WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES
REPORT OF INVESTIGATIONS 37

Landslide and Liquefaction Maps for the Long Beach Peninsula, Pacific County, Washington: Effects on Tsunami Inundation Zones of a Cascadia Subduction Zone Earthquake

Sheet 1 of 3

Pamphlet accompanies map

A

Leadbetter Point

Willapa National Wildlife Refuge

Grassy Island

Willapa Bay

Leadbetter Point State Park

Stackpole Harbor

Ocean

Pacific

Oysterville

Surfside Inn

B

Ocean

Pacific

Willapa Bay

Pacific Pines State Park

Nahcotta

Ocean Park

Ocean Park Resort

Black Bear Beach Camp

Loomis State Park

Peg's RV Park

Cranberry RV Park

Cranberry

C

Willapa Bay

Ocean

Pacific

Long Beach

Driftwood RV Park

Saddlerock RV Park

Tinker Lake

Seaview

Wisewood RV Park & Campground

Long Beach Campground

Black Lake

Ocean Beach Hospital

NE Brumbach Ave

N Head Rd (Loop 100)

Ilwaco

Port of Ilwaco Airport

North Head Lighthouse

Cape Disappointment State Park

McKenzie Lagoon

Cape Disappointment Lighthouse

Sand Island

Baker Bay

Columbia River

Lambert conformal conic projection
North American Datum of 1983
Shaded relief generated from a lidar bare-earth digital elevation model (available from Puget Sound Lidar Consortium, http://pugetsoundlidar.ess.washington.edu/); sun azimuth 315°, sun angle 45°
Digital cartography and GIS by Stephen L. Slaughter, Ian J. Hubert, and Anne C. Olson
Editing and production by Jaretta M. Roloff

Tsunami evacuation routes and post-tsunami evacuation areas are not intended for emergency use and are included for reference purposes only. The objective of these map products is to assist city and emergency management officials in evaluating the suitability of existing evacuation routes and assembly areas for potential vulnerability to ground failure from a M9+ CSZ earthquake. Results of this report could necessitate modifying, adding, or removing current tsunami evacuation routes and/or post-tsunami assembly areas.

Disclaimer: This product is provided 'as is' without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular use. The Washington Department of Natural Resources and the authors of this product will not be liable to the user of this product for any activity involving the product with respect to the following: (a) lost profits, lost savings, or any other consequential damages; (b) fitness of the product for a particular purpose; or (c) use of the product or results obtained from use of the product. This product is considered to be exempt from the Geologist Licensing Act [RCW 18.220.190 (4)] because it is geological research conducted by or for the State of Washington, Department of Natural Resources, Division of Geology and Earth Resources.

WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark - Commissioner of Public Lands

Division of Geology and Earth Resources
David K. Norman - State Geologist

Sheet 1. Shallow landslide vulnerability during a dry period for a Cascadia subduction zone magnitude 9+ earthquake for the Long Beach Peninsula, Pacific County, Washington

Stephen L. Slaughter, Timothy J. Walsh, Anton Ypma, Kelsay M. D. Stanton, Recep Cakir, and Trevor A. Contreras

October 2013

Relative vulnerability to slope failure

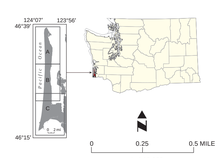
- High
- Medium
- Low
- All others not evaluated

Map symbols

- Wetland or cranberry bog
- Evacuation route
- Upland/lowland division
- 20-foot contour
- Hiking trail
- Post-tsunami assembly area
- Medical facility
- Airport
- Hiking trail
- Lighthouse
- Campground
- Recreational vehicle park

Shallow landslide vulnerability for the Long Beach Peninsula is based on the critical acceleration (a_c) of slopes by ground motions that the region might experience from a Cascadia subduction zone magnitude 9+ earthquake. The hazard ratings are qualitative indicators based on the difference between the a_c and peak ground acceleration (PGA) for each grid. High hazard is an a_c less than 0.2 *g*, medium hazard is an a_c between 0.2 *g* and 0.3 *g*, and low hazard is an a_c between 0.3 *g* and 0.4 *g*; slopes greater than 0.4 *g* were not rated. Different methods of analysis were used for the uplands that consist of soil overlaying bedrock and the lowlands that consist of sand and beach sand.

This plate represents dry conditions where groundwater is 3 ft below the surface in the uplands and below the landslide failure plane in the lowlands. The uplands and lowlands are divided by a dashed gray line. Groundwater depth was assumed to be uniform for each area of analysis.



0 0.25 0.5 MILE

scale 1:18,000