



LOW-IMPACT LIVING ON COASTAL BLUFFS

Understanding how to steward your property on a marine bluff can make the difference between increasing bluff instability and maintaining a stable slope.

Marine bluffs are dynamic landforms that are a critical part of the Puget Sound ecosystem. They may appear to be unchanging and stable, but in fact many bluffs naturally erode over time, losing sediment and vegetation while feeding the beaches and marine environment below. If you are a homeowner who lives near a marine bluff, it is critical to understand the processes at work and to become a well-informed steward of your land so you reduce the risk of causing landslides on your property.

Living on the waterfront involves amazing views and great responsibility. The following guidance offers a starting point for a better understanding of marine shoreline stewardship.

WHAT YOU NEED TO KNOW TO PROTECT YOUR SHORELINE PROPERTY

Most marine shorelines experience the ongoing natural process of erosion. A certain amount of coastal change over time should be anticipated and expected. You may observe seasonal beach surface or vegetation changes, and occasional landslides that deposit sediment, trees or other plants downslope. These natural processes provide the sediment that builds our beautiful beaches along the Puget Sound.

Unless a home is at risk or a sudden change occurs involving rapid, severe erosion or new drainage problems, these gradual changes are typical and should not be cause for alarm. The best way to live with a dynamic shoreline is always to site all structures well away from the water's edge so there is room for change.

Another important concept for shoreline living is to respect the relationship between water, vegetation, and geology. Coastal landforms often include layers of different sediments. There may be permeable sediments like sand and gravel located above impermeable layers of clay, silt, or rock. Rainwater or groundwater drains through the permeable layers until it hits clay or an impervious hardpan layer and is forced to travel out towards the face of the bluff. This weakens the sediment above and can accelerate erosion or contribute to landslides. Trees and shrubs play a critical role by helping to intercept water and to stabilize slopes with their roots.

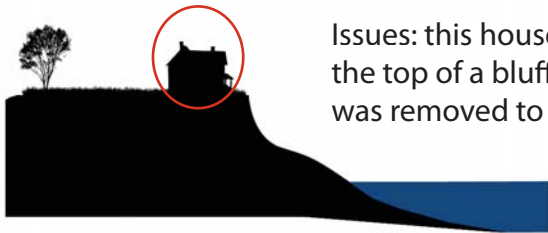
Waterfront property management activities related to water and vegetation are directly connected to slope stability. They should be a priority so you don't mistakenly contribute to shoreline instability. Start by learning about the geology and history of your property. Has there been a history of slides? This often indicates a higher risk of future slides. The Washington State Department of Ecology has an excellent website about Puget Sound coastal bluffs. Visit their website to learn more at: <http://www.ecy.wa.gov/programs/sea/landslides/about/about.html>



TIPS FOR LOW-IMPACT LIVING ON COASTAL BLUFFS

- **Exceed all building setback requirements** related to shorelines and steep slopes. Understand setback requirements to be the *absolute minimum* distance to consider when building a structure. The farther back your structures are located from a bluff or shoreline, the less vulnerable they will be as the bluff erodes. Unfortunately, engineered responses to shoreline erosion are far more stressful, expensive, and temporary than avoiding the need for anything at all, which can be achieved simply with careful planning. Seek professional guidance from geotechnical engineers and geologists before building.
 - **Keep all native vegetation around slopes,** and carefully replace invasive weeds with deep-rooted native plants that will help to stabilize your slope. Trees and shrubs provide a critical service by decreasing erosion while slowing, intercepting, and using rainwater. Without vegetation, slopes are significantly more vulnerable to erosion. Before removing trees, consult a professional arborist for options on how to prune trees for attractive views. Also, review TAM 18 (Managing Trees for Views) for additional tips on tree care. If you believe you have a hazard tree, consult a professional before removing it. Check with the County before removing any shoreline plants.
 - **Make stormwater management a priority.** Retain as much vegetation on your property as possible (trees and shrubs, not lawns), as it remains the cheapest and most effective form of stormwater management available. Next, keep uncontrolled runoff away from steep slopes by managing runoff with a professionally-designed drainage system. Minimize the impacts of runoff caused by your structures and other impervious surfaces (areas where water can't soak into the ground, such as drive-
- ways, parking areas, and compacted soils or lawns). Collect this water and convey it away from steep slopes or to an outlet above the beach via a well-designed drain system. Use a tightline to carry water down slopes (select a strong, closed pipe if you can't monitor it easily; thin, corrugated drainage pipe is prone to leaks). If possible, use a single length of pipe to minimize the risk of leaks. Schedule 40 PVC or other strong pipe is preferred, and it should be securely anchored. Hire a professional to design and install the system. If the pipe outlets at the beach, a Hydraulic Project Approval (HPA) permit from WDFW may be required. Use an energy diffuser at the pipe outlet to decrease the erosive energy of the water. Without this, you risk eroding the toe of the slope and increasing risk of bluff failure in a new way.
- **Keep native vegetation around your whole property.** As mentioned, trees and shrubs will intercept and manage stormwater for you, particularly evergreen species. Trees and shrubs are much more effective than lawn, which functions somewhat like pavement during storms. Preserving multi-storied vegetation throughout your property decreases runoff and drainage problems; removing it simply generates more water to manage in order to protect your bluff or slopes.
 - **Manage shallow groundwater if you see new problems or changes** such as seeps or excess water ponding in your yard. Sometimes shallow groundwater flowing a few feet below the surface can be intercepted with a trench or French drain, collected in a pipe, and conveyed to a safer outlet point at the base of the slope (again, outlets impacting a beach may need a permit). Designing and installing such systems should be done with professional guidance.

- Most importantly, consistent maintenance and inspection of all drainage systems will be critical for keeping your property safe.
- **Avoid irrigating landscapes on bluffs** (temporary and very limited watering of new landscapes during the peak of summer *can be done with caution*). The basic goal: minimize the amount of water you add into the soil between your home and the edge of a bluff.
 - **Never dump debris**, yard waste, grass clippings, or fill material on a slope. These materials can soak up water and contribute to larger slides.
 - **Don't cut into or alter the bottom (toe) of your slope.**
 - **Regularly inspect your property** for signs of erosion and slide potential. Even if there hasn't been a slide recently, it doesn't mean there is absolutely no risk. Slopes and bluffs are especially at risk during and after heavy rainfall. Visit the WA Department of Ecology webpage, "Puget Sound Landslides" for more on what to look for: <http://www.ecy.wa.gov/programs/sea/landslides/signs/signs.html>.
 - **Never hesitate to call for professional help** if you see signs of bluff instability that put your home at risk!



Issues: this house is located too close to the top of a bluff. Almost all vegetation was removed to create a view.

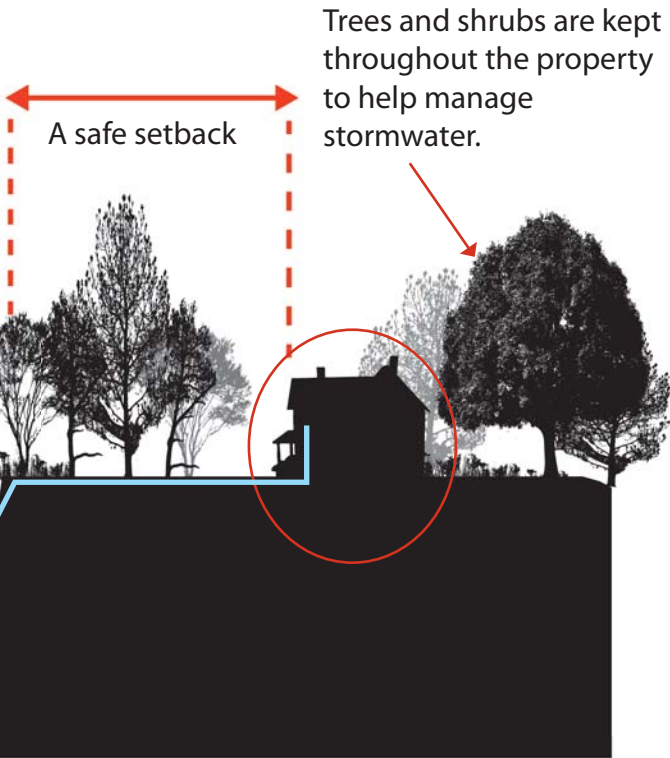
HIGH RISK DEVELOPMENT

SMART DEVELOPMENT

Waterfront trees and shrubs remain in place and are pruned for views.

Gutters are tightlined with a carefully designed system that outlets water at the toe of the slope. (If outlets are on a beach, a permit may be required.)

Vegetation is protected on the slope.



PERMITS

Simple management projects on individual residential properties generally do not require permits, but it is critical to check local regulations before you proceed. Review the Mason County Critical Areas Ordinance to understand any permits or restrictions regarding work in shoreline buffer areas. Impacts to wildlife habitat may be regulated if endangered species will be impacted. Check with the local planning department to make sure you understand the rules *before* you start work on your property.

Work that occurs in state waters requires an HPA (Hydraulics Project Approval) and this includes shoreline bulkheads, placement of drainage outfalls below the ordinary high water line, or beach modification. For example, tightlined gutters that outlet on a beach may require an HPA permit from WDFW.

RESOURCES

Washington State Department of Ecology (WA DOE) has excellent online information about landslides and land management to minimize slide risk. Visit: <http://www.ecy.wa.gov/programs/sea/landslides/about/about.html>

Washington State Department of Natural Resources, "Landslides" webpage:
<http://www.dnr.wa.gov/ResearchScience/Topics/GeologicHazardsMapping/Pages/landslides.aspx>

Mason County keeps a general list of Geotechnical specialists and consultants available on its website.

PUBLICATIONS (Available in print or online at the WA DOE website above)

Managing Drainage on Coastal Bluffs, Ecology publication # 95-107 (print version titled: "Surface Water and Groundwater on Coastal Bluffs: A Guide for Puget Sound Property Owners") <http://www.ecy.wa.gov/programs/sea/pubs/95-107/intro.html>

Slope Stabilization and Erosion Control, Ecology publication #93-30 (print version titled: "Slope Stabilization and Erosion Control Using Vegetation: A Guide for Puget Sound Property Owners")
<http://www.ecy.wa.gov/programs/sea/pubs/93-30/index.html>

Managing Vegetation on Coastal Slopes, Ecology publication # 93-31
(print version titled: "Vegetation Management: A Guide for Puget Sound Bluff Property Owners")
<http://www.ecy.wa.gov/programs/sea/pubs/93-31/intro.html>