



Urban Levee Evaluations Project

South West Sacramento Deep Water Ship Channel

Urban Non-Project 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 415 miles of Project¹ and non-Project² levees, divided into 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 South West Sacramento Deep Water Ship Channel (DWSC) Study Area includes 32.3 miles of urban non-Project levees along the left bank of the Yolo Bypass (DWSC West Levee), the right bank of the DWSC (Port North Levee), the left bank of the DWSC (Port South Levee), and the South Cross Levee (dry levee extending from Sacramento River West [right bank] Levee to DWSC East Levee). The study area was divided into seventeen reaches/sub-reaches for screening-level static analyses, and thirteen segments for screening-level seismic analyses.

Analyses

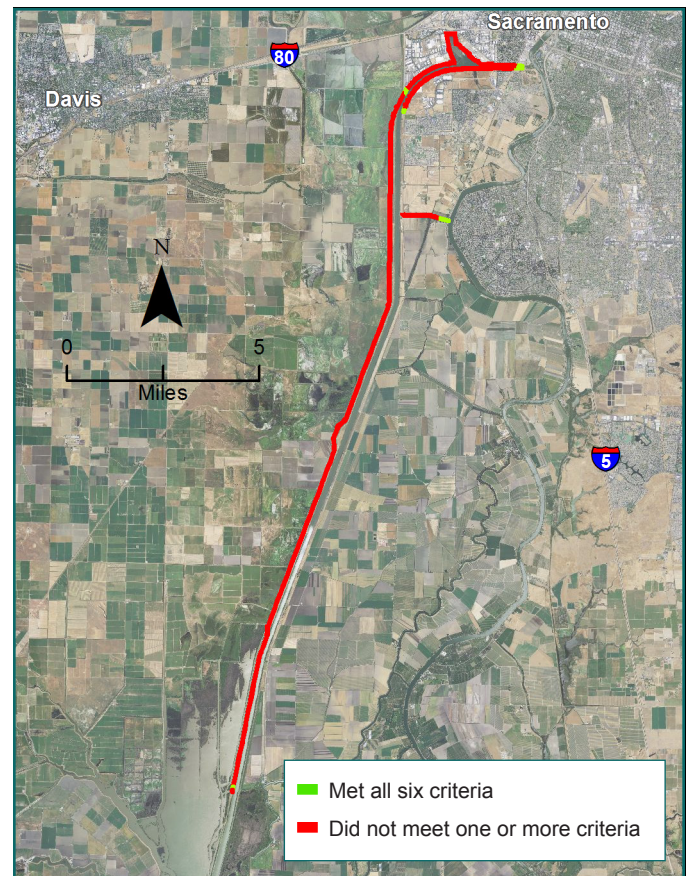
Levees in each reach/sub-reach were analyzed for six static ULE criteria at the 200-year WSE: erosion risk (i.e., risk of levee breach due to erosion), freeboard, through seepage, under-seepage, landside slope stability, and waterside slope stability. In ULE, analyses were not performed for local discontinuities 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 loaded³ levees as having high, medium, or low vulnerability with respect to post-seismic flood protection ability.

Results

For the South West Sacramento DWSC Study Area, approximately 1.4 miles of intermittently loaded levee met all static ULE criteria at the 200-year WSE; 3.7 miles of levee was not evaluated since it was designed to overtop during high water events into the Yolo Bypass. 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 18.0 miles of levee as having low seismic vulnerability, and 10.6 miles as having high seismic vulnerability. The South West Sacramento DWSC Study Area levees are intermittently loaded levees. Seismic remediation is not required under ULE criteria for intermittently loaded levees.

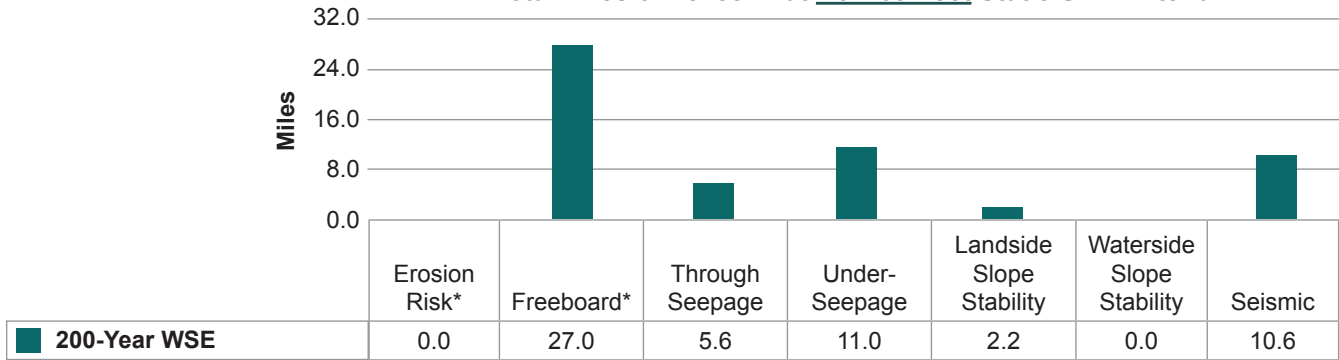


Deep Water Ship Channel Levees

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.

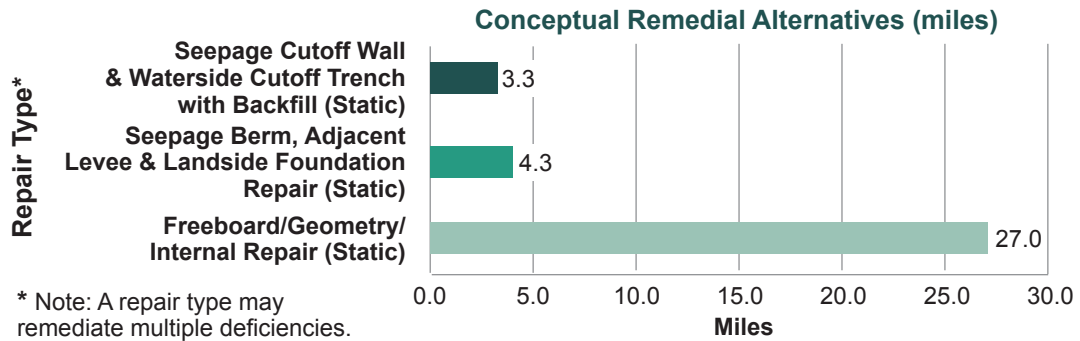
Total Miles of Levee That Do Not Meet Static ULE Criteria



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

Conceptual Remediation

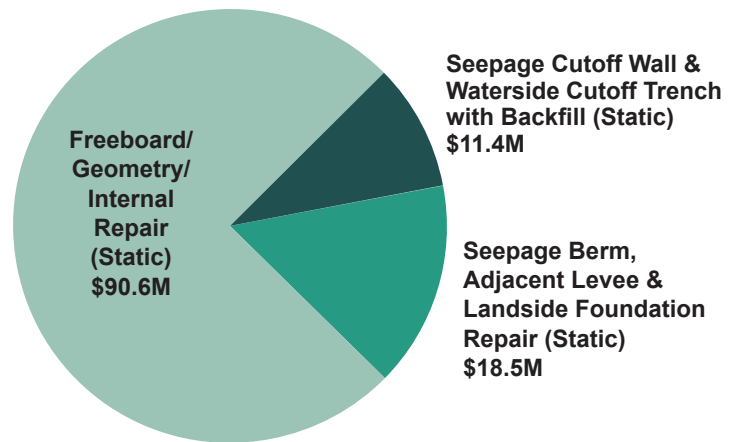
Dredge spoils on the landside of the DWSC West levee are occasionally used as fill material for other projects. Analyses were performed with no landside dredge spoils. Limits for the future removal of dredge spoils were recommended as the preferred alternative for the portions of the DWSC West levee that didn't meet the criteria for seepage and stability. Other seepage control measures used in this study area included seepage berms, seepage cutoff walls, and waterside cutoff trenches with backfill. Localized internal levee and freeboard/geometry repair to address deficiencies with levee geometry. 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.



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 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 (\$120.5 Million) [200-Year WSE]



References:

Geotechnical Evaluation Report Volume 1, Existing Conditions – South West Sacramento DWSC Study Area, Urban Levee Evaluations Project. URS, October 2014.
Geotechnical Evaluation Report Volume 2, Remedial Alternatives – South West Sacramento DWSC Study Area, Urban Levee Evaluations Project. URS, January 2015.

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/ath>
 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/>

