

Chapter 19.15.150 Geologically Hazardous Areas

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19.15.150 Geologically Hazardous Areas

A. Designation of Geologically Hazardous Areas.

1. Designation. 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 and are further described in later sections:

- a. Seismic hazard;
- b. Mine hazard;
- c. Volcanic hazard;
- d. Erosion hazard; and
- e. Landslide hazard.

2. Exemptions. Activities that are exempt from the requirements of the Geologically Hazardous Areas chapter can be found in CCC 19.15.070, Exemptions.

B. Mapping of Geologically Hazardous Areas. The approximate location and extent of geologically hazardous areas are shown on the adopted critical area maps listed in CCC 19.15.110. They are a reference and do not provide a final critical area designation.

C. Performance Standards – General Requirements for All Geologically Hazardous Areas.

1. Alterations. Alterations of geologically hazardous areas or associated buffers may only occur for activities that:

- a. Will not increase the threat of the geological hazard to adjacent properties beyond pre-development conditions;
- b. Will not adversely impact other critical areas;
- c. Are designed so that the hazard to the project is eliminated or mitigated to a level equal to or less than pre-development conditions; and
- d. Are recommended by a qualified professional in a signed and stamped geologic hazards assessment or geotechnical engineering report, whichever is required by this chapter.

2. Critical Facilities Prohibited. Critical facilities shall not be sited within geologically hazardous areas unless there is no other practical alternative.

3. Utilities Transmission Facilities. Utility facilities which carry liquid petroleum products or any other hazardous substance as defined in WAC 173-303 may be permitted within geologically hazardous areas only when demonstrated by a qualified professional that the design and location of the proposed facility will not cause adverse impacts.

D. Seismic Hazard Areas.

1. Designation.

- a. For the purposes of this classification, a seismic hazard area is any area subject to:
 - i. Underlying deposits indicative of a risk of liquefaction during a seismic event;
 - ii. Areas subject to slope failure, including lateral spreading, during a seismic event;
 - iii. Areas subject to surface faulting during a seismic event;
 - iv. Areas that are at risk of mass wasting due to seismic forces.
- b. Seismic hazard areas are indicated by:
 - i. A Zone D1 or higher rating as defined by the Seismic Risk Map of the United States adopted by the Washington State Legislature and defined in the International Residential Code (IRC).
 - ii. Areas with Site Class D, D to E, E, and F as defined by the Site Class Map of Cowlitz County, by Washington State Department of Natural Resources or the International Building Code (IBC).

2. Performance Standards – Specific Requirements. All development within areas that meet the designation for seismic hazard areas shall comply with the adopted IBC or IRC. No Critical Area Assessment is required.

E. Mine Hazard Areas.

1. Designation. Mine hazard areas are those areas underlain by or affected by mine workings such as adits, gangways, tunnels, drifts, or airshafts, and those areas of probable sink holes, gas releases, or subsidence due to mine workings. Locations may be known or unknown, based upon best available information.

2. Performance Standards – Specific Requirements. Activities proposed to be located in mine hazard area shall meet the standards of Performance Standards – General Requirements (CCC 19.15.150.C) and the following specific requirements:

- a. Areas identified where mining is known to have occurred shall be required to have a geotechnical assessment.
- b. Areas identified where suspected mine activities have occurred may require a geotechnical assessment. A geotechnical assessment will be required if mining activities are visible, such as a shaft or pit.

F. Volcanic Hazard Areas.

1. Preamble. The eruption of Mt. St. Helens on May 18, 1980, was the most destructive volcanic eruption in the history of the United States with respect to economic impact and loss of life and property. Although a majority of the volcano and its summit are located in Skamania County, the mountain is the source of four river drainages that pass through Cowlitz County to the Columbia River, and the western flank of the mountain, including portions of the Mt. St. Helens National Monument, are within Cowlitz County.

Like the other volcanoes in the Cascade Volcanic Arc, scientists cannot precisely predict when Mt. Saint Helens will erupt, the area of land that will be affected, or the force of future eruptions. However, research does provide a record of areas that have been affected by volcanic activity throughout the volcano's history and the types of hazards that have occurred in those areas. The Flowage Hazard Zones designated below are the results of such research by the United States Geological Society and indicate areas of historic impacts. The research is not intended to indicate that a future volcanic eruption will affect those areas, or that areas not included in the Flowage Hazard Zones will not be affected. Instead, it is information that should be used to make property owners aware of the historical forces that have shaped their land in the past and that have the potential to do so again in the future.

However, because there is potential for economic damage and loss of life and property, Cowlitz County has elected to restrict the development activities within the county that fall very close, within a five (5) mile radius, to the volcanic cone. This area primarily contains land designated as Flowage Hazard Zone 1 that is also within the Mt. St. Helens National Monument, but also includes some land designated as Flowage Hazard Zone 2. Because of their proximity to the volcanic cone, these areas should not be allowed to increase in population or be developed with permanent structures. Additionally, due to the extensive volumes of sediment flowing down the North Fork of the Toutle River and the potential risk of increased flows in the event of a future eruption, Cowlitz County has also elected to require that development upriver of the North Fork Toutle River Sediment Retention Structure be accompanied by an evacuation and emergency management plan.

2. Designation. Volcanic hazard areas are those areas identified as being within the Volcanic Hazard Zone 1, demarcated by a five (5) mile radius based on the center of the cone of Mt. Saint Helens and the mapped extents of Zone 1, Zone 2 and Zone 3 shown on the Cowlitz County adapted map of the Mount St. Helens Flowage-Hazard Zones Map, 1995, United States Geological Society. These areas can be subject to pyroclastic flows, lava flows, debris avalanche, and inundation by debris flows, lahars, mudflows, or related flooding resulting from volcanic activity.

- a. Volcanic Hazard Zone 1 – The area within the five (5) mile radius is indicated as having the highest risk of being affected by potential future volcanic activity, and is the only area with development restrictions based on volcanic hazard risk.
- b. Flowage Hazard Zone 1 – Areas that have been and could potentially be subject to high-density volcanic flows including lava flows and lahars that are constrained by topographic channels proximal to the volcanic source. The eruptive forces that can occur in Zone 1 can occur so rapidly after an eruption that once the eruption has begun, it is too late to attempt evacuation.
- c. Flowage Hazard Zone 2 – Areas subject to low-density volcanic flows including pyroclastic surges that are less constrained by topography. The eruptive forces that can occur in Zone 2 can occur so rapidly after an eruption that once the eruption has begun, it is too late to attempt evacuation.
- d. Flowage Hazard Zone 3 – Areas subject to inundation by well-channelized lahars caused by volcanic activity.

3. Performance Standards – Specific Requirements.

- a. All Volcanic and Flowage Hazard Zones. All new recorded plats and short plats resulting from subdivisions or short subdivisions shall include a notice stating that the lots are located within a volcanic or flowage hazard zone and indicating which specific zone applies.

- b. Volcanic Hazard Zone 1.
 - i. Allowable Uses:
 - a) Passive recreational uses, which may include hiking, boating, fishing, etc.;
 - b) Maintenance and repair of existing structures, roads, trails, educational facilities, and serviceable structures;
 - c) Agriculture and forestry activities;
 - d) Exploratory or scientific research, fish and wildlife enhancement projects, or similar such activities.
 - c. Flowage Hazard Zones 1, 2, and 3.
 - i. For areas within all Flowage Hazard Zones along the North Fork Toutle River upriver of the North Fork Toutle River Sediment Retention Structure proposals must include an evacuation and emergency management plan. At a minimum, the evacuation and emergency plan must demonstrate that the evacuation route has been determined to not contain any other potential natural hazards, such as landslide or flood hazards, that could cause a blockage or destruction of the evacuation route during an event (i.e., seismic event triggers a landslide that results in the evacuation route becoming impassible).
 - ii. A Critical Areas Assessment is not required.

G. Erosion Hazard Areas.

1. Designation. Erosion hazard areas are those areas identified by the U.S. Department of Agriculture's Natural Resources Conservation Service as having a "severe" or "very severe" erosion hazard. Erosion hazard areas are also those areas impacted by shore land and/or stream bank erosion and those areas within a stream's channel migration zone.

2. Performance Standards – Specific Requirements. Uses and activities shall conform to the following standards:

- a. Protection of Erosion Hazard Area. Modification of topography and vegetation in an erosion hazard area shall be limited in order to preserve long-term stability of sensitive slopes, reduce erosion potential and stormwater runoff, and preserve related ecological values.
- b. Erosion Control Plan. An erosion control plan shall:
 - i. Demonstrate that development activities conform to existing topography of the site and minimize topographic modification, foundations conform to the natural contours of the slope and are stepped/tiered where possible.
 - ii. Demonstrate that roads, driveways and other vehicular access, trails walkways, and parking areas are designed with lower gradients and/or are parallel to the natural contours of the site;
 - iii. Include stabilization Best Management Practices (BMPs) such as temporary/permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees and preservation of mature vegetation;
 - iv. Ensure all exposed and disturbed soils shall be stabilized by suitable and timely application of BMPs;

- v. Demonstrate that no exposed or disturbed soils shall be allowed to overwinter without erosion control BMPs in place;
 - vi. Preserve existing vegetation and under growth where feasible;
 - vii. Ensure cut and fill slopes shall be designed and constructed to minimize erosion;
 - viii. Provide stabilization to adequately prevent erosion of conveyance outlets and stream banks;
 - ix. Demonstrate that clearing, grading, and impervious surfaces shall be minimized.
- c. Seasonal Restriction.
- i. Clearing activities that disturb the soil shall be allowed from May 1 to October 1 provided that the county may extend or shorten the dry season on a case-by-case basis, except that timber harvest, not including brush clearing or stump removal, may be allowed pursuant to an approved forest practice permit;
 - ii. Outside of the designated dry season, clearing activities that disturb the soil may occur only when demonstrated by a qualified professional that no increased risk to erosion hazard and buffer areas will occur from clearing activities.
- d. Drainage Plan. A drainage plan shall be developed by a qualified professional that includes:
- i. Surface drainage, including downspouts, shall avoid draining to erosion hazard areas. Drainage originating above an erosion hazard area shall be collected and directed by tight line drain, and provided with an energy dissipative device for discharge to a swale or other acceptable natural drainage areas.
 - ii. The following uses and activities shall be permitted on severe erosion hazard areas only where analysis by a qualified professional finds that such systems will not result in an increase in erosion. A qualified professional shall design said systems. The qualified professional shall also provide verification to the county that the systems are installed as designed and function as predicted.
 - a) Storm water retention and detention systems, including percolation systems utilizing buried pipe;
 - b) On-site sewage disposal system drainfields. The septic system drainfield must be in compliance with the regulations of the Cowlitz County Health Department or its successors; and
 - c) Utility lines and pipes.

H. Landslide Hazard Areas.

1. Designation. 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. Examples of these may include, but are not limited to the following:

- a. Areas of identified landslide hazards, including:
 - i. Those areas mapped by the Department of Natural Resources 2006 Digital Landslide Inventory and/or shown on the Geologic Hazard Map of Cowlitz County, (See CCC 19.15.110 for full map references). Landslide Hazard Areas are those areas shown

- with active or inactive landslides, active or inactive scarps, and potentially unstable slopes;
- ii. Areas designated as quaternary slumps, earthflows, mudflows, lahars, or landslides on maps published by the U.S. Geological Survey or Washington State Department of Natural Resources;
 - iii. Areas with all three of the following characteristics:
 - a) Slopes steeper than fifteen percent (15%);
 - b) Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and
 - c) Springs or ground water seepage.
 - iv. Slopes that are parallel or subparallel to planes of weakness (such as bedding planes, joint systems, and fault planes);
 - v. Slopes. A slope is delineated by establishing its toe and top and is measured by averaging the inclination (dividing the vertical rise by the horizontal run) over at least ten (10) feet of vertical rise.
 - a) Slopes having gradients steeper than eighty percent (80%) or thirty-nine degrees (39°) over any distance; or
 - b) Slopes of thirty-three percent (33%) or eighteen degrees (18°) or steeper where there is a vertical relief of ten (10) or more feet, except when the area is composed of consolidated rock.
 - vi. Areas potentially unstable because of rapid stream incision, stream bank erosion, and/or undercutting by wave action;
 - vii. Areas that show evidence of, or are at risk from snow avalanches; and
 - viii. Areas located in a confined stream channel or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding.

2. Performance Standards – Specific Requirements. Uses and activities permitted shall conform to the following standards:

- a. Protection of Landslide Area and Buffer. The landslide hazard area and associated buffer shall be protected from disturbance. Modification of topography and vegetation in landslide hazard areas shall be stringently limited in order to preserve long-term stability of sensitive slopes, reduce erosion potential and stormwater runoff, and preserve related ecological values.
- b. Buffers. A buffer shall be established from all edges of landslide hazard areas. The minimum dimension of the buffer shall be fifty (50) feet from the edge of the landslide hazard area.
 - i. Buffer Reduction. The buffer may be reduced to a minimum of twenty-five (25) feet at the sides of a landslide hazard area when a qualified professional demonstrates that the reduction will adequately protect the proposed development, adjacent developments, and uses and the subject critical area. No reductions are allowed for developments uphill or downslope from landslide hazard areas.
 - ii. Buffer Use. Where reduction of the buffer is not permitted, development encroachment within the buffer area may be allowed provided a qualified professional demonstrates that site alterations will not impact a landslide area and/or the adjacent properties.

- iii. Increased Buffer. The buffer may be increased where the Director or a qualified professional determines a larger buffer is necessary to prevent risk of damage to proposed and existing development; and
 - iv. The buffer shall be clearly staked before and during any construction or clearing.
- c. Design and Development Standards. Development or alterations within a landslide hazard area and/or buffer shall be designed to meet the following requirements. Deviations from one or more of these standards may be permitted where it can be demonstrated by a qualified professional that an alternative design provides equal or greater protection of the critical area and proposal. The basic development design standards are:
 - i. Structures and improvements shall be located to avoid landslide hazard areas and other critical areas;
 - ii. Structures and improvements shall minimize alterations to the natural contour of the slope, and foundations shall be tiered where possible to conform to existing topography;
 - iii. Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation;
 - iv. The proposed development shall not result in an increase in surface water discharge or sedimentation to adjacent properties;
 - v. Development shall be designed to minimize impervious lot coverage.
 - vi. Vegetation Retention.
 - a) Removal of vegetation from a landslide hazard area or related buffer shall be permitted only when approved by a qualified professional; and
 - b) If the landslide area and buffer lacks adequate vegetation, a vegetation restoration plan or other slope stability measures may be required.
 - vii. Seasonal Restriction.
 - a) Clearing activities that disturb the soil shall be allowed from May 1 to October 1 provided that the county may extend or shorten the dry season on a case-by-case basis, except that timber harvest, not including brush clearing or stump removal, may be allowed pursuant to an approved forest practice permit;
 - b) Outside of the designated dry season, clearing activities that disturb the soil may occur only when demonstrated by a qualified professional that no increased risk to landslide hazard and buffer areas will occur from clearing activities.
 - viii. Utility Lines and Pipes. Utility lines and pipes shall be permitted in landslide hazard areas only when the applicant demonstrates that no other practical alternative is available.
 - ix. Drainage.
 - a) Surface drainage, including downspouts, shall not be directed across the face of a hazard area. If drainage must be discharged from the top of a hazard area to its toe, it shall be collected above the top and directed to the toe by tight line drain, and provided with an energy-dissipating device at the toe for discharge to a swale or other acceptable natural drainage areas.
 - b) Stormwater retention and detention systems, including percolation systems utilizing buried pipe are strongly discouraged unless a geotechnical assessment

indicates such a system shall not affect slope stability and the systems are designed by a licensed civil engineer. The licensed civil engineer shall also certify that the systems are installed as designed.

- x. Sewage disposal systems. On-site sewage disposal systems, including drain fields, shall be permitted within landslide hazard areas and related buffers only where demonstrated by a qualified professional to not increase the potential landslide hazard impact to the proposed development or surrounding developments.

I. Critical Area Assessment – Requirements for Geologically Hazardous Areas.

1. Preparation by a Qualified Professional. A qualified professional shall prepare critical areas assessments and geotechnical reports.

2. Geologic Hazards Assessment/Reports. A Geologic Hazards Assessment is required for all proposals within erosion hazard areas and landslide hazard areas. Where the applicant can clearly demonstrate to the Department through submittal of a geotechnical assessment that the regulated activity or any related site alterations will not impact a landslide or erosion hazard area or the adjacent properties, the requirements for a geotechnical report will be waived. A Geotechnical Report will be required when the assessment does not clearly demonstrate that the development activities do not impact the landslide and/or erosion hazard area or the adjacent properties, the Geotechnical Assessment recommends additional geotechnical study, and/or the development activity is within an identified active landslide hazard area.

3. Site Plan(s) - Assessments and Reports. The following information shall be provided at a minimum:

- a. The type and extent of geologic hazard areas and buffers on, adjacent to, within two hundred (200) feet of, or that are likely to impact the proposal;
- b. Proposed development activity area, including the location of existing and proposed structures, septic drainfield and reserve areas, clearing limits, fill locations, storage of materials, and drainage facilities;
- c. Dimensions of the proposed development activity to the property lines, critical areas, landslide scarp and slide mass;
- d. A contour map of the proposed site, at a scale of 1 inch = 20 feet or other scale as deemed appropriate by the Department. Slopes shall be clearly delineated for the ranges between fifteen percent (15%) and thirty-two percent (32%), thirty-three percent (33%) and seventy-nine percent (79%), and eighty percent (80%) or greater, including the height of slope, slope gradient, and cross-section of the project area; and
- e. The location and type of surface water runoff features including the location of springs, seeps, or other surface expressions of ground water on or within two hundred (200) feet of the project area or that have potential to be affected by the proposal.
- f. When site-specific conditions indicate the necessity, the Department may require the topographic data to be field surveyed.

4. Geotechnical Assessment. A geotechnical assessment is an overview of site conditions and a professional evaluation of the need for additional studies prior to development on the property. The

geotechnical assessment is intended to be a limited study of geological hazards (i.e. landslide, liquefaction, erosion) at a site, and does not include the collection of any subsurface soil, rock and groundwater data. If determined to be necessary, the qualified professional will recommend the preparation of a detailed Geotechnical Report that includes the investigation of subsurface soil, rock and groundwater conditions to better assess the geological site hazards. The geologic assessment shall include, but not be limited to:

- a. A field reconnaissance of the site and vicinity;
- b. A detailed description of the project;
- c. Site Plan of the area based on the criteria listed within Site Plan(s) above;
- d. Feasibility of the site for the proposed development activity;
- e. A description of the surface and subsurface geology, hydrology, soils, and vegetation found in the project area;
- f. A discussion of the project and its relationship to the geologic hazards found on site, which may include the type and extent of geologic hazard areas and buffers on, adjacent to, within two hundred lateral (200) feet of, or that are likely to impact the proposal or be impacted by the proposal;
- g. An overview of any field investigations, published data, and references; data and conclusions from past assessments of the site; and site specific measurements, tests, investigations, or studies that support the identification or lack of geologically hazardous areas;
- h. If applicable, an identification of any areas of the site recommended to be avoided by any aspect of the proposed development;
- i. If necessary, identification of mitigation measures needed to address any anticipated geologic problems;
- j. If applicable, development recommendations for the proposed activities. These recommendations should include, but are not limited to, structure and septic system setbacks from geologic hazard areas if less than or greater than the minimum established buffer or do not meet IBC setback requirements, foundation design, filling and excavation, erosion control, drainage and site preparations;
- k. Discussion regarding the need for follow-up studies that should be conducted, such as geotechnical engineering reports, additional subsurface exploration or more extensive soil reports;
- l. Demonstration that all applicable performance standards are met.

5. Geotechnical Engineering Report. A Geotechnical Engineering Report will be required for any development proposal on a site containing an active landslide hazard area or landslide and/or erosion hazard areas that were identified through the geotechnical assessment for further geotechnical analysis. It is the responsibility of the qualified professional to provide a report and design recommendations that are appropriate for existing site conditions and the proposed development. The Geotechnical Engineering Report shall be completed and stamped by a qualified professional and shall present results and engineering recommendations:

The Geotechnical Report will include, at the minimum, the following:

- a. The requirements listed within the geotechnical assessment criteria;
- b. Site history - description of any prior grading, soil instability or slope failure;
- c. Subsurface data – logs of borings, test pits and other exploratory methods, soil and rock stratigraphy, groundwater levels including seasonal changes and laboratory tests;
- d. The results of any laboratory tests - Laboratory data and soil index properties for soil samples;
- e. The effect construction and placement of structures will have on the slope over the estimated life of the structure;
- f. Vulnerability of the site to erosion;
- g. The location, dimensions and estimated depth of any area(s) of slope instability on the site;
- h. Description of analysis performed and results of that analysis;
- i. An estimate of the bluff retreat rate that recognizes and reflects potential catastrophic events such as seismic activity or a one hundred-year storm event;
- j. Assumed or established site and subsurface conditions used in the slope stability analysis (e.g., slope dimensions of any landslides, thickness and strengths of soil and rock units, depth to failure plane if any, ground water levels, etc.);
- k. Consideration of the run-out hazard of landslide debris and/or the impacts of landslide run-out on down slope properties;
- l. Parameters for design of site improvements including:
 - i. Building limitations;
 - ii. Suitability of on-site soil for use as fill;
 - iii. Soil compaction criteria;
 - iv. Proposed angles and heights of cut and fill slopes;
 - v. Appropriate foundations and retaining structures. These should include allowable bearing capacities and lateral earth pressures appropriate for the design of foundations and walls, installation considerations, and estimates of settlement performance;
 - vi. Recommendations for drainage and subdrainage and utility line improvements for collection, transport, treatment, discharge, and/or recycling of water, including consideration of on-site septic system disposal volumes where the additional volume will affect the landslide hazard area;
 - vii. Earthwork recommendations including clearing and site preparation criteria, fill placement, temporary and permanent slope inclinations and protection, and temporary excavation support, if necessary;
 - viii. Mitigation of adverse site conditions including slope stabilization measures and seismically unstable soils, if appropriate.
 - ix. Stability.

- a) For terrain containing no obvious instability or identified landslides, the proposed site grading or structures shall not reduce the existing slope stability on the development site or adjacent sites to less than a factor of safety of 1.5 for static conditions and 1.2 for dynamic conditions.
- b) For terrain containing active or inactive landslides or for proposed structure, cuts, fills or roads near a designated or identified areas of instability, the proposed development shall not decrease the factor of safety below the limits of 1.5 for static conditions and 1.2 for dynamic conditions at or adjacent to the development location.
- c) The Director may consider lower factors of safety, if the qualified professional provides detailed explanation that satisfies the Director regarding why lower factor of safety values present an acceptable level of risk to the development.
- d) Designs that require regular or periodic maintenance to maintain their level of function are excluded from long-term slope stabilization measures.

6. Incorporation of Previous Study. Where a valid critical areas assessment or geotechnical engineering report has been prepared within the last five (5) years for a specific site, and where the proposed land use activity and surrounding site conditions are unchanged, said assessment or report may be incorporated into the required critical area assessment. The applicant shall submit a hazards assessment detailing any changed environmental conditions associated with the site.

7. Mitigation of Long-Term Impacts. When hazard mitigation is required, the mitigation plan shall specifically address how the activity maintains or reduces the pre-existing level of risk to the site and adjacent properties on a long-term basis (equal to or exceeding the projected lifespan of the activity or occupation). Proposed mitigation techniques shall be considered to provide long-term hazard reduction only if they do not require regular maintenance or other actions to maintain their function. Mitigation may also be required to avoid any increase in risk above the pre-existing conditions following abandonment of the activity.