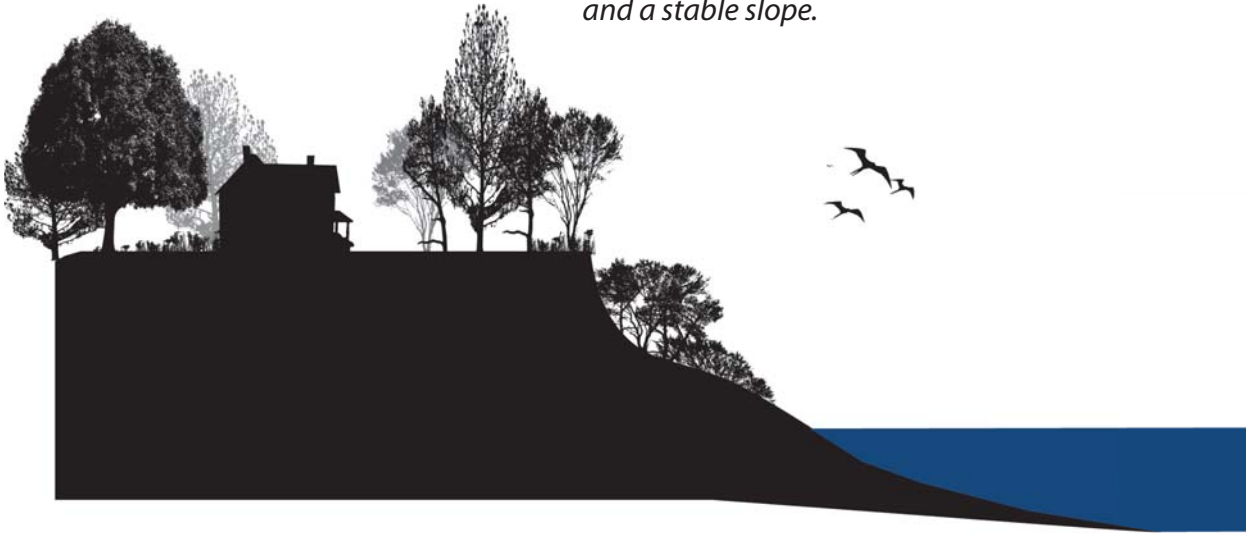




LOW-IMPACT LIVING ON COASTAL BLUFFS

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



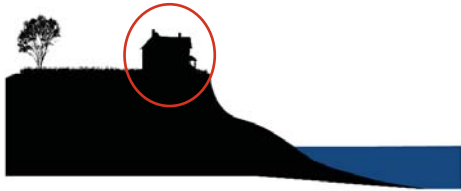
Marine bluffs are ever-changing landscapes that form part of the dynamic Puget Sound ecosystem. They may appear to be unchanging and stable, but in fact most bluffs naturally erode, losing soil and vegetation over time, feeding the marine environment below, and playing a vital role in the ecosystem of Puget Sound. If you are a landowner who lives near steep marine bluffs, it is critical to understand the processes at work and to become a knowledgeable steward of your land so that you reduce your risk of causing landslides on your property.

HOW CAN I PROTECT MY SHORELINE PROPERTY?

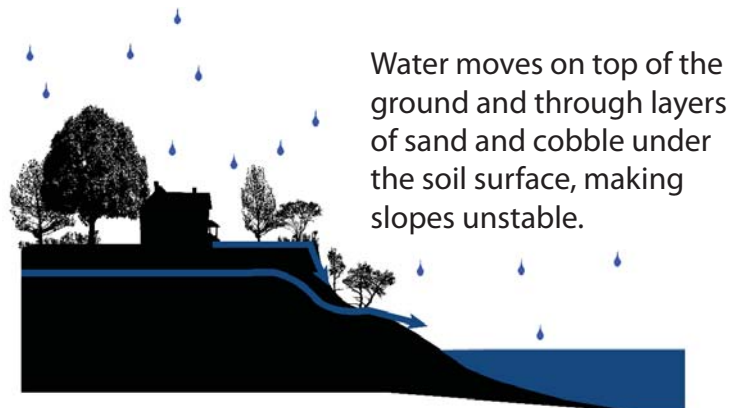
The following basic steps provide a basic starting point for thinking about marine shoreline stewardship. Living on the waterfront comes with amazing views and also with great responsibility. Landslides and bluff failures on Puget Sound are natural processes and occur for a number of reasons. A major cause of many slides is water moving through the soil. The geology of marine shorelines often includes layers of permeable sands and gravels above impermeable layers of clay/silt or rock. After water drains through the permeable layers, it hits clay or hardpan and is forced to travel out towards the face of the bluff. This can contribute to slides. Gravity can also cause slopes to slide, as can heavy rainstorms that saturate soils, wave activity, and most importantly – land management activities by homeowners on bluffs. As a property owner living on a coastal bluff, water management should be a priority so that you don't mistakenly contribute to or accelerate the erosion process along your shoreline.

Learn as much as possible about how to manage your marine shoreline in order to protect your investment and the landscape around you. 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>

DANGEROUS DEVELOPMENT



Dangers: House perched on edge of bluff, all trees and vegetation removed.



Water moves on top of the ground and through layers of sand and cobble under the soil surface, making slopes unstable.

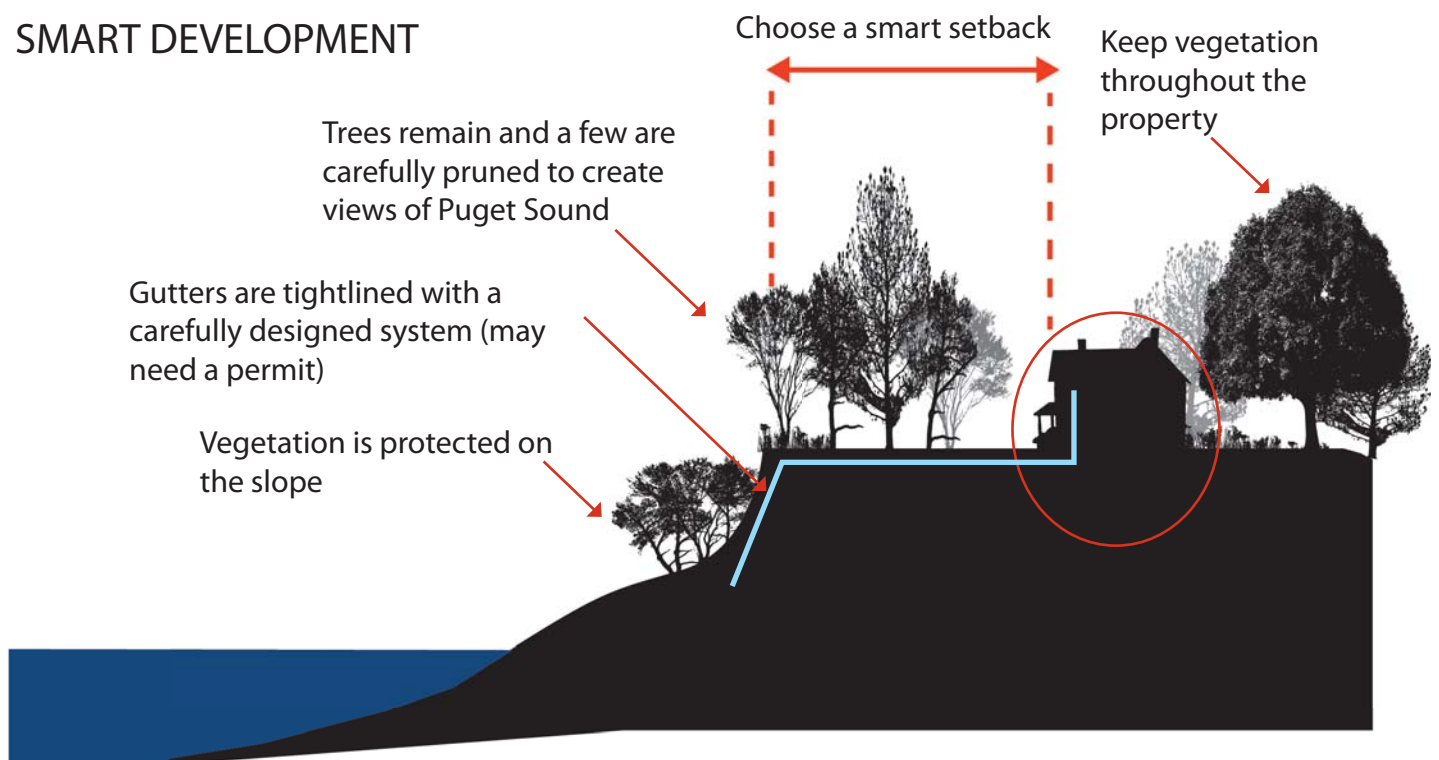
TIPS FOR LOW-IMPACT LIVING ON COASTAL BLUFFS

- **Follow all setback guidance** for locating buildings near the top or bottom of steep slopes on your property. Understand local setback requirements to be the absolute minimum distance you should consider for building. The farther back your buildings are located from the bluff, the less at risk they are if part of your bluff fails. Seek professional guidance from geotechnical engineers and geologists before constructing new buildings.
- **Keep all native vegetation around slopes**, and carefully replace invasive weeds with deep-rooted native plants that will help to stabilize your slope. Preserve bluff vegetation - above, on, and below slopes. Trees and other vegetation provide a critical service by anchoring soil to the slope, decreasing erosion, and intercepting and using rainwater as it falls. Without vegetation your bluff is much more vulnerable to failure. Instead of removing trees, follow techniques for pruning them to give you views of the water. Consult a professional arborist for guidance on how best to manage trees on your bluff for views. Also review TAM 18 for additional tips on tree care. If you believe you have a hazard tree, consult a professional before removing it. Inquire with the County before removing anything.
- **Make stormwater management your priority.** Keep uncontrolled runoff away from steep slopes. Excess water can collect and move under the soil surface, emerging on the bluff face and causing sections to slide. Collect runoff from roofs and impervious surfaces (areas where water can't soak into the ground, such as driveways, parking areas, and compacted soils or lawns) and convey it away from steep slopes or to the beach in carefully designed pipe systems that must be anchored to the slope face. Use pipes to carry water to the beach in a tightline (choose a strong, closed pipe – thin, corrugated drainage pipe is prone to failure and leaks). Use a single continuous length of pipe if at all possible, to avoid the risk of leaks. Schedule 40 PVC or other strong pipe is preferred, and it must be securely anchored to the slope. A professional can design this system appropriately so there are no unanticipated impacts. Depending on the design, an HPA permit may be required. Be sure to use an energy diffuser at the bottom of the pipe to decrease the 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 as much native vegetation around your whole property as possible.** Upland trees and shrubs will also help to intercept and manage stormwater for you, particularly evergreen trees. Trees and shrubs are much more effective than lawn, which functions like pavement when it comes to stormwater. Preserving vegetation helps to decrease stormwater runoff and drainage problems; removing it creates more runoff - and that means more water to manage in order to protect your bluff.



- **Manage shallow groundwater if you observe problems or changes** such as seeps or excess ponding on the surface. 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 (outlets may need a permit). Designing and installing such systems should be done carefully and with professional guidance. They need careful maintenance and regular inspection to keep your bluff safe.
- **Avoid irrigating landscapes on bluffs** (temporary and very limited watering of new landscapes during the peak of summer *may* be okay). You want to minimize the amount of water soaking into the soil between your home and the edge of a bluff.
- **Don't dump debris**, yard waste, grass clippings, or fill material on a steep slope. The accumulation of these materials can soak up water and contribute to larger slides.
- **Don't cut into or alter the toe of 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 that a failure can't happen – bluffs are especially at risk when heavy rains occur. Visit the WA DOE webpage, "Signs of Movement" for guidance on what to look for: <http://www.ecy.wa.gov/programs/sea/landslides/signs/signs.html>. Call for professional help if you see signs of bluff failure that put your home at risk.

SMART DEVELOPMENT





PERMITS

Simple stormwater management projects on individual residential properties generally do not require permits, but it is important 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

The Washington 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>

WA 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 in online format 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>



Mason Conservation District

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