

## Chapter 18.20

### GEOLOGICALLY HAZARDOUS AREAS

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- 18.20.010 Designation of geologically hazardous areas.
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**18.20.010** **Designation of geologically hazardous areas.** Geologically hazardous areas include areas susceptible to erosion, sliding, earthquake, or other geological events. They pose a threat to the health and safety of citizens when incompatible development is sited in areas of significant hazard. Such incompatible development may not only place itself at risk, but also may increase the hazard to surrounding development and use. Areas susceptible to one or more of the following types of hazards shall be designated as a geologically hazardous area:<sup>1</sup>

- A. Erosion hazard.
- B. Landslide hazard.
- C. Seismic hazard.
- D. Mine hazard.
- E. Volcanic hazard.
- F. Other geological events including mass wasting, debris flows, rock falls, and differential settlement. (Ord 874, December 2010)

**18.20.020** **Designation of specific hazard areas.**

- A. Erosion hazard areas. Erosion hazard areas are those areas identified by the U.S. Department of Agriculture- Natural Resources Conservation Services (USDA-NRCS) as having a “moderate to severe”, “severe”, or “very severe” rill and inter-rill erosion hazard.<sup>2</sup> Rill erosion tends to occur on slopes, particularly steep slopes with easily-erodible soils or poor vegetation. Erosion hazard areas also include those areas with slope greater than fifteen percent (15%).

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<sup>1</sup> See WAC 365-190-080(4)(a).

<sup>2</sup> See WAC 365-190-080(4)(c).

- B. Landslide hazard areas. Landslide hazard areas are areas potentially subject to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors. Example of these may include, but are not limited to the following:
1. Areas of historic failures, such as:<sup>3</sup>
    - a. Those areas delineated by the USDA-NRCS as having a “severe” limitation for building site development for factors other than slope for one or more types of building development;
    - b. Those areas mapped by the Department of Natural Resources (slope stability mapping) as unstable (“U” OR CLASS 3), unstable old slides (“UOS” or class 4), or unstable recent slides (“URS” or class 5); or
    - c. Areas designated as quaternary slumps, earth flows, mudflows, lahars, or landslides on maps published by the U.S. Geological Survey or Department of Natural Resources.
  2. Areas with all three of the following characteristics:<sup>4</sup>
    - a. Slopes steeper than fifteen percent (15%); and
    - b. Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and
    - c. Springs or ground water seepage.
  3. Areas that have shown movement during the Holocene epoch (from ten thousand years ago to the present) or that are underlain or covered by mass wastage debris of that epoch.<sup>5</sup>
  4. Slopes that are parallel or subparallel to planes of weakness (such as bedding planes, joint systems, and fault planes) in subsurface materials.<sup>6</sup>

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<sup>3</sup> See WAC 365-190-080(4)(d)(i).

<sup>4</sup> See WAC 365-190-080(4)(d)(ii).

<sup>5</sup> See WAC 365-190-080(4)(d)(iii).

<sup>6</sup> See WAC 365-190-080(4)(d)(iv).

5. Slopes having gradients steeper than eighty percent (80%) subject to rock fall during seismic shaking.<sup>7</sup>
6. Areas potentially unstable because of rapid stream incision, stream bank erosion, and undercutting by wave action.<sup>8</sup>
7. Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding.<sup>9</sup> and
8. Any area with a slope of forty percent (40%) or steeper and with a vertical relief of ten (10) or more feet except areas composed of consolidated rock. A slope is delineated by establishing its toe and tope and measured by averaging the inclination over at least ten (10) feet of vertical relief.<sup>10</sup>

C. Seismic hazard areas. Seismic hazard areas are areas subject to severe risk of damage as a result of earthquake induced ground shaking, slope failure, settlement, soil liquefaction, lateral spreading, or surface faulting. One indicator of potential for future earthquake damage is a record of earthquake damage in the past. Ground shaking is the primary cause of earthquake damage in Washington. The strength of ground shaking is primarily affected by:<sup>11</sup>

1. The magnitude of an earthquake;
2. The distance from the source of an earthquake;
3. The type of thickness of geologic materials at the surface; and
4. The type of subsurface geologic structure.

Settlement and soil liquefaction conditions occur in areas underlain by cohesionless, loose, or soft-saturated soils of low density, typically in association with a shallow ground water table.

D. Mine hazard areas. Mine hazard areas are those areas affected by steep and unstable slopes created by open mines (e.g. open basalt rock pits, rock quarries, sand and gravel pits). Factors that should be considered

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<sup>7</sup> See WAC 365-190-080(4)(d)(v).

<sup>8</sup> See WAC 365-190-080(4)(d)(vi).

<sup>9</sup> See WAC 365-190-080(4)(d)(viii).

<sup>10</sup> See WAC 365-190-080(4)(d)(ix).

<sup>11</sup> See WAC 365-190-080(4)(e).

include: proximity to development, depth from ground surface to the bottom of the pit and geologic material.<sup>12</sup>

- E. Other hazard areas. Geologically hazardous areas shall also include areas, determined by the designated official to be susceptible to other geological events including mass wasting, debris flows, rock falls, and differential settlement. (Ord 874, December 2010)

**18.20.030** **Classification of geologically hazardous areas.** The level of risk for each geologic hazard type is described in this section. Documentation of specific areas in which a known or suspected risk exists for each of the following hazard areas is provided in the City Critical Areas Map. (The provisions of this Title apply only to those areas for which a known or suspected risk exists.

Classification	Documentation and Data Sources
Known or Suspected Risk	Documentation of projection of the hazard by a qualified professional exists.
Low or No Risk	Documentation exists by a qualified professional regarding low hazard risk or lack of hazard.
Risk Unknown	Documentation, data, or projection of the hazard risk by a qualified professional are not available or sufficient to determine the presence or absence of a geologic hazard.

- A. Erosion hazard areas. Known or suspected risk in steep areas.
- B. Landslide hazard areas. Known or suspected risk in areas with slope > 15%.
- C. Seismic hazard areas. Low or no risk.
- D. Mine hazard areas. Low or no risk for underground operations. Known or suspected risk associated with open pit operations.
- E. Other hazard areas. Other geologically hazardous areas may be designated by the City if documentation thereof is available. (Ord 874, December 2010)

**18.20.040** **Mapping of geologically hazardous areas.**

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<sup>12</sup> See WAC 365-190-080(4)(f)(ii).

- A. The approximate location and extent of potential geologically hazardous areas are shown on the adopted Critical Areas Map. The hazard areas outlined on this map are based on the following data:
1. USGS 10-meter Digital Elevation Model (slope).
  2. USDA-NRCS Soil Survey of Benton County, Washington (*full citation pending erosion/landslide hazard area determination*).
  3. Additional data as determined necessary by the City.
- B. This map is to be used as a guide for the City, project applicants and/or property owners, and may be continuously updated as new critical areas are identified. It is a reference and does not provide a final critical area designation. (Ord 874, December 2010)

**18.20.050 Regulation.** In addition to the provisions of this Title, alterations of geologically hazardous areas or associated buffers must conform to City design standards and building codes. (Ord 874, December 2010)