



ENVIRONMENTAL EDUCATION
ASSESSMENT & MANAGEMENT

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LIVING NEAR THE EDGE OF PUGET SOUND

Prevent Tomorrow's Crisis Today

If you are considering building on a bluff along the Puget Sound shoreline (or on a low-bank lot backed by a steep slope), minimizing clearing & grading and preserving existing native soils & plant communities during development is the least expensive and most effective way to forestall future stormwater, erosion and shallow landslide problems on your new property. Preserving natural drainage systems will help reduce the need for & expense of designing and implementing complex stormwater management measures. You will also improve water quality, preserve wildlife & salmon habitat, and maintain the beauty of the region.

If your bluff property has already been developed your new home may have an inadequate setback, stormwater runoff problems, infestations of invasive plants, topped trees, and extensive lawns. You may be inheriting problems from past poor management practices. Lawns which extend to the bluff edge can contribute to stormwater runoff & erosion problems and destabilization of marginal slopes. A combination of adopting better management practices, structural drainage measures, and vegetation enhancement may help to improve conditions.

Whether you are developing a new home or improving an existing site, using native plant species to create a distinctively 'Northwest' residential landscape can help to reduce stormwater problems & erosion and minimize conditions which may trigger landslides.

Plantings of low-growing native species along the bluff edge (known as shoreline buffers) - about 15-30 feet in width - and reducing the extent of lawns are two of the simplest and most effective steps that shoreline owners can take to protect their property and help to keep the Puget Sound area green.

The educational resources & references provided here will help you learn about your property and aid in development of a management strategy best suited to your particular situation and site conditions.

<http://www.greenbeltconsulting.com/articles/shorelineManagement.html>

GETTING EDUCATED

Before you alter the shoreline, familiarize yourself with the characteristics of the land, shoreline processes, geology, hydrology, topography, and landscape vegetation. Understand the applicable regulations. Get advice on how to proceed. The resources below will help get you started.

RESEARCHING YOUR SITE

- Washington State Coastal Atlas – Washington Department of Ecology
<https://fortress.wa.gov/ecy/coastalatlas/>
- Washington Shoreline Aerial Photo Viewer – Washington Department of Ecology
<https://fortress.wa.gov/ecy/shorephotoviewer/>
- Landslide Hazard Maps – Washington Department of Natural Resources (DNR)
<https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/geologic-hazard-maps>
- Geologic Information Portal – Washington Department of Natural Resources (DNR)
<https://www.dnr.wa.gov/geologyportal>
- Washington LIDAR Portal – Washington Department of Natural Resources (DNR)
<http://lidarportal.dnr.wa.gov/#47.98974:-122.37716:16>
- Area Maps and Property Information – Municipal & County Development Services

HELPFUL WEBSITES

- Dept. of Natural Resources, Div. of Geology & Earth Resources - Learning about Landslides
http://file.dnr.wa.gov/publications/ger_homeowners_guide_landslides.pdf
- Shore Friendly – Washington Dept. of Fish & Wildlife
<http://www.shorefriendly.org/>
- Shore Stewards – WSU Extension
<http://shorestewards.cw.wsu.edu/>
- Washington State Dept. of Ecology – Coastal Atlas
<https://fortress.wa.gov/ecy/coastalatlas/>

- Washington State Dept. of Ecology – Puget Sound Landslides

<https://ecology.wa.gov/Water-Shorelines/Shoreline-coastal-management/Hazards/Puget-Sound-landslides>

- U.S. Geological Survey

<http://landslides.usgs.gov/>

- Dept. of Natural Resources (DNR), Div. of Geology & Earth Resources- LIDAR Portal

<http://lidarportal.dnr.wa.gov/#47.98974:-122.37716:16>

HELPFUL PUBLICATIONS

- Surface Water & Groundwater on Coastal Bluffs: A Guide for Puget Sound Property Owners

<https://fortress.wa.gov/ecy/publications/documents/95107.pdf>

- Vegetation Management: A Guide for Puget Sound Bluff Property Owners

<https://fortress.wa.gov/ecy/publications/documents/9331.pdf>

- Your Marine Waterfront

<http://wdfw.wa.gov/publications/01791/>

- Shore Stewards Guide for Shoreline living

[WSU Shore Stewards Guide for Shoreline Living](#)

- Marine Shoreline Design Guidelines

<http://wdfw.wa.gov/conservation/habitat/planning/ahg/>

WISE DEVELOPMENT PRACTICES

- [Low Impact Development Techniques for Wooded Shoreline Home Sites](#)

- [Preserving Native Vegetation to Reduce Stormwater Impacts](#)

RESOURCES FOR USE OF VEGETATION FOR STORMWATER, EROSION, AND SHALLOW LANDSLIDE CONTROL

- Washington Native Plant Society

<https://www.wnps.org/landscaping/index.html>

- King County – Plant a Beautiful & Natural Shoreline

<https://green2.kingcounty.gov/gonative/Article.aspx?Act=view&ArticleID=28>

- Resource Postings from “*Landscapes on the Edge*”, a 2-day workshop convened by the UW Botanic Gardens, November 2016

<https://botanicgardens.uw.edu/about/blog/2016/09/22/landscapes-on-the-edge/>

- Educational postings on the Greenbelt Consulting Website

www.greenbeltconsulting.com

[Restoring Native Vegetation on Coastal Bluffs in Puget Sound – An Overview](#)
[Slope Revegetation: A Checklist of Factors to Consider](#)
[Value, Benefits and Limitations of Vegetation in Reducing Erosion](#)

[“Bio-structural” Erosion Control: Incorporating Vegetation In Engineering Designs To Protect Puget Sound Shorelines](#)

GET ADVICE

- Local Planning and Public Works Offices
- County Emergency Management Division
- Engineering Geologist
- Geotechnical Engineer/ Civil Engineer
- Forester, Restoration Ecologist, or Arborist

A FEW DOS AND DON'TS TO HELP PROTECT YOUR PROPERTY

DO

- research the property characteristics (geology, soils, vegetation, development history)

- identify past & present erosion and slope stability issues
- determine potential erosion & slope failure types & causes
- get advice from a licensed geologist or engineering geologist
- get advice from a vegetation management specialist (forester, restoration ecologist, arborist)
- leave a safe setback from steep slopes / bluffs
- maintain adequate vegetated buffers between your house and the bluff
- maintain and improve vegetation on or near bluffs, especially deep-rooted trees
- exercise good judgment concerning view management and prune trees properly
- plant effective native trees and shrubs on the slope for multiple canopy-height layers
- minimize extensive lawn areas
- manage stormwater to reduce drainage issues & surface erosion – avoid discharge onto slope
- reduce soil compaction and surface water ponding
- install and maintain effective stormwater collection, conveyance, and discharge systems
- retain fallen trees & drift logs on the beach to protect the shore from wave attack
- consider ‘soft shore’ alternatives to conventional hard shoreline armoring structures
- DO BE PROACTIVE! PREVENTING PROBLEMS IS BETTER THAN ‘FIXING’ THEM.

AN OUNCE OF PREVENTION IS WORTH A TON OF STRUCTURAL REPAIRS

DON'T

- Don't clear & grade extensively
- Don't install large expanses of lawn
- Don't damage bluff-top trees during development
- Don't use automatic sprinkler systems, or install French drains and septic system drain fields near the bluff edge.

- Don't install “rain gardens” or other inappropriate Low Impact Development (LID) Measures near a steep slope which infiltrate stormwater into bluff soils
- Don't top trees on the bluff top or slope
- Don't dump grass clippings, leaves, or other landscaping debris on the slope
- Don't remove stumps or roots of a tree from the slope if you must cut a tree on the slope
- Don't remove vegetation from the slope (except non-native invasive species such as Himalayan blackberry, Scotch broom, English ivy, etc.)
- Don't let English ivy or Himalayan blackberry get out of control - they don't stabilize the soil well, and they hide signs that can warn you of an impending slide
- Don't cut into the toe of the slope
- Don't ignore signs of erosion, slope instability, or slide hazards
- Don't build bulkheads, revetments, or sea walls unless absolutely necessary to protect your home

DON'T CREATE TOMORROW'S CRISIS TODAY

Coastal Property Characterization & Drainage Checklist

Because of the impact to coastal slopes, it is important that you understand the specific slope characteristics, hydrogeology, vegetation conditions, coastal geomorphology, shore processes, and drainage conditions influencing your site. Become familiar with the potential erosion and slope instability processes effecting your area. Identify sources contributing water into and onto your slope.

If you can identify the proximate sources of erosion and slope instability, as well as surficial and groundwater sources, you can then take steps to control some of these sources.

The checklist below can help you organize the observation of surface water and groundwater conditions on your property.

Slope Characteristics

Slope Height:

- less than 10 feet
- 10 to 50 feet
- greater than 50 feet

Slope Angle:

___ degrees (see [“Relationship between degrees, percent slope, and ratio to express slope gradient”](#))

Slope Vegetation:

- bare soil areas
- vegetation cut, removed or cleared
- topped trees
- mature vegetation (trees, shrubs and ground cover)
- water loving plants (horsetail, skunk cabbage, willow, salmonberry, etc.)
- Curved Trees
- Presence of invasive plant species

Slope Geology:

- sand or sand and gravel (glacial outwash)
- hardpan (glacial till)
- fine sediments (glacial drift)
- inter-bedded silt/clay
- rock

Erosion Indicators:

- indications of sheet-flow
- rills & gullies

Landslide Indicators:

- recent slide
- bowl-shaped slope configuration
- hummocky ground
- leaning trees or bowed trunks
- areas of low brush (blackberry)/bare areas

Surface Water/Storm Water Flows

- Sheet flow from:
 - driveway
 - parking area
 - lawn
 - off site
- Roof downspouts empty:
 - onto ground
 - into buried pipe
 - other
- Outlet for downspout pipe:
 - into soil or on surface of slope
 - tight-lined down slope
 - unknown (test with hose)
- Other pipe/culvert
 - discharges:
 - onto slope
 - tight-lined down slope
 - other
- Areas where surface water disappears into ground?
 - Yes
 - No
- Seepage/water noticed along beach access path?
 - Yes
 - No

Coastal Zone Atlas:

- landslide area
- unstable
- intermediate stability
- stable

Beach Access:

- stairs
- wide path/road
- tram
- narrow path

Site Groundwater

Groundwater Observation:

- seepage on slope: crest, face, or toe?
- wet soil zone: crest, face, or toe?
- vegetation indications of wet soil: crest, face, or toe?

Location of observed groundwater:

- Near-surface soil seepage 1 to 3 feet below crest of slope
- Groundwater seepage 5 to 10 feet below crest of slope
- Groundwater seepage on slope face more than 10 feet below crest or at slope toe

Surface Water Features:

- stream channel
- ponds/wetlands - how far from crest of slope? _____
- flows down/over the slope
- tightline down slope
- erosion evidence: rills, gulleys, etc.

Other Site Features

- Septic system
 - between house and slope
 - behind house
 - N/A
- Irrigation system
 - any leaks
 - summer use only
 - control valve off and lines drained in winter
- Downspout infiltration system
 - between house and slope
 - behind house
 - not applicable
- Landscape yard drains
 - tight-line down slope
 - discharge onto slope
 - unknown (test to find out)
- Landscape pools/ponds/fountains
 - between house and slope
 - behind house
 - not applicable
- Hot tub(s)/swimming pool(s)
 - between house and slope
 - behind house
 - not applicable
- Where are tub/pool/pond/fountains drained?
 - Into a tight-line drainage system
 - onto slope
 - below slope
 - onto ground
 - unknown (test to find out)

Distance of structures & other at-risk infrastructure features from slope crest (e.g. house, septic field, etc)

NOTE: This material has been updated, adapted, & substantively revised from outreach material originally developed by the Snohomish County Marine Resources Committee --

<http://www.snocomrc.org/projects/coastal-landowners/>

and the Washington Department of Ecology –

<https://ecology.wa.gov/About-us/Get-to-know-us/Our-Programs/Shorelands-Environmental-Assistance>