



Urban Levee Evaluations Project

Sutter Feather River Urban Study Area Summary

The California Department of Water Resources (DWR) Division of Flood Management conducted a levee evaluations program to assess the existing conditions of levees in California's Central Valley from 2008 to 2015. The Urban Levee Evaluations (ULE) Project addressed approximately 350 miles of Project¹ levees, divided into 18 study areas, protecting populations of 10,000 people or more. The primary objective of the evaluation was to assess if the levees meet ULE criteria under a potential 200-year flood event. The evaluation also included assessing if the levees meet ULE criteria at the 1955/57 design water surface elevation (WSE) where available. The levees were divided into reaches/sub-reaches for evaluation. For reaches/sub-reaches not meeting ULE criteria, conceptual remedial alternatives and screening-level Class 4 cost estimates were prepared.

Study Area

The Sutter Feather River Study Area includes 44.7 miles of levees that extend along the right (west) bank of the Feather River, extending from the Feather River confluence with the Sutter Bypass at the southern (downstream) end of the study area, north (upstream) to the Thermalito Afterbay where the levee ties into an outfall structure of the Afterbay. The Sutter Feather River Study Area included the Sutter Bypass Study Area during the Phase I Geotechnical Repair (P1GDR) and Supplemental Geotechnical Report (SGDR) investigations and later was separated as its own area due to the mitigation work in progress by Sutter Butte Flood Control Agency (SBFCA). The Sutter Feather River Study Area extends through Sutter and Butte counties, and includes levees of Maintenance Area (MA) 3, Levee District (LD) 1, LD 9, MA 16, and MA 7. The study area was divided into thirty two reaches/sub-reaches for screening-level static analyses, and nineteen segments for screening-level seismic analyses.

Analyses

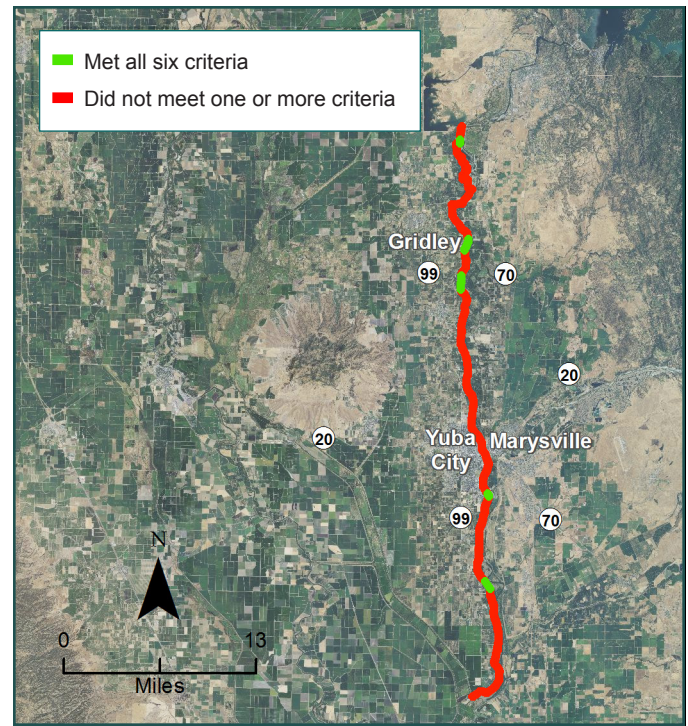
Levees in each reach/sub-reach were analyzed for six static ULE criteria at the 200-year WSE: erosion risk (i.e., risk of levee breach due to erosion), freeboard, through seepage, under-seepage, landside slope stability, and waterside slope stability. In ULE, analyses were not performed for local discontinuities or penetrations.

In addition, a seismic vulnerability evaluation was performed using a 200-year return period seismic event. The results of the assessment were used to classify intermittently loaded² levees as having high, medium, or low vulnerability with respect to post-seismic flood protection ability.

Results

For the Sutter Feather River Study Area, approximately 3.0 miles of intermittently loaded levee met all static ULE criteria at the 200-year WSE. The reaches/sub-reaches that did not meet static ULE criteria were further evaluated to identify conceptual remedial alternatives. The dimensions of these alternatives were verified by analyses and then a screening-level Class 4 cost estimate was prepared for planning purposes. The chart below summarizes the findings of the existing condition static assessments.

The seismic assessment classified 38.7 miles of levee as having low seismic vulnerability, and 6.1 miles as having high seismic vulnerability. The Sutter Feather River Study Area levees are intermittently loaded levees. Seismic remediation is not required under ULE criteria for intermittently loaded levees.

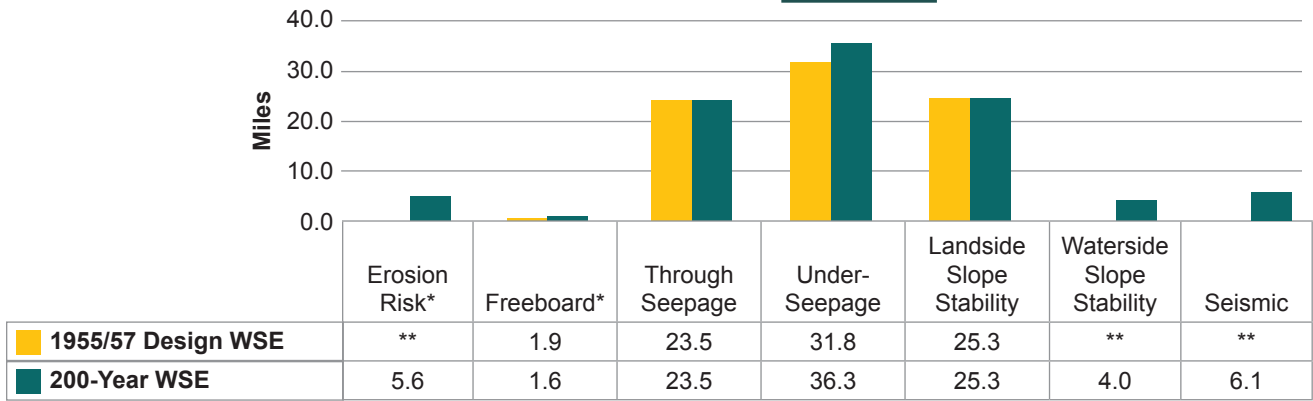


Sutter Feather River Levees

Footnotes:

- 1 Project Levee – A levee or flood wall that is a facility of the State Plan of Flood Control as defined in *Public Resources Code Section 5096.805*.
- 2 As defined in the *Urban Levee Design Criteria* (DWR, 2012), frequently loaded levees are defined as levees that experience a WSE of 1 foot or higher above the elevation of the landside toe at least once a day for more than 36 days per year on average. Levees not meeting the definition of frequently loaded levees are defined as intermittently loaded levees.

Total Miles of Levee That Do Not Meet Static ULE Criteria

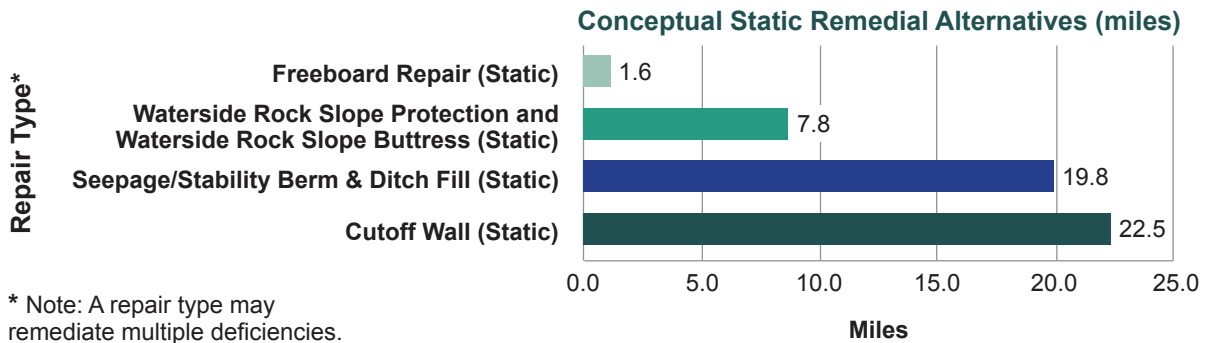


* Erosion and freeboard deficiencies were identified as portions of reaches where criteria were not met.

** Erosion risk, waterside slope stability and seismic vulnerability were not analyzed at the 1955/57 Design WSE.

Conceptual Remediation

Because of the urban setting of Marysville and Yuba City, property access on the landside of the levee is often limited, so typical conceptual static remedial alternatives in the Sutter Feather River Study Area consist of installing cutoff walls along the centerline of the levees and seepage and stability berms to address seepage and stability deficiencies, waterside rock slope protection for erosion and waterside slope stability deficiencies and localized freeboard repair. The total length of each type of repair to bring levees up to the ULE 200 year WSE criteria is depicted in the graph below.

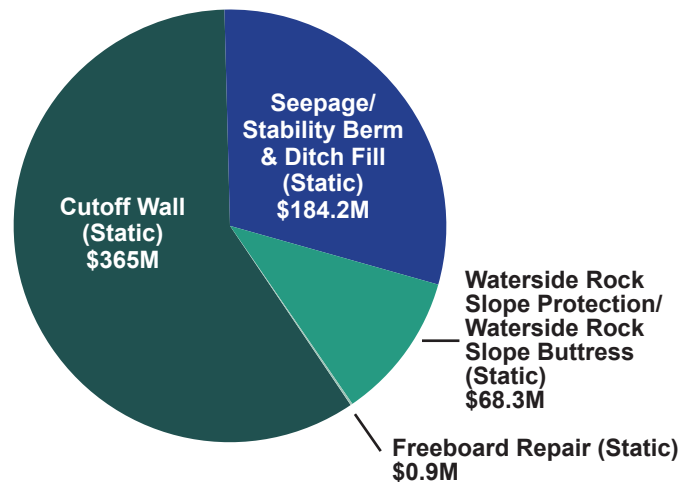


* Note: A repair type may remediate multiple deficiencies.

Costs

Screening-level Class 4 cost estimates were prepared on a 2013 basis³. Class 4 estimates are not design-level cost estimates. However, they do include both construction cost and owners' "soft" costs, such as permitting, legal, environmental mitigation, and contingency. The total estimated costs of conceptual static remedial alternatives to bring levees up to the ULE 200-year WSE criteria are shown in the adjacent pie chart.

Total Remediation Costs (\$618.4 Million) [200-Year WSE]



References:

Geotechnical Evaluation Report Volume 1, Existing Conditions – Sutter Feather River Study Area, Urban Levee Evaluations Project. URS, November 2014.
Geotechnical Evaluation Report Volume 2, Remedial Alternatives – Sutter Feather River Study Area, Urban Levee Evaluations Project. URS, March 2015.

Footnotes:

³ 2013 Basis – Industry construction cost derived from 2008 data with a 4 percent escalation included per year.

Reference sources for this document are available at <http://www.dwr-lep.com/auth>
 For further general DWR information or to obtain copies of DWR publications, please contact DWR Public Affairs (916) 651-7512 or <http://www.water.ca.gov/publicaffairs.cfm/>

