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Subject: Update of ECA Mapping for Known Landslide and Steep Slope Erosion Hazard areas	Code and Section Reference: SMC 25.09.012	
	Type of Rule: Code Interpretation	
	Ordinance Authority: SMC 3.06.040	
Index: Regulations for Critical Areas	Approved	Date
Nathan Torgelson, Director, SDCI		

PURPOSE

This rule updates the advisory map for two Environmentally Critical Areas (ECAs): Known landslide areas (25.09.012.A.3.a) and steep slope erosion hazard areas (25.09.012.A.3.b.5) The updated maps, attached, are titled "Known Landslide Areas," dated July 15, 2019 and "Steep Slope Erosion Hazard Areas," dated July 15, 2019. You can view the updated advisory map layers and the existing layers at <https://seattlecitygis.maps.arcgis.com/apps/webappviewer/index.html?id=d3138b97216d4f00b96bd1a34373c8ae>.

AUTHORITY

The authority for updating the map is Seattle Municipal Code (SMC) 25.09.030.A, *Regulations for Environmentally Critical Areas*, which states that "the Director may update or amend the maps by Director's Rule".

KNOWN LANDSLIDE AREAS (SMC 25.09.012.A.3.a)

BACKGROUND

The City of Seattle has extensive paper records documenting reported landslides that have been maintained for over a century. The records were primarily collected and maintained by the Seattle Engineering Department, which is now separated into Seattle Department of Transportation, Seattle Public Utilities, Seattle City Light, and Seattle Department of Construction and Inspections. Beginning in about 1985, the Seattle Department of Construction and Land Use (now Seattle Department of Construction and Inspections) began compiling landslide records separately from the original files maintained by the Seattle Department of Transportation.

In 1990, pursuant to the Interim Environmentally Critical Areas Regulations, the locations of landslides documented by both the Seattle Department of Construction and Land Use and the Seattle Department of Transportation were mapped in the Environmentally Critical Areas Folios, which were updated when the Regulations became effective October 31, 1992.

Due to a devastating landslide season during the winter of 1996/1997, the City Council created a landslide task force, which generated recommendations to mitigate the landslide hazard throughout the City. This resulted in the Spot Drainage program managed by Seattle Public Utilities, public outreach and education on landslide prevention, and a landslide study that was first published in 2000 and later updated in 2003 (Seattle Landslide Study, Shannon & Wilson, 2000/2003).

The Seattle Landslide Study (2000/2003) included mapped locations of the estimate of initiation points for landslides, in addition to compiling and field checking information from the paper records.

The resulting map was adopted as an updated Known Landslide Areas layer in GIS in 2001 and Director's Rule 15-2001.

During the last decade, the Seattle Emergency Operations Center instituted the use of the program, WebEOC, which includes, as one of its features, a way for City departments to document responses to landslides. The Seattle Department of Construction and Inspections, Seattle Department of Transportation, Seattle Public Utilities, and Seattle Parks and Recreation typically document their inspections of reported slides in WebEOC. These records were occasionally added to the Known Landslide layer in GIS as a single point in the center of the parcel where the slide originated.

The Known Landslides map, prior to the current update, reflects this complexity of data sources. Landslides from different source documents were mapped using different protocols, and the map did not include landslides that were documented more recently than about 2012.

BASIS FOR UPDATED KNOWN LANDSLIDES ECA MAPPING

During the current update, SDCI revisited the original data sources for historic landslide records in order to adopt consistent mapping standards and digitize all historic paper records. Through the SDCI public GIS website, digitized files will be made available for download from private computers.

The updated Known Landslides ECA layer includes City records of reported events through July 15, 2019.

The following criteria were used to describe what constitutes a Known Landslide:

- Mudflows, debris flows, rotational landslides, slumps, erosion
- Ground cracking, scarps, settlement, and set-downs
- Retaining wall failure, when accompanied by ground movement
- Slope failures following sewer or water pipe breaks
- Landslide debris and trees on-site
- Landslide runout
- Ground movement following excavation or grading

Generally, the following were not interpreted as Known Landslides:

- Retaining wall failure not accompanied by ground movement
- Structural failure not related to ground movement
- Earthquake damage, except when triggering slope movement
- Unexplained sinkholes

Landslide events are represented in the updated layer as either outlines of landslides derived from historic maps, rectangular polygons that touch properties known to have been impacted, lines that represent mapped landslide head scarps, and/or points that represent single events. The initiation points of landslides as mapped in the Seattle Landslide Study¹ were included in the database, though a modest number (fewer than 10%) of point locations were modified based on additional information found in the records. Many of these modified points were not originally field-checked by Shannon & Wilson.

In most cases, initiation points were preserved, and additional features were added to represent the full extent of the landslide. Thus, one landslide event may be represented by an initiation point and a polygon that touches the affected properties. Clicking on the feature on the map will bring up a description of the feature and provide clarity on whether one or more landslide events are being represented.

¹ Laprade, W. T., Kirkland, T. E., Nashem, W. D., & Robertson, C. A. (2000). Seattle landslide study. Shannon and Wilson, Inc.

The feature chosen to represent the landslide reflects the quantity and quality of historical data available describing the event. For each landslide, SDCI chose the feature or features that would efficiently overlap impacted properties and effectively communicate the landslide history of a neighborhood. Evidence from historic files was required for a landslide feature to overlap a private parcel.

STEEP SLOPE EROSION HAZARD AREAS (SMC 25.09.012.A.3.b.5)

BACKGROUND

“Steep slope” is a slope with an incline of 40% or more (10 feet of vertical rise over a horizontal distance of 25 feet or less) with a height of at least 10 feet. You can find more information about the definition of steep slope erosion hazard areas in SMC 25.09.012, environmentally critical areas definitions.

The existing steep slope erosion hazard area map has been in use since October 17, 2016. Prior to this map, a steep slope map was based upon aerial topography from about 1954 to 1958, with steep slope areas delineated in the late 1980s to early 1990s for use with Ordinance 116523.

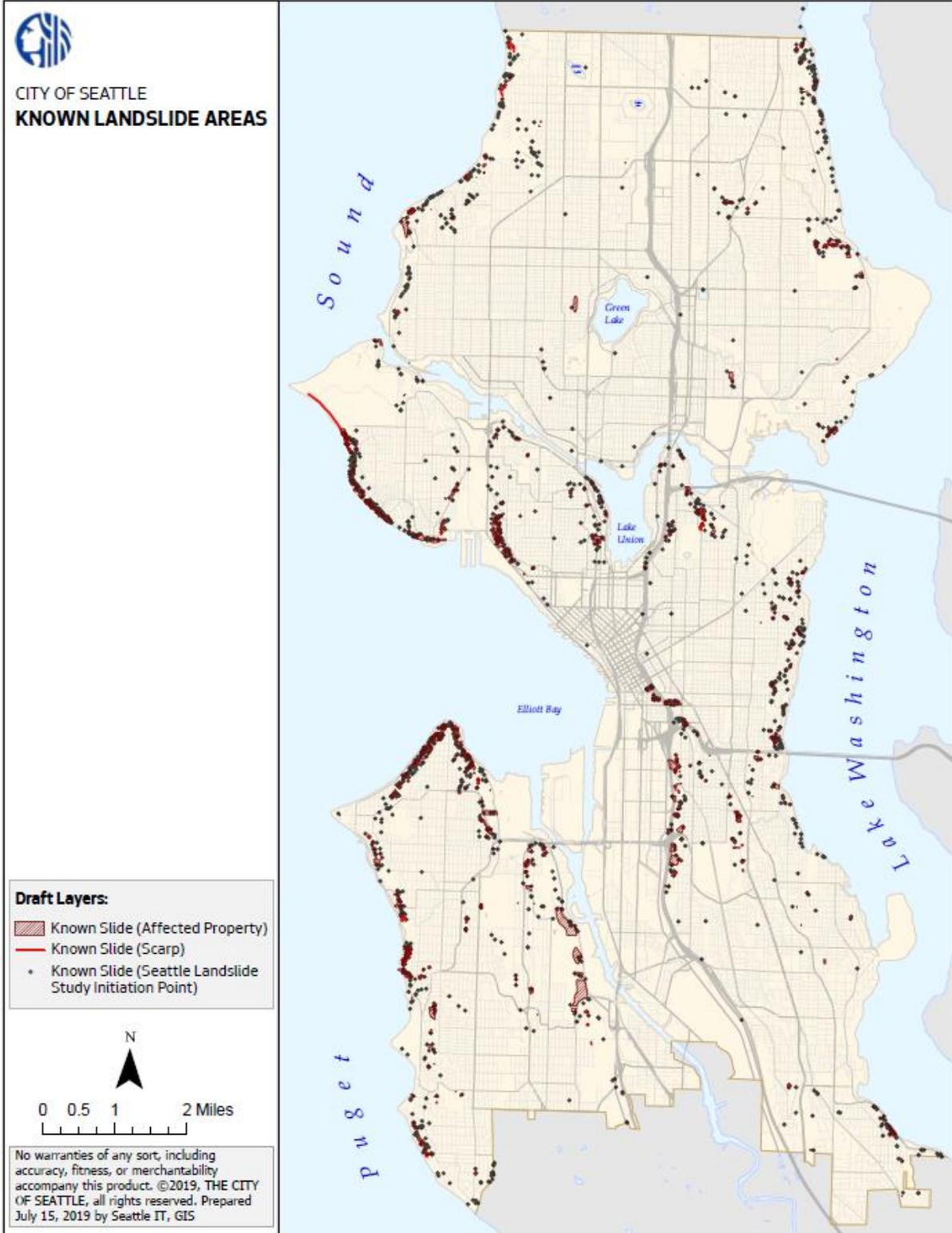
The existing map was based on 2001 LIDAR (light detection and ranging) contours (Puget Sound LIDAR Consortium) and the 1993 topographic contours from aerial photos. SDCI used both sets of contours to develop the updated map because each type of mapping has strengths and weaknesses. LIDAR is generally better where there is heavy vegetation or tree cover. The 1993 topographic contours may be more accurate in areas where there are retaining walls.

The portions of the existing advisory map of steep slope erosion hazard areas covering the northern and southern thirds of the City are based on a combination of the 2001 LIDAR and the 1993 topographic contours. Because of time constraints, the portion of the updated map covering the center third of the City is based only on the 2001 LIDAR contours.

BASIS FOR UPDATED STEEP SLOPE EROSION HAZARD ECA MAPPING

This update increases the accuracy of the existing map by automatically removing mis-mapped steep slope erosion hazard area polygons that were shorter than 10' tall and manually adjusting polygons that contained areas shorter than 10 feet tall.

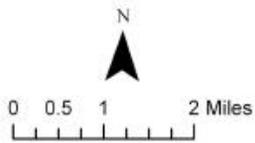
The steep slope erosion hazard area map is called “advisory” because the mapping is used by the Seattle Department of Construction and Inspections for initial information and screening. Whether or not a site is eventually treated as an environmentally critical area is based on the actual topography of the ground surface.





CITY OF SEATTLE
**STEEP SLOPE EROSION
HAZARD AREAS**

Draft Layer:
Steep Slope Erosion Hazard Area



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