

# REVIEW PLAN

October 2019

**Project Name:** Lower Cache Creek, Yolo County, Woodland Area, California, Feasibility Study

**P2 Number:** 105216

**Decision Document Type:** Feasibility Report and Supplemental Environmental Impact Statement

**Project Type:** Single-Purpose Flood Risk Management

**District:** Sacramento (SPK)

**District Contact:** David Sobel, Water Resources Planner: (916) 557-5319

**Major Subordinate Command (MSC):** South Pacific Division (SPD)

**MSC Contact:** District Support Team Lead, (415) 503-6736

**Review Management Organization (RMO):** Flood Risk Management Planning Center of Expertise (FRM-PCX)

**RMO Contact:** NWD/POD FRM-PCX Regional Manager, (206) 764-5522

## Key Review Plan Dates

**Date of RMO Endorsement of Review Plan:** 31 Mar 2010

**Date of MSC Approval of Review Plan:** 27 Aug 2010

**Date of IEPR Exclusion Approval:** N/A

**Has the Review Plan changed since PCX Endorsement?** Yes, updates to schedule, minor changes to DQC reviewer position descriptions

**Date of Last Review Plan Revision:** 22 Oct 2019

**Date of Review Plan Web Posting:** TBD

**Date of Congressional Notifications:** TBD

## Milestone Schedule

	<u>Scheduled</u>	<u>Actual</u>	<u>Complete</u>
<b><u>Alternatives Milestone:</u></b>	28 May 2014	28 May 2014	Yes
<b><u>Tentatively Selected Plan:</u></b>	28 Feb 2019	28 Feb 2019	Yes
<b><u>Release Draft Report to Public:</u></b>	18 December 2019	<i>(enter date)</i>	No
<b><u>Agency Decision Milestone:</u></b>	13 March 2020	<i>(enter date)</i>	No
<b><u>Final Report Transmittal:</u></b>	18 September 2020	<i>(enter date)</i>	No
<b><u>Senior Leaders Briefing:</u></b>	13 November 2020	<i>(enter date)</i>	No
<b><u>Chief's Report:</u></b>	26 March 2021	<i>(enter date)</i>	No

**Study Fact Sheet**  
October 2019

**Project Name:** Lower Cache Creek, Yolo County, Woodland Area, California, Feasibility Study

**Location:** Yolo County, City of Woodland Area, California

**Authority:** Flood Control Act of 1962 (P.L. 87-874), Sec. 209

**Sponsor:** State of California Central Valley Flood Protection Board and the City of Woodland

**Type of Study:** Feasibility Study and Supplemental Environmental Impact Statement

**SMART Planning Status:** 3x3 Waiver signed 16 October 2019

**Study Area:** Cache Creek is a west side tributary of the Sacramento River near Sacramento, California. The primary study area encompasses the City of Woodland, the town of Yolo, and surrounding agricultural areas. The main stem of Cache Creek originates with the outflows of Clear Lake in the Coast Range Mountains of Northern California. The north fork of Cache Creek is impounded by Indian Valley Dam and joins the main stem above Capay Valley before flowing out of the foothills into California's Central Valley. Water in the creek only reaches the Woodland area at certain times of year due to upstream retention and diversions for water supply. The channel then passes north of the City of Woodland through levees constructed by USACE in 1958 as part of the Federally-authorized Sacramento River Flood Control Project. The leveed portion of Cache Creek discharges into the Cache Creek Settling Basin (CCSB), which was also constructed by the USACE as a separately authorized component of the Sacramento River Flood Control Project. Cache Creek has historically carried a large sediment load. The settling basin was constructed to prevent sediment carried by Cache Creek from adversely affecting the hydraulic capacity of the Yolo Bypass through excessive sediment deposition and thereby increase the flood risk of the City of Sacramento. Water from the CCSB flows over a concrete weir and discharges into the Yolo Bypass. See map in Figure 1.

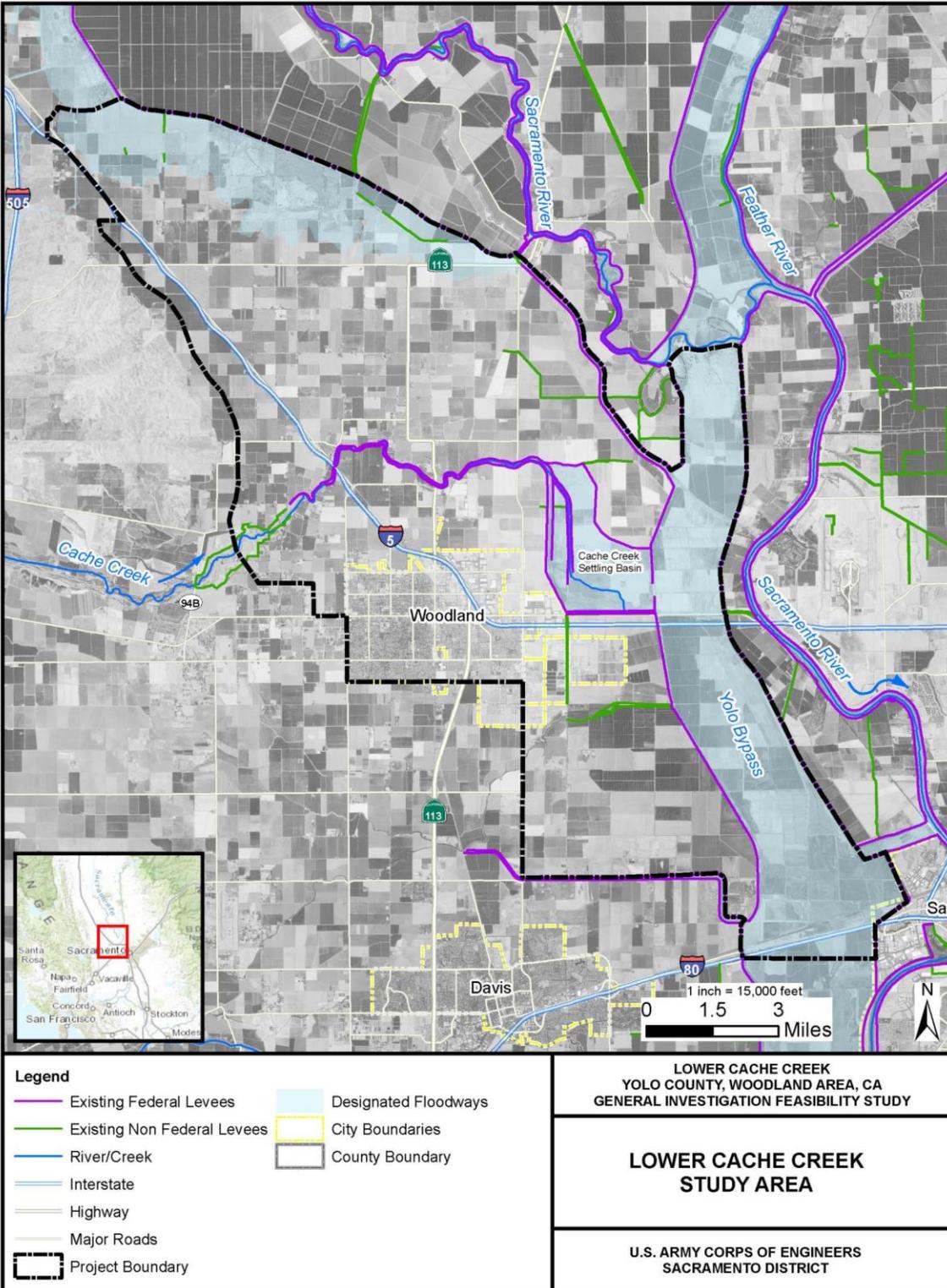


Figure 1. Lower Cache Creek Study Area

**Problem Statement:** There is a risk to human life and safety in the City of Woodland, town of Yolo, and surrounding areas from flooding of Lower Cache Creek. Floodwaters from Lower Cache Creek create a life safety risk by inundating roadways from city streets to Interstate 5, which create hazards for motorists and isolate citizens from critical facilities such as hospitals. Additionally, flooding from Lower Cache Creek poses a risk of economic damage to property and critical infrastructure within the City of Woodland, town of Yolo, and surrounding areas. The anticipated damageable property (structures and contents) is \$1.3 billion (October 2018 price levels) and the average annual damages are expected to range from \$20.7 million to \$27.5 million over the 50 year period of analysis. Damages are concentrated in an industrial area in northeastern Woodland, southwest of the CCSB.

**Federal Interest:** The threat of flooding to the City of Woodland includes potential impacts to both residential and commercial property, disruption of two major transportation routes (Interstate 5 and the Union Pacific Railroad (UPRR)), and impacts to agricultural production. Federal Interest was identified in a 2003 USACE draft feasibility study, and potential damages in the project area have grown in the intervening 15 years owing to an increase in population and value of damageable property in the study area.

### **Risk Identification:**

Flood risk and life-safety:

Lower Cache Creek flows through a perched channel in the study area, meaning that it sits a slightly higher elevation than surrounding land. Out of bank flows lead to sheet flooding that can spread in multiple directions across the landscape and pose a life-safety risk to residents and motorists. The PDT has determined that the tentatively selected plan (TSP) will lower the overall life-safety risk for the Lower Cache Creek Study Area as compared to the without project condition. The consequences of with-project failure may be higher as compared to the without project condition, the probability of a with-project failure is very low.

Study risks:

- The TSP will entail close coordination with railroads and other transportation agencies to account for existing transportation features adjacent to proposed project features.
- The TSP similar to a plan identified by 2003 USACE draft. The 2003 plan met significant public opposition and it is possible that the TSP will also face public scrutiny.

The full Risk Register is available in IWR-APT.

## **1. FACTORS AFFECTING THE LEVELS OF REVIEW**

**Scope of Review:** This review plan was developed in accordance with EC 1165-2-217, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works projects. This review plan will be provided to the Project Delivery Team (PDT), District Quality Control (DQC), Agency Technical Review (ATR), and Independent External Peer Review (IEPR) Teams, 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 1165-2-217) and planning model certification/approval (per EC 1105-2-412). Any levels of review not performed in accordance with EC 1165-2-217 will require documentation in the review plan of the risk-informed decision not to undertake that level of review.

As EC 1165-2-217 indicates, a Type I IEPR is conducted on project studies (decision documents). It is of critical importance for those decision documents and supporting work products where there are public safety concerns, significant controversy, a high level of complexity, or significant economic, environmental, and social effects to the nation. However, it is not limited to only those cases and most studies should undergo Type I IEPR. Below is a list of items considered when determining if a Type I IEPR is needed.

- Will the study likely be challenging? Yes. The engineering aspects of the study are relatively well understood, though community acceptance and economic aspects have proven challenging over the nearly two decades of USACE involvement with flood risk management in the area.
- Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks. Risk Register is included as Attachment 2.
- Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues? No. Life safety hazard due to flood risk is minimal in the study area and the TSP is not justified on life safety grounds.
- Has the Governor of an affected state requested a peer review by independent experts? No, the Governor has not requested a peer review by independent experts.
- Will it likely involve significant public dispute as to the project's size, nature, or effects? TBD. An EIS prepared in 2003 for a broadly similar study generated a large volume of public comments related to the nature of the proposed plan. The NFS has done significant work to build community support, though the community reaction is not known at this point.
- Is the project/study likely to involve significant public dispute as to the economic or environmental cost or benefit of the project? No, the study is not likely to generate significant public dispute around economic or environmental costs or benefits.
- Is the project/study likely to involve significant interagency interest? No, significant interagency interest is not expected but possible interest could stem from coordination requirements with railroads and/or Caltrans.
- Is the information in the decision document or anticipated project design likely to be based on novel methods, involve innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, contain influential scientific information, be used as a highly influential scientific assessment or present conclusions that are likely to change prevailing practices? No. The study used standard methods and models to identify the TSP. The proposed plan entails traditional levee design and standard construction methods.
- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule? No. The

TSP involves the construction of a new levee ranging from 7 to 14 feet in height with very conservative side slopes. The levee will be constructed using select borrow material consisting of fine grained highly impervious clay. There is nothing unique about character or the construction of this levee or the associated construction sequencing.

- Is the estimated total cost of the project greater than \$200 million? Yes. The costs, including all contingencies, for the alternatives in the Final Array range from \$311,170,000 to \$429,267,000.
- Will an Environmental Impact Statement be prepared as part of the study? Yes. A draft EIS was prepared for the 2003 study. A Supplemental EIS is being prepared for this study.
- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources? TBD. At this point it is not known if any impacts will occur to scarce or unique tribal, cultural, or historic resources. A complete inventory of the project area is needed to determine if cultural resources are located in the project area. If site avoidance is not viable, mitigation measures will be used to minimize the impacts to the sites.
- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures? TBD. At this point, the extent of impacts to fish and wildlife species are not known. However, based on the 2003 EIS prepared for the area, substantial adverse impacts are not likely.
- Is the project expected to have, before mitigation measures, more than a negligible adverse impact on an endangered or threatened species or their designated critical habitat? No. This project is anticipated to be Not Likely to Adversely Affect (NLAA threatened or endangered species).
- Will the decision document require Congressional authorization? Yes. Coordination will occur with the Cost Engineering DX.

## 2. REVIEW EXECUTION PLAN

This section describes each level of review to be conducted. Based upon the factors discussed in Section 1, this study will undergo the following types of reviews:

**District Quality Control.** All decision documents (including data, analyses, environmental compliance documents, etc.) undergo DQC. This internal review process covers basic science and engineering work products. It fulfils the project quality requirements of the Project Management Plan, of which the Review Plan is a component.

**Agency Technical Review.** ATR is performed by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. These teams will be comprised of certified USACE personnel. The ATR team lead will be from outside the home MSC. If significant life safety issues are involved in a study or project a safety assurance review should be conducted during ATR.

**Independent External Peer Review.** Type I IEPR may be required for decision documents under certain circumstances. This is the most independent level of review, and is applied in cases that meet criteria where the risk and magnitude of the project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision is made as to whether Type I IEPR is appropriate.

**Cost Engineering Review.** All decision documents shall be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX). The MCX will assist in determining the expertise needed on the ATR and IEPR teams. The MCX will provide the Cost Engineering certification. The RMO is responsible for coordinating with the MCX for the reviews. These reviews typically occur as part of ATR.

**Model Review and Approval/Certification.** EC 1105-2-412 mandates the use of certified or approved models for all planning work to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions.

**Policy and Legal Review.** All decision documents will be reviewed for compliance with law and policy. ER 1105-2-100, Appendix H provides guidance on policy and legal compliance reviews. These reviews culminate in determinations that report recommendations 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. These reviews are not further detailed in this section of the Review Plan.

Table 1 provides the schedules and costs for reviews. The specific expertise required for the teams are identified in later subsections covering each review. These subsections also identify requirements, special reporting provisions, and sources of more information.

**Table 1: Levels of Review**

<b>Product(s) to undergo Review</b>	<b>Review Level</b>	<b>Start Date</b>	<b>End Date</b>	<b>Cost</b>	<b>Complete</b>
Draft Feasibility Report and Supplemental EIS	District Quality Control	23 Oct 2019	5 Dec 2019	\$50,000	No
	Agency Technical Review	18 Dec 2019	23 Jan 2020	\$50,000	No
	Type I IEPR	18 Dec 2019	17 Apr 2020	\$100,000	No
	Policy and Legal Review	23 Oct 2019	25 Nov 2019	n/a	No
Final Feasibility Report and Supplemental EIS	District Quality Control	24 Jul 2020	07 Aug 2020	\$20,000	No
	Agency Technical Review	10 Aug 2020	04 Sep 2020	\$20,000	No
	Policy and Legal Review	07 Sep 2020	04 Dec 2020	n/a	No
<b>In-kind Products from Non-Federal Sponsor for USACE Review</b>					
Biological Assessment	DQC	15 Apr 2019	16 Sep 2019	\$20,000	No
404(b)(1) Alternatives Analysis	DQC	1 May 2019	16 Sep 2019	\$30,000	No

**a. DISTRICT QUALITY CONTROL**

The home district (Sacramento) shall manage DQC, in accordance with the Major Subordinate Command and district Quality Management Plan, and will appoint a DQC Lead to manage the local review (see EC 1165-2-217, section 8.a.1). The DQC Lead will prepare a Quality Management Plan and periodically update it to reflect changes and appropriate refinement. USACE produced documents and In-kind products from the Non-Federal Sponsor will undergo a DQC review. Both sets of documents will be submitted together for review. Table 2 identifies the required expertise for the DQC team.

**Table 2: Required DQC Expertise**

<b>DQC Team Disciplines</b>	<b>Expertise Required</b>
DQC Lead	A senior professional with extensive experience preparing Civil Works decision documents and conducting DQC. The lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Planning	A senior water resources planner with experience in flood risk management studies and the disposition process. The planner should also be familiar with current Administration Policy, Executive Orders and guidance related to planning studies, and alternative optimization.
Economics	The economist will have experience evaluating flood risk management projects in accordance with ER 1105-2-100 and USACE models, including a thorough understanding of HEC-FDA and HEC-LifeSim.
Environmental Resources	This reviewer should have a strong background in flood risk management, as it relates to NEPA and other State and Federal environmental laws and regulations. This reviewer should also have a background in the cultural resources aspects of flood risk management studies. If necessary, more than one reviewer may be assigned to satisfy required expertise in environmental resources and cultural resources.
Cultural Resources	This reviewer should have a strong background in flood risk management, as it relates to cultural resources.
Hydrology & Hydraulic Engineering	A senior professional with experience in the analysis and design of hydraulic structures of dams. The hydraulic engineer will be knowledgeable and experienced with the routing of inflow hydrographs through multipurpose flood control reservoirs using multiple discharge devices, evaluation of extreme flood events (e.g., PMF), development of the flood hazard/loading (i.e., stage-frequency and duration relationships), USACE hydrologic and hydraulic modeling, and breach and non-breach inundation for dam safety risk analysis. In addition, this professional should have a good working knowledge of open channel dynamics, application of levees and floodwalls, and computer modeling such as HEC-RAS, FLO-2D, and other related modeling systems. If necessary,

DQC Team Disciplines	Expertise Required
	more than one reviewer may be assigned to satisfy required expertise in hydrology and hydraulics.
Geotechnical Engineering	The geotechnical engineer will have experience in the design, construction, and evaluation of embankments, potential failure mode analysis, and dam safety risk analysis. The geotechnical engineer will have experience in subsurface investigations, rock and soil mechanics, internal erosion evaluation, slope stability evaluation, and earthwork construction.
Cost Engineering	Reviewer should be a registered or certified cost engineer with a BS degree or higher in engineering or construction management, and should have experience estimating complex, phased multi-year civil works construction projects and hydraulic retention structures.
Real Estate	A senior professional with experience in the preparation of Real Estate plans. The reviewer should also have experience with real estate issues related to flowage easements associated with existing USACE projects, as well as a working knowledge of USACE real estate policy and regulation.
Civil Engineer	Reviewer should be a senior level, with extensive experience with civil site layout and levee projects. This reviewer should also have experience to provide oversight for other engineering disciplines, including structural, construction and operation. These competencies include a thorough working knowledge of other similar civil works projects, and have experience in the engineering construction field. This reviewer should have experience evaluating the design, construction, and evaluation of hydraulic structures, potential failure mode analysis, and levee safety risk analysis.
Hazardous, Toxic, and Radiological Waste (HTRW)	Reviewer will have expertise in assessment of HTRW to determine the nature and extent of HTRW materials within the project area.

**Documentation of DQC.** Quality Control should be performed continuously throughout the study. A specific certification of DQC completion is required at the public review draft and final report stages. Documentation of DQC should follow the District Quality Manual and the MSC Quality Management Plan. An example DQC Certification statement is provided in EC 1165-2-217, on page 19 (see Figure F).

Documentation of completed DQC should be provided to the MSC, RMO and ATR Team leader prior to initiating an ATR. The ATR team will examine DQC records and comment in the ATR report on the adequacy of the DQC effort. Missing or inadequate DQC documentation can result in delays to the start of other reviews (see EC 1165-2-217, section 9).

Recommended Best Practice: Use DrChecks software to document DQC. Attach a Dr Checks Report to the DQC Certification to help illustrate the thoroughness of the DQC.

**b. AGENCY TECHNICAL REVIEW**

The ATR will assess whether the analyses are technically correct and comply with guidance, and that documents explain the analyses and results in a clear manner. The lead PCX member manages ATR and is responsible for identifying the ATR team members. For this study, the home district will not nominate candidates for the ATR panel. The review is conducted by an ATR Team whose members are certified to perform reviews. Lists of certified reviewers are maintained by the various technical Communities of Practice (see EC 1165-2-217, section 9(h)(1)). The study anticipates 11 ATR reviewers, but is subject to change depending on funding availability. Table 3 identifies the disciplines and required expertise for this ATR Team.

**Table 3: Required ATR Team Expertise**

ATR Team Disciplines	Expertise Required
ATR Lead and Plan Formulation	A senior water resources planner with extensive experience preparing Civil Works decision documents and conducting ATR. The lead will also serve as the plan formulation reviewer. The lead should have experience in flood risk management studies and also be familiar with current Administration Policy, Executive Orders and guidance related to planning studies, and alternative optimization.
Economics	The economist will have experience evaluating flood risk management projects in accordance with ER 1105-2-100, ER 1105-2-101, and USACE models, including a thorough understanding of HEC-FDA and HEC-LifeSim.
Environmental and Cultural Resources	This reviewer should have a strong background in flood risk management, as it relates to NEPA and other State and Federal environmental laws and regulations. This reviewer should also have a background in the cultural resources aspects of flood risk management studies. If necessary, more than one reviewer may be assigned to satisfy required expertise in environmental resources and cultural resources.
Hydrology & Hydraulic Engineering	A senior professional with experience in the analysis and design of hydraulic structures of dams. The hydraulic engineer will be knowledgeable and experienced with the routing of inflow hydrographs through multipurpose flood control reservoirs using multiple discharge devices, evaluation of extreme flood events (e.g., PMF), development of the flood hazard/loading (i.e., stage-frequency and duration relationships), USACE hydrologic and hydraulic modeling, and breach and non-breach inundation for dam safety risk analysis. In addition, this professional should have a good working knowledge of open channel dynamics, application of levees and floodwalls, and computer modeling such as HEC-RAS, FLO-2D, and other related modeling systems. If necessary, more than one reviewer may be assigned to satisfy required expertise in hydrology and hydraulics.
Geotechnical Engineering	The geotechnical engineer will have experience in the design, construction, and evaluation of embankments, potential failure

**Table 3: Required ATR Team Expertise**

ATR Team Disciplines	Expertise Required
	mode analysis, and dam safety risk analysis. The geotechnical engineer will have experience in subsurface investigations, rock and soil mechanics, internal erosion evaluation, slope stability evaluation, and earthwork construction.
Cost Engineering	Reviewer should be a registered or certified cost engineer with a BS degree or higher in engineering or construction management, and should have experience estimating complex, phased multi-year civil works construction projects and hydraulic retention structures. The reviewer shall have extensive knowledge of MII software and the Total Project Cost Summary (TPCS) as required during ATR. A certification from the Cost Engineering Mandatory Center of Expertise (MCX) in Walla Walla District is required.
Real Estate	A senior professional with experience in the preparation of Real Estate plans. The reviewer should also have experience with real estate issues related to flowage easements associated with existing USACE projects, as well as a working knowledge of USACE real estate policy and regulation.
Civil Engineer	Reviewer should be a senior level, with extensive experience with civil site layout and levee projects. This reviewer should also have experience to provide oversight for other engineering disciplines, including structural, construction and operation. These competencies include a thorough working knowledge of other similar civil works projects, and have experience in the engineering construction field. This reviewer should have experience evaluating the design, construction, and evaluation of hydraulic structures, potential failure mode analysis, and levee safety risk analysis.
Climate Preparedness and Resilience CoP Reviewer	A member of the Climate Preparedness and Resiliency Community of Practice (CoP) will participate in the ATR review. The reviewer should have experience with inland flood risk management studies.
Risk and Uncertainty	A reviewer with experience in 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.
HTRW	Reviewer will have extensive expertise in assessment of HTRW to determine the nature and extent of HTRW materials within the project area.

**Documentation of ATR.** DrChecks will be used to document all ATR comments, responses and resolutions. Comments should be limited to those needed to ensure product adequacy. If a concern cannot be resolved by the ATR team and PDT, it will be elevated to the vertical team for resolution using the EC 1165-2-217 issue resolution process. Concerns can be closed in DrChecks by noting the concern has been elevated for resolution. The ATR Lead will prepare a Statement of Technical Review (see EC 1165-2-217, Section 9), for the draft and final reports, certifying that review issues have been

resolved or elevated. ATR may be certified when all concerns are resolved or referred to the vertical team and the ATR documentation is complete.

Recommended Best Planning Practice: All members of the ATR team should use the four part comment structure (see EC 1165-2-217, Section 9(k)(1)).

**c. INDEPENDENT EXTERNAL PEER REVIEW**

**(i) Type I IEPR.**

Type I IEPR is managed outside of the USACE and conducted on 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. An Outside Eligible Organization (OEO), external to USACE, will manage the IEPR.

**Decision on Type I IEPR.** Project costs are estimated to exceed \$200 million and an Environmental Impact Statement will be prepared, therefore the study will be subject to IEPR.

**Products to Undergo Type I IEPR.** The full draft report including Supplemental EIS and appendices will undergo IEPR. Public comments made on the Draft Report will be given to the IEPR reviewers prior to the initiation of the Type I IEPR

**Required Type I IEPR Panel Expertise.** Panels will consist of independent, recognized experts from outside of the USACE in disciplines representing a balance of areas of expertise suitable for the review being conducted. The IEPR reviewers will be selected by an OEO. Four IEPR reviewers are anticipated for this study. Table 4 lists the required panel expertise.

**Table 4: Required Type I IEPR Panel Expertise**

<b>IEPR Panel Member Disciplines and Expertise Required</b>
<p><b><u>Civil Works Planner / Economics</u></b>  <b>Expertise Required:</b> The Civil Works Planner / Economist selected as a review panel member should be from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm with demonstrated experience in public works planning. The Review Panel member must be very familiar with USACE plan formulation process, procedures, and standards. The review panel member should also be familiar with evaluation of alternative plans for Dam Safety Modification Studies and Feasibility Studies. Familiarity with USACE standards and procedures is required. In addition, review panel member should have experience related to evaluating traditional Civil Works plan benefits associated with Feasibility Studies, to include experience in USACE methodologies for determining the cost effectiveness of alternative evaluations.</p>
<p><b><u>Environmental</u></b>  <b>Expertise Required:</b> The review panel member should be a scientist from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm with a minimum MS degree or higher in a related field. The review panel member must have at least 10 years of</p>

**Table 4: Required Type I IEPR Panel Expertise**

<p>experience directly related to environmental evaluation or review and should have extensive knowledge of the following: estuarine ecology, salmonid biology (spawning, rearing, freshwater migration), wetlands, riparian habitats, riverine systems, and process-based restoration. Demonstrated experience working with National Environmental Policy Act (NEPA) impact assessments, including cumulative effects analyses, for complex ecosystem projects with competing trade-offs is highly desirable.</p>
<p><b><u>Hydrology and Hydraulic Engineering</u></b> <b>Expertise Required:</b> The review panel member must be a registered professional engineer with a minimum of 15 years' experience in hydrologic and hydraulic engineering. The review panel member should be experienced with all aspects of hydrology and hydraulic engineering including: hydrology, urban hydrology and hydraulics, open channel systems, effects of management practices and low impact development on hydrology, design of earthen dams and detention ponds, use of non-structural systems as they apply to flood-proofing, warning systems, and evacuation. The review panel member must be familiar with Hydraulic Engineering Center (HEC) modeling computer software, or equivalent commercial software, including HEC River Analysis System (RAS) and HEC Hydrologic Modeling System (HMS). Additionally, the candidate should have specialized experience in river engineering, sediment transport, and familiarity with rivers with water control structures and dredging projects.</p>
<p><b><u>Geotechnical Engineer</u></b> <b>Expertise Required:</b> The Geotechnical Engineering panel member should be a senior-level geotechnical engineer with extensive experience, a minimum of 15 years, in the field of geotechnical engineering related to the analysis, design, and construction of embankments, including rehabilitations of these structures. The panel member should have knowledge and experience in the evaluation of backward erosion piping (BEP) potential failure modes in the foundations of embankments, and in the development, design, and construction of remediation alternatives for correcting BEP issues. The panel member should have experience in failure mode analysis, risk assessment of embankments, evaluation of risk reduction measures for dam/levee safety assurance projects, and familiarity with the USACE dam and levee safety guidance. The panel member should have a working knowledge of all applicable USACE design criteria, and shall be a licensed Professional Engineer.</p>

**Documentation of Type I IEPR.** Comments will be captured in Dr. Checks. The OEO will submit a final Review Report no later than 60 days after the end of the draft report public comment period. USACE shall consider all recommendations in the Review Report and prepare a written response for all recommendations. The final decision document will summarize the Review Report and USACE response and will be posted on the internet.

**(ii) Type II IEPR.**

The second kind of IEPR is Type II IEPR, which would be conducted during Preconstruction, Engineering and Design (PED) if determined to be necessary at that time. These Safety Assurance Reviews are managed outside of the USACE and are conducted on design and construction for

hurricane, storm and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. A Type II IEPR Panel will be convened to review the design and construction activities before construction begins, and until construction activities are completed, and periodically thereafter on a regular schedule.

**Decision on Type II IEPR.** The decision to undertake a Type II IEPR will be made during PED.

**d. MODEL CERTIFICATION OR 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 are any models and analytical tools used 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 a planning product. The selection and application of the model and the input and output data is the responsibility of the users and is subject to DQC, ATR, and IEPR.

**Table 5: Planning Models.** The following models may be used to develop the decision document:

<b>Model Name and Version</b>	<b>Brief Model Description and How It Will Be Used in the Study</b>	<b>Certification / Approval</b>
HEC-FDA v. 1.4.2	Economic model used to calculate estimated economic damages corresponding to floodplain mapping of alternative plans. It will be used to aid identification of the NED plan and inform plan selection.	Certified
HEC-LifeSim v. 1.0.1	Economic model used to calculate estimated loss of life corresponding to floodplain mapping of alternative plan and scenarios.	Pending Certification
CAFRE	This model estimates the economic benefits associated with a reduction in damages to agricultural production.	Pending Certification

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. The professional practice of documenting the application of the software and modeling results will be followed. The USACE Scientific and Engineering Technology Initiative has identified many engineering models as preferred or acceptable for use in studies. These models should be used when 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.

**Table 6: Engineering Models.** These models may be used to develop the decision document:

<b>Model Name and Version</b>	<b>Brief Model Description and How It Will Be Used in the Study</b>	<b>Approval Status</b>
HEC-RAS 5.0	Unsteady 1-dimensional flow model used to simulate the channel hydraulics in the initial feasibility study.	CoP Preferred
TUFLOW	Unsteady 1-dimension and 2-dimension flow models to simulate depth-averaged hydraulic conditions for channel,	Allowed for use

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Approval Status
	floodplain, and levee breach scenarios for current feasibility study.	
MCACES or MII	These are cost estimating models. This is a cost estimating model that was developed by Building Systems Design Inc. Crystal Ball risk analysis software may also be used.	Enterprise Software

Per ES 08101 Section 7.3, the requested “Allowed for Use” software must be justified in writing and its use approved by the ATR Team prior to its use during the feasibility study. The justification for the use of Tuflow Model is this that the study utilized an existing TUFLOW model developed by the sponsors' engineering consultants. The model approach is comparable to HEC-RAS two dimensional model and found by SPK to be sufficient for use on this study. Use of existing information where possible is preferred in the SMART planning process.

**e. POLICY AND LEGAL REVIEW**

Policy and legal compliance reviews for draft and final planning decision documents are delegated to the MSC (see Director’s Policy Memorandum 2018-05, paragraph 9).

**(i) Policy Review.**

The policy review team is identified through the collaboration of the MSC Chief of Planning and Policy and the HQUSACE Chief of the Office of Water Project Review. The team is identified in Attachment 1 of this Review Plan. The makeup of the Policy Review team will be drawn from Headquarters (HQUSACE), the MSC, the Planning Centers of Expertise, and other review resources as needed.

- The Policy Review Team will be invited to participate in key meetings during the development of decision documents as well as SMART Planning Milestone meetings. These engagements may include In-Progress Reviews, Issue Resolution Conferences or other vertical team meetings plus the milestone events.
- The input from the Policy Review team should be documented in a Memorandum for the Record (MFR) produced for each engagement with the team. The MFR should be distributed to all meeting participants.
- In addition, teams may choose to capture some of the policy review input in a risk register if appropriate. These items should be highlighted at future meetings until the issues are resolved. Any key decisions on how to address risk or other considerations should be documented in an MFR.

**(ii) Legal Review.**

Representatives from the Office of Counsel will be assigned to participate in reviews. Members may participate from the District, MSC and HQUSACE. The MSC Chief of Planning and Policy will coordinate membership and participation with the office chiefs.

- In some cases legal review input may be captured in the MFR for the particular meeting or milestone. In other cases, a separate legal memorandum may be used to document the input from the Office of Counsel.
- Each participating Office of Counsel will determine how to document legal review input.

**b. Public Participation.**

As required by EC 1165-2-217, the approved Review Plan will be posted on the District public website (<https://www.spk.usace.army.mil/Media/USACE-Project-Public-Notices/>). Information will be conveyed to the public through the use of press releases and media interviews, as necessary, and through the use of posting information to the Sacramento District website. The public can provide comments on the documents; after all comments have been submitted, the comments will be provided to the technical reviewers and responses will be given to the public.

**3. FUTURE REVIEWS**

Type II IEPR will be considered during PED phase.

**ATTACHMENT 1: TEAM ROSTERS**

PROJECT DELIVERY TEAM		
Name	Position	Phone Number
Charles Austin	Project Manager	(916) 557-7550
Jim Hutchison	Planner/RTS	(213) 452-3826
Rhiannon Kucharski	Senior Supervising Plan Formulator	(916) 557-7258
David Sobel	Lead Planner	(916) 557-5319
Lindsay Floyd	Co-Planner	(916) 557-7742
Anne Baker	Environmental Manager	(916) 557-7277
Keleigh Duey	Environmental Manager	(916) 557-5131
Robert Gudiño	Cultural	(916)557-5104
Dean McLeod	RTS Economist	(916) 557-5313
Timi Shimabukuro	Economist	(916) 557-6626
Brian Haines	Engineering Technical Lead	(916) 557-6742
Cory Koger	HTRW	(916) 557-5112
Saba Siddiqui	Hydraulic Engineer	(916) 557-6945
Joaquin (Kin) Quenga	Civil Engineer	(916) 557-6623
Clark Stanage	Geotechnical Engineer	(916) 487-5212
Robert Muskthel	Cost Engineer	(509) 527-7266
Casey Young	GIS	(916) 557-7158
Bill Casale	Real Estate	(916) 557-7386
Margaret Johns	Scheduler	(916) 557-7743
Danielle Daniels	Budget Analyst	(916) 557-6978
Bronwen Tomb	Legal Counsel	(916) 557-7098
John High	Hydrology	(916) 557-7136

DISTRICT QUALITY CONTROL TEAM			
Name	Office	Position	Phone Number
Melissa Hallas	CESPK-PD-WF	Water Resources Planner, DQC Lead	(916) 557-7774
Mariah Brumbaugh	CESPK-PD-RP	Environmental Planner RTS	(916) 557-6774
Joanne Goodsell	CESPK-PDR	Cultural Resources Management RTS	(916) 557-7907
Aaron Schlein	CESPK-PD-WE	Acting Chief Economic Risk	(916) 557-5372
Gene Maak	CESPK-ED-HA	Hydraulic Engineer	(916) 557-7020
Mark Boedtker	CESPK-EDED-A	Civil Engineer	(916) 557-6637
Johan Jacobsen	CESPK-EDG-B	Civil Engineer	(916) 557-6736

Joe Reynolds	CESPK-ED-SC	Cost Engineer	(916) 557-7573
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AGENCY TECHNICAL REVIEW TEAM			
Name	Office	Position	Phone Number
Sierra Keenan		ATR Lead and Plan Formulation	(651) 290-5221
TBD		Economics	
TBD		Environmental and Cultural Resources	
TBD		Environmental and Cultural Resources	
TBD		Hydrology & Hydraulic Engineering	
TBD		Geotechnical Engineering	
TBD		Cost Engineering	
TBD		Real Estate	
TBD		Civil Engineer	
TBD		Climate Preparedness and Resilience CoP Reviewer	
TBD		Risk and Uncertainty	

VERTICAL TEAM			
Name	Office	Position	Phone Number
Jessica Burton Evans	CESPD-PDC	DST	(415) 503-6556
Karen Berresford	CESPD-PDC	Chief, Civil Works Integration Division	(415) 503-6557
Stacey Brown	CECW-I	Chief, Planning and Policy Division	(202) 761-0115
Charles Wilson	CECW-SPD	SPD RIT Planner	(202) 761-4085
Josephine Axt	CESPD-DD-P	Chief Planning and Policy	(415) 503-6590
Eric Thaut	CESPD-PDP	Deputy Director FRM-PCX	(415) 503-6852

POLICY REVIEW TEAM			
Name	Office	Position	Phone Number
Fay Lachney	CECW-PC	Plan Formulation and Review Manager	(202) 761-0668
Kurt Keilman	CESPD-PDP	Economics	(415) 503-6596
Julie Alcon	CECW-PC	Environmental	(202) 761-0523
Aaron Hostyk	CECC-G	Office of Counsel	(202) 761-8525

John Cline	CEMP-CR	Real Estate	(202) 761-8635
Chandra Pathak	CECW-CE	Engineering and Construction	(202)761-4668
TBD		Climate Change	

