stockton has filed for bankruptcy and any assessments to fund a project will require local elections for approval. There are portions of the study area with extensive encroachments on the levee system that may raise economic costs of any proposed project.

EC 1165-2-214 Criteria	Lower San Joaquin River Feasibility Study
Will the study be based on information from novel methods, present complex challenges or interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices?	The study is one of the first to implement the Planning SMART guidance; therefore, the PDT and reviewers will be involved in a new process which will require a change from business as usual. This will be especially challenging for reviewers as they will have to manage and balance an adequate level of detail and uncertainty throughout the pre-authorization planning process, eliminating unnecessary data collection and analyses while maintaining quality of analysis and outcome.

- b. Products to Undergo Type I IEPR.** IEPR will be performed on the Integrated Feasibility Report, EIS/EIR and Appendices. The review will take place at the draft report stage, concurrent with public review.
- c. Required Type I IEPR Panel Expertise.** This section outlines the number of Type I IEPR panel members and briefly describes the expertise that will be represented on the panel. The expertise represented on the Type I IEPR panel is similar to those on the ATR team, but is more specifically focused and doesn't involve as many disciplines. The panel includes the necessary expertise to assess the engineering, environmental, and economic adequacy of the decision document as required by EC 1165-2-214, Appendix D. The PDT has made the initial assessment of the expertise is needed based on the PMP and the factors affecting the scope and level of review outlined in Section 3 of the review plan. The Outside Eligible Organization (OEO) will determine the final participants on the panel. The following table provides the disciplines that will be included on the IEPR team and a description of the expertise required.

IEPR Panel Members/Disciplines	Expertise Required
Economics	The Economics Panel Member should be experienced in civil works and related flood risk reduction projects, and have a thorough understanding of HEC-FDA.
Environmental	The Environmental panel member will be experienced in NEPA/CEQA process and analysis, and have a biological or environmental background that is familiar with the project area and ecosystem restoration.
Engineering with a focus on Hydraulics	The Panel Member should be an expert in the field of urban hydrology & hydraulics, have a thorough understanding of the dynamics of the both open channel flow systems, enclosed systems, application of detention / retention basins, effects of best management practices and low impact development on hydrology, approaches that can benefit water quality, application of levees and flood walls in an urban environment with space constraints, non-structural measures especially as related to multipurpose alternatives including ecosystem restoration, non-structural solutions involving flood warning systems, and non-structural alternatives related to flood proofing. The team member will have an understanding of computer modeling

IEPR Panel Members/Disciplines	Expertise Required
	techniques that will be used for this project (HEC-HMS, HEC-RAS, UNET, and TABS).
Geotechnical Engineer	The geotechnical engineering reviewer should have an extensive experience in evaluation of flood risk management structures such as static and dynamic slope stability, evaluation of the seepage through earthen embankments and under seepage through the foundation of the flood risk management structures, including dam and levee embankments, floodwalls, closure structures and other pertinent features, and in settlement evaluation of the structures.

d. Documentation of Type I IEPR. The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, Appendix D. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 4.d above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

e. Products to Undergo Type II IEPR, SAR. This list of products to undergo SAR is preliminary and will be refined as the review plan is updated during the transition from Feasibility Phase to the Planning, Engineering, and Design (PED) phase. The products expected to undergo SAR will be: Detailed Design Reports, Plans and Specifications, and other reports developed during the PED phase.

f. Required Type II IEPR Panel Expertise. This section outlines the number of Type II IEPR panel members expected and briefly describes the expertise that will be represented on the panel. This will be refined as the study moves from the Feasibility phase to the PED phase. The expertise represented on the Type II IEPR panel is similar to those on the ATR team, but is more specifically focused and doesn't involve as many disciplines. The panel includes the necessary expertise to assess the engineering, environmental, and economic adequacy of the PED phase documents as well as during construction as required by EC 1165-2-214, Appendix E. The PDT has made the initial assessment of the expertise needed based on the PMP and the factors affecting the scope and level of review outlined in Section 3 of the review plan. The Outside Eligible Organization (OEO) will

determine the final participants on the panel. The following table provides the disciplines that will be included on the IEPR team and a description of the expertise required.

IEPR Panel Members/Disciplines	Expertise Required
Economics	The Economics Panel Member should be experienced in civil works and related flood risk reduction projects, and have a thorough understanding of HEC-FDA.
Environmental	The Environmental panel member will be experienced in NEPA/CEQA process and analysis, and have a biological or environmental background that is familiar with the project area and ecosystem restoration.
Engineering with a focus on Hydraulics	The Panel Member should be an expert in the field of urban hydrology & hydraulics, have a thorough understanding of the dynamics of the both open channel flow systems, enclosed systems, application of detention / retention basins, effects of best management practices and low impact development on hydrology, approaches that can benefit water quality, application of levees and flood walls in an urban environment with space constraints, non-structural measures especially as related to multipurpose alternatives including ecosystem restoration, non-structural solutions involving flood warning systems, and non-structural alternatives related to flood proofing. The team member will have an understanding of computer modeling techniques that will be used for this project (HEC-HMS, HEC-RAS, UNET, and TABS).
Geotechnical Engineer	The geotechnical engineering reviewer should have an extensive experience in evaluation of flood risk management structures such as static and dynamic slope stability, evaluation of the seepage through earthen embankments and under seepage through the foundation of the flood risk management structures, including dam and levee embankments, floodwalls, closure structures and other pertinent features, and in settlement evaluation of the structures.

- g. Documentation of Type II IEPR, Safety Assurance Review.** The SAR review panel will prepare a review report which will be finalized by the District and coordinated with the RMO per EC 1165-2-214, Appendix E.

7. POLICY AND LEGAL COMPLIANCE REVIEW

All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army

policies, particularly policies on analytical methods and the presentation of findings in decision documents.

8. COST ENGINEERING DIRECTORY OF EXPERTISE (DX) REVIEW AND CERTIFICATION

All decision documents shall be coordinated with the Cost Engineering DX, located in the Walla Walla District. The DX will assist in determining the expertise needed on the ATR team and Type I IEPR team (if required) and in the development of the review charge(s). The DX will also provide the Cost Engineering DX certification. The RMO is responsible for coordination with the Cost Engineering DX.

9. MODEL CERTIFICATION AND APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. As part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

- a. Planning Models.** The following planning models are anticipated to be used in the development of the decision document:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
HEC-FDA 1.2.5 (Flood Damage Analysis)	<p>The HEC-FDA program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating flood risk management plans using risk-based analysis methods. The program will be used to evaluate and compare the future without- and with-project plans to aid in the selection of a recommended plan to manage flood risk.</p> <p>This program:</p> <ul style="list-style-type: none">o Provides a repository for both the economic and hydrologic data required for the analysiso Provides the tools needed to understand the resultso Calculates the Expected Annual Damages and the Equivalent Annual Damages	Certified CoP Preferred

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
	<ul style="list-style-type: none"> o Computes the Annual Exceedence Probability and the Conditional Non-Exceedence Probability o Implements the risk-based analysis procedures contained in EM 1110-2-1619. 	
IWR PLAN	This software assists with the formulation and comparison of alternative plans. While IWR-PLAN was initially developed to assist with environmental restoration and watershed planning studies, the program can be useful in planning studies addressing a wide variety of problems. IWR-PLAN can assist with plan formulation by combining solutions to planning problems and calculating the additive effects of each combination, or "plan." IWR-PLAN can assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are the best financial investments and displaying the effects of each on a range of decision variables.	Certified CoP Preferred
Habitat Sensitivity Indices (HSI)	In accordance with the Fish and Wildlife Coordination Act, a HEP analysis, including the use of HSI models, will be used by the Fish and Wildlife Service to identify impacts to habitat. HSI models relevant to the project will be determined by the PDT's environmental subcommittee. The Ecosystem Restoration Planning Center of Expertise has responsibility for approving ecosystem output methodologies for use in ecosystem restoration planning and mitigation planning,	

- b. Engineering Models.** The following engineering models are anticipated to be used in the development of the decision document: The approval status of many engineering models can be found on the Hydraulics, Hydrology, and Coastal Engineering CoP SharePoint site at: <https://kme.usace.army.mil/NTCT/HHC/default.aspx> under shared documents/SET software lists.

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-RAS 4.0 (River Analysis System)	The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program provides the capability to perform one-dimensional steady and unsteady flow river hydraulics calculations. The program will be used for steady flow analysis to evaluate the future without- and with-project conditions along the Lower San Joaquin River, Calaveras River, Paradise Cut, and Mormon Slough.	HH&C CoP Preferred Model
FLO-2D	This model will be used for the overbank reaches.	Allowed for use
HEC-HMS	By applying this model the PDT is able to: <ul style="list-style-type: none"> o Define the watersheds' physical features o Describe the metrological conditions 	CoP Preferred

	<ul style="list-style-type: none"> o Estimate parameters o Analyze simulations o Obtain GIS connectivity 	
HEC-Res-Sim	This model predicts the behavior of reservoirs and to help reservoir operators plan releases in real-time during day-to-day and emergency operations. This model includes a Graphical User Interface, Map-Based Schematics and Rule-Based Operations	CoP Preferred
MCACES or MII	This software is used to help develop detailed cost estimates for the study.	Allowed for use

10. REVIEW SCHEDULES AND COSTS

a. DQC Schedule and Cost

DQC Timeline

Task	Date
DQC Appendices as Available	November 2012 – July 2013
DQC of Alternatives Milestone Documentation	February 2013
DQC of Draft Document	September 2013
DQC of Final Document	July 2014

The estimated costs for DQC are as follows:

- Milestone Documentation and Technical Appendices \$5,000
- Draft Report \$10,000
- Final Report \$10,000
- Total **\$25,000**

b. ATR Schedule and Cost.

ATR Timeline

Task	Date
ATR Hydrology Appendix	February – March 2013
ATR of Draft Document	November – December 2013
ATR Lead Participation in Agency Decision (Milestone #3) Conference	May 2014
ATR of Final Document	August 2014
ATR Certification	September 2014

The estimated costs for the ATR are as follows:

- Draft Report \$40,000
- Final Report \$30,000
- Civil Works Review Board (ATR Lead) \$5,000
- Total **\$75,000**

c. Type I IEPR Schedule and Cost.

IEPR Timeline

Task	Date
Develop IEPR Charge, SOW and IGE	October 2013
District MIPRs funds to CVO ¹	October 2013
CVO awards IEPR Contract	October 2013
Provide draft review docs & charge to OEO	November 2013
OEO – Corps Kickoff Meeting	November 2013
OEO Develops work Plan	December 2013
Conflict of Interest Questionnaire	December 2013
IEPR Panel identified	December 2013
Final Review documents and charge to OEO	January 2014
USACE/OEO kickoff meeting with Panel	January 2014
Panel Review and comment	January 2014
Mid-Review Meeting with Panel	February 2014
Collate Comments and develop IEPR Report	February 2014
OEO submits report to USACE	March 2014
HQ and Congressional Coordination	April 2014
USACE response	April 2014
Panel Back-check	April 2014
IEPR participation at CWRB	May 2014

¹Contract Vehicle Organization.

Estimated costs for the IEPR are as follows:

- FRM PCX for IEPR Manager \$10,000 (Cost Shared)
- District support of IEPR review \$40,000 (Cost Shared)
- IEPR Contract \$200,000 (Federal Cost)

d. Type II IEPR (SAR) Schedule and Cost. Schedule for SAR to be conducted for PED and project construction will be prepared during the transition from Feasibility Phase to PED phase. A preliminary estimate of cost for SAR is \$150,000 at full Federal cost.

e. Model Certification/Approval Schedule and Cost. All planning and engineering models proposed for use during completion of the study are either certified or approved for use. Should any planning models be developed that would need to be certified/approved, this document will be revised to provide a schedule and cost estimate for the certification/approval process.

11. PUBLIC PARTICIPATION

The public will have opportunities to participate in this study. The earliest opportunity will be as part of the NEPA public scoping process during the first year of the study. The public scoping meeting for the NEPA process was held January 27, 2010. Public review of the draft feasibility report will occur after issuance of the Milestone #2 policy guidance memo and concurrence by HQUSACE that the document is ready for public release. As such, public comments other than those provided at any public meetings held during the planning process will not be available to the review teams. Public review of the draft report will begin approximately 1 month after the completion of the ATR process and policy guidance

memo. The period will last a minimum of 45 days as required for an Environmental Impact Statement. One or more public workshops may be held during the public review period if warranted. Comments received during the public comment period for the draft report will be provided to the IEPR team prior to completion of the final Review Report and to the ATRT before review of the final Decision Document. The public review of necessary state or Federal permits will also take place during this period. A formal State and Agency review will occur concurrently with Headquarters review of the Draft Chief's report. However, it is anticipated that intensive coordination with these agencies will have occurred concurrent with the planning process. Upon completion of the review period, comments will be consolidated in a matrix and addressed, if needed. A comment resolution meeting will take place if needed to decide upon the best resolution of comments. A summary of the comments and resolutions will be included in the document. A plan for public participation will be developed early in the study which might identify informal as well as additional formal forums for participation in the study.

12. REVIEW PLAN APPROVAL AND UPDATES

The South Pacific Division Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving District, MSC, RMO, and HQUSACE members) as to the appropriate scope and level of review for the decision document. Like the PMP, the Review Plan is a living document and may change as the study progresses. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) will be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, will be posted on the Home District's webpage. The latest version of the Review Plan will also be provided to the RMO and home MSC.

13. REVIEW PLAN POINTS OF CONTACT

Public questions and/or comments on this review plan can be directed to the following points of contact:

- District Point of Contact: Lead Planner, Mr. Stacy Samuelson, 916-557-6931
- MSC Point of Contact: DST Lead Sacramento District, Ms. Karen Berresford, 410-503-6557
- FRM-PCX Point of Contact: Eric Thaut, Deputy Director, 415-503-6852

ATTACHMENT 1: TEAM ROSTERS

Name	Role in the Study	Contact Information	Email
Project Delivery Team (PDT) Members			
Michelle Williams, Project Manager (CESPK-PM-C)	Report Review, Schedule and Budget	(916) 557-7098	Michelle.R.Williams@usace.army.mil
Scott Miner, (CESPK-PD-W)	Plan Formulation and Ecosystem Restoration	(916) 557-6695	Scott.P.Miner@usace.army.mil
Stacy Samuelson, Water Resources Planner (CESPK-PD-WF)	Plan Formulation and evaluation. Report Preparation. Graphic Preparation	(916) 557-7368	Stacy.D.Samuelson@usace.army.mil
Tanis Toland, Environmental Manager (CESPK-PD-W)	Report Preparation and Impact Assessment	(916) 557-6717	Tanis.J.Toland@usace.army.mil
Paul Larson, PE DWR Project Manager	State Coordination	(916) 574-1050	plarson@water.ca.gov
Aaron Schlein, Economist (CESPK-PD-WE)	Economic Analysis	(916) 557-5372	Aaron.P.Schlein@usace.army.mil
Gary Bedker, Agricultural Economist (CESPK-PD-W)	Agriculture Economic Damage Assessment	(916) 557-6707	Gary.M.Bedker@usace.army.mil
Mike Lin, Hydraulic Engineer(CESPK-ED-HD)	Hydraulic Design	(916) 557-7967	Mike.C.Lin@usace.army.mil
Bob Vrchoticky, Cost Engineering (CESPK-ED-DR)	Cost Engineering	(916) 557-7336	Robert.D.Vrchoticky@usace.army.mil
Jesse Hogan, Geotechnical Engineer(CESPK-ED-GS)	Geotechnical Analysis and Report Preparation	(916) 557-7178	Jesse.W.Hogan@usace.army.mil
Will Doyle, Civil Engineer(CESPK-ED-DB)	Civil Design – Technical Lead	(916) 557-7429	William.A.Doyle@usace.army.mil
Benson Liang, Civil Design(CESPK-ED-D)	Civil Design	(916) 557-6768	Benson.Y.Liang@usace.army.mil
Jeremy Hollis, Real Estate Specialist (CESPK-RE-B)	Real Estate	(916) 557-6880	Jeremy.I.Hollis@usace.army.mil
Lisa Clay, Attorney, (CESPK-OC)	Environmental Legal Review	(916) 557-5295	Lisa.H.Clay@usace.army.mil
Carolyn Alexander, Attorney, (CESPK-OC)	Real Estate Legal Review	(916) 557-5239	Carolyn.A.Alexander@usace.army.mil
Alarice Hansberry, Attorney, (CESPK-OC)	Legal Review	(916) 557-7264	Alarice.R.Hansberry@usace.army.mil

Name	Role in the Study	Contact Information	Email
District Quality Control (DQC) Team Members			
Mike Dietl (CESPK-PD-WF)	Planning Review	(916) 557-6742	Michael.L.Dietl@usace.army.mil
Nick Applegate (CESPK-PD-WE)	Economics Review	(916) 557-6711	Nicholas.J.Applegate@usace.army.mil
Jane Rinck	Cultural Resources Review	(916) 557-6715	Jane.L.Rinck@usace.army.mil
Scott Clark	Environmental Review	(916) 557-7211	E.Scott.Clark@usace.army.mil
Lea Adams	Hydraulics Review	(916) 557-7143	Lea.G.Adams@usace.army.mil
John High	Hydrology Review	(916) 557-7136	John.M.High@usace.army.mil
Ben Gompers	Geotechnical Review	(916) 557-7183	Ben.Gompers@usace.army.mil
Peter Valentine	Civil Design Review	(916) 557-6618	Peter.Valentine@usace.army.mil
Paul Zianno	Real Estate Review	(916) 557-6993	Paul.V.Zianno@usace.army.mil
Michelle Kuhl	Project Management Review	(916) 557-7619	Michelle.M.Kuhl@usace.army.mil
Name	Role in the Study	Contact Information	Email
Agency Technical Review (ATR) Team			
Donald Bisbee, (CENWS-PM-PL)	ATR Chairperson and Economics Review	(206) 764-3713	Donald.J.Bisbee@usace.army.mil
Linda Smith (CENWS-PM-PL)	ATR Planning	(206) 764-6721	Linda.S.Smith@usace.army.mil
Mathew Fleming (IWR-HEC)	ATR Hydrology and Hydraulic Design	(530) 756-1104	Matthew.Fleming@usace.army.mil
Allen Holland (CENWK)	Risk Analysis	(816) 389-3105	Edward.A.Holland@usace.army.mil
TBD	ATR Civil Design		
TBD	ATR Real Estate		
Paul Anderson (CENWS-EC-DB-CS)	ATR Geotechnical	(206) 764-6506	Paul.F.Anderson@usace.army.mil
Gary Smith	ATR Cost Estimating		grs52@comcast.net
James Neubauer (CENWW-EC-X)	ATR Cost Estimating (DX)	(509) 527-7332	James.G.Neubauer@usace.army.mil
TBD	ATR Environmental		
Review Management Organization (RMO)			
Eric Thaut, Flood Risk Management PCX (CESPD-PDS-P)	Review Management	(415) 503-6852	Eric.W.Thaut@usace.army.mil
Dean McLeod (CESPK-PD-WE)	Review Management	(916) 557-7436	Dean.M.McLeod@usace.army.mil
Major Subordinate Command (MSC)			
Karen Berresford (CESPD-PDC)	District Support Team Lead	(415) 503-6557	Karen.G.Berresford@usace.army.mil
Regional Integration Team (RIT)			
Pauline Acosta (CECW-MP-SPD-RIT)	Deputy Chief, Regional Integration Team	(202) 761-4085	Pauline.M.Acosta@usace.army.mil
Outside Eligible Organization (OEO) not identified at this time			

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the <type of product> for <project name and location>. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrCheckssm.

SIGNATURE

Name

ATR Team Leader

Office Symbol/Company

Date

SIGNATURE

Name

Project Manager

Office Symbol

Date

SIGNATURE

Name

Architect Engineer Project Manager¹

Company, location

Date

SIGNATURE

Name

Review Management Office Representative

Office Symbol

Date

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: Describe the major technical concerns and their resolution.

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE

Name

Chief, Engineering Division

Office Symbol

Date

SIGNATURE

Name

Chief, Planning Division

Office Symbol

Date

¹ Only needed if some portion of the ATR was contracted

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number
8Feb13	Address review changes under Planning Modernization (3x3x3) and provide clarification for scoping of reviews.	Paragraphs 1a, 5a, 5d, 3c, and 10b.

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

<u>Term</u>	<u>Definition</u>	<u>Term</u>	<u>Definition</u>
AFB	Alternative Formulation Briefing	MSC	Major Subordinate Command
ASA(CW)	Assistant Secretary of the Army for Civil Works	NED	National Economic Development
ATR	Agency Technical Review	NER	National Ecosystem Restoration
CEQA	California Environmental Quality Act	NEPA	National Environmental Policy Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and maintenance
DPR	Detailed Project Report	OMB	Office and Management and Budget
DQC	District Quality Control/Quality Assurance	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DX	Directory of Expertise	OEO	Outside Eligible Organization
EA	Environmental Assessment	OSE	Other Social Effects
EC	Engineer Circular	PCX	Planning Center of Expertise
EIR	Environmental Impact Report	PDT	Project Delivery Team
EIS	Environmental Impact Statement	PAC	Post Authorization Change
EO	Executive Order	PMP	Project Management Plan
ER	Ecosystem Restoration	PL	Public Law
FDR	Flood Damage Reduction	QMP	Quality Management Plan
FEMA	Federal Emergency Management Agency	QA	Quality Assurance
FRM	Flood Risk Management	QC	Quality Control
FSM	Feasibility Scoping Meeting	RED	Regional Economic Development
GRR	General Reevaluation Report	RMC	Risk Management Center
Home District/MS	The District or MSC responsible for the preparation of the decision document	RMO	Review Management Organization
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RTS	Regional Technical Specialist
IEPR	Independent External Peer Review	SAR	Safety Assurance Review
ITR	Independent Technical Review	USACE	U.S. Army Corps of Engineers
LRR	Limited Reevaluation Report	WRDA	Water Resources Development Act

ATTACHMENT 5: RISK REGISTER

Item	Date	Task	Risk and its cause	Consequence	Consequence rating	Evidence for consequence rating	Likelihood rating	Evidence for likelihood rating	Uncertainty rating	Risk Rating	Decision(s) Affected	Risk Management Options	Recommendation	Study Tasks Affected	Outcome	Notes
Id number	Date entry was last updated	This is the task, decision, problem, question, issue, event, hazard or opportunity that is to be managed.	Briefly identify the risk. Considering the entry in column C, what can go wrong and how can it happen?	Describe the consequence of the column D risk. If things do "go wrong" in the way described what is the specific consequence for the study or project outcomes? (List the most significant consequence first if more than one.)	If the most significant consequence in column E occurs what is its potential magnitude?	Enter specific evidence used to support the consequence rating in column F.	What is the likelihood that the most significant consequence in column E will occur?	Enter specific evidence used to support the likelihood rating in column H.	How great is the uncertainty about either the consequence or likelihood of the risk identified in column D?	Qualitative risk rating from lookup table.	Identify all the decision criteria that could be affected by the risk identified. If an important decision not represented among the decision criteria is affected identify it here.	Enter options for reducing the risk.	Identify any preferred course for managing the risk. Tolerate the risk is the default option.	For study risks identify any other study tasks that could be affected by the outcome of the risk identified for this entry.	Describe the result of the risk management action.	Make note of any significant information not provided in the other cells.
PFP-1	6/10/2012	Concurrent Reviews	Concurrent 45-day Public Review and IEPR instead of sequential review.	IEPR could identify issues resulting in substantial changes that would require another public review. Schedule and budget could be impacted.	High	Baed on past experience, these reviews have impacted schedule.	Low	Based on experience, reviews not likely to require substantial changes to plan formulation. Will have substantial public and vertical team involvement.	Low	Low	Entire study	Potentially not conduct IEPR review.	Tolerate the risk.	Milestones 4 and 5.		
PFP-2	6/10/2012	Identification of Problems & Opportunities	A reduced amount of time will be spent on identifying problems, opportunities, and objectives.	Some problems and opportunities could get missed or identified later in the plan formulation process, which would require revisiting previous steps in the planning process.	Low	The team is not likely to have missed anything significant.	Low		Low	Low	Continuation of the study and development of alternative plans.	Ensure problems and opportunities within the study area are properly identified.	Tolerate the risk.	Milestone 1		

Econ-1	6/10/2012	Levee Fragility Curves and resulting AEP	Existing condition levee fragility curves have not gone through all the necessary reviews.	Any changes to the existing levee fragility curves could significantly impact residual damages and plan selection. Results in FDA are very sensitive to fragility curves.	High		High		High	High			Insure fragility curves are correct prior to use of FDA for damage evaluations.			
Env-1	6/10/2012	Vegetation ETL Compliance.	Proposed strategy (variance) to address ETL requirements may not be acceptable to higher authority.	Substantial changes to address reviews may delay study and affect alternative formulation and cost.	High		Medium		Medium	Medium	Milestone 2 - tentatively selected plan.	Obtain a variance from the ETL.	Either obtain a variance to the ETL, or design an ETL compliant project.	Milestones 2 and 3.		
Env-2	6/10/2012	Level of detail for Constraints Analysis.	Reconnaissance level of analysis may not identify important environmental issues that could influence alternatives selection.	Potential for cost and schedule changes if information is not detailed enough or if scoping identifies new significant issues to be addressed.	Medium		Low	Extensive existing information provides sound basis for description of problems, opportunities, and constraints.	Low	Low	Milestone 1.	Conduct adequate scoping prior to Milestone 1.	Tolerate the risk.			
Env-3	6/10/2012	Alternative formulation and evaluation.	Additional scoping, analysis, or agency interaction may identify additional environmental (or other technical discipline) issues that could affect alternative plan formulation or plan evaluation.	Potential for cost increases and schedule delays after Milestone 1.	High		Medium		Medium	Medium		Maximize use of existing information, including public comments. Do scoping prior to Milestone 1. Perform VE planning charrette early in plan formulation process.	Tolerate the risk.	Milestones 2-5.		

Env-4	6/10/2012	Agency Consultation.	Agency consultation and review are beyond the control of the PDT.	Schedule and delays due to unanticipated and significant environmental impacts identified by resource agencies during formal consultation.	Low		Low		Low	Low		Do scoping, work with resource agencies on appropriate scope of work for formal coordination during PMP revision.	Tolerate the risk.	Milestones 2-5.		
Env-5	6/10/2012	Model Certification.	Models developed to assess environmental impacts may require model certification.	Schedule and budget for model certification is highly uncertain and likely to impact schedule.	High		Medium		Medium	Medium		Use only certified models.	Tolerate the risk.	Milestone 2 and 3.		
Eng-1	6/10/2012	Hydrology	Incomplete hydrology. Something left out of hydrology report.	Hydrology must refine and update, which affects all other disciplines.	High		Low	Low, if hydrology studies are appropriately scoped early in the study.	Low	Medium						
Eng-2	6/10/2012	Parametric cost estimates.	Cost estimates may not be accurate.	May under- or over-report net benefits resulting in no Federal interest.	High		Medium		Medium	Medium						
Eng-3	6/10/2012	Climate change analysis.	Climate change effects not adequately described.	Listed as a concern by the vertical team. May result in an under-designed project.	Medium		Medium		Medium	Medium						
CR-1	6/10/2012	Discovery of Native American human remains.	Native American (NA) human remains are a politically charged and very sensitive issue. Local NA individuals and tribes want to have a more active role in Corps Cultural Resource activities. Tribes are much more	Political, possible law suit if the remains are not treated properly and in accordance with State and Federal Law.	High		Medium		High	High	Milestones 1-5.		Tolerate the risk.			

			active since the discovery of human remains on the NLIP project.													
CR-2	6/10/2012	Undertake cultural resource surveys prior to PED.	Early and timely surveys reduce potential for unanticipated discoveries during construction. They may also be important for alternative selection.	Undertaking complete surveys for all project alternatives would be more costly than surveying for the selected alternative only. Conducting these surveys would be time consuming and could result in schedule delays.	Medium		Medium		Medium	Medium						
CR-3	6/10/2012	Other discoveries during construction.	Buried archaeological sites incur costly delays when they are discovered during construction.	Unanticipated finds result in the increased cost of the data recovery excavations and can incur long, costly, construction delays.	High		Medium		High	High						
HH-1	6/10/2012	Downstream boundary conditions.	N-year tide stage is assumed to match n-year river flow.	Will result in WSEL higher than the average approximately from 0.5' at the downstream to zero at the upstream reach.	Low		Low		Low	Low	Milestones 1-5.		Tolerate the risk.			
HH-2	6/10/2012	Preliminary hydraulic models.	Both HEC-RAS and Flo-2D models are preliminary and need to be finalized.	Preliminary results may under- or over-estimate WSEL along the river channels.	Medium		Medium		Low	Low	Milestones 2 and 3.	Final models will be used for the final alternative analysis.	Tolerate the risk.			
HH-3	6/10/2012	Index point selection.	May not capture the critical geotechnical	May underestimate the Economic damages.	High		High		High	High	Milestones 2 and 3.					

			weak points.													
HH-4	6/10/2012	Levee breach parameters.	Levee breach parameters are not yet fully understood.	Conservative approach has been used.	Low		Low		Low	Low	Milestones 2 and 3.	Determine appropriate modes of levee failure.	Tolerate the risk.			
HH-5	6/10/2012	Numbers of flood events.	Cost estimate may be inaccurate.	Under- or over-reporting of net benefits may result in no Federal interest.	Medium		Medium		Medium	Medium	Milestone 2.		Tolerate the risk.			
HH-6	6/10/2012	Climate change analysis.	Climate change effects may not be adequately quantified.	Project components may not be adequate for actual climate-induced changes.	Medium		Medium		Medium	Medium	Milestones 2 and 3.	Conduct climate change and sea level rise analyses during alternative formulation.	Tolerate the risk.			
HH-7	6/19/2012	Incomplete Hydrology	Something left out of the Hydrology Report	Hydrology must refine and update, which affects all other disciplines	High	Past studies have suffered	Low	The scope-of-work has been vetted thoroughly	Low	Low	Milestones 1-2	Rely on DQC and ATR	Rely on DQC and ATR			
Cost-1	6/10/2012	Availability of materials for construction.	Assume sufficient levee fill material is available relatively close (0-10 miles) to the proposed projects.	Project costs will be significantly underestimated if materials must be imported from farther away. Plan formulation may require changes if new information indicates severe limitations on resource availability for reasonable cost.	High		Medium		Medium	Medium	Milestones 2 and 3.	Maximize use of available information; perform adequate cost risk assessment prior to Milestone 2.	Tolerate the risk.			
Cost-2	6/10/2012	Level of detail for available information.	Quantity estimates for parametric design may be difficult to define.	Project/plan costs for parametric designs may be significantly over- or under-estimated.	High		Medium		Medium	Medium	Milestones 2 and 3.	Develop parametric estimating matrix to standardize assumptions and estimates.	Tolerate the risk.			

Cost-3	6/10/2012	Construction sequencing and schedule.	Schedule, sequencing, availability of contractors and phasing of projects is uncertain and will not be assessed until after Milestone 1.	Logistics of implementation may significantly affect costs and schedules for project implementation .	Low		Low		Low	Low	Milestones 2 and 3.	Perform cost risk analysis after Milestone 1 during plan formulation and analysis.	Tolerate the risk.			
Cost-4	6/10/2012	Design information & quantities from other technical elements.	Designs and quantities from Civil Design may not be sufficiently detailed to develop accurate costs or not delivered to Cost Engineering in a timely manner.	Design templates and other design drawings may be inadequate for cost engineering, requiring significant iteration within the PDTI. Delays in receiving design quantities may lead to a late rush by Cost Engineering to meet/maintain schedule (possibility of errors/omissions of critical cost elements & delay of Cost Engineering data to Economics).	Medium		Medium		Medium	Medium	Milestones 2-4.	Active participation with other technical elements to ensure designs are sufficient for cost estimating and delivered early enough to complete Cost Engineering data in a timely manner. Relocations should be identified early in design.	Tolerate the risk.			
Geo-1	6/10/2012	Subsurface information.	Lack of subsurface information about ring levees means there is more uncertainty in the design for ring levees than fix in place options.	Underestimate the design of potential levees, and underestimation of their true cost.	Medium		Low		Low	Low	Milestones 2 and 3.		Tolerate the risk.			

Geo-2	6/10/2012	Quality of borrow material.	Due to lack of identified borrow, there is great uncertainty about the quantity and quality of borrow material for the project(s).	The cost of potential new levees could be underestimated relative to fix-in-place, as their cost relies more on borrow availability than fix-in-place repairs.	Medium		Low		Low	Low	Milestones 2 and 3.		Tolerate the risk.			
RE-1	6/10/2012	Real Estate costs.	Real Estate costs will be developed based on land type and location, not parcel by parcel.	Cost uncertainty associated with lower level of analysis.	Medium		Medium		Medium	Medium	Milestones 2 and 3.	Include in the cost risk analysis.	Tolerate the risk.			
RE-2	6/10/2012	Utility relocation costs developed based on existing information.	Information available for existing utilities may not be available or accurate.	Potential for significant cost increases if design phase identifies utilities.	Low		High		Low	Low	Milestones 2 and 3.	Ground truth during Milestone 2 preparation.	Tolerate the risk.			
RE-3	6/10/2012	Real Estate interests to be obtained.	Limited ability to develop specific details on easements and other RE interests required.	Potential for significant cost increases if additional investigations show that a greater complexity exists.	High		Medium		Medium	Medium	Milestones 2 and 3.	Include in cost risk analysis.	Tolerate the risk.			
RE-4	6/10/2012	Flowage easements.	Limited information on design of projects may lead to inaccurate estimates for flowage easements required.	Greater analysis and increased cost to the project during design phase and implementation.	Medium		High		Low	Medium	Milestones 2 and 3.	Include in cost risk analysis.	Tolerate the risk.			
RE-5	6/10/2012	Local sponsor capabilities.	Local sponsor's obligations to acquire LERRDS may exceed their ability to timely acquire them.	Significant delays in project implementation and increased total project cost.	Low		Low		Low	Low	Milestones 2 and 3. Project construction.	Work in advance with NFS to develop common understanding of	Tolerate the risk.			

												requirement s and processes, and coordinate during the study.				
PM-1	8/3/2012	Funding "External Risk".	Funding stream is not guaranteed, i.e. CRA.	Funding constraints could impact project schedule and costs.	High	Project has not been in PresBud. Funding to date has been congressiona l add or work plan funds.	High	0	High	High	Milestones 1-5.	Allow NFS to advance funding to keep study on schedule. Amend FCSA to allow NFS to contribute funds to complete study.	Tolerate the risk.	0	0	0
PM-2	6/10/2012	Resources risk "Internal Risk".	Resource shortage - inadequate staffing.	Deliverables not completed on schedule or within budget.	Medium		Medium		Medium	Medium	Milestones 1-5.	Managemen t support of study from a resourcing perspective.	Tolerate the risk.			
PM-3	6/10/2012	Schedule risk "Internal".	Slippage of schedule.	If timely and effective decisions are not made and ork is not executed during the Feasibility Study, it will cause a delay(s) in the schedule and therefore cause in getting a Chief's Report signed by December of 2014.	Medium		Medium		Medium	Medium	Milestones 1-5.	Managemen t support of study from a resourcing perspective.	Tolerate the risk.			