



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000

711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

June 30, 2008

Grays Harbor County Department of Public Services  
Attn: Brian Shea  
Planning and Building Division  
100 West Broadway Avenue, Suite 31  
Montesano, Washington 98663-3614

*SUBJECT: Comments regarding Draft amendments to Grays Harbor County Code 18.06. Proposed Grays Harbor County Critical Areas Ordinance: geological hazards and flood hazards.*

Dear Mr. Shea:

Thank you for providing the opportunity to comment on the April 2008 Draft Grays Harbor County Critical Areas Ordinance. We appreciate the county's effort in drafting its first critical area ordinance.

Ecology has expertise on erosion hazards through its Coastal Monitoring and Analysis Program, as well as regulatory authorities related to managing shorelines and floodplains. Ecology's comments in this letter focus on the geological and flood hazards portions of the county's draft ordinance. Ecology's detailed comments are as follows:

**18.06.060 Maps and Inventories**

We appreciate the acknowledgement and incorporation of mapped inventories for critical areas and emphasis on code language over maps for official designation. However, no maps were provided that indicate general locations of critical areas or county boundaries, including areas within jurisdictions of cities rather than the county. This information would be useful in evaluating whether the county has designated all appropriate critical areas.

**18.06.095 Critical Protection Area Development Standards for Geologically Hazardous Areas.**

**18.06.095 (A)**

The purpose of this section should be to indicate best available science resources used for designating geologically hazardous areas. This draft section lacks current and relevant information for identifying areas prone to a range of geological hazards: erosion,

landslides, earthquakes, and tsunamis. We suggest utilizing the following references as best available science for geologically hazardous areas in Grays Harbor County:

- Geologic Map of the Shelton, Copalis Beach, Westport, Chehalis River, and the southern portion of Forks and Mount Olympus Quadrangles, Washington, Washington Division of Geology and Earth Resources, 1987 digitized in 2000.
- Liquefaction Susceptibility and Site Class Maps for Washington State, by Stephen P. Palmer, Sammantha L. Magsino, Eric L. Bilderback, James L. Poelstra, Derek S. Folger, and Rebecca A. Niggemann, Washington State Department of Natural Resources, Division of Geology and Earth Resources, 2004; Report and associated maps.
- Erosion monitoring and profiles for outer coast beaches, including historic shorelines and contemporary monitoring data and trends, available from Department of Ecology's Coastal Monitoring and Analysis Program at: <http://www.ecy.wa.gov/programs/sea/swces/index.htm>.
- See attached bibliography for other best available science on the Grays Harbor area and related analyses of local and regional erosion trends.
- *Tsunami hazard map of the southern Washington coast—Modeled tsunami inundation from a Cascadia subduction zone earthquake*, by T. J. Walsh, C. G. Caruthers, A. C. Heinitz, E. P. Myers III, A. M. Baptista, G. B. Erdakos, and R. A. Kamphaus. 2000. 12 p. text, 1 pl., scale 1:100,000.
- *Tsunamis on the Pacific coast of Washington State and adjacent areas—A selected, annotated bibliography and directory*, compiled by C. J. Manson and Lee Walkling. 40 p.
- For additional information and best available science discussions on Channel Zone Migration see:
  - Whatcom County Critical Area Ordinance (September 2005): [http://www.co.whatcom.wa.us/pds/shorelines\\_critical\\_areas/workproducts.jsp](http://www.co.whatcom.wa.us/pds/shorelines_critical_areas/workproducts.jsp)  
Also, see on the same website Whatcom County's May 2006 *Best Available Science Record*, an accessible analysis of current scientific information relevant to developing critical area codes.
  - A Framework for Delineating Channel Migration Zones, Ecology Publication 03-06-027, Cygnia Rapp, R.G.; Timothy Abbe, Ph.D., R.G., 2003. Available at: <http://www.ecy.wa.gov/biblio/0306027.html>
  - King County Best Available Science: Chapter 4: CHANNEL MIGRATION ZONES available at: <http://www.metrokc.gov/ddes/cao/PDFs04ExecProp/BAS-Chap4-04.pdf>.  
For entire Best Available Science volume, see: <http://www.metrokc.gov/ddes/cao/>

#### 18.06.095(B)(1)

Slope is only one factor in determining whether an erosion hazard exists. Designated erosion hazards should also incorporate shoreline areas subject to erosion including factors such as geology, channel migration zones, floodways, and coastlines subject to erosion from waves, tides, and storms. The county should use these broader factors to

designate erosion hazard areas. Furthermore, it is not clear how the county intends to evaluate whether an erosion hazard exists. We suggest utilizing the best available science references noted above as well as providing mapping for erosion areas. To evaluate potential new erosion areas, the county could rely on the various factors of erosion as well as technical review by a qualified professional.

The current development standards in this section focus solely on slope erosion. We appreciate the county's emphasis on retaining and managing vegetation and stormwater management practices for steep slopes. As indicated by the best available science above, erosion hazards are not just areas with steep slopes. Development standards for all erosion hazard areas should follow a standard mitigation sequence (avoid, minimize, and then mitigate). In addition, new developments should be planned so they do not require stabilization over the life of the project. For existing structures, one must consider relocation or reconstruction prior to establishing any protection structures. Overall development standards should also consider the following: setbacks based on current and future expected erosion rates, including away from steep slopes; avoiding the need for shoreline structures to protect new development from erosion; not advancing current footprint of structure closer to erosion areas; preference for softer shoreline structures when absolutely necessary for existing structures; protection of coastal vegetation and dunes, and ensuring no-net ecological loss of shoreline functions.

#### **18.06.095(B)(2)**

Landslides are generally designated as "areas potentially subject to the risk of mass movement due to a combination of geologic, topographic, and hydrologic factors", but it is not clear how they will be identified or mapped more specifically. Ecology suggests utilizing best available science based on geological mapping to designate the locations more specifically. In addition, the county could identify a process, such as a site inspection by a qualified geotechnical professional, to verify areas at risk to landslides. The standards suggested by the county such as setbacks and retention of vegetation are generally appropriate for the risk posed by landslides.

For alterations to slopes greater than 33 percent, Ecology suggests clarifying what constitutes an adequate "special engineered study" [see 18.06.095(B)(2)d(i)(II)]. What are the qualifications and professional standards for this study? Is this a study conducted by a professional engineer?

#### **18.06.095(B)(3)**

The seismic hazards section does not specifically indicate which areas in Grays Harbor County might be designated or subject to seismic risks. The sole use of the international building code in section A does not indicate the best available science for determining areas subject to seismic hazards. While these building codes may be appropriate development standards for reducing risk to seismic hazards, see the suggested geological maps referenced above, including tsunami inundation and liquefaction reports for southwest Washington for designating the area subject to these risks. Tsunami and storm surge inundation information should also be referenced under Frequently Flooded areas.

**18.06.100 Critical Protection Area Development Standards for Frequently Flooded Areas.**

It appears that Grays Harbor County is adopting FEMA maps to designate frequently flooded areas. FEMA maps are standard, and required, for floodplain designation. However, a local government can utilize different maps for floodplain identification when the other map (non-FIRM) is more restrictive.

Ecology will need to have the opportunity to review, and approve, the county's definitions prior to adoption. Areas without a Base Flood Elevation, where the development proposed is in excess of 5-acres or 50-lots (whichever is less), will require the applicant to develop a Base Flood Elevation through detailed methodology. Under FEMA definitions, below grade crawlspace construction in a floodplain is considered a basement and therefore prohibited unless the county adopts specific language (not by reference) from FEMA Technical Bulletin 11-01. Adopting this language provides a waiver from this prohibition as long as the project follows the construction standards of the technical bulletin.

While not required under the critical areas ordinance until adoption of a new shoreline master program, Ecology recommends also designating the channel migration zone (CMZ) under frequently flooded areas. To reduce flood hazards under the shoreline master program, a jurisdiction must establish the location of the channel migration zone. For designating the CMZ, please see the best available science references for CMZs referenced under geological hazards above. Another option the county may consider for designation criteria is to use Ecology's definition from state Shoreline Master Program (SMP) Guidelines:

[[http://www.ecy.wa.gov/programs/sea/sma/st\\_guide/jurisdiction/CMZ.html](http://www.ecy.wa.gov/programs/sea/sma/st_guide/jurisdiction/CMZ.html)].

Regulations relating to CMZs are also referenced at this site. For example, the shoreline master program should not allow new development or new uses in shoreline jurisdiction when it would require structural flood hazard reduction measures within the channel migration zone or floodway.<sup>1</sup> The county could require geotechnical reports for developments proposed within CMZs to reduce threats to life and property. Some examples of critical ordinance codes are provided in the King County Critical Area Ordinance, see: <http://www.metrokc.gov/mkcc/Code/29-Title%2021A24-21A26.pdf>

**18.06.130 Provisions for Flood Hazard Reduction in Coastal High Hazard Areas.**

**18.06.130(B)(6)**

Ecology appreciates the county's standard which prohibits man-made alteration of sand dunes. This standard is consistent with protection from coastal hazards, especially flooding, and maintenance of coastal ecological processes.

**18.06.130(B)(7)**

Ecology suggests clarifying why different elevation standards should apply for new manufactured homes at an "existing manufactured home park or subdivision" versus all other types of locations for new manufactured homes. The FIRM designation zones (V1-

---

<sup>1</sup> WAC 173-26-221

30, VE, and V) included for these standards are the same, which indicates the risk of flooding is similar to all structures in this area.

**SMA and Future Consistency with State Regulations**

The county may be planning to adopt a shoreline master program (SMP) that will rely on the Critical Area Ordinance (CAO) for protection of associated wetlands and other critical areas in shoreline jurisdiction. While Ecology's role in the CAO adoption process is advisory, the SMP is a joint document of Ecology and Grays Harbor County, and the SMP must be consistent with Ecology's SMP guidelines.<sup>2</sup> Specifically, Ecology's guidelines state:

Local master programs shall include regulations and mitigation standards ensuring that each permitted development will not cause a net loss of ecological functions of the shoreline; local government shall design and implement such regulations and mitigation standards in a manner consistent with all relevant constitutional and other legal limitations on the regulation of private property. (WAC 173-26-176(8)(b)(i)).

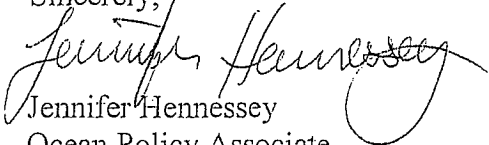
In its current form, the CAO does not meet the "no net loss of ecological functions" requirement because it contains provisions that represent a high level of risk to shoreline resources and wetlands and could cause a net loss of ecological functions. If the county wanted to adopt a Master Program that referenced its CAO, the SMP would need to require stronger, clearer critical area protection measures than those in the current draft CAO. The SMP also requires that channel migration areas are located and development and shoreline modification restrictions apply. Under the SMP channel migration areas are considered critical wildlife and fish habitat<sup>3</sup> as well as an element of flood hazard reduction.<sup>4</sup> Please see Ecology's detailed guidance provided on geologically hazardous areas, frequently flooded areas, and wetlands for mitigation sequence and standards.

In closing, Ecology appreciates Grays Harbor County's effort in drafting its first Critical Area Ordinance. If you need further clarification on these comments or additional references, please contact:

- For flood hazards - Kevin Farrell at (360) 407-7253 or [kfar461@ecy.wa.gov](mailto:kfar461@ecy.wa.gov)
- For geological hazards - Jennifer Hennessey at (360) 407-6595 or [jenh461@ecy.wa.gov](mailto:jenh461@ecy.wa.gov)

We look forward to working with you as this process continues.

Sincerely,



Jennifer Hennessey  
Ocean Policy Associate  
Shorelands and Environmental Assistance Program

<sup>2</sup> WAC 173-26

<sup>3</sup> WAC 201(3)(d)(i)(D), WAC 173-26-221(2)(c)(iv)(A), WAC 173-26-221(2)(c)(iv)(B)

<sup>4</sup> WAC 173-26-221(3)(b), WAC 173-26-221(3)(c)

## Attachment to Ecology's comments on Grays Harbor Draft Critical Areas Ordinance:

### Suggested additional Best Available Science references for geological hazards

- Allan, J.C., and Komar, P.D. 2000. Are ocean wave heights increasing in the eastern North Pacific? *EOS, Transactions American Geophysical Union*, 81 (47), pp. 561, 566-567.
- Allan, J.C., Komar, P.D. 2002. Extreme storms in the Pacific Northwest coast during the 1997-98 El Niño and 1998-99 La Niña. *Journal of Coastal Research*, 18 (1), pp. 175-193.
- Allan, J. C., and Komar, P.D. 2006. Climate controls on US West Coast erosion processes: *Journal of Coastal Research*, 22, pp. 511-529.
- Atwater, B.F. 1992. Geologic evidence for earthquakes during the past 2000 years along the Copalis River, southern coastal Washington. *Journal of Geophysical Research*, 97, 1901-1919.
- Atwater, B.F. 1996. Coastal evidence for great earthquakes in Western Washington, in Rogers, A.M., Walsh, T.J., Kockelman, W.J., and Priest, G.R. (eds.), *Assessing Earthquake Hazards and Reducing Risk in the Pacific Northwest*, 1, U.S. Geological Survey Professional Paper 1560, pp. 77-90
- Buijsman, M.C., Kaminsky, G.M., and Gelfenbaum, G. 2003a. Shoreline change associated with jetty construction, deterioration, and rehabilitation at Grays Harbor, Washington, *Shore & Beach*, 71 (1), pp. 15-22.
- Buijsman, M.C., Sherwood, C.R., Gibbs, A.E., Gelfenbaum, G., Kaminsky, G.M., Ruggiero, P., and Franklin, J. 2003b. Regional sediment budget analysis of the Columbia River littoral cell, USA: Analysis of bathymetric- and topographic-volume change, *U.S. Geological Survey Open-File Report OF 02-281*, 103 p.
- Burch, T.L. and Sherwood, C.R., 1992. Historical Bathymetric Changes Near the Entrance to Grays Harbor, Washington. *Batelle/Marine Sciences Laboratory Sequim, Washington*.
- Byrnes, M.R., Baker, J.L., and Kraus, N.C. 2003. Coastal sediment budget for Grays Harbor, Washington, *Proceedings of Coastal Sediments '03*, East Meets West productions, CD-ROM, 10 p.
- Clague, J.J. 1997. Evidence for large earthquakes at the Cascadia subduction zone, *Reviews of Geophysics*, 35 (4), pp. 439-460.
- Kaminsky, G.M., Buijsman, M.C., Gelfenbaum, G., Ruggiero, P., Jol, H.M., Gibbs, A.E., and Peterson, C.D. 1999a. Synthesizing geological observations and processes-response data for modeling coastal change at management scale, *Proceedings of Coastal Sediments '99*, ASCE, pp. 1660-1675.
- Kaminsky, G.M., Buijsman, M.C., and Ruggiero, P. 2001. Predicting shoreline change at decadal scale in the Pacific Northwest, USA, *Proceedings of the 27th International Conference on Coastal Engineering*, ASCE, pp. 2400-2413.
- Kaminsky, G.M., Ruggiero, P., and Gelfenbaum, G.R. 1998. Monitoring coastal change in southwest Washington and northwest Oregon during the 1997/98 El Niño, *Shore & Beach*, 66 (3), pp. 42-51.
- Kraus, N.C. and H.T. Arden (Editors), *North Jetty Performance and Entrance Navigation Channel Maintenance, Grays Harbor, Washington, Volume I: Main Text*. ERDC/CHL TR-03-12, Coastal and Hydraulics Laboratory, U.S. Army Engineer Research and Development Center, Vicksburg, MS.

- McCrary, P.A., Foster, D.S., Danforth, W.W., and Hamer, M.R. 2002. Crustal Deformation at the Leading Edge of the Oregon Coast Range Block, Offshore Washington (Columbia River to Hoh River), *U.S. Geological Survey Professional Paper 1661-A*, 47 p.
- Peterson, C.D., Gelfenbaum, G., Jol, H.R., Phipps, J.B., Reckendorf, F., Twichell, D.C., Vanderburg, S., and Woxell, L. 1999. Great earthquakes, abundant sand, and high wave energy in the Columbia cell, USA, *Proceedings of Coastal Sediments '99*, ASCE, pp. 1676-1691.
- Peterson, C.D., Doyle, D.L., and Barnett, E.T. 2000. Coastal flooding and beach retreat from coseismic subsidence in the central Cascadia margin, USA, *Environmental & Engineering Geoscience*, VI (3), pp. 255-269.
- Ruggiero, P., Eshleman, J., Kingsley, E., Kaminsky, G., Thompson, D.M., Voigt, B., Kaminsky, G., and Gelfenbaum, G. 2007. Beach monitoring in the Columbia River littoral cell: 1997-2005, Report: *U. S. Geological Survey Data Series 260*, 88 p. <http://pubs.usgs.gov/ds/2007/260/>
- Ruggiero, P., Gelfenbaum, G., Sherwood, C.R., Lacy, J., and Buijsman, M.C. 2003b. Linking nearshore processes and morphology measurements to understand large scale coastal change, *Proceedings of Coastal Sediments '03*, ASCE, East Meets West productions, CD-ROM, 13 p.
- Ruggiero, P., Kaminsky, G.M., Gelfenbaum, G., and Voigt, B. 2005. Seasonal to interannual morphodynamic variability along a high-energy dissipative littoral cell, *Journal of Coastal Research*, 21 (3), pp. 553-578.
- Ruggiero, P., Kaminsky, G.M., Komar, P.D., and McDougal, W.G. 1997. Extreme waves and coastal erosion in the Pacific Northwest, *Proceedings of Waves '97*, ASCE, pp. 947-961.
- Twichell, D.C., and Cross, V.A. 2001. Holocene evolution of the Southern Washington and Northern Oregon shelf and coast: Geologic discussion and GIS data release. *U.S. Geological Survey Open-File Report 01-076*, 28 p. (with CD).