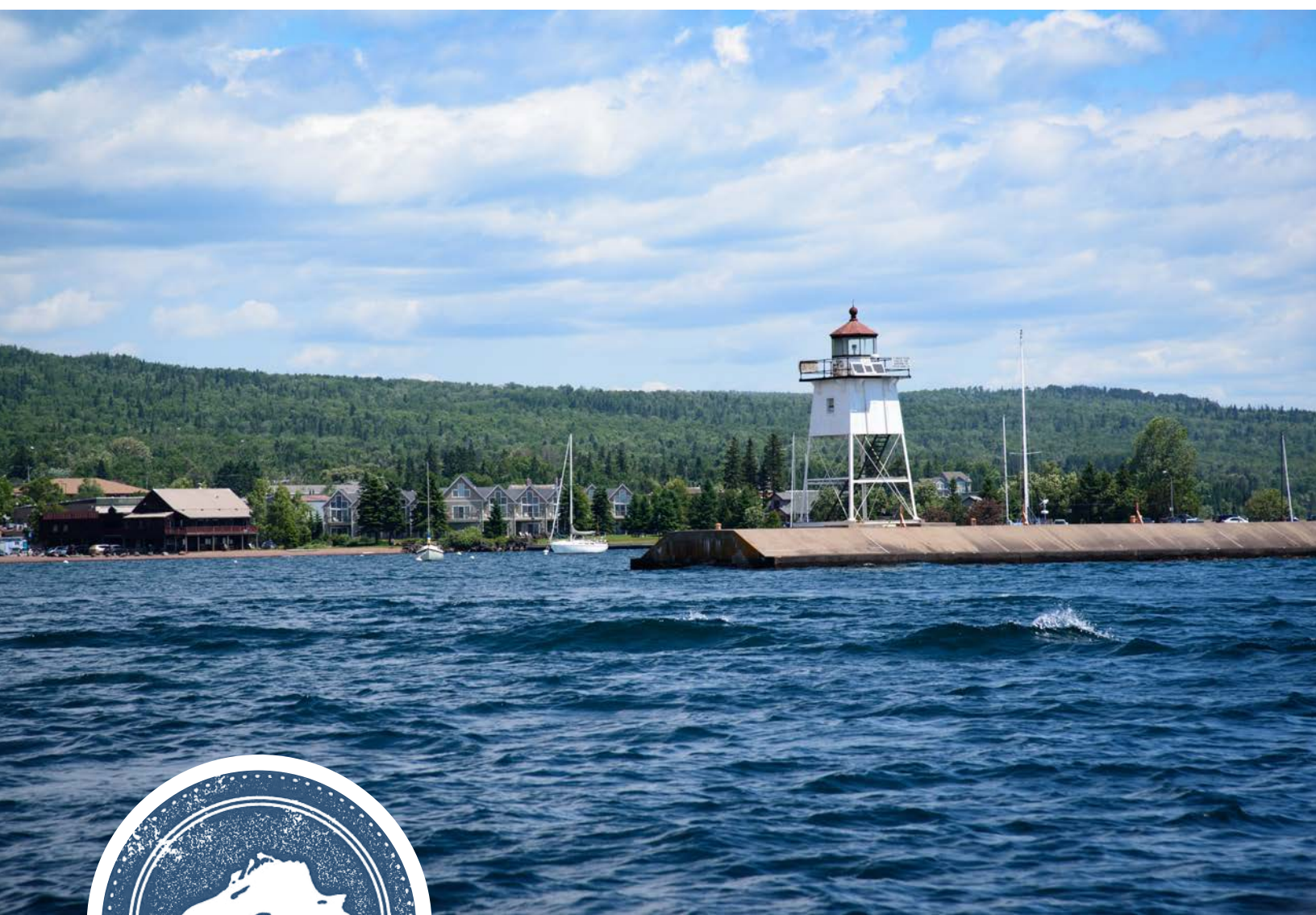


# LAKE SUPERIOR PROPERTY OWNER RESOURCE GUIDE



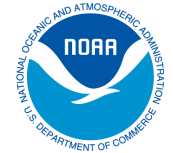
A TOOL FOR LAKE SUPERIOR PROPERTY OWNERS  
TO MINIMIZE COASTAL SHORELINE EROSION

2021

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*The Lake Superior Property Owner Resource Guide was prepared by Cook and Lake County Soil and Water Conservation Districts using Federal funds under award NA20NOS4190088 from the Coastal Zone Management Act of 1972, as amended, administered by the Office for Coastal Management, National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce provided to the Minnesota Department of Natural Resources (DNR) for Minnesota’s Lake Superior Coastal Program. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of NOAA, the U.S. Department of Commerce, or the DNR.*



*Funding for this project was also provided by Minnesota Board of Water and Soil Resources.*

*This guide can be found online at [cookswcd.org](http://cookswcd.org) and [lakecountyswcd.org](http://lakecountyswcd.org).*





# LAKE SUPERIOR PROPERTY OWNER RESOURCE GUIDE

*Photo: Lake Superior Shoreline (Minnesota Pollution Control Agency)*

## INTRODUCTION

The Lake Superior coastal area is dynamic with a varying coastline, from clay bluffs to rocky beaches. The area is scattered with natural areas and a variety of types of development. Fluctuating water levels and wave energy from wind and storms on the lake have varying affects on the coastline. This resource guide is a compilation of materials created and gathered as part of a Minnesota Lake Superior Coastal Program project, aimed at providing education and outreach to landowners, local land use decision makers, contractors, realtors, and any others directly or indirectly involved with land use, as it relates to the Lake Superior coastal area. This guide aims to increase knowledge and understanding of the natural processes of coastal erosion, while also providing some methods to minimize erosion impacts using current science research and information.

*The tips in this resource guide have been provided as general information for addressing coastal erosion. This guide is provided for information purposes only. The author(s) do not accept any liability to any person for the use of the information or advice contained herein. This is not an exhaustive list of resources, nor an endorsement of any included service providers.*



*Photo: Lake Superior Shoreline (Minnesota Pollution Control Agency)*

# Understanding Coastal Erosion: A Guide for Landowners

Overview of Landowner Workshop presented by FreshWater Engineering with Cook and Lake County Soil & Water Conservation District



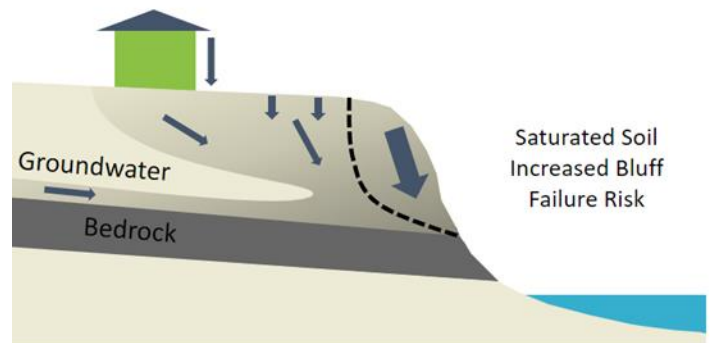
## What Causes Lake Superior Coastal Erosion?

### Main Causes

1. **Wind:** Creates waves. In addition, strong winds can erode bluffs and land without established vegetation.
2. **Waves:** Force that repeatedly eats away at the bluffs and shorelines. Biggest when wind comes from the east.
3. **Fluctuating Water Levels:** Determines how much of your land is affected by water.
  - **Seasonal Variation:** Highest water levels in Spring and Summer, lowest in the Winter.
  - **Storm Surge:** Precipitation and increased inflow from rivers increases water levels.
  - **Wave Height**
  - **Wave Runup:** Waves crash on the shore and run up the shoreline. Depends on slope of shore.

### Additional Causes

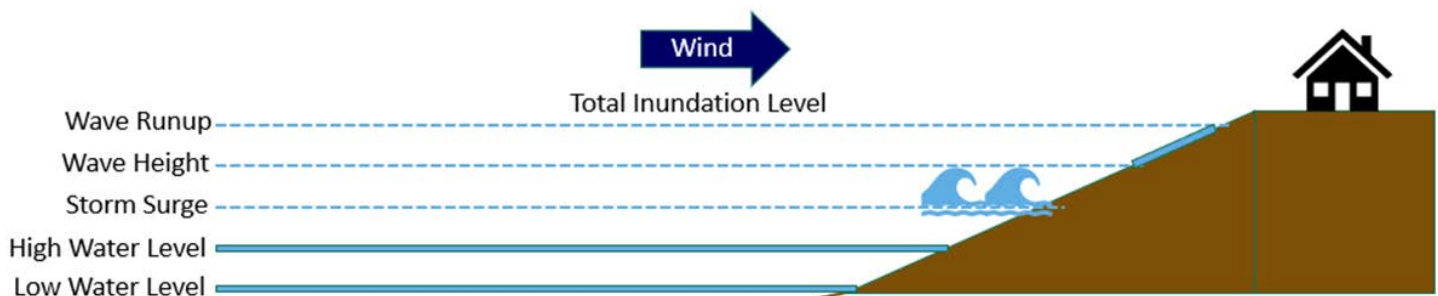
- Surface Water Runoff
- Lack of Vegetation
- Removal of Vegetation
- Groundwater Saturation
- Ice Forces
- Freeze-Thaw Cycles



### Ordinary High Water Level (OHWL)

Elevation of the highest water level that leaves evidence upon the landscape. Commonly the point where natural vegetation changes from aquatic to land based. This is also the landward extent of DNR jurisdiction.

Any alterations below this level must be first permitted by the DNR and U.S. Army Corps of Engineers, as required. Contact the local DNR Area Hydrologist to determine this elevation.



### Water Levels

Great Lakes Water Levels: <https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Information-2/Water-Level-Data/>

Great Lakes Dashboard: <https://www.glerl.noaa.gov/data/wlevels/>

# Understanding Erosion on Your Property

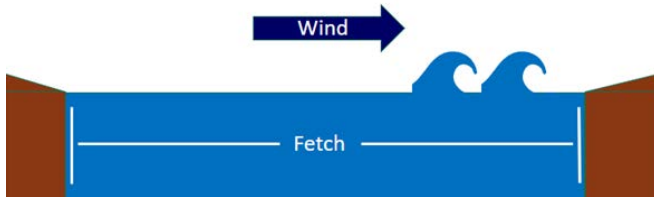
## Every Property is Different

Erosion is dependent on:

1. **Site Conditions**
  - Soil/rock type
  - Bluff slope angle
  - Bedrock extent
  - Bedrock condition
  - Stormwater management
  - Vegetative cover
  - Neighboring hard armor
2. **Wave Environment**

## Understanding Wave Environment

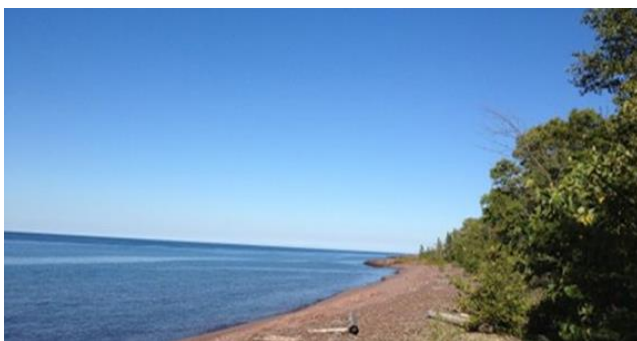
**Fetch:** Length of lake surface over which the wind blows in an essentially constant direction, generating waves.



Low Wave Energy: Limited fetch in a sheltered, shallow, or small water body (bay)



High Wave Energy: large fetch (deep, open water)



## North Shore Coastal Erosion Hazard Map

The North Shore Coastal Erosion Hazard Map is a web-based mapping tool that is easily accessible to landowners, contractors, realtors, and local officials. The tool can also be used to identify the suitability for development and can be used to guide decisions related to conservation concerns and hazardous erosion areas.

Link: [ardc.org/CEHM/](http://ardc.org/CEHM/)



## North Shore Erosion Rates

(note: erosion is not constant)

	Average	Maximum
<b>High Erosion Potential</b> <ul style="list-style-type: none"> <li>▪ Organic deposits</li> <li>▪ Sand and gravel</li> <li>▪ Clay and silt</li> <li>▪ Unsorted glacial deposits</li> </ul>	0.46	1.09
<b>Low Erosion Potential</b> <ul style="list-style-type: none"> <li>▪ Bedrock</li> </ul>	0.16	0.64

Table shows average and maximum recession rates measured, 1930s-75, ft/yr. (University of Minnesota, Minnesota Sea Grant, 1990)

# What Solutions are Available?

## Grey Infrastructure



*What is it?* Uses harder features like rocks and concrete.

*When to use it?* High energy environments

## Green Shorelines



*What is it?* Uses nature-based features like vegetation and geotextiles

*When to use it?* Low energy environments

## Hybrid Shorelines



*What is it?* Combination of both vegetation and rocks

*When to use it?* Low – High energy environments

## Gray Infrastructure

1. **Seawalls:** Vertical or sloped wall aimed to stabilize shoreland and prevent from flooding and overtopping of waves.



### Advantages

- Long lifespan
- Shoreline stabilization behind structure
- Low maintenance cost if built properly

### Maintenance Issues

- Deterioration
- Loss of toe stability
- Cracking
- Settlement behind wall
- Erosion near the flank can lead to failure

### Disadvantages

- Can be expensive
- Wave reflection causes: erosion of adjacent unreinforced sites and toe erosion
- Prevents upland from being sediment source
- Can fail during large events
- Rising water levels decrease effectiveness
- Low visual appeal

### Costs

- Extremely variable (\$\$\$\$)

2. **Rip Rap Revetments:** A sloping wall usually made with angular quarry stone with the goal of protecting the toe of a bluff or piece of shoreland.



### Advantages

- Dissipates wave energy
- Little maintenance
- Long lifespan

### Maintenance Issues

- Stone Deterioration and cracking
- Toe stability
- Erosion near the flank can lead to failure

### Disadvantages

- Erosion of adjacent unreinforced sites
- Prevents upland from being sediment source
- Gets rid of shoreline habitat
- Waterfront access can be difficult

### Costs

- Extremely variable (\$\$\$ - \$\$\$)

3. **Breakwaters:** Offshore structure intended to break waves and reduce the force of wave action on the shoreline.



**Advantages**

- Reduces wave force and height
- Economical in shallow areas

**Maintenance Issues**

- Stone deterioration
- Toe stability

**Costs**

- Extremely variable (\$\$\$ - \$\$\$\$)

**Disadvantages**

- Expensive in deep water
- Reduces water circulation
- Navigational hazard
- Toe erosion
- Disrupts sediment transport
- Wave reflection
- Low visual appeal
- Needs USACE permit

**Why is Cost so Variable?**

Depends on:

- Site needs & energy environment
- Engineering requirements
- Contractor
- Distance to quarry/material pits
- Access to site (barges, cranes, pump trucks, hand-carrying, etc.)
- Length of shoreline
- Height of structure

**The Impacts of Grey Infrastructure and Human Coastal Development**

Erosion becomes more severe down-drift of structures because of:

1. Increased wave reflection
2. Disrupted sediment budgets
3. Impacts to wave breaking processes

Also,

4. Gets rid of shoreline habitat
5. Freeze/thaw can be more severe
6. Waterfront access becomes more difficult

**Resources**

Coastal Bluff Evolution Adjacent to Shoreline Protection Structures: <https://coastalbluffevolution.weebly.com/>

In wake of Concordia University Project, beaches and bluffs fade away:

<https://archive.isonline.com/news/ozwash/in-wake-of-concordia-university-project-beaches-and-bluffs-fade-away-b99424792z1-289255751.html/>

**Green Shorelines**

Roots of native plants hold soil in place to reduce erosion. Creates a buffer to upland areas.



**Advantages**

- Improves habitats and biodiversity
- Visually appealing
- Lessens downdrift impacts
- Shoreline sustainability
- Improves water and air quality
- Low maintenance and cost

**Maintenance Issues**

- Condition of vegetation
- Invasive species

**Disadvantages**

- High energy wave environments pose challenges
- Affected by high water levels
- Cold climates/ice can damage vegetation
- Situationally limited

**Costs**

- Variable (\$\$ - \$\$\$)

---

## Hybrid Shorelines

1. **Sills:** Combination of either a small breakwater or revetment along with vegetative stabilization.



### Advantages

- Provides habitats and ecosystem services
- Dissipates wave energy
- Slows inland water transfer

### Maintenance Issues

- Condition of vegetation
- Invasive species
- Toe stability and erosion
- Cracking of stone

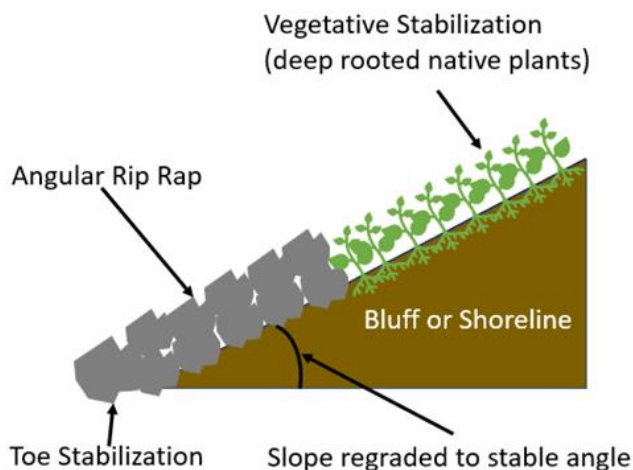
### Disadvantages

- Not entirely effective in high energy wave environments
- Uncertainty of vegetative growth
- Erosion at the tow of the structure

### Costs

- Extremely Variable (\$\$\$ - \$\$\$\$)

2. **Regrading, Toe Protection, and Vegetative Stabilization:** Regrades a bluff or shoreline to a more stable angle, which makes it easier for vegetation to establish. This is usually combined with toe protection through use of a rip rap revetment or seawall. Rip rap does not need to extend all the way up the slope, and the extent should be determined by a professional.



### Advantages

- Provides habitats and ecosystem services
- Dissipates wave energy
- Improves water and air quality
- Slope stabilization

### Disadvantages

- Erosion of adjacent unreinforced sites
- Prevents upland from being a sediment source
- Gets rid of shoreline habitat

### Maintenance Issues

- Condition of vegetation
- Invasive species
- Toe stability and erosion
- Cracking of stone

### Costs

- Extremely Variable (\$\$\$ - \$\$\$\$)

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## Other Options – Moving your House

### Advantages

- Potentially increase value of home
- Potentially less expensive than shore protection/bluff stabilization
- Avoids damaging ecosystems/neighboring properties
- Preserves sediment input to the lake

### Costs

- Extremely variable
- Depends on square footage, location, weight, nearest contractor, site access

### Disadvantages

- Relocation cost could potentially exceed the value of home
- May not be enough space to relocate
- Your land is still eroding

### Potential Contacts

- H J Mc Gregor House Moving - Mountain Iron, MN
- Building Relocators – Duluth, MN
- Iron Range Moving Inc – Virginia, MN



## Setback by County and Hazard Area

**Vegetation line:** Point where water prevents growth of permanent or woody vegetation.

	Non-Erosion Hazard Areas	Erosion Hazard Areas
Cook County	<b>40 feet</b> from vegetation line Additional setback: <b>30 feet</b> from top of bluff	Structures and Soil Absorption Area Setbacks  <b>(Annual Erosion Rate x 50) + 25 feet</b> from bluff  <b>OR</b> (if no erosion rate) <b>125 feet</b> from eroding bluff
Lake County	Whichever sets you furthest back between: <b>40 feet</b> from vegetation line <b>OR</b> <b>75 feet</b> from the mean water level (601.5 ft above sea level) Additional setback: <b>30 feet</b> from top of bluff	

## Permitting

Contact your local SWCD to learn more about all required permits for your site-specific project.

### What is needed from the DNR for shoreline projects? How do I apply for a permit?

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>Plans and Designs<br/>(best if done by a capable engineer)</li> <li>Aquatic Plant Management Permit if planting below the Ordinary High Water Level (OHWL)</li> </ol> | <ol style="list-style-type: none"> <li>In search engine, type “MPARS” (Minnesota DNR Permitting and Reporting System)</li> <li>Create an account and password</li> <li>Fill out the online application</li> <li><b>Apply Early</b> – DNR requires up to 6 months to process permit applications</li> </ol> |
|--|--|

## How can we make our property more resilient?

### Start from the Top Down

- Manage stormwater with green practices**  
*Why?* Directing water from your roofs and driveways to green practices decreases surface water runoff by increasing the infiltration of water into the ground. In addition, practices like rain gardens and permeable pavement help maintain water quality by filtering pollutants collected from lawns, driveways, and roofs.
- Redirect stormwater away from bluff or shoreline**  
*Why?* Runoff directed towards the face of a bluff can erode surface material. Instead, direct the water near the front of your properties away from the shoreline or bluff.



(rain garden, rain barrel, permeable pavement)

3. **Minimize your footprint to the lake**  
*Why?* Compacting trails to the lake lead to increased surface water runoff down the face of a bluff or shoreline, which can lead to gully erosion.

4. **Plant native vegetation**  
*Why?* Plant roots strengthen soil. Avoid using turf grass, as it does not have deep roots and offers little addition to soil strength. Plants also offer ecosystem services, including enhanced air quality and offering habitat for creatures.

5. **Avoid removing vegetation (Do not mow near your shore!)**  
*Why?* Try to leave native vegetation in place on at least half the length of your property to the lake. Native plant roots strengthen soil and remove water through root uptake and transpiration. They also slow runoff and trap sediment. Since plant roots help hold soil in place, removing vegetation will weaken the soil and make bluff or shoreline stability and surface water erosion worse.

## Vegetation Selection

### Shrubs

Shrubs are shorter and have deep root systems. Along with native grasses such as switchgrass, they should be considered first for bluff and shoreline stabilization.

#### Native Species:

Black Chokeberry	Mountain Maple
Chokecherry	Staghorn Sumac
Serviceberry	Hazelnut
Dogwood	Willows
Ninebark	Red Berried Elderberry
Wild Rose	Beaked Hazel
Red Raspberry	Grey Alder
Currants	Prickly Gooseberry
Mountain Ash	Sand Cherry
Northern Bush	Downy Arrow-wood
Honeysuckle	

### Trees

Trees should not be the first choice when planting native vegetation near the lake. A significant amount of soil can be lost with one tree falling. Also, wind and the weight of a tree can increase risk of falling.

#### Native Species:

Paper Birch	Red Maple
White Spruce	Red Oak
Quaking Aspen	Yellow Birch
Pine (Red, White, Jack)	Sugar Maple
Basswood	Burr Oak
Balsam Fir	

#### MN DNR Resources for Vegetation Selection

Native Plant Suppliers, Landscapers, and Restoration Consultants:

[https://files.dnr.state.mn.us/assistance/backyard/gardens/native\\_plant/suppliers\\_northeast.pdf](https://files.dnr.state.mn.us/assistance/backyard/gardens/native_plant/suppliers_northeast.pdf)

## Consulting Contractors and Engineers

We highly recommend that you seek professional help and assistance when hard armoring or altering your shorelines. These projects can become extremely complex and can have a huge impact on the environment and on neighboring properties.

### Key Steps in the Decision-Making Process

1. **Set Project Goals:** Keep in mind the effects your project could have on the environment and on neighboring properties.
2. **Talk with Your Neighbors:** Seek out neighbors who have had structures built on their properties

to learn more about standard costs and procedures. Also, you may be able to reduce costs by teaming up with neighbors who also want to protect their land.

3. **Research Your Options:** Do not settle on the first quote or armoring solution that you receive from a firm or contractor. Make sure to research all available options.
4. **Seek Advice:** Talk to local professionals and contact the DNR. In addition, contact your local SWCD. They can provide guidance on land management strategies.

## Resources

Extra resources are available on the SWCD websites, including resources developed to help landowners understand coastal erosion, the permit process, shoreland stewardship, and many other related topics. Additionally, there are Minnesota DNR contacts below that were highlighted in the workshop.



### **Cook County Soil & Water Conservation District**

411 W. 2<sup>nd</sup> Street, Grand Marais, MN 55604

Phone: (218)387-3647

Website: [cookswcd.org](http://cookswcd.org)

### **Patricia Fowler**

**MN DNR Area Hydrologist**

Phone: (218)302-3246

Email: [patricia.fowler@state.mn.us](mailto:patricia.fowler@state.mn.us)



### **Lake County Soil & Water Conservation District**

408 First Ave., Two Harbors, MN 55616

Phone: (218)834-8370

Website: [lakecountyswcd.org](http://lakecountyswcd.org)

### **Brooke Haworth**

**MN DNR Northeast Plant Ecologist**

Phone: (218)302-3248

Email: [brooke.haworth@state.mn.us](mailto:brooke.haworth@state.mn.us)

## References

1. The Associated Press. "Presque Isle Breakwaters Passing Test of Time, Tide." 4 Nov. 2001, [old.post-gazette.com/healthscience/20011104erie1104p8.asp](http://old.post-gazette.com/healthscience/20011104erie1104p8.asp).
2. Bechle, Adam and Melanie Perello, directors. CHAOS - Preserving the Lake Superior Shoreline July 2020, 27 July 2020, [www.youtube.com/watch?v=i2xYusekwq4](http://www.youtube.com/watch?v=i2xYusekwq4).
3. Burgquist, Lee. "In Wake of Concordia University Project, Beaches and Bluffs Fade Away." Milwaukee Journal Sentinel, 21 Jan. 2015, [archive.jsonline.com/news/ozwash/in-wake-of-concordia-university-project-beaches-and-bluffs-fade-away-b99424792z1-289255751.html/](http://archive.jsonline.com/news/ozwash/in-wake-of-concordia-university-project-beaches-and-bluffs-fade-away-b99424792z1-289255751.html/).
4. "Erosion On Bluffs." Shore Friendly, 25 Sept. 2015, [www.shorefriendly.org/your-erosion-risk/on-beaches/](http://www.shorefriendly.org/your-erosion-risk/on-beaches/).
5. Foyle, Anthony, and Sean Rafferty. Penn State University, 2017, BLUFF EROSION HAZARDS AND CONSTRUCTION SETBACKS ON THE GREAT LAKES COASTS OF THE UNITED STATES: A REVIEW.
6. Grilliot, M. J., et al. "The Role of Large Woody Debris in Beach-Dune Interaction." AGU Journals, John Wiley & Sons, Ltd, 5 Dec. 2019, [agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019JF005120](http://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019JF005120).
7. "Guidance for Considering the Use of Living Shorelines." National Oceanic and Atmospheric Administration, [www.noaa.gov/](http://www.noaa.gov/).
8. Johnston, Carol, et al. University of Minnesota Duluth. Minnesota Sea Grant, 1990, Erosion Hazard of Minnesota's Lake Superior Shoreline.
9. Jordan, Nick, and Matt Allie. "Coastal Bluff Evolution Adjacent to Shoreline Protection Structures." Coastal Bluff Evolution, [coastalbluffevolution.weebly.com/](http://coastalbluffevolution.weebly.com/).
10. "Monthly Mean Lakewide Average Water Levels." Detroit District, U.S. Army Corps of Engineers, [www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Information-2/Water-Level-Data/](http://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Information-2/Water-Level-Data/).
11. "Natural and Structural Measures for Shoreline Stabilization." Systems Approach to Geomorphic Engineering, [sagecoast.org/](http://sagecoast.org/).
12. Salus, Lydia, and Adam Bechle. "Relocating Buildings Threatened by Great Lakes Erosion and Bluff Failure." SE WI COASTAL Resilience, SE WI COASTAL Resilience, 13 Apr. 2020, [sewicoastalresilience.org/relocating-buildings-threatened-by-great-lakes-erosion-and-bluff-failure/](http://sewicoastalresilience.org/relocating-buildings-threatened-by-great-lakes-erosion-and-bluff-failure/).
13. Shea, Briana. Nature-Based Shorelines for Wisconsin's Great Lakes Coast. Esri, 8 Dec. 2020, [storymaps.arcgis.com/stories/def578589be547b88870578612897cab](http://storymaps.arcgis.com/stories/def578589be547b88870578612897cab).
14. Sunderland, Anna, and Helen John. A Guide to Maintaining Coastal Bluff Stability, [wiblufferosion.weebly.com/](http://wiblufferosion.weebly.com/).

**Photo Credit:** Logan Morrison, Brent Teske, Lake County SWCD, Cook County SWCD, Melanie Perello, Rob Peterson

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## 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.

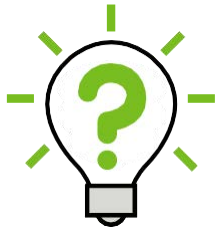
DNR area hydrologists are responsible for shoreland management and permitting work in or next to our lakes and streams. Your SWCD can provide guidance on land management strategies.

#### Contact your local DNR or SWCD office:

- ◆ **DNR Area Hydrologist** ([mndnr.gov/waters](http://mndnr.gov/waters))
- ◆ **Cook County SWCD** ([cookswcd.org](http://cookswcd.org))
- ◆ **Lake County SWCD** ([lakecountyswcd.org](http://lakecountyswcd.org))
- ◆ **South St. Louis SWCD** ([southstlouisswcd.org](http://southstlouisswcd.org))

# 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.



## 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 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.**

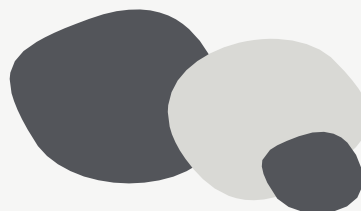
These projects can also create habitat, increase water infiltration and provide aesthetic benefits. Hardened shorelines are appropriate for areas where the wave energy is higher. Hardened shorelines can address severe erosion problems or threats to structures.

### GREEN or nature-based elements



- Native plants
- Coir logs
- Geotextiles

### GRAY or hardened elements



- Rocks
- Concrete

# 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 gray scale. These designs are not suitable for all sites.

## Lake Buffer

A boarder 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 (\$\$\$ - \$\$\$\$)



## 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 (\$\$\$ - \$\$\$\$)



## GREEN 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 (\$\$\$\$ - \$\$\$\$)



## Breakwater or Breakwall

Stone or concrete structure built in the water away from the shore to break wave action.

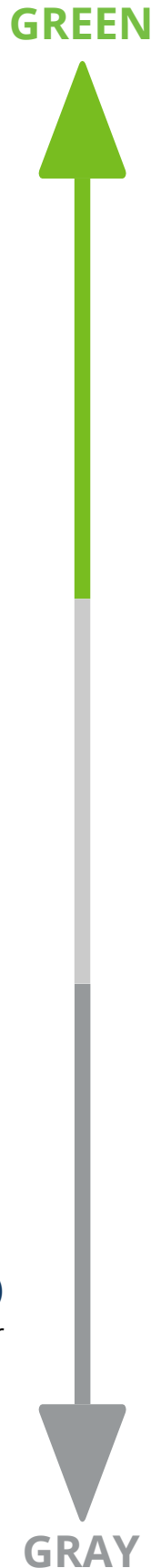
Scale: Municipal/industrial (\$\$\$ - \$\$\$\$)



## Seawall (lakewall)

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

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



GRAY



## 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.

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

# LAKE SUPERIOR SHORELINE PROJECTS: PERMITS

Most shoreline projects and activities on our Lake Superior coast require permits.

## Who has a role in protecting our Lake Superior coast?

Everyone has a responsibility to protect our coast. There are numerous federal, tribal, state and local agencies or departments that have a role in protecting Lake Superior.

Most of Minnesota's Lake Superior coast falls under the North Shore Management Board. Local and tribal governments form the board and set standards that are enforced locally.



**Identify who is your local permitting authority** (often your city or county) and whether your project may require state or federal permits. Visit their websites to learn about the application process or call their office directly.

## Who is responsible for getting permits for my project?

**The property owner must acquire all necessary permits.** Reach out to your local or tribal permitting authority first and determine what permits you need. If working with a contractor or engineer, they may be able to assist you in applying for permits.



**Early in the project planning process, contact your local, state, tribal or federal permitting authorities.** Discuss your project scope and needs. Meet with them first before submitting any project applications.



Local government permitting authority is landward of the OHWL.

The **Ordinary High Water Level (OHWL)** is an elevation along the shoreland. It is determined by a site visit from the DNR. Speak with your local **DNR Area Hydrologists** ([mndnr.gov/waters](http://mndnr.gov/waters)) to get your OHWL determination.



Ordinary High Water Level (OHWL)

Activities lakeward of the OHWL may require state or federal permits.

## Who has permitting authority?

Permitting authority in Minnesota is based on the Ordinary High Water Level or OHWL. Activities that are located landward of the OHWL fall under the local government.

Lakeward of the OHWL is the state and federal permitting authority.



# WORKING WITH REGULATORS

Property owners planning to do a project on their shoreline will need to work closely with the appropriate regulators.

## COMMON TERMS

**Floodplain** - Land near a river or waterbody that is prone to flooding, mapped by Federal Emergency Management Administration (FEMA) and DNR.

**Ordinary High Water Line (OHWL)** - An elevation on the shoreland where high water levels have been maintained. Delineated by permanent vegetation line and other evidence of water levels and wave run up.

**Permit** - An official authorization to conduct work or other activity.

**Public Waters** - Lakes, rivers and wetlands where the State of Minnesota has regulatory authority. Defined by the DNR.

**Regulatory Authority** - The responsibility to oversee or regulate or oversee activities.

**Setback** - Minimum distance between a structure and a protected resource.

**Shoreland** - Land next to a public water body. Local government shoreland ordinances apply.

**Variance** - A permit that allows for activities that deviate from current requirements.

**Waters of the United States** - Water bodies that fall under federal law as defined by the US Environmental Protection Agency (EPA) and US Army Corps of Engineers (USACE).

**Wetland** - Areas that are saturated with surface or groundwater. Wetlands have characteristic soils and vegetation.

**Zoning** - Laws that define allowable land use or development for a community.



**Plan ahead.** The permitting process can take several weeks to months. Reach out to your regulators directly to ask about their timeframe for processing applications. You may need to submit your application well in advance of construction.



Visit the permitting authority's website. Most permit applications need to be submitted online. Many regulatory agencies provide guidance for property owners planning projects on their website.



**Stay in touch with your regulators** throughout the permitting process. They will reach out to you if they need more information about your project.

# DO I NEED A PERMIT?

Most projects that occur along our Lake Superior coast need permits. Permits may come from local, state, tribal, or federal governments.



**To confirm if permits are needed for your project, contact the appropriate agency or department directly.**

The DNR has a [helpful website](http://mndnr.gov/permits/water/needpermit.html) to identify what permits might be needed (mndnr.gov/permits/water/needpermit.html).

## Do I need a permit to .....

... build a structure or building along my shoreline?

A. **Yes.** You will need a local government permit for any construction on your property. If your structure or building will extend below the OHWL, than a DNR public waters permit is required. USACE permit may also be required.

... install a shoreline structure, such as riprap, retaining wall or seawall?

A. **Yes.** You will need a local government permit, DNR public waters permit and USACE permit (if the project is below the OHWL).

... clear vegetation on my shoreline?

A. **Most likely.** You may need a permit from your local government and the DNR (depending on what vegetation is being disturbed and if it is below the OHWL).

... plant vegetation on my shoreline?

A. **In most cases, no** permits are required. However, you may need approval of your plans from the DNR, local government or your local Soil & Water Conservation District.

... build a boat ramp, dock, stairs, or other structure to access my beach or shoreline?

A. **Depends** on the structure and if it meets certain conditions. Many structures do not require DNR public water permits. They may require a local government permit.

... modify, fill, or grade my bluff or bank?

A. **Yes.** Grading and construction above the OHWL will need a local government permit. If the project extends below the OHWL, a DNR public waters permit is required. USACE permit may be required.

... remove aquatic vegetation near my house?

A. **Yes.** You need a DNR aquatic plant management permit. This includes any actions to control, remove, or apply pesticides to aquatic vegetation.

# WHO DO I CONTACT?

## Soil & Water Conservation Districts

Your local SWCD can help advise you on next steps, but do not have any permitting authority.

- **Cook County SWCD**
  - ◆ [cookswcd.org](http://cookswcd.org)
  - ◆ Phone: 218-387-3647
- **Lake County SWCD**
  - ◆ [lakecountyswcd.org](http://lakecountyswcd.org)
  - ◆ Phone: 218-834-8370
- **South St. Louis SWCD**
  - ◆ [southstlouisswcd.org](http://southstlouisswcd.org)
  - ◆ Phone: 218-723-4867

## Minnesota Department of Natural Resources (DNR)

State agency responsible for shorelands, protected species, and vegetation. Contact the DNR to first determine the location of the OHWL and to see if permits are needed.

- **DNR Water Permits** ([mndnr.gov/waters](http://mndnr.gov/waters))
- **DNR Area Hydrologists** ([mndnr.gov/waters](http://mndnr.gov/waters))
- **DNR Aquatic Plant Management Program** ([mndnr.gov/shorelandplants](http://mndnr.gov/shorelandplants))

## Grand Portage Band of Lake Superior Chippewa

Responsible for all land management and shorelands on tribal lands.

- Contact the **Roads and Realty Manager** at [roadsandrealty@grandportage.com](mailto:roadsandrealty@grandportage.com)

## US Army Corps of Engineers (USACE)

Lead federal agency responsible for permitting activities on Lake Superior shorelands. Contact the USACE if your project is below the OHWL to determine if a permit is needed.

- **US Army Corps of Engineers St. Paul District** ([mvp.usace.army.mil/Missions/Regulatory.aspx](http://mvp.usace.army.mil/Missions/Regulatory.aspx))
- **Nationwide Permits** ([mvp.usace.army.mil/missions/regulatory/nwp/](http://mvp.usace.army.mil/missions/regulatory/nwp/))
- **Regional General Permits** ([mvp.usace.army.mil/missions/regulatory/rgp/](http://mvp.usace.army.mil/missions/regulatory/rgp/))

## Local Governments

Always contact your local government to determine if permits are needed for your project.

- **City of Beaver Bay**
  - ◆ [beaverbaymn.com](http://beaverbaymn.com)
  - ◆ Phone: 218-226-3251
  - ◆ Email: [city\\_beverbay@lakenet.com](mailto:city_beverbay@lakenet.com)
- **City of Duluth Planning & Development**
  - ◆ [duluthmn.gov/planning-development](http://duluthmn.gov/planning-development)
  - ◆ Phone: 218-730-5580
  - ◆ Email: [planning@duluthmn.gov](mailto:planning@duluthmn.gov)
- **City of Grand Marais**
  - ◆ [ci.grand-marais.mn.us](http://ci.grand-marais.mn.us)
  - ◆ Phone: 218-387-1848
  - ◆ Email: [cityhall@grandmarais.city](mailto:cityhall@grandmarais.city)
- **City of Silver Bay**
  - ◆ [silverbay.com](http://silverbay.com)
  - ◆ Phone: 218-226-4408
- **City of Two Harbors**
  - ◆ [twoharborsmn.gov](http://twoharborsmn.gov)
  - ◆ Phone: 218-834-5631
  - ◆ Email: [info@twoharborsmn.gov](mailto:info@twoharborsmn.gov)
- **Cook County Land Services**
  - ◆ [co.cook.mn.us](http://co.cook.mn.us)
  - ◆ Phone: 218.387.3630
- **Duluth Township**
  - ◆ [duluthtownship.org](http://duluthtownship.org)
  - ◆ Phone: 218-525-5705
  - ◆ Email: [PlanningZoning@duluthtownship.org](mailto:PlanningZoning@duluthtownship.org)
- **Lake County**
  - ◆ [co.lake.mn.us/environmental-services](http://co.lake.mn.us/environmental-services)
  - ◆ Phone: 218-834-8327
- **Lakewood Township**
  - ◆ [sites.google.com/site/lakewoodtownshipmn](http://sites.google.com/site/lakewoodtownshipmn)
  - ◆ Phone: 218-525-4991
  - ◆ Email: [zoningadmin@lakewoodmn.org](mailto:zoningadmin@lakewoodmn.org)

# LAKE SUPERIOR SHORELINE PROJECTS: FIND THE RIGHT PROFESSIONAL

Most Lake Superior shoreline projects need help from a coastal professional. Before consulting a professional, it is important to recognize that erosion is a natural process and what is your risk tolerance. Think about your project goals and do a little research. Being prepared will set your project on the path to success.

## RESOURCES:

**Living on the Coast: Protecting Investments in Shore Property on the Great Lakes** ([publications.aqua.wisc.edu](http://publications.aqua.wisc.edu))

**Working with Engineers and Contractors on Shore Protection Projects** ([publications.aqua.wisc.edu](http://publications.aqua.wisc.edu))

**Restore Your Shore** ([mndnr.gov/rys](http://mndnr.gov/rys))

**Systems Approach to Geomorphic Engineering** ([sagecoast.org](http://sagecoast.org))

## FIRST STEPS



### Set goals for your project

What is the purpose of your project? For example, you may want to address erosion or maintain access to your beach.

**A clear project goal will help you understand your options.**



### Research your options

**Identify the projects, strategies, or designs that can meet your goals.**

This will help determine the professional that you might need for your project.



### Seek advice

Contact your local Soil & Water Conservation District (SWCD) or consult your DNR Area Hydrologist. They can help you understand your options and identify next steps.

## WHO SHOULD I CONSULT FOR MY PROJECT?

That depends on the complexity of your project. Your project may need design help, special equipment or skills for installation. Every coastal professional offers different services based on their skills and experience.



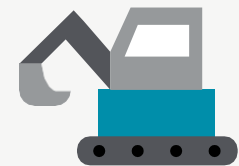
**Restoration specialists** are ecologists, contractors and/or landscape designers. They use **nature-based techniques to restore coastal habitats.**

Restoration specialists may charge hourly for consultation work or based on project scope.



**Coastal engineers** have specialized training and experience **working in coastal environments.** They are licensed professional engineers.

Engineering firms generally charge by the hour and costs can range from \$100 - \$250 per hour.



**Marine or coastal contractors** have experience with coastal projects. They have experience constructing structures in the water and/or **working underwater.**

Contracting firms charge based on the project scope.

# CONSULT A COASTAL PROFESSIONAL

It's important to find an experienced coastal professional to assist with your shoreline stabilization project. Seek recommendations, do your research, and ask questions.



## WHERE DO I FIND COASTAL PROFESSIONALS?

### Native Plant Contractors and Suppliers

- **DNR Native Plant Suppliers, Landscapers, and Restoration Consultants** ([mndnr.gov/gardens/nativeplants/suppliers.html](http://mndnr.gov/gardens/nativeplants/suppliers.html))
- **Midwest Invasive Plant Network's Ecological Service Providers** ([mipn.org](http://mipn.org))

### Coastal Engineers and Contractors

- **American Society of Civil Engineers: Duluth Chapter** ([sections.asce.org/duluth](http://sections.asce.org/duluth))
- **Duluth Seaway Port Authority – Port Services Directory** ([duluthport.com](http://duluthport.com))
- **WI Sea Grant's Great Lakes coastal engineering firms and contractors** ([seagrant.wisc.edu](http://seagrant.wisc.edu))
- **Academy of Coastal, Ocean, Port, & Navigation Engineers** ([acopne.org](http://acopne.org))
- **American Council of Engineering Companies of Minnesota** ([acecmn.org](http://acecmn.org))



### Interview Professionals

- Consult with several professionals and get quotes to compare services and costs.
- Talk with each professional about their experience and expertise in coastal environments.
- Discuss specifics about your project. What will the project look like? What materials will be used? What is the timeline and cost?
- Determine what permits you need. Many firms will apply for permits on your behalf.



### Get Recommendations

- Speak to any neighbors or friends that have had similar projects done on their property.
- Look for projects completed in your area. Identify the companies and professionals involved.
- Talk to your local planning, SWCD, or parks department, ask if they have recommendations.
- Look at reviews and credentials for any professional you are considering.



### Protect Yourself

- Ensure that any professional you work with is licensed and insured (bonded).
- Discuss whether your engineer or contractor offers any warranty for their work.
- Have a detailed and signed contract before work begins.

## Coastal and Civil Engineers

- AMI Consulting Engineers, P.A. <https://www.amiengineers.com/> - Superior, Wisconsin
- Anchor QEA (formally FreshWater Engineering) – Madison, Wisconsin
- Baird <https://www.baird.com/> - Madison, Wisconsin
- Barr <https://www.barr.com/> - Duluth, Minnesota
- Bolton & Menk [Bolton-Menk.com](http://Bolton-Menk.com) – Duluth, Minnesota
- Cardno <https://www.cardno.com/> - Eagan, Minnesota
- Dewberry <https://www.dewberry.com/> - Various US offices
- Engineering Partners Company (EPC) <http://www.epcduluth.com/> - Duluth, Minnesota
- Fleis and Vandenbrink <https://www.fveng.com/> - Grand Rapids, Michigan
- HDR Inc. <https://www.hdrinc.com/> - Minneapolis, Minnesota
- Krech Ojard & Associates <https://www.krechojard.com/> - Duluth, Minnesota
- LHB Engineers & Architects <https://www.lhbcorp.com/> - Duluth, Minnesota
- SEH Inc. <https://www.sehinc.com/> - Duluth, Minnesota
- SmithGroup <https://www.smithgroup.com/> - Madison, Wisconsin
- Stantec <https://www.stantec.com/en> - Various US offices
- Tetra Tech <https://www.tetratech.com/> - St. Paul, Minnesota
- TKDA <https://www.tkda.com/> - Duluth, Minnesota
- TRC Companies <https://www.trccompanies.com/> - Eagan, Minnesota
- Woolpert <https://woolpert.com/> - Various US offices
- WSP <https://www.wsp.com/> - New York, New York

## Marine and Coastal Contractors

- Edwin Thoreson, Inc. (218)-387-1644 – Grand Marais, MN
- J.F. Brennan Company <https://www.jfbrennan.com/> - Duluth, MN
- Johnston Masonry – (218) – 525- 7278 – Duluth, MN
- Marine Tech, LLC <http://marinetechduluth.com/> - Duluth, MN
- Nordic Group <https://www.nordicuw.com/> - Duluth, MN
- S&C Masonry and Concrete (218) 387-9011- Grand Marais, MN
- Superior Construction Duluth <https://www.superiorconstructioncompany.com/> - Duluth, MN
- Veit & Company <https://veitusa.com/> - Duluth, MN
- W Labor (218) 370-8187 – Grand Marais, MN

## Restoration Contractors (All Minnesota based)

- Applied Ecological Services <https://www.appliedeco.com/>
- Boreal Natives/Prairie Restorations <http://www.prairieresto.com/>
- Miller Creek <https://millercreek.com/>
- Minnesota Native Landscapes <https://mnnativelandscapes.com/>
- Northern Ecological Services <https://www.necoservices.com/>
- Shoreview Natives <http://www.shoreviewnatives.com/>
- WSP <https://www.wsp.com/>

## Directories

### Engineer and Contractor Directories

- Academy of Coastal, Ocean, Port, & Navigation Engineers (ACOPNE) has a list of its members and their contact details: <https://www.acopne.org/board-certified-experts/diplomate-directory>
- American Council of Engineering Companies of Minnesota (ACEC/MN) identifies some of its members who work on private properties: <https://www.acecmn.org/>
- Duluth area chapter of the American Society of Civil Engineers (ASCE): <http://sections.asce.org/duluth/>
- Duluth Seaway Port Authority – Port Services Directory: <https://duluthport.com/>
- Minnesota chapter of the American Society of Civil Engineers (ASCE): <https://ascemn.org/>
- Thomas Register is a resource for finding professionals and suppliers across multiple industries (cost to use): <https://www.thomasnet.com/>
- WI Sea Grant’s list of Great Lakes coastal engineering firms and contractors: <https://www.seagrant.wisc.edu/our-work/focus-areas/coastal-processes-and-engineering/resources-for-property-owners/great-lakes-coastal-engineering-firms-and-contractors/>

### Restoration Contractor Directories

- DNR Native plant suppliers, landscapers, and restoration consultants for Minnesota: <https://www.dnr.state.mn.us/gardens/nativeplants/suppliers.html>
- Midwest Invasive Plant Network <https://www.mipn.org/cwma-resources/site-revegetation/site-revegetation-contractors/>

## Native Plant Suppliers and/or Contractors

- *Boreal Natives (a division of Prairie Restoration Inc.):* [www.prairieresto.com](http://www.prairieresto.com)
  - Location: 3943 Munger Shaw Road, Cloquet, MN 55720
  - To place an order, contact by phone at 218-729-9044 or fill out the online order information form here: [www.prairieresto.com/orders](http://www.prairieresto.com/orders)
- *Shoreview Natives:* [www.shoreviewnatives.com](http://www.shoreviewnatives.com)
  - Location: Two harbors, MN
  - To place an order, contact by phone 218-341-5286 or email [shoreviewnatives@gmail.com](mailto:shoreviewnatives@gmail.com)
- *Taproot Landscaping:* Alisa Berns, AOLCP
  - Location: Grand Marais, MN
  - Garden/landscape design, installation, maintenance
  - Contact by phone at 218-370-8946 or email at [taproot@boreal.org](mailto:taproot@boreal.org)
- *Frykman Art and Landscape:* Sharon and Steve Frykman
  - Location: Grand Marais, MN
  - Garden/Landscape design, installation, maintenance
  - Contact by phone at 218-387-1949
- *Lutsen Landscaping:* Matt Kartes
  - Location: Lutsen, MN
  - Landscaping
  - Contact by phone at 218-663-7910/218-779-4308
- *McMillan Tree Services:* Mike McMillan
  - Location: Grand Marais, MN
  - Able to assist with the purchase of larger trees; tree removal
  - Contact by phone at 218-370-0118
- *Northern Ecological Services:* Jeff Stedman, [www.necoservices.com](http://www.necoservices.com)
  - Location: 101 East Highway 61, Esko, MN 55733
  - Full-service restoration and land management company, project design, consultation, installation, and future maintenance
  - Contact by phone at 218-590-7835, [jestedman@necoservice.com](mailto:jestedman@necoservice.com)
- *Minnesota Native Landscapes:* Chris Hoye, [mnnativelandscapes.com](http://mnnativelandscapes.com)
  - Location: 8740 - 77<sup>th</sup> St NE, Otsego, MN 55362
  - Consult, design, implement and manage the process and landscape projects
  - Contact by phone at 763-295-0010, [info@MNLcorp.com](mailto:info@MNLcorp.com) or fill out an online form



- *Prairie Moon Nursery:* [www.prairiemoon.com](http://www.prairiemoon.com)
  - Location: 32115 Prairie Lane, Winona, MN
  - Sells a variety of native plants, visit website for ordering and contact information
- *Wild Ones: Native Plants, Natural Landscapes:*
  - Location: Northeast Minnesota
  - Promotes environmentally sound landscaping practices to preserve biodiversity through the preservation, restoration, and establishment of native plant communities.
  - MN & Western WI Native Plant Nurseries & Landscaping Services Listing
  - Visit websites for ordering and contact information:
    - Prairie Edge – Central Minnesota Chapter* [www.wildonesprairieedge.org](http://www.wildonesprairieedge.org)
    - Arrowhead – NE Minnesota Chapter* [arrowhead.wildones.org](http://arrowhead.wildones.org)
- *Xerces Society:* [xerces.org/pollinator-resource-center](http://xerces.org/pollinator-resource-center)
  - Native seed and plant vendor list information

## Free Sources of Trees (species vary)

Hedstrom Lumber, Grand Marais, MN [hedstromlumber.com](http://hedstromlumber.com)

Available to Cook County property owners or renters only during a limited sale period.

## Commercial Sources of Trees/Shrubs (Closer sources are better. Minimum order may apply)

- Hammarlund Nursery, Esko, MN [hammarlundnursery.com](http://hammarlundnursery.com) 218-879-3600
- Itasca Greenhouse, Cohasset, MN [www.itascagreenhouse.com](http://www.itascagreenhouse.com) 1-800-538-8733
- Prairie Restorations, Princeton, MN [www.prairieresto.com](http://www.prairieresto.com) 763-389-4342
- Maxwell's Woodland Nursery, Finland, MN 218-353-7726
- McMillian Tree Service, Grand Marais, MN 218-370-0118
- The Blue Moose, Grand Marais, MN 218-387-9303
- North Central Reforestation Inc. Evansville, MN 218-747-2622
- Lincoln-Oakes Nurseries, Bismark, ND [www.lincolnoakesnursery.com](http://www.lincolnoakesnursery.com) 701-223-8575
- Cold Stream Farm, Free Soil, MI [www.coldstreamfarm.net](http://www.coldstreamfarm.net) 231-464-5809
- PRT Growing Services, Ltd. Canada & Michigan [www.prt.com](http://www.prt.com)

## Government Sources of Trees/Shrubs (minimum order size may apply)

Cook County SWCD, Grand Marais, MN, [www.cookswcd.org](http://www.cookswcd.org) 218-387-3647

Lake County SWCD, Two Harbors, MN, [www.lakecountyswcd.org](http://www.lakecountyswcd.org) 218-834-8370

South St. Louis SWCD, Duluth, MN, [www.southstlouisswcd.org](http://www.southstlouisswcd.org) 218-723-4867

MN State Forest Nursery, Akeley, MN, [www.dnr.state.mn.us/forestry/nurseries](http://www.dnr.state.mn.us/forestry/nurseries) 218-652-2385

The Minnesota Department of Natural Resources (DNR) is providing this list of select resources and tools for coastal property owners. These resources cover a broad range of topics relating to coastal hazards, reducing risks, and important considerations unique to coastal properties. Please note that many of these resources are not specific to Minnesota's shoreline. Inclusion in this list is not any endorsement. *Revised May 2021*

## Coastal Hazards and Preparedness

### Erosion

[A Guide to Coastal Erosion Processes](http://seagrant.sunysb.edu) (seagrant.sunysb.edu)

Author(s): Charles O'Neill Jr., New York Sea Grant; 1985

Provides a good overview of the natural drivers of erosion.

[Living on the Coast](http://publications.aqua.wisc.edu) (publications.aqua.wisc.edu)

Author(s): US Army Corps of Engineers (USACE) & University of Wisconsin Sea Grant Institute; 2003

Overview of natural shoreline processes ranging from storm surges to erosion.

### Disaster Preparedness

[Ready](http://ready.gov) (ready.gov)

Author(s): Federal Emergency Management Agency (FEMA)

National resources for disaster preparedness and response.

[Ready North](http://readynorth.org) (readynorth.org)

Author(s): Ready North

Local guidance and resources for preparing and responding to natural disasters.

### Flooding

[Flood Factor](http://floodfactor.com) (floodfactor.com)

Author(s): First Street Foundation

Online tool to identify existing flood risk for your home and projections of future flood risk.

[Flood Forecasts](http://water.weather.gov) (water.weather.gov)

Author(s): National Weather Service (NWS)

Flood forecasts from the NWS-Duluth Office for Northeastern MN and Northwestern WI.

[Flood Map Service Center](http://msc.fema.gov) (msc.fema.gov)

Author(s): FEMA

Interactive online viewer to search for flood maps based on location.

Provides access to digital flood maps where available.

[Flood Preparation, Response, & Recovery](http://mndnr.gov/floodplain) (mndnr.gov/floodplain)

Author(s): DNR

Resources and guidance from the DNR on preparing for and responding to flooding at your home.

[National Flood Insurance Program](https://www.floodsmart.gov/) (floodsmart.gov)

Author(s): FEMA

Information about flood insurance for homeowners, businesses, and renters.

## Lake Superior Water Levels

[Lake Level Viewer](https://coast.noaa.gov/llv/) (coast.noaa.gov/llv)

Author(s): National Oceanic and Atmospheric Administration (NOAA)

Interactive map viewer that shows how changes in lake level across the Great Lakes might potentially impact the shoreline. You can raise or drop lake levels by up to 6 feet and understand potential impacts on your shore.

[Great Lakes High Water](https://lre.usace.army.mil/about/great-lakes-high-water/) (lre.usace.army.mil/about/great-lakes-high-water/)

Author(s): USACE

US Army Corps of Engineers webpage with all of its resources relating to high water levels on the Great Lakes.

[The Great Lakes Dashboard](https://glerl.noaa.gov/) (glerl.noaa.gov)

Author(s): NOAA & USACE

Viewer that shows monthly averages of water levels in all of the Great Lakes.

## Reducing Your Coastal Hazard Risks

### Adapting to Coastal Hazards

[Adapting to a Changing Coast](https://publications.aqua.wisc.edu/) (publications.aqua.wisc.edu)

Author(s): Wisconsin Sea Grant; 2017

Guide for different strategies that homeowners can take to adapt to coastal shoreline changes and hazards.

[Great Lakes Coastal Resilience Planning Guide](https://greatlakesresilience.org/) (greatlakesresilience.org)

Author(s): NOAA

Examples and guidance on coastal resiliency in the Great Lakes.

### Natural Shorelines and Vegetation Buffers

[Living Shorelines Academy](https://livingshorelinesacademy.org/) (livingshorelinesacademy.org)

Author(s): EPA, North Carolina Coastal Federation, Restore America's Estuaries

Guidance for homeowners on designing and implementing a living shoreline.

[Minnesota Shoreland Management Resource Guide](https://shorelandmanagement.org/) (shorelandmanagement.org)

Author(s): Minnesota Sea Grant

Interactive quick guide on managing shorelines and best management practices.

[Natural Infrastructure](https://coast.noaa.gov/digitalcoast/topics/) (coast.noaa.gov/digitalcoast/topics/)

Author(s): NOAA Digital Coast

Resources and tools on natural or nature-based infrastructure for coastal projects.

[Restore Your Shore](http://mndnr.gov/rys) (mndnr.gov/rys)

Author(s): DNR

Online tool that provides information and resources on shoreland restoration and projects.

[Shoreline Alterations: Lakescaping](http://mndnr.gov/publications/waters) (mndnr.gov/publications/waters)

Author(s): DNR; 2012

Explains the importance of vegetation buffers and the concept of lakescaping.

[Shoreland Properties](http://extension.umn.edu/lakes-and-wetlands/shoreland-properties) (extension.umn.edu/lakes-and-wetlands/shoreland-properties)

Author(s): University of Minnesota Extension

Guide with videos explaining best management practices for shoreland properties.

[Vegetative Best Management Practices: A Manual for Pennsylvania/Lake Erie Bluff Landowners](http://seagrant.psu.edu)

(seagrant.psu.edu)

Author(s): Pennsylvania Department of Environmental Protection; 2017

Although not all of the plants and legal considerations are relevant to Minnesota, this is an excellent handout for understanding how to protect bluff shorelines.

## **Water Runoff and Stormwater**

[Controlling Coastal Bluff Groundwater](http://nsgl.gso.uri.edu/) (nsgl.gso.uri.edu/)

Author(s): New York Sea Grant

Discusses strategies for addressing groundwater seepage in coastal bluffs.

[Lake Superior Homes and Gardens](http://lakesuperiorstreams.org) (lakesuperiorstreams.org)

Author(s): Lake Superior Streams

Guidance for coastal homeowners on managing stormwater and preventing water pollution at their home.

## **Protecting Your Shoreline**

### **Permits & Regulations Related to Coastal Properties**

[DNR Public Waters Permits](http://mndnr.gov/permits/water) (mndnr.gov/permits/water)

Author(s): DNR

DNR Public Waters permitting program is responsible for activities in Minnesota's shorelands.

[Shoreland Management Program](http://mndnr.gov/waters/watermgmt_section/shoreland) (mndnr.gov/waters/watermgmt\_section/shoreland)

Author(s): DNR

Information for Minnesota shoreland property owners and shoreland regulations.

[US Army Corps Regulatory Program](http://mvp.usace.army.mil/Missions/Regulatory/) (mvp.usace.army.mil/Missions/Regulatory/)

Author(s): USACE St. Paul District

Regulatory information on permits required from the USACE.

## Shoreline Protection and Modification

[Engineering with Nature](http://ewn.ercd.dren.mil) (ewn.ercd.dren.mil)

Author(s): USACE

Combining coastal engineering with natural processes.

[Erosion Management for New York's Great Lakes Shorelines](http://nsgl.gso.uri.edu/) (nsgl.gso.uri.edu/)

Author(s): Roy Widrig, New York Sea Grant

Guidance on managing erosion along the Great Lakes coasts.

[Great Lakes Coastal Shore Protection Structures and Their Effects on Coastal Processes](http://publications.aqua.wisc.edu)

(publications.aqua.wisc.edu)

Author(s): WI Sea Grant

Shore protection structure impacts to coastal shorelines.

[Maintaining Shoreline Erosion Control Structures](http://nsgl.gso.uri.edu/) (nsgl.gso.uri.edu/)

Author(s): New York Sea Grant

Guidance on care and maintenance needed for effective shoreline structures.

[Systems Approach to Geomorphic Engineering](http://sagecoast.org) (sagecoast.org)

Author(s): USACE, NOAA

Overview on nature-based and living shoreline stabilization.

[Ohio Coastal Design Manual](http://coastal.ohiodnr.gov) (coastal.ohiodnr.gov)

Author(s): Ohio Department of Natural Resources Office of Coastal Management; 2014

Designs specific to Lake Erie, but is a useful manual on engineering considerations when designing shoreline protection.

[Stabilizing Coastal Slopes on the Great Lakes](http://publications.aqua.wisc.edu) (publications.aqua.wisc.edu)

Author(s): Gene Clark, University of Wisconsin Sea Grant Institute; 2012

Guidance for maintaining stable slopes on coastal bluffs and banks.

[Structural Methods for Controlling Coastal Erosion](http://nsgl.gso.uri.edu/) (nsgl.gso.uri.edu/)

Author(s): Charles O'Neill Jr., New York Sea Grant; 1986

In-depth guidance on erosion control structures.

## Working with Engineers and Contractors

[Great Lakes Coastal Engineering Firms and Contractors](http://seagrant.wisc.edu) (seagrant.wisc.edu)

Author(s): University of Wisconsin Sea Grant Institute

List of engineering and contracting firms that specialize in coastal projects in the Great Lakes.

[Guidelines for Selecting a Marine Contractor](http://nsgl.gso.uri.edu/) (nsgl.gso.uri.edu/)

Author(s): New York Sea Grant; 2015

Tips on choosing a contractor and a glossary of common coastal structure terms.

[Working with Engineers and Contractors on Shore Protection Projects](http://publications.aqua.wisc.edu) (publications.aqua.wisc.edu)

Author(s): Gene Clark, University of Wisconsin Sea Grant Institute; 2012

Guidance for homeowners on selecting and working with engineers and contractors.

## Local Resources

### Contacts for Support and Assistance

[DNR Area Hydrologists](http://mndnr.gov/permits/water) (mndnr.gov/permits/water)

[Cook County Soil & Water Conservation District](http://cookswcd.org) (cookswcd.org)

[Lake County Soil & Water Conservation District](http://lakecountyswcd.org) (lakecountyswcd.org)

[South St. Louis County Soil & Water Conservation District](http://southstlouisswcd.org) (southstlouisswcd.org)

### Online Maps and Tools

[Cook County mAPP](http://cookcountymn.maps.arcgis.com) (cookcountymn.maps.arcgis.com)

Interactive map platform with property information for Cook County.

[Lake County Atlas](http://co.lake.mn.us/gis/) (co.lake.mn.us/gis/)

Interactive map with aerial imagery and property information for Lake County.

[North Shore Erosion Mapping Tool](http://ardc.org/CEHM) (ardc.org/CEHM)

Author(s): ARDC, DNR, NOAA, and partners

Interactive map with shoreline and erosion data for the Minnesota's Lake Superior shoreline.

[National Wetland Index \(NWI\) Wetland Finder](http://arcgis.dnr.state.mn.us/ewr/wetlandfinder/) (arcgis.dnr.state.mn.us/ewr/wetlandfinder/)

Author(s): DNR

Interactive map for locating wetlands in the state of Minnesota.

[St. Louis County Land Explorer](http://gis.stlouiscountymn.gov/landexplorer/) (gis.stlouiscountymn.gov/landexplorer/)

Interactive map platform with local property information for St. Louis County.

### Property Owner Guides

[The Property Owner's Resource Guide: Cook County](http://co.cook.mn.us) (co.cook.mn.us)

Author(s): Cook County, Minnesota; 2013

Guide for Cook County property owners and prospective buyers.

[Shoreland Stewardship Resource Guide](http://cookswcd.org) (cookswcd.org)

Author(s): Cook County Soil and Water Conservation District; 2019

Shoreland guide that highlights best management practices.

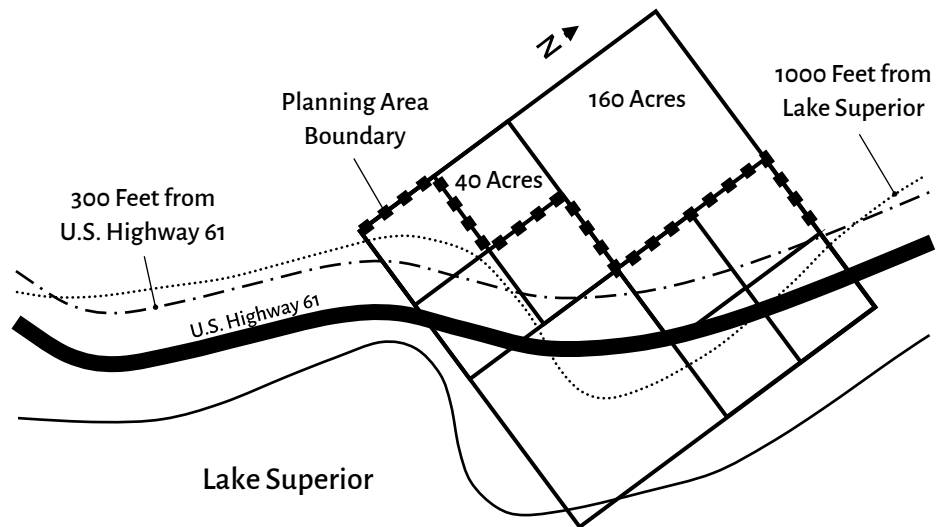
# Lake Superior Shoreland Properties

Minnesota’s Lake Superior shoreline has long been recognized for its stunning features and unique characteristics. Because Lake Superior is so different than other lakes in Minnesota, it was identified in the 1980s as a distinct management unit not adequately addressed by the existing Statewide Shoreland Management Program. A Joint Powers Board called the North Shore Management Board was formed in 1987 for the purpose of developing and implementing a management plan for the shoreland corridor of Lake Superior. Through coordination and cooperation with the DNR, the North Shore Management Plan, a shoreland management plan for Lake Superior’s North Shore, was adopted in 1988. [northshoremanagementboard.com](http://northshoremanagementboard.com)

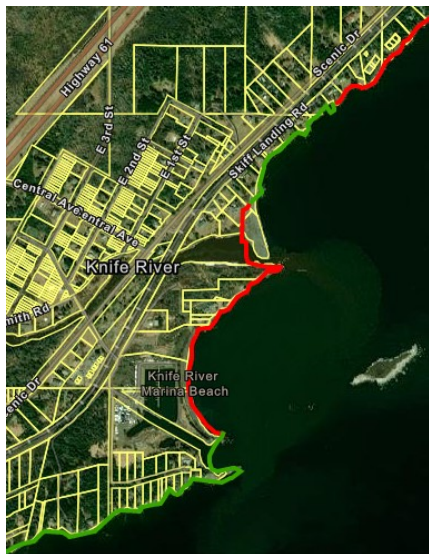
## North Shore Management Plan

The North Shore Management Plan specifies the minimum standards and criteria for the subdivision, use, and development of the Lake Superior shoreland, except for the city of Duluth’s planning area. Local units of government, such as Cook County, are required to adopt as restrictive or more restrictive standards than those contained in this plan. Specific regulations for Cook County are outlined in Article 8 of Cook County’s Zoning Ordinance #37.

The North Shore Management Plan area boundary is defined along the 40 -acre subdivision lines of the rectangular coordinate system established in the U.S. Public Land Survey. For a 40-acre parcel to be included in the plan it would need to have any portion of the parcel within 1000 feet of the Lake Superior shoreline or 300 feet from the center line of U.S. Highway 61.



## Coastal Erosion Hazard Mapping Tool



Coastal erosion impacts the Lake Superior North Shore community and environment by stressing Lake Superior water quality and nearshore biological communities through increased erosion and Coastal community infrastructure, economy, and resiliency considering increasing storm events. Current coastal erosion hazard mapping data does exist to mitigate and plan for stressors on the coastal community, but is not consistent, thorough, or readily available to the public. The main goal of the Coastal Erosion Hazard Mapping (CEHM) project is to develop a web-based mapping tool that can be used to confidently identify areas along Lake Superior’s North Shore that are susceptible to high rates of erosion.

To learn more about the Coastal Erosion Hazard Mapping Project and access the web-based tool, visit the Arrowhead Regional Development Commission (ARDC) website at [ardc.org/cehm](http://ardc.org/cehm).

# COOK & LAKE COUNTY FREQUENT CONTACT INFORMATION

## City of Grand Marais

City Hall ..... 218-387-1848

## City of Silver Bay

City Hall ..... 218-226-4408

## City of Two Harbors

City Hall ..... 218-834-5631

## Grand Portage

Trust Lands and Natural Resources Department

Front Desk ..... 218-475-2202

Housing Authority ..... 218-475-2552

Water/Sewer ..... 218-475-2212

## Land Use Permits/Grade and Fill Permits/ Stormwater & Erosion Control/Sub-Dividing Land

Before building a driveway or building on land in the County, contact the Land Services Department to obtain zoning requirements and information. If you are in the city limits, contact the City Clerk.

\* Cook County Land Services ..... 218-387-3630

\* Grand Marais ..... 218-387-1848

\* Lake County Planning & Zoning ..... 218-387-3630

\* Silver Bay ..... 218-226-4408

\* Two Harbors ..... 218-834-8806

## Property Assessments / Ownership

Property classification, estimated market and assessed property values, maps and current property ownership.

\* Cook County Assessor ..... 218-387-3650

\* Lake County Assessor ..... 218-834-8310

## Recorded Documents

Deeds, surveys, restrictive covenants, and property restrictions

\* Cook County Recorder ..... 218-387-3660

\* Lake County Recorder ..... 218-834-8347

## Sewage Treatment Systems

State law regulates sewage treatment system installation, including separation distance from wells, buildings, and property lines. Counties may have additional requirements and/or recommendations.

\* Cook County Environmental Health ..... 218-387-3630

[www.co.cook.mn.us](http://www.co.cook.mn.us)

\* Lake County Environmental Services ..... 218-834-8327

[www.co.lake.mn.us](http://www.co.lake.mn.us)

## Water Information

Basic information on streams and lakes: [www.cookswcd.org](http://www.cookswcd.org) or

[www.lakecountyswcd.org](http://www.lakecountyswcd.org) or [www.lakesuperiorstreams.org](http://www.lakesuperiorstreams.org)

## Solid Waste Management

Household garbage and hazardous waste, demolition material, and recycling.

\* Cook County Recycling Center ..... 218-387-3044

\* Lake County Recycling Center ..... 218-834-8373

## Surface Waters

Permits are needed for docks, culverts, beach development, stream and lakeshore stabilization and stream crossings when working in public waters and/or wetlands. Before diverting, withdrawing, impounding, or distributing any surface water, you must obtain a water use permit.

\* Minnesota DNR ..... 218-834-1441

[www.dnr.state.mn.us/permits/water/index.html](http://www.dnr.state.mn.us/permits/water/index.html)

## Water Quality

Livestock manure, pesticides, sediment, erosion, and shoreline stabilization concerns. Testing services, pollutants and spills that may impact both environment and health.

\* Cook County Soil & Water ..... 218-387-3647

\* Cook County Land Services ..... 218-387-3630

\* Cook County Extension ..... 218-387-3015

\* Lake County Soil & Water ..... 218-834-8370

\* Lake County Environmental Services ..... 218-834-8327

\* Lake County Extension ..... 218-834-8469

## Water Wells

All wells must be registered with the State of Minnesota. Your well driller should take care of your registration.

\* Water Testing Kits:

Cook County Environmental Health ..... 218-387-3630

Lake County Environmental Health ..... 218-834-8327

\* Minnesota Department of Health

Well Management Unit ..... 218-302-6166

[health.state.mn.us/wells](http://health.state.mn.us/wells)

## Wetlands

County Land Service Departments regulate activities in wetlands and permits are required. You may also need permits from local, state and federal governments for your projects.

\* Cook County Land Services ..... 218-387-3630

\* Lake County Planning & Zoning ..... 218-834-8327

\* US Army Corps of Engineers ..... 218-720-5291 ext. 35403

\* DNR Division of Waters ..... 218-834-1441

[bwsr.state.mn.us/wetlands-regulation-minnesota](http://bwsr.state.mn.us/wetlands-regulation-minnesota)

[www.dnr.state.mn.us/wetlands/index.html](http://www.dnr.state.mn.us/wetlands/index.html)

## Cook County Soil & Water Conservation District

411 W. Second St. Grand Marais, MN 55604

[www.cookswcd.org](http://www.cookswcd.org)

218-387-3647

## Lake County Soil & Water Conservation District

408 First Ave. Two Harbors, MN 55616

[www.lakecountyswcd.org](http://www.lakecountyswcd.org)

218-834-8370