Notes: Footnote style numbers in this draft refer to corresponding numbers in “Best Available Science/Guidance-Geologic Hazard Areas” (2005, draft). That document contains excerpts from scientific literature that are relevant to the draft regulations.

Thurston County Planning Department

BOARD OF COUNTY COMMISSIONERS PUBLIC HEARING DRAFT

AMENDMENTS TO THE CRITICAL AREAS REGULATIONS
Changes from Planning Commission Recommendation
TCC 24.15

6/4/2012

Geologic Hazard Areas

24.15.005 Geologic Hazard Areas – General purposes.
24.15.010 Geologic Hazard Areas – Applicability.
24.15.015 Geologic Hazard Areas – Standard buffer for landslide hazard areas and marine bluff hazard areas.
24.15.020 Geologic Hazard Areas – Nisqually hillside overlay district.
24.15.021 Geologic Hazard Areas – Nisqually hillside overlay district - Standards.
24.15.025 Geologic Hazard Areas – Standards and allowable uses and activities within geologic hazard areas and associated buffers.
24.15.030 Geologic Hazard Areas – General standards.
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24.15.140 Geologic Hazard Areas – Roads/streets – New and expanded.
24.15.150 Geologic Hazard Areas – Slope stabilization – New.
24.15.155 Geologic Hazard Areas – Shoreline stabilization – Repair, maintenance, or renovation.
24.15.160 Geologic Hazard Areas – Stair tower, stairway, and mechanical lift.
24.15.170 Geologic Hazard Areas – Stormwater facilities on existing lots – New.
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24.15.180 Geologic Hazard Areas – Vegetation removal – Generally.
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24.15-1
24.15.005  Geologic Hazard Areas — Geologic Hazardous Areas — General purposes.
The purposes of this chapter are to:

A. Protect public health and safety;
B. Avoid and minimize damage to property due to landslide, or other naturally occurring events;
C. Avoid and minimize impacts of erosion and landslide hazards on wetlands and important wildlife habitats and species; and
D. Identify and map geologic hazard areas.

24.15.010  Geologic Hazard Areas — Applicability.
A. The provisions of this chapter apply to the following types of geologically hazardous areas:
   1. Erosion hazard areas;
   2. Landslide hazard areas; and
   3. Marine bluff hazard areas.
B. In accordance with RCW 36.70A, agricultural uses are not subject to these regulations. Agriculture uses, consistent with RCW 36.70A, are subject to chapter 17.15 TCC.
C. The provisions of this chapter do not apply to the following types of geologically hazardous areas:
   1. Seismic Hazard Areas;
   2. Volcanic Hazard Areas; and

24.15.015  Geologic Hazard Areas — Standard buffer for landslide hazard areas and marine bluff hazard areas. Landslide and marine bluff hazard areas require an undisturbed buffer of approved vegetation, except as otherwise provided for in this chapter. The required buffer shall be the greater amount of the following:

A. Fifty feet from toe and top of slope; or
B. A distance measured as follows:

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Note: Footnote style numbers in this draft refer to corresponding numbers in “Best Available Science/Guidance—Geologic Hazard Areas” (2005, draft). That document contains excerpts from scientific literature that are relevant to the draft regulations.
1. Landslide Hazard Areas. A buffer from the toe and top of slope equal to the following: The distance measured from the toe of slope upward at a slope of 2:1 (horizontal to vertical) to a point that intersects with the existing topography of the site; or

2. Marine Bluff Hazard Areas. A distance from the ordinary high water mark landward at a slope of 2:1 (horizontal to vertical) which intersects with the existing topography of the site; or

C. The minimum distance recommended by the geotechnical professional in the geological assessment, based on review of the extent of unstable landform and definition of the potential hazard area from each site investigation, as measured outward from the toe and top of slope.

Buffers for marine bluff hazard areas shall also comply with sections 24.25.045-055 TCC, and all applicable sections of the Shoreline Master Program for the Thurston Region, as amended.

24.15.020 Geologic Hazard Areas – Nisqually hillside overlay district.
The Nisqually hillside overlay district is generally located on the bluff to the west of the Nisqually River, and is characterized as a special landslide hazard area in Thurston County due to past unstable slope conditions.

A. This area is depicted on the map entitled “Nisqually Land Use Categories and Zoning Districts,” a copy of which shall be on file with the Thurston County Resource Stewardship Department.

B. This overlay district shall extend from the toe of McAllister Bluff to a point two hundred feet westerly of the top of McAllister Bluff, except as provided for in 24.15.021, below. The top of McAllister Bluff is so noted on the aforementioned map as “Bluff Line” as lies to the west of McAllister Creek. The actual bluff line is subject to field verification.

C. The criteria to field locate the top of McAllister Bluff is a distinct topographic break in the slope less than thirty percent and at least fifteen feet wide which is verified by the Thurston County Resource Stewardship Department.

24.15.021 Geologic Hazard Areas – Nisqually hillside overlay district - Standards.
Any development permit within the aforementioned area shall be subject to the following standards:

A. Residential development within this overlay district is prohibited, however, the number of dwelling units, as calculated by the underlying residential zone (one unit per five acres), may be clustered on that portion of the parcel not within this overlay district or transferred to an adjacent parcel. Cluster development in the Nisqually hillside overlay district shall be developed consistent with the underlying zoning district and associated development requirements in chapters 20.30 or 20.30A TCC. No fractional units will be created in this calculation unless the parcel size is less than five acres.

B. The western two hundred feet of the Nisqually Hillside Overlay District is a buffer measured from the top of McAllister Bluff, except that portion of the bluff between I-5 and Martin Way which shall be fifty feet.
C. Some flexibility from subsection B above will be provided for areas of preexisting development along the bluff. These areas include lots less than one acre in size, undeveloped lots in a subdivision, and the portion of the slope between Martin Way and I-5. In those locations the buffer from McAllister Bluff shall be at least fifty feet wide, with the exact location on the bluff determined on a case by case basis through an administrative site plan review process. This buffer width must protect the stability of the bluff and maintain the visual integrity of the hillside.

24.15.025 Geologic Hazard Areas – Standards and allowable uses and activities within geologic hazard areas and associated buffers.

A. Those uses and activities listed in Table 24.15-1 are only allowed in geologic hazard areas or their buffers as set forth in that table, subject to the performance standards set forth in sections TCC 24.15.030-240 TCC;

B. All other land uses and activities not allowed pursuant to Table 24.15-1, or not mentioned in Table 24.15-1, are prohibited, unless determined otherwise pursuant to subsection TCC 24.01.030(B) TCC;

C. Differences in regulations because of the overlap of two or more critical areas are governed by chapter 24.01 TCC.

The general standards listed in section TCC 24.15.030 TCC apply to all uses in Table 24.15-1. The standards provided in sections TCC 24.15.040 – 24.15.240 TCC apply only to those uses and activities in Table 24.15-1 when carried out within a geologic hazard area (i.e., landslide, marine bluff, erosion) or buffer. Where no specific performance standards are specified for the uses and activities in Table 24.15-1, the approval authority shall review projects based upon the purposes and provisions of this chapter. Table 24.15-1 contains the primary section references for each activity covered by this chapter.
Note: Footnote style numbers in this draft refer to corresponding numbers in “Best Available Science/Guidance-Geologic Hazard Areas” (2005, draft). That document contains excerpts from scientific literature that are relevant to the draft regulations.

Table 24.15-1
Restricted Uses and Activities in Geologic Hazard Areas and Associated Buffers

<table>
<thead>
<tr>
<th>Activity</th>
<th>Landslide Hazards</th>
<th>Marine Bluff Hazards</th>
<th>Erosion Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural uses, existing and ongoing are subject to chapter 17.15 TCC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural uses, new (TCC 24.15.030 &amp; 24.01.055)</td>
<td>P</td>
<td>X</td>
<td>P</td>
</tr>
<tr>
<td>Antenna support structures regulated by chapter 20.33 TCC</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Asphalt batch plants</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Boat ramp or marine railway and associated vehicle access</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Bridges and culverts – Maintenance or repair</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Bridges and culverts – Replacement or expansion</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Bridges and culverts – New construction</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Cemeteries</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Clearing and grading/timber harvest in conjunction with a development project</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Creation of ponds &lt;1 acre (also see agricultural ponds)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Creation of a ski lake</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Critical facilities--see Table 24.15-2</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Drainage ditch maintenance</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Drilling and testing for required report or engineering study</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Emergency response (see chapter 24.90 TCC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing lots approved prior to [the effective date of this ordinance] – Construction of primary structures and associated, decks, garages, and appurtenant structures.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

A = Permitted without a Critical Area Permit (CAP), subject to requirements of this title
P = Permitted, subject to CAP
X = Prohibited

24.15-5
### TABLE 24.15-1 (Cont.)

<table>
<thead>
<tr>
<th>RESTRICTED USES AND ACTIVITIES</th>
<th>Landslide Hazards</th>
<th>Marine Bluff Hazards</th>
<th>Erosion Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fences (see chapter 24.60 TCC)</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Fill</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Forestry - Class IV Forest Land Conversion and COHPS</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Gardening for personal consumption</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Habitat restoration/enhancement</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Infiltration of reclaimed water (application to the land’s surface above agronomic rates)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>*Critical area regulations will be proposed when more information is available to the county.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lawfully established existing uses (see chapter 24.50 TCC)</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Lawns, landscaping, golf courses, and cemeteries – Maintenance</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Mineral extraction (Also see, chapter 20.54 special uses, chapter 20.30B, and chapter 17.20 TCC – mineral extraction code)</td>
<td>P</td>
<td>X</td>
<td>P</td>
</tr>
<tr>
<td>Mitigation required by the county (see 24.15.030)</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Nonconforming structures/uses – Maintenance, repair, alteration, expansion, replacement, or relocation</td>
<td>SEE CHAPTER 24.50 TCC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site sewage disposal system – Maintenance/repair</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>On-site sewage disposal system – New construction</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Open space (e.g., critical area tract)</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

#### LEGEND

| A     | Permitted without a Critical Area Permit (CAP), subject to requirements of this title |
| P     | Permitted, subject to CAP                                                             |
| X     | Prohibited                                                                            |
**TABLE 24.15-1 (Cont.)**

<table>
<thead>
<tr>
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<th>Landslide Hazards</th>
<th>Marine Bluff Hazards</th>
<th>Erosion Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piers – Construction&lt;br&gt;<strong>Section TCC</strong> 24.15.110</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Public facility&lt;br&gt;<strong>Section TCC</strong> 24.15.030</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Public park facilities, trails and developed recreation areas – Maintenance&lt;br&gt;<strong>Sections TCC</strong> 24.15.120; 130</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Public project of significant importance&lt;br&gt;<strong>Section TCC</strong> 24.15.030</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Recreation activities (outdoors) – Passive and low impact outdoor recreation activities (e.g., bird watching, boating, bicycling, canoeing, fishing, hiking, hunting, jogging, photography, swimming, and similar activities).</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Recreation facilities (Passive), trails/paths, elevated walkways, and associated facilities – New&lt;br&gt;<strong>Section TCC</strong> 24.15.130</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Recreation facilities – Active (e.g., public and private parks, day camps and camping sites. This does not include structures).&lt;br&gt;<strong>Section TCC</strong> 24.15.120</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Recreation facilities – Active – New golf courses, swimming pools and structures&lt;br&gt;<strong>Section TCC</strong> 24.15.120</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Research (e.g., education, scientific, and site investigation)&lt;br&gt;<strong>Section TCC</strong> 24.15.030</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Roads – Repair and maintenance&lt;br&gt;<strong>Section TCC</strong> 24.15.145</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Roads – Replacement of lawfully established roads within maintained, improved (paved or railroad tracks) rights-of-way or easements&lt;br&gt;<strong>Section TCC</strong> 24.15.145</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Roads – Expansion&lt;br&gt;<strong>Section TCC</strong> 24.15.140</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Roads – New construction&lt;br&gt;<strong>Section TCC</strong> 24.15.140</td>
<td>P</td>
<td>X</td>
<td>P</td>
</tr>
</tbody>
</table>

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TABLE 24.15-1 (Cont.)

<table>
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<tr>
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<th>Landslide Hazards</th>
<th>Marine Bluff Hazards</th>
<th>Erosion Hazards</th>
</tr>
</thead>
</table>
| Slope/shoreline stabilization – New  
Section TCC  24.15.150 | P | P | P |
| Slope/shoreline stabilization – Repair and maintenance  
Section TCC  24.15.155 | P | P | P |
| Signs (e.g., interpretation, critical area tract, and survey markers,) | See chapter 24.60 TCC |
| Stair tower, stairway or mechanical lift  
Section TCC  24.15.160 | P | P | P |
| Stormwater conveyance system or detention/treatment facility – Maintenance/repair  
Section TCC  24.15.175 | P | P | P |
| Stormwater retention/treatment facility – Construction  
Section TCC  24.15.170 | X | X | X |
| Stormwater – Temporary sediment control ponds – Construction  
Section TCC  24.15.170 | X | X | P |
| Stormwater – Surface water conveyance system – Construction  
Section TCC  24.15.170 | X | X | P |
| Subdivisions  
See Chapter 24.55 TCC. | | | |
| Utilities – Maintenance, repair, or replacement  
Section TCC  24.15.030 | A | A | A |
| Utility facility  
Section TCC  24.15.030 | X | X | P |
| Utility transmission lines, utility corridors, outside of existing improved roads and utility corridors – New construction  
Section TCC  24.15.030 | P | P | P |
| Utility lines and facilities in improved roads and utility corridors – New installation  
Section TCC  24.15.030 | P | P | P |
| Utility service lines – Installation  
Section TCC  24.15.030 | P | P | P |

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<table>
<thead>
<tr>
<th>TABLE 24.15-1 (Cont.)</th>
<th>Landslide Hazards</th>
<th>Marine Bluff Hazards</th>
<th>Erosion Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REstricted Uses And Activities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation removal – Noxious weeds</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td><strong>Section</strong> TCC 24.15.210</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation removal – Invasive vegetation</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td><strong>Section</strong> TCC 24.15.220</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation removal – Removal of hazard trees</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td><strong>Section</strong> TCC 24.15.200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation removal – Other</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td><strong>Section</strong> TCC 24.15.230</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wells – New and replacement</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td><strong>Section</strong> TCC 24.15.240</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife blind or nesting structure</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Uses allowed in the applicable zoning district/shoreline master program not listed elsewhere in this table</td>
<td>See <strong>Section</strong> TCC 24.15.030 TCC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

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24.15.030 Geologic Hazard Areas – General standards.
The following requirements apply, as applicable, to all uses and activities listed in Table 24.15-1.

A. Regulatory differences. See chapter 24.01 TCC.

B. Geologic assessments. Applications for all uses listed in Table 24.15-1 that require a development permit, with the exception of emergency responses provided for in chapter 24.90 TCC, shall submit a geologic assessment as specified in chapter 24.35 TCC.

C. Applications. Applications to undertake a use or activity within a geologic hazard area shall contain all information necessary to evaluate the proposed activity, its impacts, and its compliance with the provisions of this chapter.

D. Public health and safety. All development in geologic hazard areas shall be designed to protect public health and safety.

E. Avoid increased threat to adjacent properties. Development in geologic hazard areas shall be designed so it does not increase the threat of the geologic hazard to other properties that would likely be affected in the event of a slope failure, based on the professional opinion of a geotechnical professional.

F. Avoidance of impacts. All allowed uses and activities shall be designed and constructed to avoid or, where that is not possible, minimize negative impacts to geologic hazard areas and associated buffers. Applicants must first demonstrate an inability to avoid or reduce impacts, prior to the approval authority considering restoration and mitigation of impacts.

G. Avoid the need for shoreline stabilization. The approval authority shall deny proposed developments and uses if it is determined that the development or use would require structural shoreline stabilization measures at the time of construction/implementation or over the life of the development. Developments and uses that would require such structural shoreline stabilization must be approved through the reasonable use exception process (see chapter 24.45 TCC).

H. Surety. Applicants for proposals involving restoration or enhancement of degraded geologic hazard areas as a condition of permit approval shall submit to the county a surety consistent with chapter 24.70 TCC.

I. Mitigation. Adverse impacts to geologic hazard areas and associated buffers shall be fully mitigated.

J. Any application of the Chapter to an existing use or structure assumes that such use or structure was legally established. A proposal to apply this Chapter to a use or structure that has not been legally established is prohibited.
24.15.040  Geologic Hazard Areas – Agricultural activities.
Reserved for future critical area agriculture regulations. Refer to chapter 17.15 TCC for regulations on new and existing agricultural activities.

24.15.050  Geologic Hazard Areas – Boat ramp, or marine railway and associated vehicle access.
Refer to the Shoreline Master Program for the Thurston Region, as amended, and section TCC 24.25.110 TCC. Hand launching sites are not considered boat ramps under this section and are subject to the general standards in section TCC 24.15.030 TCC.

24.15.060  Geologic Hazard Areas – Bridges and culverts – Maintenance and repair.
A. Existing bridges and culverts can be maintained and repaired within the existing road bed/footprint provided best management practices are employed to avoid increasing the potential for a hazard area to fail, and to prevent erosion. Bridges and culverts must also be consistent with sections TCC 24.25.280-290 TCC, Fish and Wildlife Habitat Conservation Areas Important Habitat and Species.
B. Clearing of culverts does not require a permit. Clearing of culverts shall be limited to removal of sediment and debris from the culvert and its inlet, invert, and outlet.

24.15.070  Geologic Hazard Areas – Bridges and culverts – Expansion or replacement.
Expansion or replacement of a bridge or culvert is allowed if necessary to conform to current county or state standards and if:
A. The existing bridge or culvert was lawfully established; and
B. There is not another alternative available that has less adverse impact on the geologic hazard area or associated buffer; and
C. The bridge or culvert is designed to avoid or, if not possible, minimize impacts to the geologic hazard area and it is in compliance with the standards for new crossings contained in section TCC 24.25.280 TCC.

24.15.080  Geologic Hazard Areas – Bridges and road-culverts – New.
New bridges and road culverts are allowed if:
A. There is not another alternative access available outside of the geologic hazard area(s) or associated buffer(s);
B. The bridge or culvert shall be designed and located in a manner that presents the lowest risk of exacerbating an existing geologic hazard or impacting the associated buffer; and
C. The bridge or culvert is designed in compliance with the standards for new crossings contained in section TCC 24.25.280 TCC.
24.15.090 Geologic Hazard Areas – Clearing and grading.
Clearing and grading within landslide, marine bluff, and erosion hazard areas shall be limited to the area approved for development and shall not be allowed during the wet season (October 1st through May 1st) unless the approval authority determines that adequate provisions for wet season erosion have been identified in the geological assessment. All such erosion control measures shall be implemented as a condition of wet-season clearing and grading. The approval authority may require monitoring to ensure that the erosion control is functioning properly. The County may further restrict grading between May 1st and October 1st and also require wet season erosion control provisions if the site is particularly susceptible to erosion and sedimentation that could create unstable conditions or jeopardize a wetland or important habitat. Also see chapter 14.20 TCC regarding grading requirements and the Drainage Design and Erosion Control Manual for Thurston County, as amended (chapter 15.05 TCC).

24.15.100 Geologic Hazard Areas – On-site sewage systems – New and replacement.
A. New sewage systems. New on-site sewage systems shall be prohibited within geologic hazard areas and associated buffers.
B. Replacement. Failing onsite sewage disposal systems shall be remedied through a method that results in the least impact to the hazard area and associated buffer. Replacement sewage disposal systems shall not be allowed within geologic hazard areas or the associated buffers unless there is no alternative site available outside of such areas to accommodate the facilities. This may require systems that provide a higher level of sewage treatment. The approval authority may deny the request to replace a failing on-site sewage system if it is determined, in consultation with a geotechnical professional, that it poses a risk to public safety. Clearing of existing vegetation to remedy the failing system shall be limited to the minimum extent practicable.

24.15.110 Geologic Hazard Areas – Piers.
Refer to the Shoreline Master Program for the Thurston Region, as amended.

24.15.115 Geologic Hazard Areas – Reclaimed water.
Section reserved for future critical area reclaimed water regulations. Standards will be proposed when more information is available to the county.

24.15.120 Geologic Hazard Areas – Recreation – Active.
The approval authority may allow active recreation facilities, such as, but not limited to, public and private parks and campgrounds within geologic hazard areas and associated buffers subject to the following criteria and exceptions. Also see sections TCC 24.15.180-230, 24.25.270, and 24.30.260 TCC:
A. Active recreation facilities and access to them shall be designed and located to minimize disturbance to the hazard area and associated buffers.
B. Parking areas for trails and restrooms shall be located outside the geologic hazard area and associated buffers.
24.15.130 Geologic Hazard Areas – Recreation facilities (Passive), trails/paths, elevated walkways, and associated facilities – New.

Trails and trail related passive recreation facilities shall only be authorized within geologic hazard areas subject to the following criteria (also see sections TCC 24.15.180-230, 24.25.270, and 24.30.260 TCC):

A. Trails and related passive recreation facilities shall be placed on existing levees, dikes, road grades, utility corridors, or any other previously disturbed areas to the maximum extent practicable, as determined by the director;

B. The width of trails extending through a geologic hazard area and/or buffer shall be minimized. Access paths extending through the geologic hazard area and buffer shall be no more than four feet in width unless they are designated for public access and designed to accommodate handicapped persons. In that case, the trail and associated clearing shall comply with the American with Disabilities Act (ADA) guidance for trail construction. Clearing shall be done with hand tools unless the approval authority determines that the scale of the project necessitates mechanized equipment and its use will not increase the hazard associated with the geologic hazard area or buffer within and beyond the trail corridor;

C. Trails and related passive recreation facilities shall be planned to minimize vegetation removal;

D. Viewing platforms, interpretive signs, picnic areas, benches and access to them shall be designed and located to minimize disturbance;

E. Trails and related passive recreation facilities shall provide water quality protection measures to assure that runoff from them does not create channels or otherwise directly adversely affect the stability of the steep slope or marine bluff;

F. Native vegetation disturbed by trail construction shall be made available for salvage.

G. The removal or disturbance of vegetation, clearing or grading shall be prohibited:
   1. During the wet season (November 1st to May 1st) or
   2. During other wet time periods where clearing and grading may result in a public safety risk, as determined by the director;

H. The proposed trail shall not adversely affect existing slope conditions within the landslide hazard area, or any required buffer; and

I. Parking areas for trails and restrooms shall be located outside the geologic hazard area and associated buffers.
24.15.140 Geologic Hazard Areas – Roads/streets – New and expanded.
New roads and streets are prohibited in marine bluff hazard areas. Proposed road crossings or encroachments into other geologic hazard areas or associated buffers shall follow all applicable local, state, and federal laws and the requirements listed below. These requirements also apply, as applicable, to road expansion within existing rights-of-way, footbridges, and private access roads.

A. Road alignments shall avoid landslide hazard areas and associated buffers, except where there is no alternative and safeguards will be employed to minimize the risk of slope failure and potential habitat degradation, consistent with a geological assessment. (See chapter 24.35 TCC).

B. Mitigation measures shall be provided that ensure the roadway prism and/or bridge structure will not be susceptible to damage from active erosion or seismically-induced ground deformation.

C. Expansion of roads in marine bluff hazard areas shall be prohibited unless it is needed for public safety. Expansion shall not result in an increase in road capacity and shall not exacerbate or create risks to public safety associated with the geologic hazard.

Roads, streets, highways, rights-of-way and other existing facilities, equipment, and appurtenances within approved rights-of-way may be maintained, repaired, resurfaced, replaced, installed, or constructed by the county or the holder of a current right-of-way use permit consistent with all applicable local, state, and federal laws. Such maintenance that involves road expansion shall be subject to the requirements of section TCC 24.15.140 TCC. Also see requirements in chapters 24.25 and 24.30 TCC.

24.15.150 Geologic Hazard Areas – Slope stabilization – New.
The approval authority may authorize stabilization of a steep slope or marine bluff only where they determine it to be necessary to protect lawfully established threatened existing structures as defined in this title and by the Shoreline Master Program for the Thurston Region (1990) as amended and applicable, and that cannot be relocated with less impact to geologic hazard areas or other critical areas. Stabilization of marine shorelines is subject to standards within the Shoreline Master Program for the Thurston Region, as amended, and consistent with this section. Any proposal for slope/bluff stabilization must be supported by a geological assessment from a qualified geotechnical professional and a biologist and shall adhere to the following preferential order:

A. Nonstructural shoreline protective techniques. When stabilization methods are deemed necessary by the director, nonstructural shoreline protective techniques are preferred to concrete bulkheads or other types of shoreline armoring. Nonstructural techniques may include but are not limited to: beach nourishment, coarse beach fill, gravel berms, vegetation plantings and bioengineering. Best available science shall be used to evaluate the best techniques for protection as determined by the director. Refer to the Washington Department of Ecology publications “Slope Stabilization and Erosion Control Using
Vegetation” (1993, Publication 93-30), and “Marine Shoreline Armoring and Puget Sound” (2010, Publication 10-06-003).

B. Bioengineering. If necessary, stabilization of slopes and marine bluffs shall be accomplished with bioengineering or similar “soft” stabilization techniques unless the applicant’s qualified engineer and biologist demonstrate that such techniques are not sufficient to protect structures and facilities listed above from erosion and slope failure. The stabilization shall be designed and installed to minimize adverse impacts on the habitat’s functions.

C. Combination of bioengineering and hard armoring. If the applicant’s qualified engineer and/or biologist demonstrates to the approval authority that bioengineering alone will not be sufficient to protect structures and facilities listed above, the approval authority may authorize a combination of bioengineering and structural solutions that is least damaging to the habitat. The stabilization shall be designed and installed to minimize any adverse impacts on habitat functions. The structural stabilization solutions shall comply with subsection D below.

D. Structural techniques (e.g., bulkhead, gabion, riprap, revetments, or wall). If the applicant’s qualified engineer and biologist demonstrates to the approval authority’s satisfaction that the techniques provided above are not possible or will not be sufficient to protect structures and facilities listed above from erosion and slope failure, they may, in consultation with a biologist and qualified engineer at the applicant’s expense, approve a structural stabilization solution consistent with the following:

1. Hard armoring, such as rip-rap and bulkheads may only be allowed when the applicant demonstrates to the approval authority that a public facility, public road, utility (not individual service lines that can be relocated), sole access road, or occupied structure cannot be safely and practically maintained without such measures. The armoring shall be the minimum length necessary to protect the structure.

2. Structural techniques shall only be allowed along the toe of a marine bluff when:

   a. It is to protect a legally permitted threatened structure; and

   b. The residence and normal appurtenances are located within the 2:1 slope measured from the toe of the bluff or within the 50-foot top of slope buffer, whichever is greater; and

   c. Only if a marine bluff geotechnical assessment completed per chapter 24.35 TCC finds that the structure to be protected will be threatened based on the long-term erosion rate (30-50 year average) within the next three years if toe protection is not provided.
3. Hard armoring shall not be allowed along Type F and S waters in salmonid rearing areas unless it is necessary to protect critical public facilities, human life, or threatened dwellings.

E. Retaining Wall (Not a Bulkhead). The approval authority may allow retaining walls to provide protection for a threatened existing legally established single-family residence or public road where other nonstructural or bioengineering techniques have not been successful or would not be appropriate. Design, placement and mitigation shall be established by a geotechnical assessment and revegetation plan as described in chapter 24.35 TCC.

F. Designed by engineer. A professional engineer licensed in the State of Washington with demonstrated expertise regarding hydraulic actions along shorelines shall design stabilization projects along streams and marine shorelines in consultation with a qualified biologist.

G. Avoid intrusion into the important habitat area of a geologic hazard area. Any new or replaced shoreline protective structures shall be placed as close to the existing bank as possible and parallel to the natural shoreline. In areas where dry land has been previously created by fill behind the bulkhead, the replacement structure should be designed to remove the fill and place the new structure as close to the historical OHWM as possible.

H. Repair, maintenance or renovation. Repair, maintenance, or renovation of lawfully established shoreline stabilization structures within geologic hazard areas is permitted consistent with state and federal regulations and the Shoreline Master Program for the Thurston Region, provided that the facilities are not increased in height or length or expanded waterward. Replacement of existing shoreline stabilization structures shall be considered a new use, except as provided for by the Shoreline Master Program for the Thurston Region (see Section XVIII Shoreline Protection).

J. Nontoxic materials. Approved stabilization shall only use materials that do not pose a risk to water quality, consistent with best available science.

I. Slope stabilization. Slope stabilization is only allowed in Geologic Hazards, if consistent with chapter 24.25 TCC, Fish and Wildlife Habitat Conservation Areas and chapter 24.20 TCC, Frequently Flooded Areas, and only where erosion or landsliding threatens a use listed in this section. Bioengineering shall be used where possible.

J. A mitigation plan for impacts to geologic hazard areas including the shoreline ecological functions as a result of the armoring shall be prepared by a qualified biologist and implemented immediately following construction. Mitigation measures may include temporary or perpetual beach feeding with appropriate substrate, additional woody debris, revegetation of the adjacent upland area, or other measures designed to minimize the impacts to the nearshore environment from armoring.

K. Prior to any approval of shoreline armoring, the applicant shall demonstrate that other...
measures have been taken to address the erosion or other threats to the structure. This includes improving or installing a functioning drainage system, minimizing impervious areas, restoration of trees and other native vegetation on the adjacent buffer slope or bluff, possible relocation of structures, or other measures that would improve stabilization and reduce the threat to the structure.

24.15.155 Geologic Hazard Areas – Shoreline stabilization – Repair, maintenance, or renovation.

Repair, maintenance, or renovation of lawfully established shoreline stabilization structures is permitted consistent with state and federal regulations and the Shoreline Master Program for the Thurston Region, as amended, provided that the facilities are not increased in height or length or expanded waterward. Replacement of existing shoreline stabilization structures shall be considered a new use, except as provided for by the Shoreline Master Program for the Thurston Region, as amended.

24.15.160 Geologic Hazard Areas – Stair tower, stairway, and mechanical lift.

A. Stair towers, stairways, and mechanical lifts may be permitted consistent with the “General Regulations” and specific “Environmental Designation and Regulations” for “XVI. Residential Development” contained within the Shoreline Master Program for the Thurston Region (1990), as amended, and section TCC 24.25.110 TCC.

B. Stair towers, stairways, and mechanical lifts shall be designed and constructed to avoid adverse impacts to existing slope conditions.

24.15.170 Geologic Hazard Areas – Stormwater facilities on existing lots – New.

New stormwater facilities and swales proposed to store, treat and/or convey stormwater for residential development on existing lots may be constructed within geologic hazard areas and associated buffers consistent with the Drainage Design and Erosion Control Manual, as amended (chapter 15.05 TCC) under the following conditions:

A. No alternative. The applicant shall demonstrate that there is no alternative for accommodating stormwater with less impact to the hazard area and/or buffer due to topography or other physical constraint. The facilities shall be designed and located to minimize impacts on the geologic hazard area and associated buffer.

B. Geologic hazard areas and associated buffers. If there is no alternative with less impact, stormwater facilities shall be constructed as follows:

1. Surface drainage down the face of the slope must be avoided. If drainage must be discharged, it shall be collected upland of the top of the slope and conveyed by tight line drain through a high-density polyethylene pipe with fuse-welded joints, or similar product that is technically equal or superior. The pipe shall be located on the surface of the ground and properly anchored so that it will continue to function in the event of an underlying slide or active erosion conditions. The stormwater shall be treated prior to release by a method that meets clean water standards and poses the least risk of destabilizing the slope (e.g. a compost filter).

24.15-17
2. If drainage must be discharged to a water body, stream or river below the landslide or erosion hazard area, the conveyance system described in paragraph 1 above shall include an energy dissipating device at the shoreline edge of the water body.

3. Surface drainage not discharged per paragraphs 1 or 2 above, must be directed away from the slope and collected in a tight line or other approved method for discharge to an acceptable natural drainage. The tight line drain should terminate at the end of the drainage course rather than at a point within the natural drainage course.

4. A maintenance and monitoring plan shall be developed for approved tight line drainages.

5. If tight lining is not possible, stormwater retention and detention systems, such as dry wells and infiltration systems (including those utilizing buried pipe, French drains, or swales), within a landslide or erosion hazard area or associate buffers shall require approval of a Reasonable Use Exception, in compliance with chapter 24.45 TCC. Any such system receiving approval of a Reasonable Use Exception shall be designed by a licensed civil engineer and shall include a geological assessment indicating that such a system will not affect the stability of the slope. Monitoring wells shall be required through one wet season, at a minimum, for a proposed infiltration system and the results included in the geotechnical assessment.

6. Proposals in geologic hazard areas and associated buffers located within jurisdiction of the Shoreline Management Act shall comply with the Shoreline Master Program for the Thurston Region, as amended.

24.15.175 Geologic Hazard Areas – Stormwater facilities – Repair and maintenance. Repair and maintenance and repair of existing stormwater retention, treatment and conveyance systems is permitted.

24.15.180 Geologic Hazard Areas – Vegetation removal – Generally. Vegetation removal is prohibited in geologic hazard areas and associated buffers except as provided for in this chapter.

24.15.190 Geologic Hazard Areas – Vegetation removal – Forest practices permit.

A. Class IV Forest Practices Permits and Conversion Option Harvest Plans (COHPs) are subject to the standards of this Chapter.

B. The harvesting of trees with an approved Class II or Class III forest practices permit is subject to review and approval by Washington Department of Natural Resources and shall not be subject to the standards of this Chapter.
24.15.200  Geologic Hazard Areas – Vegetation removal – Hazard trees.
The approval authority may authorize the limbing, thinning or removal of hazard trees located within a geologic hazard area or buffer provided that:

A. The approval authority may require the applicant to submit a report from an appropriate professional(s) (certified arborist, geotechnical engineer, professional forester, etc.) that documents the hazard. The professional arborist may recommend suitable replacement trees for any trees removed pursuant to this subsection.

B. Tree cutting is limited to limbing or crown thinning in compliance with National Arborist Association pruning standards, unless the tree has a disease that would jeopardize the survival of other trees, or felling the tree is otherwise justified by the landowner/expert to eliminate hazard trees or to otherwise protect the integrity of the bluff or slope.

C. Trees subject to wind throw that may increase slope instability if they blow down may be removed, subject to a report from the appropriate professional(s) (e.g., certified arborist, geotechnical engineer, professional forester, etc.) to confirm that there is a risk of wind throw and that removal of the tree(s) will not decrease slope stability increase the hazard.

D. The landowner shall replace any tree that is taken down in the buffer. Replacement trees shall be native, field grown, 15 gallon pot size, a height of four (4) feet, and be three (3) years old. Larger trees may be required when there are insufficient minimal remaining trees in the buffer to ensure slope stability and prevent the creation of more hazard trees, as determined by the approval authority.

E. To ensure survival of replacement trees, replacement shall be at a ratio of 3:1 for each tree removed. The approval authority may require that the trees be planted from October to February and that watering, maintenance, and/or monitoring plans be submitted to ensure their survival. Demarcation and protection of planted trees may be required to ensure tree survival.

24.15.210  Geologic Hazard Areas – Vegetation removal – Noxious weeds.
Removal of noxious weeds, as defined by chapter 16-750 WAC, under the direction of the Thurston County Noxious Weed Control Board, is permitted in geologic hazard areas and associated buffers consistent with a county approved integrated pest management plan, applicable county and state regulations, any applicable approved farm plan, and this section. Prior to requiring removal of noxious weeds within a landslide or marine bluff hazard area or associated buffer that would involve the use of motorized equipment or broadcast spraying of herbicides, the Noxious Weed Control Board staff shall consult with the Resource Stewardship Department to evaluate alternative methods of weed removal and the associated risks to the stability of the landslide or marine bluff hazard area and buffer.

A. Plant removal shall be performed with hand labor, including the use of hand held non-motorized tools, unless the approval authority determines that the scale of the project warrants use of small scale motorized equipment (e.g., riding mowers or light mechanical cultivating equipment) or other method (i.e., application of herbicide in
Note: Footnote style numbers in this draft refer to corresponding numbers in “Best Available Science/Guidance-Geologic Hazard Areas” (2005, draft). That document contains excerpts from scientific literature that are relevant to the draft regulations.

accordance with state and federal law by a licensed applicator) and use of the equipment/method does not pose a significant risk to untargeted areas, slope stability, or habitat functions.

B. Plant removal that would expose more than 500 square feet of soil within a landslide or marine bluff hazard area or buffer shall require submission of a plan for county approval that identifies the proposed plant removal and site restoration consistent with the provisions of this section.

C. Erosion shall be effectively controlled and exposed areas shall be stabilized immediately following plant removal consistent with the chapter 15.05 TCC. If the area of exposed soil lies within the landslide or marine bluff hazard area or the buffer, the exposed area shall be planted with appropriate plant species present in the area at a density that will provide complete ground cover at maturity, unless the approval authority determines that the area will revegetate naturally without jeopardizing slope stability or habitat functions.

D. Vegetation removal shall be the minimum extent necessary; and shall not create a public safety risk.

24.15.220 Geologic Hazard Areas – Vegetation removal – Invasive plants.
Removal of invasive plants is permitted subject to all of the following:

A. Plant removal shall be performed such that it will not increase the likelihood of erosion or slope instability within marine bluff or landslide hazard areas and associated buffers, significantly damage untargeted vegetation, or impair any habitat functions.

B. Plant removal shall be performed with hand labor, including the use of hand held, non-motorized tools, unless the approval authority determines that the scale of the project warrants use of small scale motorized equipment (e.g., riding mowers or light mechanical cultivating equipment) or other method (i.e., application of herbicide in accordance with state and federal law by a licensed applicator) and use of the equipment/method does not pose a significant risk to untargeted areas, slope stability, or habitat functions.

C. Plant removal that would expose more than 500 square feet of soil in a contiguous area within a landslide or marine bluff hazard area or buffer shall require submission of a plan for county approval that identifies the proposed plant removal and site restoration consistent with the provisions of this section.

D. Erosion shall be effectively controlled and exposed areas shall be stabilized immediately following plant removal consistent with the chapter 15.05 TCC. If the area of exposed soil lies within the landslide or marine bluff hazard area or the buffer, the exposed area shall be planted with appropriate plant species present in the area at a density that will provide complete ground cover at maturity, unless the approval authority determines that the area will revegetate naturally without jeopardizing slope stability or habitat functions.
24.15.230 Geologic Hazard Areas – Vegetation removal – Other.
Other vegetation may be removed from the hazard area and associated buffer, as follows:

A. Removal of vegetation to the minimum extent necessary for surveying or testing purposes, as determined by the approval authority.

B. Marine Bluff or Landslide Hazard Area. The approval authority may allow the trimming or removal of vegetation to the minimum extent necessary to provide an approved pedestrian access or view corridor, provided that view corridors are limited to a maximum width of twenty feet. The trimming of limbs on individual trees is preferred to the removal of trees. Trimming shall be limited to limbing or crown thinning in compliance with National Arborist Association pruning standards. Trimming shall not include felling, topping, or removal of trees or jeopardize the tree’s survival. Prior to tree removal, the approval authority shall require the applicant to submit a report from the appropriate professional(s) (e.g., arborist, geotechnical engineer, professional forester, etc) to confirm that removal of the tree(s) will not increase the hazard.

C. Erosion Hazard Areas. The applicant shall comply with section TCC 24.15.090 when removing vegetation within an erosion hazard area.

D. Other vegetation may be managed by the periodic mowing of previously cleared areas to maintain pasture vegetation or other vegetation management designed to stabilize the slope or bluff.

New or replacement wells serving an approved individual use are allowed within geologic hazard areas and associated buffers, as specified in Table 24.15-1, provided that:

A. There is not minimally sufficient area on the property outside the hazard area and/or buffer to accommodate the well, as determined by the approval authority; and

B. New on-site wells shall be consistent with the applicable provisions of Articles III of The Rules and Regulations of the Thurston County Board of Health Governing Water Supplies; and

C. If a landslide or marine bluff hazard area is present on the site, the approval authority may require the applicant to demonstrate that the drilling will not destabilize the slope; and

D. Vegetation removal shall be consistent with this chapter; and

E. Pumphouses, wellhouses and any associated structures shall be located outside of geologic hazard areas and their associated buffers.
**Note:** Footnote style numbers\(^1\) in this draft refer to corresponding numbers in “Best Available Science/Guidance-Geologic Hazard Areas” (2005, draft). That document contains excerpts from scientific literature that are relevant to the draft regulations.

<table>
<thead>
<tr>
<th>Occupancy Category</th>
<th>Nature of Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV. Essential</td>
<td>Hospitals and other medical facilities having surgery and emergency treatment areas</td>
</tr>
<tr>
<td></td>
<td>Fire, rescue and police stations and other emergency vehicle garages</td>
</tr>
<tr>
<td></td>
<td>Water treatment facilities required to maintain water pressure for fire suppression</td>
</tr>
<tr>
<td></td>
<td>Designated earthquake, hurricane or other emergency shelters</td>
</tr>
<tr>
<td></td>
<td>Designated emergency preparedness, communication, and operation centers and other facilities required for emergency response</td>
</tr>
<tr>
<td></td>
<td>Power-generating stations and other public utility facilities required as emergency backup facilities for essential facilities.</td>
</tr>
<tr>
<td></td>
<td>Aviation control towers, air traffic control centers, and emergency aircraft hangars</td>
</tr>
<tr>
<td></td>
<td>Structures containing sufficient quantities of toxic materials or explosive substances to be dangerous to the safety of the general public if released</td>
</tr>
<tr>
<td>III. Hazardous</td>
<td>Buildings and other structures having critical national defense functions</td>
</tr>
<tr>
<td></td>
<td>Buildings and other structures where more than 300 people congregate in one area.</td>
</tr>
<tr>
<td></td>
<td>Buildings and other structures with elementary school, secondary school, or day care facilities with an occupant load &gt; 250</td>
</tr>
<tr>
<td></td>
<td>Buildings and others structures with an occupant load greater &gt; 500 for colleges or adult education facilities</td>
</tr>
<tr>
<td></td>
<td>Health care facilities with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities</td>
</tr>
<tr>
<td></td>
<td>Jails and detention facilities</td>
</tr>
<tr>
<td></td>
<td>All structures with occupancy load &gt; 5,000</td>
</tr>
<tr>
<td></td>
<td>Power-generating stations, water treatment for potable water, waste water treatment facilities and other public utility facilities not included as an Essential Facility, above</td>
</tr>
<tr>
<td></td>
<td>Buildings and other structures not included as an Essential Facility, above, containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released</td>
</tr>
</tbody>
</table>
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Table 24.15-3 --Erosion Soils of Thurston County

<table>
<thead>
<tr>
<th>Map Symbol</th>
<th>Soil Name</th>
<th>Percent Slope</th>
<th>Water Erosion Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Alderwood gravelly sandy loam</td>
<td>30-50%</td>
<td>Severe</td>
</tr>
<tr>
<td>8</td>
<td>Baldhill very stony sandy loam</td>
<td>30-60%</td>
<td>Severe</td>
</tr>
<tr>
<td>10</td>
<td>Baumgard loam</td>
<td>40-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>12</td>
<td>Baumgard-Pheeney complex</td>
<td>40-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>13</td>
<td>Baumgard-Rock outcrop complex</td>
<td>40-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>30</td>
<td>Dystric Xerochrepts</td>
<td>60-90%</td>
<td>Severe</td>
</tr>
<tr>
<td>35</td>
<td>Everett very gravelly sandy loam</td>
<td>30-50%</td>
<td>Severe</td>
</tr>
<tr>
<td>49</td>
<td>Jonas silt loam</td>
<td>30-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>53</td>
<td>Kapowsin silt loam</td>
<td>30-50%</td>
<td>Severe</td>
</tr>
<tr>
<td>61</td>
<td>Mal clay loam</td>
<td>30-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>63</td>
<td>Mashel loam</td>
<td>30-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>80</td>
<td>Pheeney gravelly loam</td>
<td>30-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>81</td>
<td>Pheeney-Baumgard complex</td>
<td>30-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>82</td>
<td>Pheeney-Rock outcrop complex</td>
<td>40-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>83</td>
<td>Pheeney-Rock outcrop complex</td>
<td>65-90%</td>
<td>Severe</td>
</tr>
<tr>
<td>91</td>
<td>Rainier clay loam</td>
<td>30-65%</td>
<td>Severe</td>
</tr>
<tr>
<td>96</td>
<td>Rock outcrop-Pheeney complex</td>
<td>40-90%</td>
<td>Severe</td>
</tr>
<tr>
<td>119</td>
<td>Tacoma silt loam</td>
<td>30-60%</td>
<td>High</td>
</tr>
<tr>
<td>122</td>
<td>Vailton silt loam</td>
<td>30-65%</td>
<td>Severe</td>
</tr>
</tbody>
</table>