Article V: Geologically Hazardous Areas

17.38.600 Purpose.

The purpose of this article is to minimize hazards to the public from development activities on or adjacent to geologically hazard areas. For the purposes of this chapter, geologically hazardous areas include: erosion hazard areas, steep slope and landslide hazard areas, seismic hazard areas, mine hazard areas, channel migration zones, alluvial fan hazard areas and volcanic hazard areas. [Ord. 1204 Exh. A § 2, 2008]

17.38.610 Administration.

The administration of this Article shall occur in accordance with Article I of this code and the standards listed below.

(1) Review. The applicant shall prepare a geotechnical report consistent with the requirements in LCC 17.38.710 when required by Table 17.38-7.

(2) Qualified professional. Geotechnical reports shall be prepared by a qualified professional as defined in LCC 17.38.110. Geotechnical reports shall include a discussion of how the project incorporates mitigation sequencing and maintains the long-term stability of the geologic hazard (including any recommended buffers). Geotechnical reports shall also address the potential impact of the proposed mitigation on the hazard area, the subject property, and any affected adjacent properties.

17.38.620 Designation.

(1) Designation of Geologically Hazardous Areas. Lands that meet the criteria for geologically hazardous areas and their buffers are presented in Table 17.38-7:

Table 17.38-7

<table>
<thead>
<tr>
<th>Classification</th>
<th>Report Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion Hazard Area</td>
<td>17.38.640 Within severe and very severe erosion hazard area</td>
</tr>
<tr>
<td>Steep Slope and Landslide Hazard Area</td>
<td>17.38.650 Within steep slope and landslide hazard area and buffer that is equal to the largest of:</td>
</tr>
<tr>
<td></td>
<td>(a) Fifty (50) feet; or</td>
</tr>
</tbody>
</table>
(b) The vertical height of the slope multiplied by:
   
   (i) 1 for slopes from 15 to 40 percent.
   
   (ii) 1.5 for slopes from 40 to 50 percent.
   
   (iii) 2 for slopes that are greater than 50 percent.

<table>
<thead>
<tr>
<th>Geologic Area</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seismic Hazard Area</td>
<td>17.38.660</td>
<td>No report is required in a seismic hazard area, though the applicable standards in 17.38.630 must be met.</td>
</tr>
<tr>
<td>Volcanic Hazard Area</td>
<td>17.38.670</td>
<td>No report is required in a volcanic hazard area, though the applicable standards in 17.38.630 must be met.</td>
</tr>
<tr>
<td>Mine Hazard Area</td>
<td>17.38.680</td>
<td>Within a classified mine hazard area.</td>
</tr>
<tr>
<td>Channel Migration Zone</td>
<td>17.38.690</td>
<td>Within a channel migration zone.</td>
</tr>
<tr>
<td>Alluvial Fan Hazard Area</td>
<td>17.38.695</td>
<td>Within 200 feet of an alluvial fan hazard area.</td>
</tr>
</tbody>
</table>

17.38.630 Standards.

(1) Standards for Certain Geologically Hazardous Areas and their Buffers. The following standards apply to geologically hazardous areas and their required buffers, except for alluvial fan, volcano and seismic hazards:

(a) Development of geologically hazardous areas and their required buffers shall follow the mitigation sequence in LCC 17.38.080(2).

(b) Where no reasonable alternative to the alteration of a potentially hazardous area is available, the administrator may allow the development of the area when a geotechnical report, as described in LCC 17.38.710, is submitted by a qualified professional.

(c) When a geotechnical report has been submitted, the administrator may only allow the alteration when the report shows:

   (i) The site is stable under existing conditions based on a plane of failure analysis with a factor of safety of 1.5 under seismic conditions for unconsolidated deposits or other factor of safety relevant to the type of development and hazard.
(ii) The alteration of vegetation will not increase the probability of the failure of the geologically hazardous area.

(iii) The proposed grading, excavation and structures will not increase the probability of the failure of the geologically hazardous area, and the construction of facilities to reduce risk, such as drainage systems, are effective in the absence of mechanical systems and ongoing long-term maintenance.

(iv) The development will incorporate measures to control additional erosion and deposition downslope or downstream, and the proposed measures to control the erosion are feasible.

(v) The development will not increase the risk of geologic failure on the site or adjacent properties.

(vi) The alteration will not adversely impact other critical areas or their associated buffers, such as wetlands, wildlife habitat areas, frequently flooded areas and critical aquifer recharge areas.

(d) The alteration may be approved, approved with conditions, or denied based on the administrator’s evaluation of the suitability of the geotechnical report and proposed mitigation measures to protect life, safety, and stability on the subject and nearby properties.

(2) Standards for Seismic Hazard Areas. Developments that are proposed within seismic hazard areas shall meet the applicable provisions of the International Building Code.

(3) Standards for Alluvial Fan Hazard Areas. Development is not permitted within alluvial fan hazard areas, beyond what is allowed in the reasonable use provisions of this code.

(4) Standards for Critical Facilities. Critical facilities, as defined under LCC 17.10 (Definitions), shall only be allowed within seismic and volcanic hazard areas. Provided that, no critical facilities shall be allowed within 1/4 mile of an active fault or trench. When an application for a critical facility is proposed within a seismic or volcanic hazard area, the proposal shall articulate the planned strategies to evacuate individuals within the facility, or ensure continuity of operations, in the case of a natural hazard.

(5) Verification of Completion of Mitigation. Upon the completion of a project, a qualified professional shall verify that any mitigation or safety measures associated with a geotechnical report have been properly implemented in accordance with LCC 17.38.090. Depending on the nature of the mitigation (i.e. structural versus planting (of vegetation) or small or large scale improvements), the administrator may waive the five year monitoring timeframe that is specified within that section.
APPENDIX V-A
CLASSIFICATION OF HAZARD AREAS

17.38.640 Classification of Erosion Hazard Areas.


17.38.650 Classification of Steep Slope and Landslide Hazard Areas.

(1) Classification of Steep Slope Hazard Areas. Steep slope hazard areas are areas where there is not a mapped or designated landslide hazard, but where there are steep slopes equal to or greater than a thirty-five percent (35%) slope with a vertical relief of 10 or more feet. Steep slopes which are less than ten (10) feet in vertical height and are not part of a larger steep slope system, and steep slopes created through previous legal grading activity, are not regulated steep slope hazard areas. Presence of a steep slope suggests potential slope stability problems.

(2) Classification of Landslide Hazard Areas. Landslide hazard areas are those areas meeting any of the following criteria:

(a) Areas subject to previous slope failures, including areas of unstable old or recent landslides;

(b) Areas with all of the following characteristics:

(i) A slope greater than 15 percent;

(ii) Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and

(iii) Springs or ground water seepage;

(c) Slopes that are parallel or sub-parallel to planes of weakness (such as bedding planes, joint systems, and fault planes) in subsurface materials;

(d) Slopes having gradients greater than 80 percent subject to rockfall during seismic shaking;

(e) Areas potentially unstable as a result of rapid stream incision and streambank erosion or undercutting;

(f) Areas located in a canyon, on an alluvial fan, or presently or potentially subject to inundation by debris flows or catastrophic flooding;

(3) Mapped Landslide Hazard Areas. Landslide hazard areas include the following mapped sources:
(a) Areas mapped as “unstable,” “landslides,” and “old landslides” in the Slope Stability Study of the Centralia-Chehalis Area, Lewis County, Washington, by Allen J. Fiksdal, Department of Natural Resources, Division of Geology and Earth Resources, 1978.


17.38.660 Seismic Hazard Areas.

(1) Classification of Seismic Hazard Areas. Seismic hazard areas are locations subject to severe risk of damage as a result of earthquake-induced soil liquefaction, ground shaking amplification, slope failure, settlement, or surface faulting.

(a) All structures that require a building permit within Lewis County are required to be consistent with the D1 seismic zone (as specified in the International Building Code).

(b) Active faults or trenches are considered seismic hazards.


17.38.670 Volcanic Hazard Areas.

(1) Classification of Volcanic Hazard Areas. Volcanic hazard areas are locations where the risk to life and property by a large volcanic event is high. For the purpose of these regulations, damage from lahars and near volcano hazards constitute the primary volcanic hazards. Volcanic tephra (ash), while disruptive and potentially dangerous, is not considered a volcanic hazard that is subject to these regulations.

(a) Volcanic Hazard Areas are shown on maps available from the United States Geological Service (USGS) Volcano Hazards Program. Data was accessed from https://volcanoes.usgs.gov/volcanoes/ on January 3, 2017. Maps for Mount Rainier, Mount Saint Helens and Mount Adams are dated March 2014.

17.38.680 Mine Hazard Areas.

(1) Classification of Mine Hazard Areas. Mine hazard areas are those areas within 100 horizontal feet of a mine opening at the surface or which are underlain at a depth of 300 feet or less by mine workings. Known locations of historic mines are identified in the Washington State Department of

17.38.690 Channel Migration Zones.

(1) Classification of Channel Migration Zones. Channel migration zones are areas within which a river channel can be expected to migrate over time due to hydrologically and geomorphologically related processes.

(2) Mapped channel migration zones are based on:

(a) The location of severe and moderate channel migration areas as identified with the report: Channel Migration and Avulsion Potential Analyses: Upper Nisqually River, Pierce County, Washington, produced by GeoEngineers for Pierce County Public Works and Utilities, Water Programs Division, 2007, 59 pages; or as revised.

(b) The location of severe and moderate channel migration areas identified within the report: Geomorphic Evaluation and Channel Migration Zone Analysis Addendum: Cowlitz River, near Packwood and Randle, Lewis County, Washington, produced by GeoEngineers for the Lewis County Public Works Department, 2009, 76 pages; or as revised.

(c) The location of historical migration zones (HMZ), avulsion hazard zones (AHZ), and erosion hazard areas (EHA) within the report Reach Analysis and Erosion Hazard Management Plan: Cispus River from River Mile 12.3 (Greenhorn Creek) to River Mile 17.6 (Cispus Road Bridge), prepared by Herrera Environmental Consultants, Inc. for the Lewis County Public Works Department, 2004, 105 pages; or as revised.

(d) The location of the channel migration area identified for Rainey Creek within the report: Geomorphic Evaluation and Channel Migration Zone Analysis, Lewis County, Washington, produced by GeoEngineers for the Lewis County Public Works Department, 2003, 52 pages; or as revised.

(e) The location of a channel migration zone may be modified by the administrator based on a study provided by an applicant and prepared by a qualified professional that demonstrates there are specific geologic, landform, hydraulic, sediment transport, or other factors that demonstrate that a specific area is not in the channel migration zone. Such a study shall be developed in accordance with Best Available Science and investigate areas upstream and downstream of the review site that could influence the migration of the channel and the channel migration corridor.

17.38.695 Alluvial Fan Hazards.
(1) Classification of Alluvial Fan Hazards. Alluvial fan hazard areas are low, outspread, relatively flat to gently sloping deposits of sediments and organic debris, shaped like an open fan or segment of a cone, deposited by streams or debris flows where they issue from narrow, steep valleys upon a plain or broad valley or wherever the gradient of the stream suddenly decreases.

(2) A single mapped alluvial fan hazard area is depicted in Geomorphic Evaluation and Channel Migration Zone Analysis Addendum: Cowlitz River, near Packwood and Randle, Lewis County, Washington, produced by GeoEngineers for the Lewis County Public Works Department, 2009, 76 pages. Additional research is necessary to identify the location, presence, and potential risk of other alluvial fan hazards.
APPENDIX V-B
GEOTECHNICAL REPORT

17.38.710 Geotechnical report.

(1) When a site proposed for development or alteration is located or may be located within a geologically hazardous area or its buffer, or will negatively impact a geologically hazardous area, the administrator shall have the authority to require the submittal of a geotechnical report.

(2) A geotechnical report is an evaluation of the geologic characteristics of the subject property and adjacent areas. A geotechnical report shall include a field investigation and may include an analysis of historical aerial photographs, review of public records and documentation, and interviews with adjacent property owners.

(3) Submittal requirements will vary depending on the type of project and the type of hazard mitigations that are proposed. The administrator may waive parts of the submittal requirements if he/she determines that they are not applicable to the proposed activity.

(4) Submittal Requirements. The following submittals may be required for a geotechnical report.

(a) A site plan that shows:
   (i) The site boundary lines.
   (ii) Existing physical features of the site including buildings, fences, and other structures, roads, parking lots, utilities, water bodies, etc.
   (iii) A detailed depiction of the proposed development including features such as lot location (for land divisions); utility location (well, septic, drainfield, etc.); parking and access location; the location of any proposed building(s); and the limits of grading and vegetation removal.
   (iv) An identification of critical areas and buffers within 300 feet of the site and an estimate of the existing acreage for each. The assessment of off-site critical areas shall be based on available information and shall not require access to off-site properties.

(b) Site geology information:
   (i) Topographic contours at two (2) foot intervals or as specified by the responsible official.
   (ii) Subsurface data including the exploration method, location of soil borings, borings, logs, soil and rock stratigraphy, and groundwater levels including seasonal changes.
   (iii) The location of landslides, or down-slope soil movement, faults, and geologic contacts on the subject property and adjacent properties.
(iv) A site history that describes any prior grading, soil instability and/or slope failure.

(v) A description of the site vulnerability to seismic events.

c) Geotechnical Information and Plan Requirements:

(i) A slope stability study and opinion of slope stability on the subject property and adjacent properties.

(ii) A grading plan, including road profiles.

(iii) Structural foundation requirements and estimated foundation settlements.

(iv) Soil compaction criteria.

(v) Allowable soil-bearing pressure for foundations, minimum footing widths, piling recommendations for foundations, and design pressure for retaining walls.

(vi) Laboratory data and soil index properties for soil samples.

(vii) Suitability for fill.

(viii) Lateral earth pressures.

(ix) A description of erosion vulnerability and an erosion control plan, including measures to reduce the impacts of erosion on neighboring critical areas.

(x) An evaluation of proposed surface and subsurface drainage, and a drainage control plan.

(xi) Building limitations.

(xii) A vegetation management and restoration plan or other means to maintain long-term stability of the hazardous areas and their buffers.

d) A site evaluation that describes the suitability of the site to accommodate the proposed activity.

e) Such additional information describing existing physical features of the site and the surrounding area as required by the responsible official to complete a review of the project.

17.38.720 Standards for mine hazard studies.

(1) Mine Hazard Study. A mine hazard study shall include the items in LCC 17.38.710, all available documentary information about historic or current mine workings, and the results of a surface reconnaissance that identifies any mine hazards, mine waste dumps, or evidence of mine subsidence or sinkholes.
(1) The study shall include:

(a) Historical mining data, including available copies of the original mine records for mine workings.

(b) A map showing property boundaries, mine hazard boundaries, and any potential hazards identified on or within 100 feet of the property.

(2) The study shall occur in accordance with the best available science for mine hazards and consider, among other items:

(a) Shallow hazards such as entry portals, shaft collars, ventilation shafts, prospects, and mine waste.

(b) Potential trough subsidence.

(c) Potential sinkhole hazards.