

Upper Yuba Levee Improvement Project Safety Assurance Review Plan

Revised August 2014

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This document is to satisfy the Safety Assurance Review (SAR) requirements for the Upper Yuba Levee Improvement Project (UYLIP) as required by Section 2035 in the Water Resource Development Act (WRDA) of 2007 as described in the U. S Army Corps of Engineers' EC 1105-2-410, Civil Works Review Policy, subsequently superseded by EC 1165-2-214. In 2013, TRLIA amended its UYLIP in coordination with the State of California Department of water Resource to include additional work along the Western Pacific Interceptor Canal (WPIC) in response to new urban levee design criteria issued by the State. To this end, TRLIA has updated this SAR Plan to reflect the new work. The SAR Panel has not changed.

The Three Rivers Levee Improvement Authority (TRLIA) is in the process of designing and constructing improvements to the levee system that protects the area of Reclamation District (RD) 784 in south Yuba County, California. TRLIA has been constructing these improvements since 2004 and has completed improvements on levees along the WPIC, the Bear River, the Feather River, and the Yuba River to Simpson Lane. TRLIA needs to perform additional levee alteration to the Sacramento River Flood Control Project along the Yuba River above Simpson Lane to ensure public safety for citizens of south Yuba County. This project is referred to as the Upper Yuba Levee Improvement Project (UYLIP). TRLIA and State subsequently expanded the project to include the WPIC west levee.. Safety Assurance Reviews ensure that good science, sound engineering, and public health, safety, and welfare are the most important factors in guiding the engineering design and implementation of the UYLIP. TRLIA is partnering with the State of California to implement the UYLIP as part of the State's Early Implementation Program (EIP).

TRLIA is proactively working to ensure independent review of its UYLIP design and implementation and the proposed actions in this Safety Assurance Plan should satisfy Section 2035 in WRDA 2007. This document outlines how the SAR will be performed and identifies the independent consultants who will comprise the Board of Senior Consultants (BOSC) that will be charged with executing an adequate SAR for the UYLIP.

1.0 Project Background

The RD 784 service area in southwestern Yuba County is protected by levees on the south side of the Yuba River, the east side of the Feather River, the north side of the Bear

River, and the west side of the Western Pacific Interceptor Canal (WPIC). Since 2004 TRLIA has been evaluating and repairing these lines of protection as needed. TRLIA has accomplished repairs along the WPIC, the Bear, the Feather and the Yuba from its connection with the Feather East Levee to Simpson Lane, see Figure 1. The specific project design objective in all repairs is to provide increased flood protection against the flood event with a 0.5 percent chance of occurrence in any given year (referred to herein as the 200-year flood event). References in this document to levels of flood protection are based on the deterministic approach (the current Federal Emergency Management Agency [FEMA] method) and should not be taken as Corps concurrence that such levels will be achieved when the Corps probabilistic approach is utilized to define system performance. However, a risk and uncertainty analysis will be performed for UYLIP and will be reviewed by the Corps and the SAR Panel.

Recent revised hydraulic analysis, *Hydraulic and Hydrologic Analysis for Yuba River Patrol Road Levee Project*, MBK Engineers, December 2008, of the Upper Yuba River and detailed geotechnical evaluation, *Problem Identification Report, Upper Yuba Levee Improvement Project, Yuba River South Levee Evaluation, Simpson Lane to Yuba Gold Fields, Reclamation District 784, Yuba County, CA, Kleinfelder Inc., September 29, 2009*, of the South Levee of the Yuba River from Simpson Lane to the end of the project levee at the Goldfields, see Figure 2, have determined that the upper portion of the south Yuba Levee does not provide reliable flood protection for the 100-year or the 200-year flood events. Problems identified include under and through seepage and geometry deficiencies. This new information has resulted in TRLIA initiating environmental evaluations, alternative repair evaluations, and designs to construct a project that would provide 200-year protection along this reach of levee. The UYLIP will meet all of the USACE's current levee design criteria. Alternative repair evaluations are still underway but the most current probable project would consist of slurry cut-off walls, seepage berms, levee geometry correction, and erosion protection, see Table 1.

Following the State of California's issuance of urban levee design criteria in 2012, and the State's subsequent evaluation of the RD 784 levee system under its Urban Levee Evaluation Program, TRLIA amended its UYLIP to include additional work along the Western Pacific Interceptor Canal (WPIC) right (west) bank levee. TRLIA is initiating its design and planning program for this expanded footprint. The anticipated alterations, three cutoff walls, are expected to be relatively minor, but still require permission from the USACE pursuant to 33 USC 408.

2.0 Purpose of a SAR

The purpose of a SAR is to ensure that good science, sound engineering, and public health, safety, and welfare are the most important factors that determine a project's fate and is achieved by independent and impartial review. The SARs are used to inform the USACE Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare.

Safety Assurance Reviews will address the following questions:

- 1) Are the models used to assess hazards appropriate?
- 2) Are the assumptions made for the hazards appropriate?
- 3) Is the quality and quantity of the surveys, investigations, and engineering for the concept design sufficient to support the models and assumptions made for determining the hazards?
- 4) Does the analysis adequately address the uncertainty given the consequences associated with the potential for loss of life for this type of project?
- 5) Do the assumptions made during the planning phase for hazards remain valid through the completion of design as additional knowledge is gained and the state-of-the-art evolves?
- 6) Do the project features adequately address redundancy, robustness, and resiliency with an emphasis on interfaces between structures, materials, members, and project phases?
- 7) Do the assumptions made during design remain valid through construction?
- 8) For O&M manuals, do the requirements adequately maintain the conditions assumed during design and validated during construction; and will the project monitoring adequately reveal any deviations from assumptions made for performance and is sufficient to evaluate the change in project effectiveness?

3.0 SAR Implementation

The SAR shall include participation by independent experts selected from among individuals who are distinguished experts in civil engineering, geotechnical engineering, hydraulic engineering, hydrology, and other appropriate disciplines. Independent, in this instance, means that the persons selected to review the design are not involved in the original design, have no conflict of interest, and do not carry out or advocate for or against Federal water resources projects for the duration of the project design, construction and follow-up activities. The SAR Panel shall evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable and inform the design team on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare. The panel will consider how project features adequately address redundancy, robustness, and resiliency and how the findings during construction reflect the assumptions made during design.

The BOSC shall:

- a. Conduct the review for the subject project in a timely manner in accordance with the study and SAR Plan schedule;
- b. Follow the “charge,” but when deemed appropriate by the BOSC lead, feel free to request other products relevant to the project and the purpose of the review;
- c. Receive from USACE any public written and oral comments provided on the project;
- d. Provide timely written and oral comments throughout the development of the project, as requested;
- e. Submit BOSC reports in accordance with the review plan milestones; and
- f. The BOSC lead shall be responsible for ensuring that comments represent the group, be non-attributable to BOSC individuals, and where there is lack of consensus, note the non-concurrence and why.

Safety Assurance Reviews will be conducted on an as needed basis but, at a minimum, will occur at 60 percent design, 90 percent, and final design/ start of construction. Reviews will also be conducted during construction, as needed and appropriate based on regular updates to the SAR Panel. The SAR panel has the option to request additional or alternate milestones where warranted and reasonable.

The first meeting will be held with the UYLIP Board of Senior Consultants (BOSC), as the SAR Panel is referred to, in early November 2009. The first meeting will focus on familiarizing the BOSC with the flood risk reduction project, discussion of the supporting technical documents that demonstrate the need for the project, and include a discussion of the proposed plan for repair. Follow-up sessions with the BOSC will be held on a quarterly basis or as needed depending on the status of the program. In advance of each meeting, the design team will prepare an agenda containing important topics, questions for the BOSC, etc., as well as provide supporting reports and meeting materials. In addition to the BOSC, representatives of TRLIA, the California Department of Water Resources (DWR), the USACE, and the California Central Valley Flood Protection Board (CVFPB) will be invited to participate in the BOSC meetings. At the conclusion of each meeting, the BOSC will prepare a formal meeting letter report documenting its observations, the questions posed, the BOSC recommendations that were made, and if appropriate, the responses by the design team members. The BOSC reviews may result in the need to obtain additional investigation, perform additional analysis, and potentially modify the design.

Following the design phase of the project, TRLIA proposes to seek input by means of independent reviews during construction by inviting the panel, DWR and the USACE to attend weekly construction meetings to keep apprised of construction progress. The agenda of these meetings will include construction progress, immediate future construction efforts, findings made during construction, and any issues due to changed

conditions or findings that are different than those made during the design. Significant issues will generate a formal SAR. Because all independent reviewers cannot attend every weekly meeting, meeting minutes will be drafted by the construction management lead and Quality Control and Quality Assurance information will be provided to TRLIA, USACE, DWR, and CVFPB reviewers after each construction meeting.

4.0 Reporting & Documentation

This SAR Plan, once approved, and all written comments or recommendations by the panel and related TRLIA responses will be made available to the public through electronic means on the Internet.

Review reports may be provided at the record of final design in the Design Documentation Report; at the completion of the plans, specifications, and cost estimate; at the midpoint of construction for multi-year construction contracts, prior to final inspection; and at critical construction milestones. At a minimum, a report will be prepared following the SAR for final design. Reports will contain the panel's evaluation, including the panel's assessment of the adequacy and acceptability of the methods, models, and analyses used. All comments in reports will be finalized prior to release of the report. Comments that lack consensus should be clarified to explain the non-concurrence. Since this SAR Plan is a living document, review comments, questions, and responses will be included as the program progresses through review and construction.

5.0 SAR Panel

The UYLIP SAR Panel, or BOSC, does not include members from the Federal Government. The SAR Panel will provide comments and recommendations to TRLIA and does not advise, or make recommendations to the Federal Government regarding the UYLIP. The SAR Panel does not meet the criteria of a Federal Advisory Committee and is therefore compliant with Federal Advisory Council Act (FACA).

The UYLIP SAR Panel includes Dr. Faiz Makdisi, Mr. Donald Babbitt, and Dr. David Williams; all are recognized experts in flood control projects and geotechnical engineering (Makdisi, Babbitt) and hydrologic and hydraulic engineering (Williams). In addition to their design expertise Dr. Makdisi and Mr. Babbitt have also been involved in the evaluation of construction of large embankments as well as serving as resources in addressing problems arising during construction. The panel members' qualifications are clearly indicated in the Conflict of Interest disclosure forms included in Attachment 1. The members of the panel have no conflicts of interest with respect to the UYLIP. They do not own land in the vicinity of the levee footprint nor do they own land in RD 784. Their fields of expertise and practice are in geotechnical adequacy of embankment designs and construction, hydrologic and hydraulic engineering and they do not carry out or advocate for or against Federal water resources projects.

6.0 Adequacy of the SAR

The information provided in this document demonstrates TRLIA's effort to ensure good science, sound engineering, and public welfare are the most important considerations

during development of the UYLIP. TRLIA feels that the planned actions, as carried out in the future, outlined in this document satisfy the intent of Section 2035 of WRDA 2007. This SAR Plan is a living document and as presented and can be modified in the future, as needed.