



Executive Summary
Levee Engineering Assessments
September 26, 2014

Purpose

Multnomah County Drainage District (MCDD), the agency responsible for managing the Columbia Corridor levee system, received notification that in August of 2013 the United States Corps of Engineers' (USACE) certification of the levees in Peninsula District 1 (PEN 1) and Peninsula District 2 (PEN 2) would expire. This finding was based on a USACE review of the levee that found insufficient evidence documenting whether the levees were adequate to protect against the 1-percent-annual-chance flood. Loss of this certification by USACE could result in the loss of accreditation with the Federal Emergency Management Association and which means that residents, businesses, and property owners could be at an elevated risk of flood while losing access to flood insurance.

In response, more than twenty jurisdictions and other regional partners have come together through a Governor-designated Oregon Solutions process convened by Portland Mayor Charlie Hales and Multnomah County Commissioner Jules Bailey. The Oregon Solutions Project Team is working to ensure that the Columbia Corridor levee system meets federal standards and reduces the risk of damage to lives and property that can result from flooding. The first step in that process, and the purpose of the Levee Engineering Assessments, is to deliver a collaboratively-sponsored evaluation of the current condition of the levee systems in PEN 1 and PEN 2. Based on this assessment, the levee systems in PEN 1 and PEN 2 were found to meet federal standards in all but the four areas of concern identified below.

Oregon Solutions will use the findings as a starting point to determine the community's flood risk tolerance and identify flood risk reduction strategies. The assessment does not identify strategies for improving levee performance or reducing flood risk. Nor does the report estimate the costs to address the areas of concern. Identifying and selecting strategies to address identified concerns, and estimating the associated costs, is part of what the Oregon Solutions Project Team will address next. Oregon Solutions will work to engage all communities with current or historical ties to the levee system in a collaborative discussion about how to address the technical and community based implications of levee maintenance and improvements.

Background Information about the Levee System and Safety Standards

A large portion of North and Northeast Portland are natural floodplains. Beginning in 1917, a system of levees and pump stations has been constructed to provide critical flood protection and stormwater management functions for the Columbia Corridor. This levee system is broken into four distinct subsystems. These are PEN 1, PEN 2, MCDD, and the Sandy Drainage Improvement Company (SDIC). This system is a valuable asset



Peninsula Drainage Canal

that is the product of local, state, and federal investment. It reduces the risk of flooding for an area that is home to thousands of people, 10 percent of the jobs in Multnomah County and billions of dollars in investment.

Responsibility for flood risk reduction is shared among many parties. FEMA and USACE set standards and act as catalysts to ensure that local communities understand their level of risk and their role in reducing risk. Local agencies can participate in FEMA's NFIP if they inspect, maintain, and, when necessary, reinvest in levee systems to ensure they meet FEMA standards. In order to qualify as a risk reduction system in the NFIP, local agencies must ensure that levees protect property owners from, at minimum, the 1-percent-annual-chance flood. MCDD (as well as PEN 1, PEN 2 and SDIC) also maintains the levees based on agreements with USACE.

Remaining in good standing within FEMA and USACE programs ensures:

- The levees are maintained to modern standards for safety and flood risk reduction
- Public safety in areas protected by levees
- Property owners are not required to buy flood insurance
- If desired, property owners can acquire low cost flood insurance through the National Flood Insurance Program (NFIP)
- City of Portland Floodplain Development Code standards do not apply to developments within the leveed area
- When a high water event occurs, USACE will assist with levee repairs

Summary of Findings

Levee Engineering Assessments have been completed for PEN 1 and PEN 2 and document the current condition of each levee system. Engineering firms were contracted in 2013 to conduct a variety of tasks including field work, laboratory tests, and analytic modeling to compare the existing levee system to federal standards and identify any areas of concern within each system. To learn more about the federal certification standards used in the analyses or the methodology used to arrive at the findings, please visit the Oregon Solutions website:

<http://orsolutions.org/osproject/MCDD>.

Full reports will be available on-line beginning in early October, 2014. Based on the Levee Engineering Assessments, the levee systems in PEN 1 and PEN 2 were found to meet federal standards in all but four areas (*see maps below*):

West Side of PEN 1: Railroad Embankment

- The embankment was built by railroad companies for the purpose of rail transport and came to be included as part of the levee system after its construction.
- The railroad embankment is one of the locations where there was a breach in 1948, resulting in the Vanport flood and subsequent flooding of PEN 2.
- It was not possible to collect current soil samples or conduct analysis at this location due to access limitations associated with railroad ownership of the land.
- Information gathered since the Vanport flood indicates that the embankment does not meet modern soil stability or water seepage standards.

PEN 1 Cross-Levee: Interstate 5 and North Marine Drive

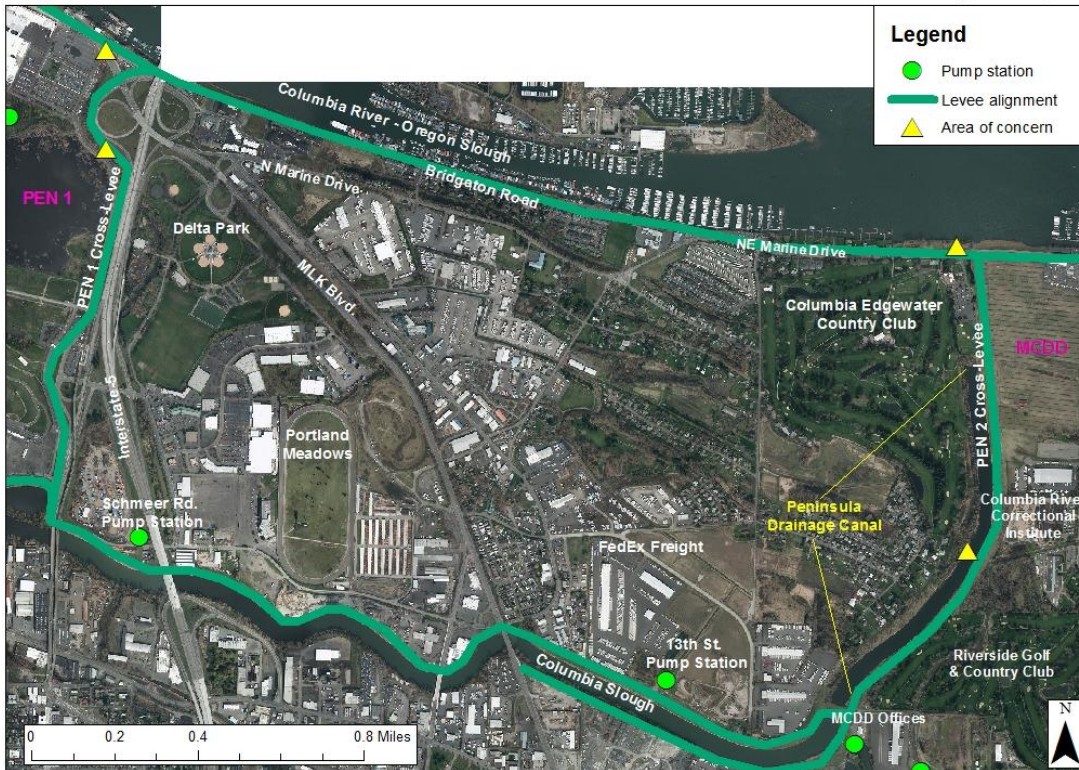
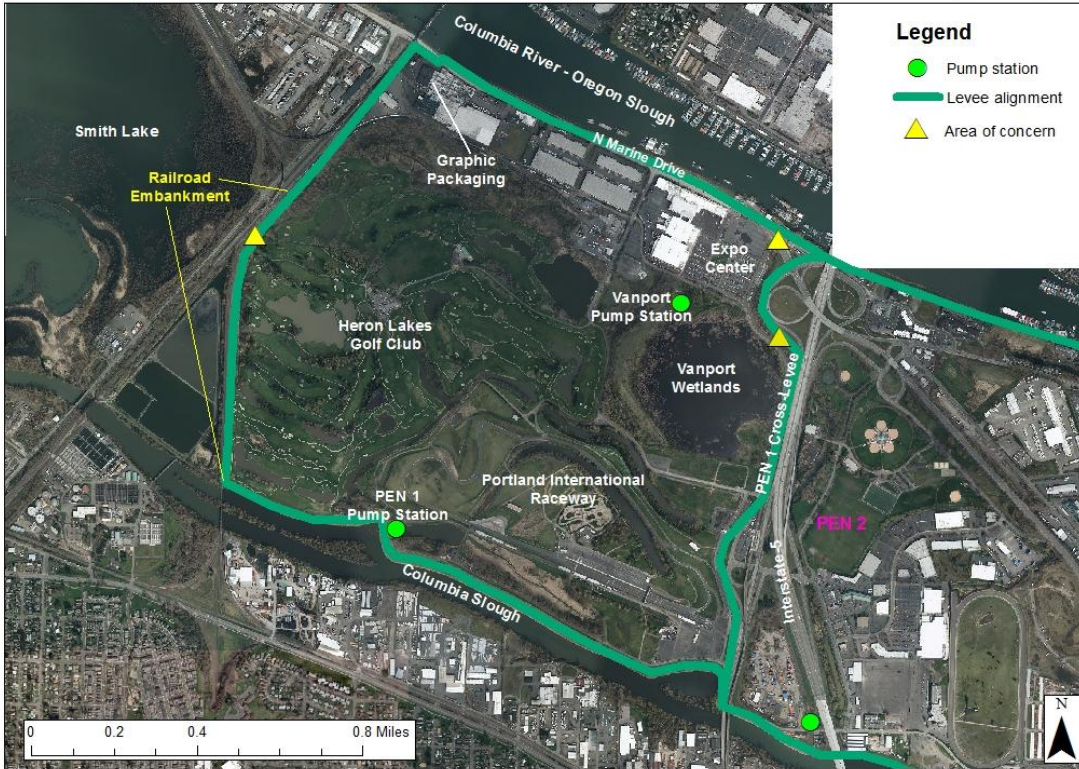
- There are two sections within the vicinity of the interchange that are not high enough to prevent flood waters from entering PEN 1 or PEN 2.

Northeast Corner of PEN 2: Columbia River Levee

- The height of the existing levee adjacent to Marine Drive (just west of the intersection of NE 33rd Drive) is 6 to 12 inches lower than the required height.

PEN 2 Cross-Levee: Peninsula Drainage Canal

- The cross-levee is narrow in width and has steep walls. The level of existing water in the Peninsula Drainage Canal is lower than the 1-percent-annual-chance flood elevation. This inequality in water level causes instability in the levee and can result in a large amount of erosion, which can cause failure.
- The Peninsula Drainage Canal is designated as a Special Habitat Area (SHA). It is home to sensitive species (including the Western painted turtle) and is also a migratory stopover habitat and a wildlife connectivity corridor. Any modification to the levee structure must evaluate the impacts to these species and existing habitat.



Study Limitations

- The model uses the 1-percent-annual-chance flood elevation, which is the minimum standard used by FEMA.
 - The 1-percent-annual-chance flood is the flood elevation (water level) that has a 1-percent chance of occurring in any year
- Some cities in the U.S. have opted to protect to a higher 0.5-percent-annual-chance or 0.2-percent-annual-chance elevation.
- Neither climate change nor potential Columbia River Treaty scenarios were modeled.
- Because river systems vary widely, USACE selects a unique design standard for each levee's inclusion and rating in their Rehabilitation and Inspection Program (RIP).
 - For the Columbia Corridor levee system, the design standard is the "flood of record" which occurred in 1894. This is a higher standard than 1-percent-annual-chance flood used by FEMA.
- The model does not include a seismic assessment of the levees.
- The assessment does not assign costs to address the areas found to be deficient because costs are dependent on the strategies selected through the Oregon Solutions process.

Next Steps

The findings of the Levee Engineering Assessments represent a significant first step in understanding the safety and resiliency of the communities protected by the levee system. After vetting the findings presented in this report, the Oregon Solutions Project Team will engage in a discussion to determine what level of flood protection the community desires. Then, the Project Team will identify the proper design, construction, and financing options that will achieve these community goals and keep the levee system in compliance with FEMA and USACE standards.

For more information, visit Oregon Solutions at <http://orsolutions.org/osproject/MCDD> or contact Steve Greenwood at sgreenw@pdx.edu, or (503) 725-9092.