



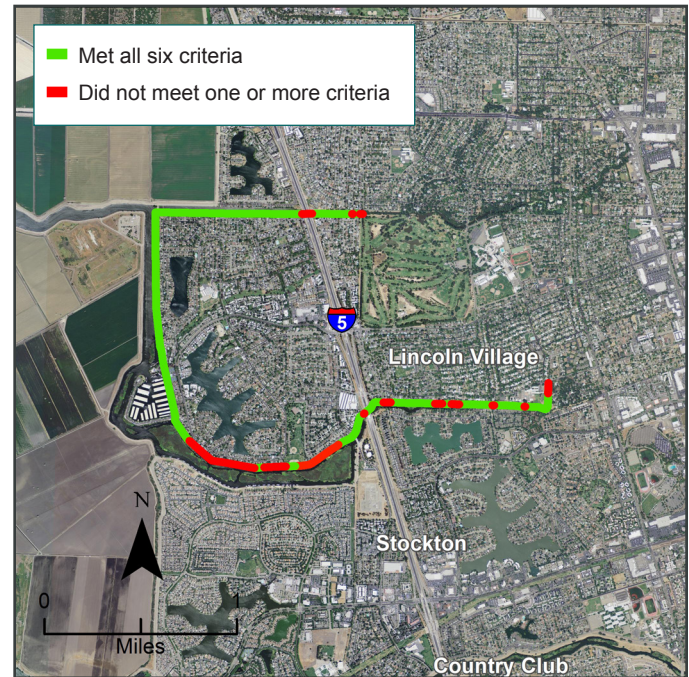
Urban Levee Evaluations Project

Lincoln Village 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 and non-Project² levees. Non-Project levees are considered appurtenant and are included under the ULE Project, as appropriate, when these levees protect part of a basin partially protected by Project levees. The Urban Non-Project levees were divided into 8 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 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 Lincoln Village Study Area includes 4.5 miles of levees within the City of Stockton in San Joaquin County, California. The study area was divided into seven reaches/sub-reaches for screening-level static analyses, and ten segments for screening-level seismic analyses. The Lincoln Village Study Area contains only frequently loaded levees (no intermittently loaded³ levees) as defined in the *Urban Levee Design Criteria* (DWR, 2012).



Lincoln Village Levees

Analyses

Levees in each reach/sub-reach were analyzed for six static ULE criteria at the 200-year WSE: erosion risk, freeboard, through seepage, under-seepage, landside slope stability, and waterside slope stability.

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 loaded levees as having high, medium, or low vulnerability with respect to post-seismic flood protection ability. Frequently loaded levees were classified as meeting or not meeting ULE criteria, and conceptual remedial alternatives and cost estimates were prepared.

Results

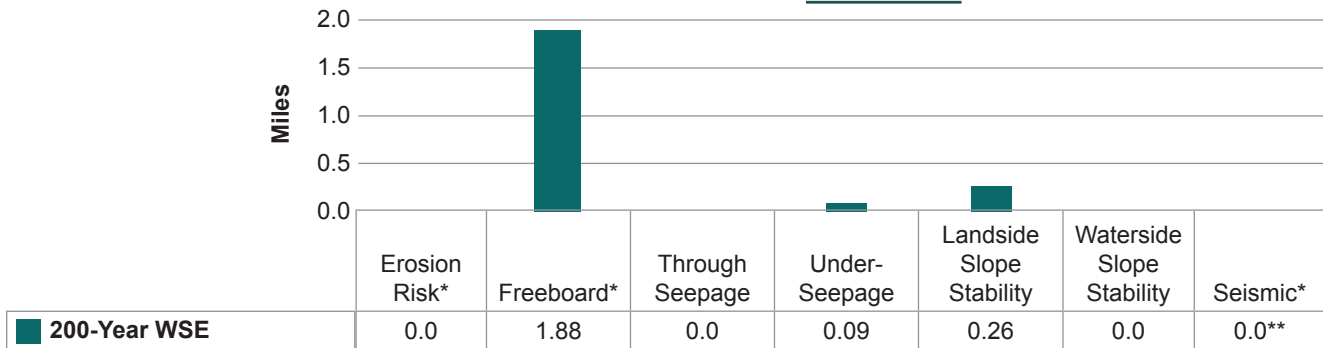
For the Lincoln Village Study Area, approximately 2.36 miles of levee met all static ULE criteria at the 200-year WSE. The reaches/sub-reaches that did not meet static ULE criteria was further evaluated to identify conceptual remedial alternatives. The dimensions of these alternatives were verified by analyses, and then a screening-level Class 4 cost estimate was prepared for planning purposes. The chart on the following page summarizes the findings of the existing condition static assessments.

The seismic assessment did not need to classify intermittently loaded levees as having low or high seismic vulnerability because intermittently loaded levees were not present for this study area. However, 4.5 miles of frequently loaded levees were classified as meeting ULE criteria and zero miles as not meeting criteria. Seismic remediation is not required under ULE criteria for intermittently loaded 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 Non-Project Levee – A levee or flood wall that is not a project levee as defined above.
- 3 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

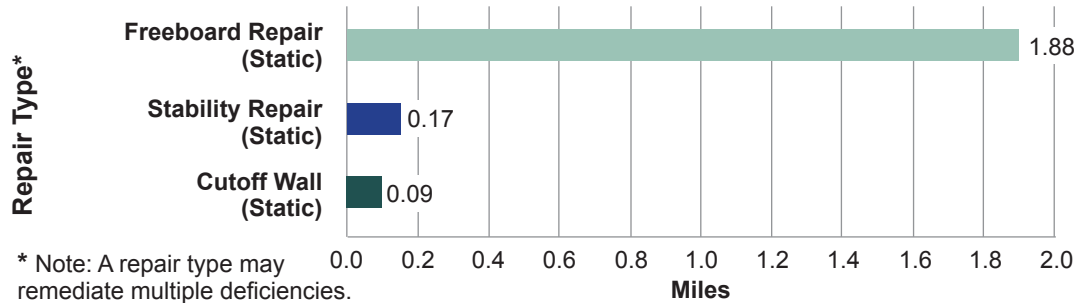


* Erosion and freeboard deficiencies and seismic vulnerability were identified as portions of reaches where criteria were not met.
 ** Frequently loaded levee

Conceptual Remediation

Because of Stockton’s urban setting, property access on the landside is often limited. Therefore, typical conceptual static remedial alternatives in the Lincoln Village Study Area consist of installing a cutoff wall along the centerline of the levee to address seepage and stability deficiencies, a stability berm to address slope stability along the land side of the levee, as well as, freeboard repair for levee height deficiencies. 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.

Conceptual Remedial Alternatives (miles)



Costs

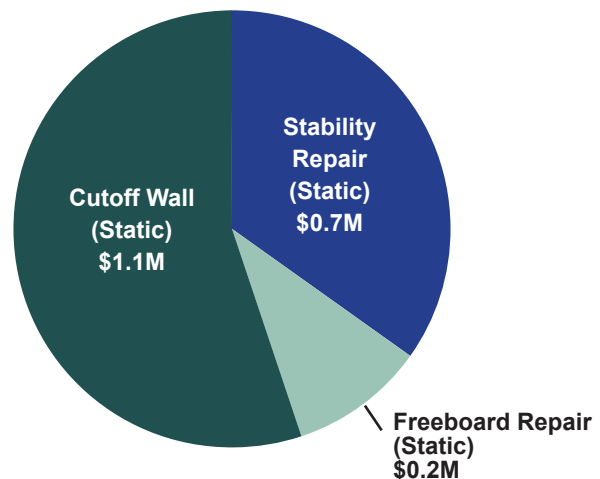
Screening-level Class 4 cost estimates were prepared on a 2013 basis⁴. Class 4 estimates are not design-level cost estimates. However, they do include construction cost and owners’ “soft” costs, such as permitting, legal, environmental mitigation, and contingency. The total estimated costs of conceptual static remedial alternatives to bring levees up to the ULE 200-year WSE criteria are shown in the adjacent pie chart.

References:

Geotechnical Evaluation Report Volume 1, Existing Conditions – Lincoln Village Study Area, Urban Levee Evaluations Project. Kleinfelder, March 2015.

Geotechnical Evaluation Report Volume 2, Remedial Alternatives – Lincoln Village Study Area, Urban Levee Evaluations Project. Kleinfelder, March 2015.

Total Remediation Costs (\$2 Million) [200-Year WSE]



Footnotes:

4 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/>

