

Volcanic Hazard Areas

- Case I Inundation Level (Debris Flow & Debris Avalanche Zone) -500 to 1,000 Year Frequency
- Sub-Case of Case I Inundation Level (Debris Flow & Debris Avalanche Zone)
- Case II Inundation Level (Debris Flow & Debris Avalanche Zone) -100 to 500 Year Frequency
- 0.5 ELTT Estimated Lahar Travel Time (in hours) from when the AFM Warning System sounds the alarm for lahars approaching the Case I Lahar in magnitude
- 0.5 ELTT Estimated Lahar Travel Time (in hours) from the source of the event for lahars approaching the Case I Lahar in magnitude

Pierce County Code Title 18E regulates activities within Volcanic Hazard Areas.

The boundaries of volcanic hazard areas are approximate and are intended only to provide an indication of the presence of said areas. Additional volcanic hazard areas that have not been mapped may be present.

- Sources:
- 1) Digital data set of Volcano Hazards for Active Cascade Volcanoes, Washington; Steven P. Schilling, US Geological Survey Open-File Report 96-178, Version 1.0, 1996.
 - 2) "Map Showing Debris Flows and Debris Avalanches at Mount Rainier, Washington, Historical and Potential Future Inundation Areas," Hydrogeologic Investigations Atlas HA-729, U.S. Department of Interior, Geological Survey, 1995, as amended by Kevin Scott, USGS, on Nov. 10, 1997, to be consistent with the reports listed as 3) and 4) below.
 - 3) Volcano Hazards from Mount Rainier, Washington by Hoblitt, Walder, Driedger, Scott, Pringle and Valance, U.S. Geological Survey Open File Report 95-213, 1995.
 - 4) Sedimentology, Behavior, and Hazards of Debris Flows at Mount Rainier, Washington, U.S. Geological Survey Professional Paper 1547, 1995.
 - 5) Emergency Action Plan for Nisqually Hydroelectric Project, Federal Energy Regulatory Commission (FERC) Project No. 1862, December 13, 1996, City of Tacoma, Department of Public Utilities, Light Division.
 - 6) An Empirical Method For Estimating Travel Times For Wet Volcanic Mass Flows, Bulletin of Volcanology, V. 60, P. 98-109, T.C. Pierson, 1998.

- Notes:
- 1) Boundaries do not mark a distinct change between hazard and non-hazard areas. The degree of hazard decreases with increase of distance or elevation outside the boundary.
 - 2) Case III inundation levels are completely contained within the boundaries of Mount Rainier National Park, and are not shown on this map.
 - 3) Travel times are estimated from actual travel times of lahars from 10,000,000 to 100,000,000 cubic meters in volume. Fastest, rather than mean, travel times are used. No data exists for lahars having about 200,000,000 cubic meters volume (the designated Case I magnitude). If a substantially larger volume of material in a lahar is involved, travel times could be faster than shown.

Time Travel Zones

The ability to evacuate people from within a volcanic hazard area correlates to the distance from the source of an event (i.e., those areas closest to the event will have less time to evacuate than those areas farther away from the source of an event) and the amount of time for evacuation from the public notification (via a warning alarm system) that a lahar event has occurred. The amount of time that is anticipated for a debris flow, lahar, flood, or avalanche (estimated at 100,000,000 cubic feet of volume) to travel geographically from either the source of the event or the point where the AFM alarm is sounded is classified into the following time travel zones:

Time Zone A
On the Nisqually and White River systems: that area within an estimated one-hour travel distance from the source of the event.
On the Puyallup and Carbon River systems: that area within an estimated one-half hour travel distance from the point where the AFM alarm is sounded.

Time Zone B
On the Nisqually and White River systems: that area within an estimated one and one-half hour travel distance from the source of the event.
On the Puyallup and Carbon River systems: that area within an estimated one-hour travel distance from the point where the AFM alarm is sounded.

Time Zone C
On the Nisqually and White River systems: that area within an estimated two-hour travel distance from the source of the event.
On the Puyallup and Carbon River systems: that area within an estimated one and one-half hour travel distance from the point where the AFM alarm is sounded.

Time Zone D
On the Nisqually and White River systems: that area more than an estimated two-hour travel distance from the source of the event.
On the Puyallup and Carbon River systems: that area more than an estimated one and one-half hour travel distance from the point where the AFM alarm is sounded.

Note on lower Puyallup River:
Case II inundation area in lower Puyallup River includes the entire area possibly subject to inundation by such a flow. Actual inundation areas will probably be more limited and will be strongly influenced by the existing and future network of levees, road and rail embankments.

Adopted _____, 2002 - Ordinance No. _____
Effective _____, 2002

Note: There is no AFM Warning System on the White River.

Note on lower Nisqually below Alder Dam:
Inundation area shown downstream from Alder Dam is a sub-case of the Case I lahar. Inundation could result from dam failure caused by lahar impact, displacement by the lahar of some of the water impounded by the reservoir, or possible continuation of the lahar past the dam site. Some part of a Case I lahar may be impounded in the reservoir. Thus, without dam failure, lahar-related inundation downstream from Alder Dam would most probably affect less area than shown.
Note: Downstream risk associated with this inundation area includes the potential for dam failure from nonvolcanic causes, including seismically induced failure. Inundation area is mapped at a 1:24,000 scale by the City of Tacoma Department of Public Utilities.

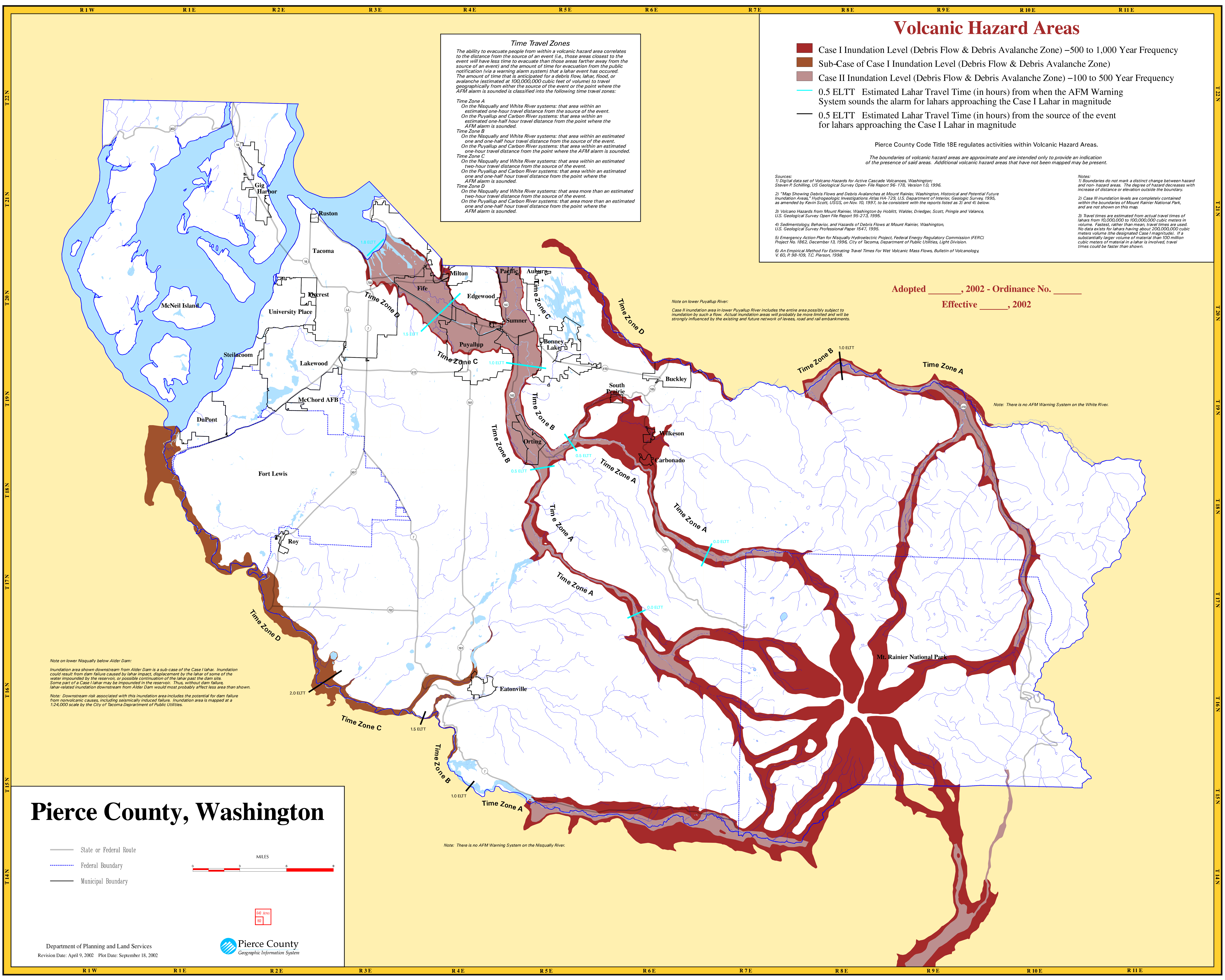
Note: There is no AFM Warning System on the Nisqually River.

Pierce County, Washington

- State or Federal Route
- Federal Boundary
- Municipal Boundary

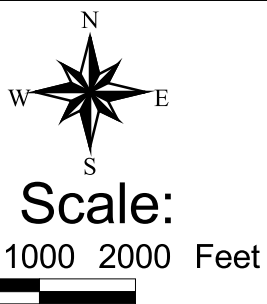


Department of Planning and Land Services
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City of Sumner Evacuation Routes



LEGEND:
 Evacuation Routes
 Volcanic Hazard Zone

