

COASTAL EROSION

Coastal erosion on Lake Superior is a natural process. Erosion can become problematic when it threatens property and coastal habitats.



Why is my shoreline eroding?

All coastal shorelines are susceptible to erosion, even bedrock. Coastal processes including waves, storms, and water levels affect erosion. Erosion is more severe in areas exposed to higher wave energy and lower in sheltered coves or bays. Geology also influences the speed of coastal erosion.

Land management also plays a role. Vegetation loss and unstable soils make shorelines more susceptible to erosion. Strategic management of water runoff and vegetation can prevent damage to your property.

It is important to monitor erosion happening on your property. Take photos and measure the distance between your shoreline and a permanent feature, like a building. This information is useful to share with experts on a site visit.



Who can I contact for help?

Property owners experiencing coastal erosion are encouraged to seek help. Contact your local Department of Natural Resources (DNR) area hydrologist or Soil & Water Conservation District (SWCD) for a site visit.

DNR area hydrologists are responsible for shoreland management and permitting work in or next to our lakes and streams. Your SWCD can provide guidance on land management strategies.

Contact your local DNR or SWCD office:

- **DNR Area Hydrologists** (mndnr.gov/waters)
- <u>Cook County SWCD</u> (cookswcd.org)
- Lake County SWCD (lakecountyswcd.org)
- <u>South St. Louis County SWCD</u> (southstlouisswcd.org)





These tips have been provided as general information for addressing coastal erosion. This handout is provided for information purposes only. Minnesota's Lake Superior Coastal Program does not accept any liability to any person for the use of the information or advice contained in herein.

CONSIDER YOUR OPTIONS

Property owners dealing with shoreline erosion have options. Research your options and consult with experts.



Is a project needed?

Undertaking a shoreline project is a big decision for property owners. Not all properties need a shoreline project. Some erosion problems can be managed by incorporating soil and water best management practices or BMPs. Consult with experts, including the DNR and your SWCD to help determine if a project is needed.

For some properties, planting vegetation is an appropriate project. For other sites, the shoreline will have to be stabilized or armored. Most shoreline projects require the assistance of a coastal professional to be successful.

GREEN TO GRAY

Most shoreline projects incorporate green and gray elements into the design. Many projects fall along a green to gray spectrum. Projects that rely on green elements are called nature-based or living shorelines. Projects that use only gray elements are called hardened or armored shorelines. For most of Lake Superior shorelines, a hybrid or combination of green and gray elements is suitable.

Nature-based projects may be more resilient to changing lake levels and coastal storms.

These projects can also create habitat, increase water infiltration and provide aesthetic benefits. Hardened shorelines are appropriate for areas where the wave energy is higher. Hardened shorelines can address severe erosion problems or threats to structures.



How much will it cost?

Soil or water BMPs can be very cost-effective strategies. Changing your land management has little to no cost. Many projects to redirect water from your bluff or bank are also inexpensive. Many BMPs can be do-it-yourself projects.

If a shoreline project is needed, costs vary widely based on the design. Native plant projects can cost as little as \$4 per foot; while seawalls can cost as much as \$5,000 per foot. Costs increase with project complexity. Projects that use nature-based designs often cost less than hardened shorelines.

GREEN or nature-based elements



- Native plants
- Coir logs
- Geotextiles

GRAY or hardened elements

RocksConcrete

SHORELINE PROTECTION

There are multiple types of projects used to protect coastal shorelines. This list highlights some of the designs used around the Great Lakes along the green to gray scale. These designs are not suitable for all sites.

GREEN

Lake Buffer

A border of native vegetation along the lakeshore. Scale: Private landowner/residential to municipal/industrial (\$\$ - \$\$\$)



Marsh or Rock Sill

A low-profile stone structure that protects a wetland or bank.

Scale: Private landowner/residential to municipal/industrial (\$\$\$ - \$\$\$\$)



Credit: NOAA Habitat Blueprint

Hybrid Shorelines

Nature-based designs that incorporate native plants and rocks.

Scale: Private landowner/residential to municipal/industrial (\$\$\$ - \$\$\$\$)



Revetment (armor stone, riprap)

Use of armor or angular stone along the toe or base of the shoreline slope. Scale: Private landowner/residential to municipal/industrial (\$\$\$ - \$\$\$\$)



Dune Stabilization

Revegetation and sloping of coastal sand dunes. Scale: Private landowner/residential to municipal/industrial (\$\$\$ - \$\$\$\$)



Bluff Stabilization

Stabilization of the slope of the lake bank or bluff through grading and vegetation. Scale: Private landowner/residential to municipal/industrial (\$\$\$ - \$\$\$\$)



Credit: Concordia University

Breakwater or Breakwall

Stone or concrete structure built in the water away from the shore to break wave action. Scale: Municipal/industrial (\$\$\$ - \$\$\$\$)



Seawall (lakewall)

GRAY

Concrete or stone wall at the water line to reflect waves.

Scale: Private landowner/residential to municipal/industrial (\$\$\$\$)





WHERE TO START

Take a top-down approach to manage the water and soil on your property. Start with managing the water and soil closest to your home or building and work your way down to the water edge.

Speak with your DNR hydrologist or SWCD staff.

They can advise you on land management strategies for protecting your shoreline. They can advise you on whether a shoreline project is needed.

How can I protect any development?

It is important to keep buildings and other development back from the water.

- Maintain a **large setback** or distance between structures and the lake (e.g., 100 200 ft).
- **Relocate any structures or septic systems** away from the bluff or bank.
- Reduce the impact of any development by incorporating low impact or nature-based designs.

What can I do to manage water and protect soils?

There are many steps you can take to manage water and soils on your property.

- Retain a **buffer of native vegetation** along the shoreline. Do not cut down or remove trees, shrubs and plants near the bank or bluff edge.
- Redirect water drainage away from your bluff or bank. This includes water from your roof downspouts and driveway.
- Use soil and water BMPs such as rain barrels and planting native vegetation.

Where do I find more information?

These are just some of the resources that can help with understanding coastal processes, soil and water BMPs, and shoreline protection.

- <u>DNR Landscaping with Native Plants</u> (mndnr.gov/gardens/nativeplants)
- <u>DNR Restore Your Shore</u> (mndnr.gov/rys)
- DNR Shoreland Management Program (mndnr.gov/shorelandmgmt)
- Living on the Coast (publications.aqua.wisc.edu)
- <u>Living Shorelines Academy</u> (livingshorelinesacademy.org)
- <u>Minnesota Stormwater Manual</u> (stormwater.pca.state.mn.us)
- <u>Systems Approach to Geomorphic Engineering</u> (sagecoast.org)
- <u>University of Minnesota Extension Shoreland</u>
 <u>Properties</u> (extension.umn.edu/lakes-and-wetlands/shoreland-properties)

This document is available in alternative formats to individuals with disabilities by contacting info.dnr@state.mn.us, 651-296-6157. For TTY/TDD communication contact us through the Minnesota Relay Service at 711 or 800-627-3529.