

Shallow-Seated Landslide Susceptibility Map of the Central-Eastern Quarter of the Astoria Quadrangle, Clatsop County, Oregon

2013

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Landslide Inventory, Susceptibility Maps, and
Risk Analysis of the City of Astoria, Clatsop County, Oregon

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PLATE 5

EXPLANATION

This shallow landslide susceptibility map identifies landslide-prone areas within the area. This susceptibility map is not regulatory, and revisions can happen when new information regarding factors that affect landslide susceptibility is found or when future (new) landslides occur. Therefore, it is possible that there are areas susceptible to shallow landslides within the map that were not identified or that the conditions leading to such susceptibility developed after the map was prepared.

On the basis of several factors and past studies (described in detail by Burns and Madin, 2009), a value for depth of 15 ft (4.5 m) is used to divide shallow from deep landslides. This susceptibility map was prepared by combination of three factors: 1) calculated factor of safety (FOS), 2) landslide inventory data, and 3) buffers applied to the previous two factors. The factor of safety was calculated using conservative values such as having a water table at the ground surface. The landslide inventory data were taken from the corresponding inventory map. The combinations of these factors comprise the relative susceptibility hazard zones: high, moderate, and low as shown by the Hazard Zone Matrix below. The landslide susceptibility data are displayed on top of a base map that consists of an aerial photograph (orthorectified) overlain on the lidar-derived digital elevation model. For additional detail on how this map was developed see Burns and others (2012).

This susceptibility map is intended to provide users with relative hazard information regarding shallow-landslide susceptibility within the area. The map is not intended to replace site-specific engineering geologic and geotechnical investigations. It is intended that this map will provide useful information to guide regional and site-specific investigations for future developments, to assist in regional planning, and to reduce risk in areas where moderate and high hazards intersect vulnerable population.

SHALLOW-LANDSLIDE SUSCEPTIBILITY CLASSIFICATION

Each landslide susceptibility hazard zone shown on this map has been developed according to a number of specific factors. The classification scheme was developed by the Oregon Department of Geology and Mineral Industries (Burns and others, 2012). The symbology used to display these hazard zones is explained below.

Landslide Susceptibility Zones: This map uses color to show the relative degree of hazard. Each zone is a combination of several factors.

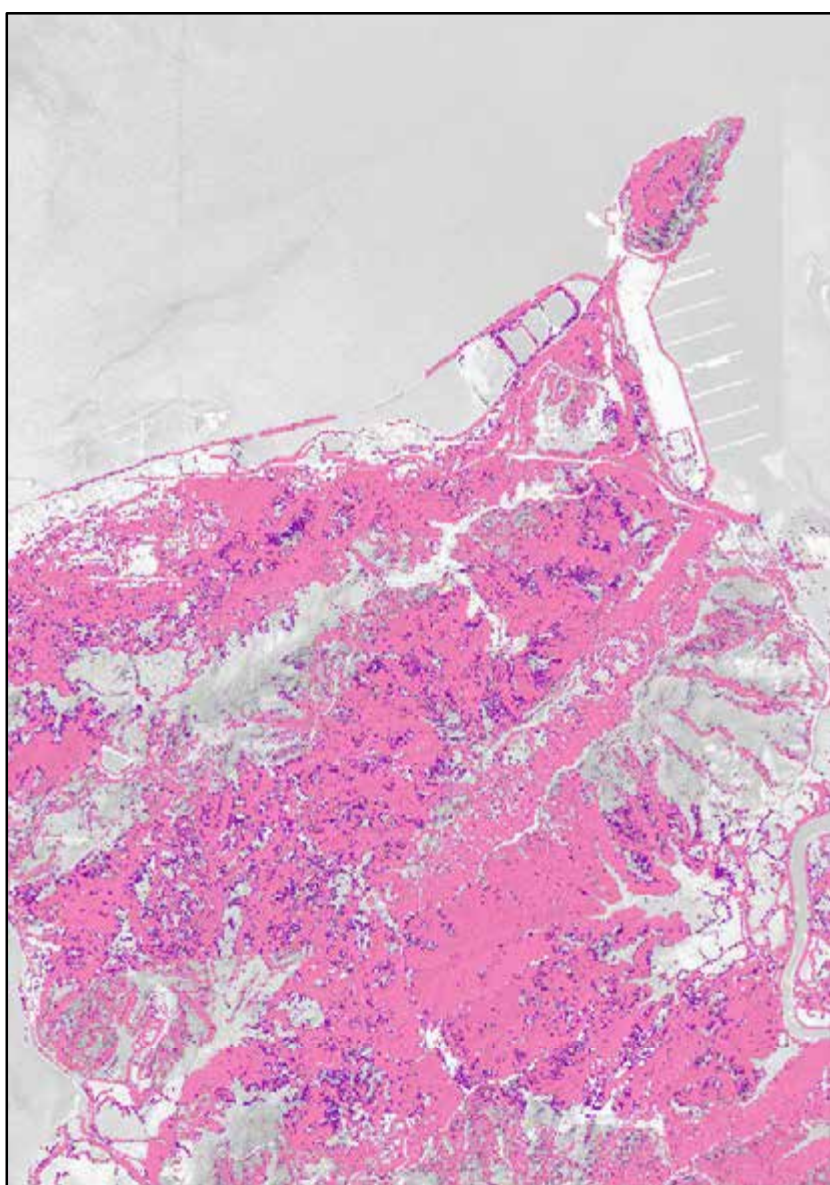
- HIGH:** High susceptibility to shallow landslides.
- MODERATE:** Moderate susceptibility to shallow landslides.
- LOW:** Low susceptibility to shallow landslides.

Hazard Zone Matrix

Contributing Factors *	Final Hazard Zone		
	High	Moderate	Low
1 Factor of Safety (FOS)	less than 1.25	1.25 - 1.5	greater than 1.5
2 Shallow Landslide Deposits & Head Scarps	included	—	—
3 Buffers	2H-1V (head scarps)	2H-1V (FOS less than 1.5)	—

*See explanation of corresponding contributing factors below.

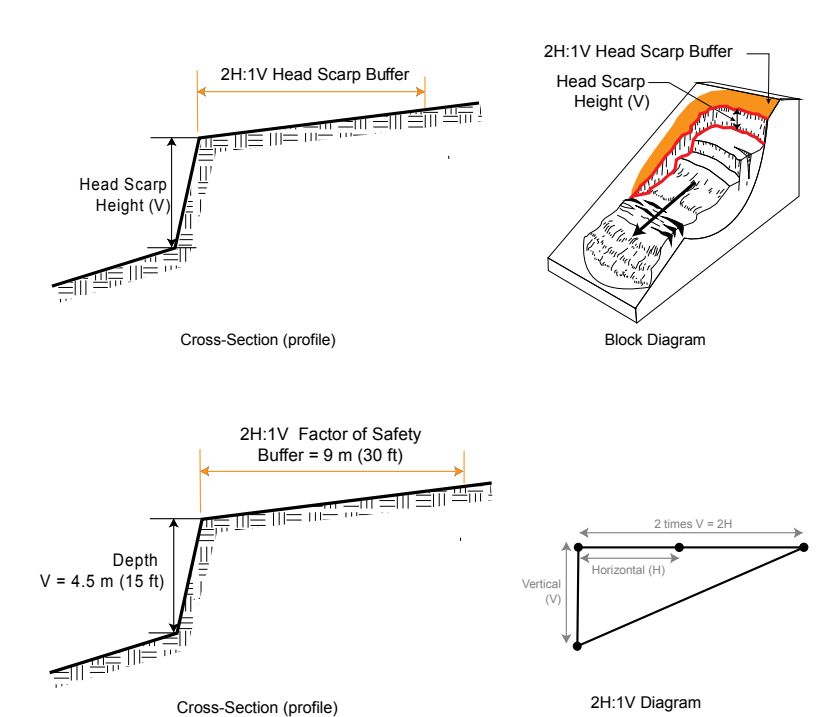
1 Factor of Safety Map



2 Landslide Inventory Map



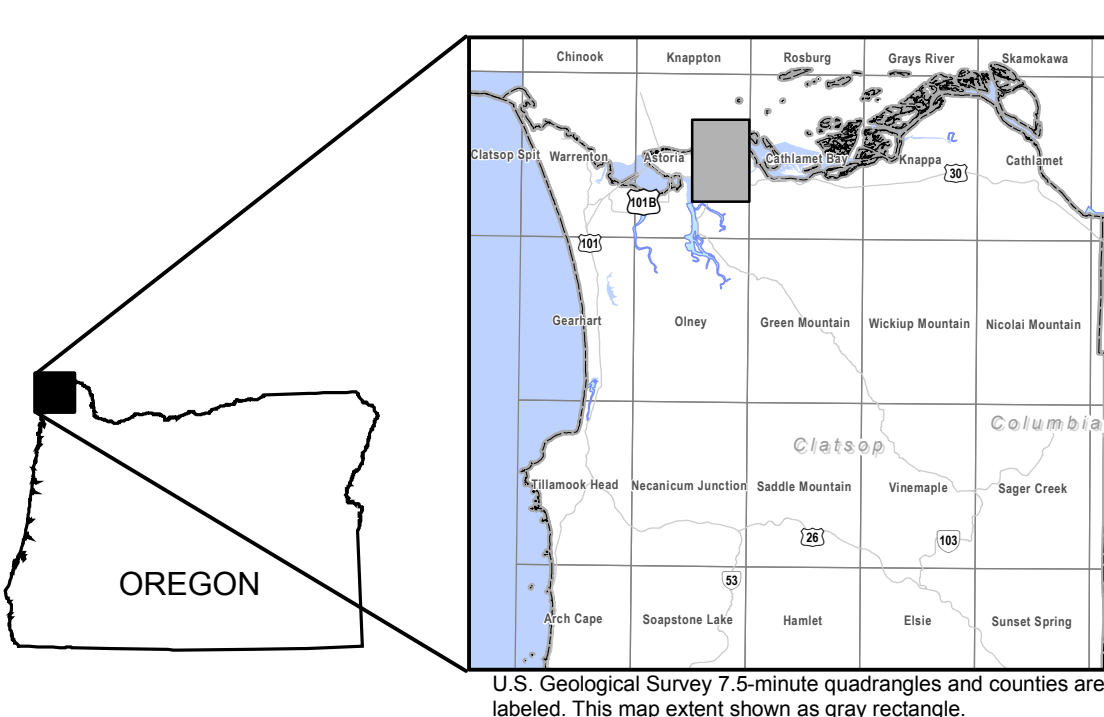
3 Buffers for Head Scarps and Factor of Safety Less Than 1.5



REFERENCES

- Burns, W. J., and Madin, I. P., 2009. Protocol for inventory mapping of landslide deposits from light detection and ranging (Lidar) imagery: Oregon Department of Geology and Mineral Industries, Special Paper 42, 30 p.
- Burns, W. J., Madin, I. P., Mickelson, K. A., 2012. Protocol for shallow landslide susceptibility mapping: Oregon Department of Geology and Mineral Industries, Special Paper 45, 32 p.
- Cornforth, D. H., 2005. Landslides in practice: Investigation, analysis, and remedial/preventative options in soils: Hoboken, New Jersey, John Wiley and Sons, Inc., p. 506.
- Highland, L., compiler, 2004. Landslide types and processes, U.S. Geological Survey Fact Sheet 2004-3072 (ver. 1.1), 6 p.
- Turner, A. K., and Schuster, R. L., eds., 1986. Landslides: Investigation and mitigation: Transportation Research Board, National Research Council, Special Report 247, 670 p.

LOCATION MAP

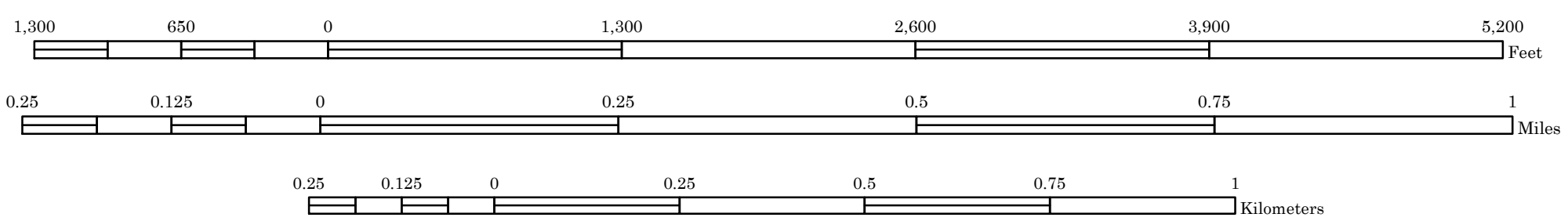


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Base Map:
Lidar-derived elevation data are from Puget Sound Lidar Consortium, 2005. Digital elevation model (DEM) consists of a 3-foot-square elevation grid that was converted into a hillshade image with sun angle at 315 degrees at a 45-degree angle from horizontal. The DEM is multiplied by 5 vertical exaggeration to enhance slope areas.
Orthophoto is from Oregon Geospatial Enterprise Office, 2005, and consists of 2005 orthophoto draped over DEM with transparency.
Projection: North American Datum 1983, UTM zone 10 north.
Software: Esri ArcMap 9.3, Adobe Illustrator CS2.
Source File: Books/Publications/Astoria.mxd.

77°
APPROXIMATE MEAN
DECLINATION, 2006

SCALE 1:8,000



Cartography by William J. Burns, Oregon Department of Geology and Mineral Industries
Outside agency review by Ken Cook, Public Works Director, City of Astoria

IMPORTANT NOTICE

This map depicts landslide susceptibility zones developed on the basis of limited data. The susceptibility zones were created following the protocol defined by Burns, Madin, and Mickelson (2012). This map cannot serve as a substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from those shown on this map.