

Blue Thumb's

# Resilient Shorelines Planning Workbook



A Project Guidebook for Stewarding Minnesota's Shorelines



# Table of Contents

Introduction .....	2
DIY Site Assessment Guide .....	3
Ordinary High Water Level .....	5
Plant Zones .....	6
Plant Zone Site Assessment Guide .....	7
Permits .....	8
Common Scenarios Guide .....	9
Are Permits Required for Your Shoreland Restoration? .....	11
Project Types .....	12
What are Your Project Goals? .....	14
Project Design	
Sketch Your Site .....	15
Plant Selection .....	16
Site Preparation .....	17
Planting .....	20
Caring for Your Project .....	21
Native Plants for a Shoreline Buffer .....	22
Beyond DIY Projects .....	24
Good Neighbor Guide .....	26
Additional Resources .....	27



Metro Blooms, a non-profit 501(c)(3) organization that partners with communities to create resilient landscapes and foster clean watersheds, embracing the values of equity and inclusion to solve environmental challenges. Metro Blooms coordinates the Blue Thumb program.



Blue Thumb is an education program sharing accessible clean water and native planting resources with Minnesotans to help protect our environment, change landscaping norms, and create a more sustainable future. We rely on the support of our network partners, which include nonprofits, governmental units, and companies in gardening and landscape design.

# Introduction

Minnesota's shorelines are in trouble. According to a July 2023 report by the Natural Shorelines Partnership, Minnesota has lost 40-50% of its natural shore and we lose more every year. Healthy, natural shorelines are essential for protecting water quality and fish and wildlife habitat.

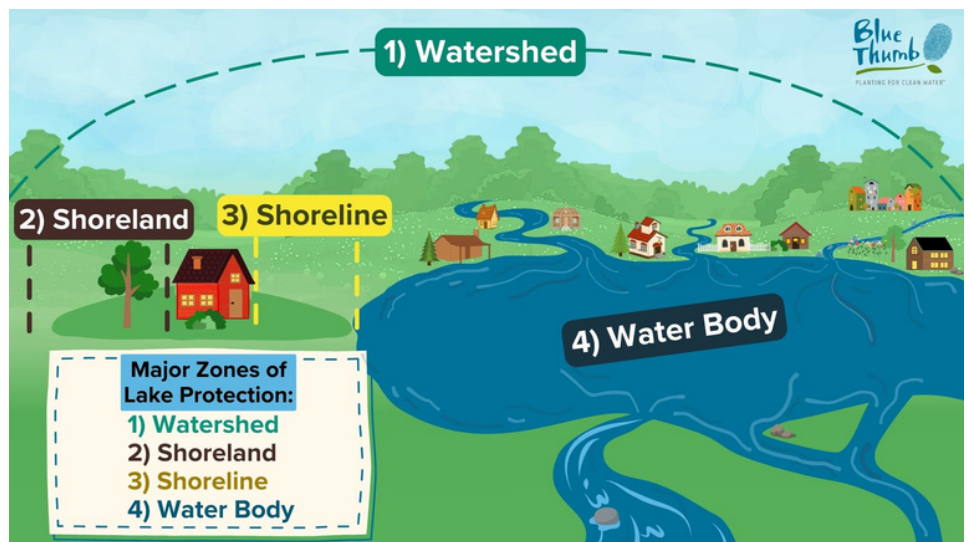
Shoreline restoration projects improve water quality, reduce erosion, create valuable wildlife habitat, can increase property value, and improve your enjoyment of your lake.

This workbook is designed to help you plan and complete a shoreline planting project, connecting you with agencies and resources you'll need along the way. The worksheets throughout are meant to help you reflect on aspects of your shoreline you may not have thought about before. They will also prepare you for conversations with permitting agencies. Unlike some garden projects, many shoreline restorations are not do-it-yourself projects. Don't let that scare you away, though! There are many resources to support you in a shoreline restoration, and many committed staff at local government agencies across the state who are ready to help.

## A Healthy Watershed = A Healthier Lake

Every lake, river, stream, and wetland is nestled within a watershed. A **watershed** is an area of land that drains to a common water body.

Imagine all of the water that falls during a rain storm. Where does that water go? As the water travels across the landscape, it can be absorbed into the soil or it can flow over hard surfaces directly to our lakes and rivers.



Water that infiltrates into the ground picks up fewer pollutants and is naturally filtered as it makes its way into the soil or is absorbed by trees and plants. Water that flows across hard surfaces, like roofs and roads, is contaminated by pollutants as it flows, carrying them directly to our lakes and rivers. All of that runoff has a major impact on the health and water quality of our water bodies.

We can protect Minnesota shorelines and water by taking action in every area of our watersheds. When you think about the role of your watershed on our lakes and rivers, it's no wonder we say every Minnesotan lives on shoreline property!

# DIY Site Assessment Guide

Conducting a site assessment is the first step of a shoreline restoration project. A site assessment helps you understand the health of your shoreline, what can be improved, and what to do next. This will inform plant selection and clean water solutions for your property, and help you determine whether your project is DIY or will require more assistance.

Use the following worksheets to assess the overall health of your lake, the condition of your shoreline, and on-land factors that will impact your restoration project. Take your time to gather accurate information – knowing as much as you can before you start your project may help you avoid costly mistakes later on.

1. Describe the color and clarity of the water:

---

2. How steep is the slope to the water?

- Relatively flat, gradual slope    Less than a 45 degree angle    More than a 45 degree angle    Nearly vertical

3. What does your shoreline treatment look like?

- Riprap (large rocks)    Retaining wall    None    Other

4. What is the condition of the shoreline treatment?

- Excellent    Good    Fair    Poor    Failing

5. Describe the waves on your shoreline:

- Severe    Moderate    Infrequent    Minimal

6. What is the source of the waves?

- Wind    Boat traffic/jet skis    Other \_\_\_\_\_

7. What is the approximate distance to the shore on the opposite side of the lake?

(This distance is called the “fetch”.)

---

8. Is an ice ridge present?

- No    Yes

If yes, how high \_\_\_\_\_



*Image of ice ridge on Lake Miliona, from MN DNR*



# DIY Site Assessment Guide

9. Does the water level of your lake change throughout the year?

- Yes, with the seasons       Yes, controlled by a dam       Yes, it is noticeable after rain       No, it is stable

10. Is there evidence (such as gullies or bare ground) of run-off entering the lake?

If yes, are there contributing factors to the run-off or erosion?

- No       Yes
- |  |                                     |  |
|--|-------------------------------------|--|
| <input type="checkbox"/> Roof / downspout              | <input type="checkbox"/> Ice ridges | <input type="checkbox"/> Construction on site              |
| <input type="checkbox"/> Bare soil in garden/play area | <input type="checkbox"/> Waves      | <input type="checkbox"/> Run-off from neighboring property |
| <input type="checkbox"/> Compost/brush on steep hill   | <input type="checkbox"/> Path       | <input type="checkbox"/> Flooding                          |
| <input type="checkbox"/> Failing retaining walls       | <input type="checkbox"/> Poor turf  |  |

11. Do you have erosion? What types, and where? For additional information on shoreline erosion, visit the DNR's Restore Your Shore resource: <https://www.dnr.state.mn.us/rys/sl/commonproblems.html>.

- Undercut banks       Gullies       Ground settling

12. Are there excess nutrients running off into the lake?

- Over-fertilized lawn/garden       Run-off from driveway/sidewalk/roof       Pet waste  
 Lawn clippings/leaves       Fire ring near water       Failing septic  
 Other \_\_\_\_\_

13. Describe land alterations such as fill, excavation, foundation:

---

---

14. Describe the number and types of properties around the lake. Example: 12 houses on forested lots, 1 apartment complex.

---

---

15. Have you called Gopher State One Call (811) to have public utilities marked on your property? Check out page 17 for more information on marking utilities.

---

---

16. Do you have any private utility lines on your property?

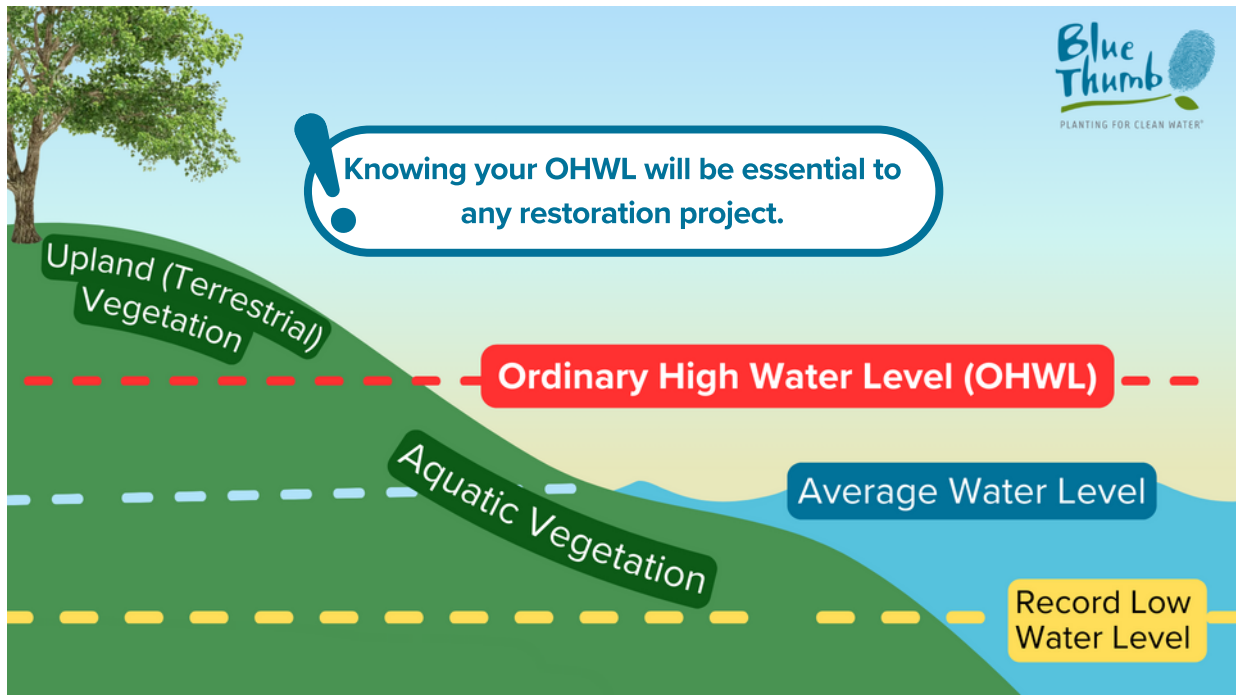
---

---

Another helpful tool is the DNR's **Score Your Shore** tool, an in-depth questionnaire designed to assess the health and habitat conditions of developed lakeshore lots. Check it out online at: <https://www.dnr.state.mn.us/scoreyourshore/index.html>

# Ordinary High Water Level

It is very important to identify the Ordinary High Water Level (OHWL) before attempting to alter your shoreline. The definition of OHWL from Minnesota Statutes is below. Any work done below the OHWL is subject to additional rules and permits in order to protect our lakes and shorelines.



## Minnesota Statutes 103G.005

Subd. 14. Ordinary High Water Level. “Ordinary High Water Level” means the boundary of waterbasins, watercourses, public waters, and public waters wetlands, and:

1. the Ordinary High Water Level is an elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial;
2. for watercourses, the Ordinary High Water Level is the elevation of the top of the bank of the channel; and
3. for reservoirs and flowages, the Ordinary High Water Level is the operating elevation of the normal summer pool.

Contact your DNR Waters Area Hydrologist to determine your OHWL:  
[https://files.dnr.state.mn.us/waters/area\\_hydros.pdf](https://files.dnr.state.mn.us/waters/area_hydros.pdf)

# Plant Zones

To successfully complete your site assessment, you will need to familiarize yourself with the different plant zones found on your shore. These divide the shoreline into categories based on the types of plants best suited for their growing conditions.

- **Upland:** This is the uppermost plant zone on a shore. The Upland zone is a moist to dry area, and many of its plants tolerate drier conditions.
- **Transitional:** This plant zone is located directly below the Upland zone and has moist to saturated soil. This zone marks the change between the wet, low areas of the shore from the dry upland areas. The Upland and Transitional zones may have trees, shrubs, wildflowers, grasses, sedges, rushes, or ferns. Plants in these zones are critical for holding sediment in place and preventing erosion, and absorbing nutrients from stormwater runoff, like nitrogen and phosphorus.
- **Emergent:** The Emergent zone is the area of shallow water. It is characterized by “emerging” vegetation: aquatic plants with their roots underwater but stems and leaves that grow above.
- **Aquatic:** The Aquatic zone is always submerged and has floating vegetation. Plants in the Emergent and Aquatic zones provide critical habitat for fish, amphibians, and other wildlife, break wave action, and stabilize the lake bottom.





# Plant Zone Site Assessment Guide

Upland
Transitional
Emergent

	Upland	Transitional	Emergent
<b>Area</b> Length x Width			
<b>Soil type</b> Sand, Loam, Silt/Clay, Gravel (less than 2”), Rubble (2-10”), Boulders ( more than 10”), Other _____			
<b>Sun Exposure</b> <ul style="list-style-type: none"> <li>Full sun (6-8 hours)</li> <li>Partial sun (3-4 hours)</li> <li>Full shade (less than 3 hours)</li> </ul>			
<b>Describe existing vegetation</b> Turfgrass, mostly invasive plants, mix of invasive & native plants, mostly native plants. Check out Blue Thumb website’s <a href="#">Resources</a> page under the “Learn” tab for plant ID resources.			
<b>Are there any special features, such as</b> rare plants, high quality wildlife habitat or wildlife?			
<b>Do you have nuisance plants and/or</b> <b>animals</b> (for example purple loosestrife, buckthorn, flowering rush, Canada geese, invasive carp)?			



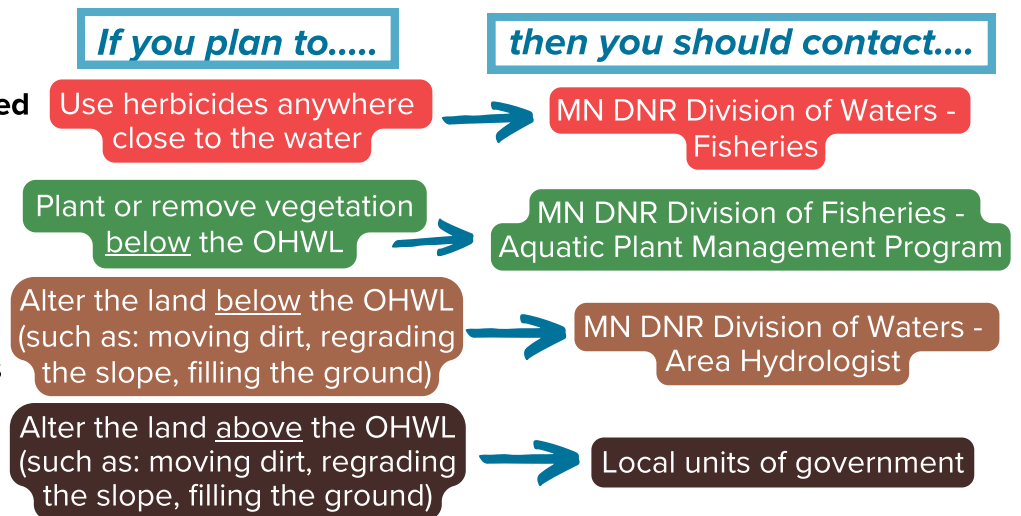
# Permits

As exciting as planning your shoreline project is, it is important to make sure your plans abide by all of the rules and regulations regarding shorelines in Minnesota. Depending on the location and type of project you are planning, one or more permits may be required from various units of government.

There are four major entities you will work with regarding shoreline regulations and permits: (1) local government units like cities, counties, and townships, (2) watershed districts and watershed management organizations, (3) Minnesota Department of Natural Resources, and (4) soil and water conservation districts.

**Your local unit of government should be your first point of contact**, as they often set local regulations around shorelines and manage permitting for shoreline projects. The permitting entity can vary, as can processing times for permits, so reach out early in your project planning stages.

Your shoreline may also fall within the boundaries of a **watershed district or watershed management organization (WMO)**. These government agencies manage projects and regulations regarding water resources within their watershed. Watershed districts and WMOs can also manage permits for shoreline projects within their boundaries.



Not every area of Minnesota has a watershed district or WMO, but you can check if you live within a watershed district at [www.mnwatersheds.com/maps](http://www.mnwatersheds.com/maps).

The **Minnesota Department of Natural Resources (DNR)** sets the standards for shorelines across the state. Shoreline projects must meet DNR regulations.

Lastly, **Soil and Water Conservation Districts (SWCDs)** are local government agencies who can be a great resource for your project. They usually don't have regulatory authority, but may provide technical assistance and possibly connect you with grant opportunities as you plan.

The permitting process may seem overwhelming, but these requirements help protect Minnesota shorelines. Ensuring that your project abides by these rules ensures that your project benefits our water!

# Common Scenarios Guide

Project Type	Who to Contact	When is a DNR Permit Required?	Additional Regulations
<b>Clearing trees</b>	City/county zoning admin to determine if the property is within a special management district	If removing more than 10-20% of trees and shrubs (within MN shoreland management districts)	Depending on your area, other local rules apply (i.e. watershed buffer rules)
<b>Creating a beach</b>	City/county and watershed district (at least 7 days in advance)	<p>If....</p> <ul style="list-style-type: none"> <li>Covering emergent vegetation, unless already authorized by an Aquatic Plant Management permit from DNR Fisheries</li> <li>Creating a beach in a posted fish spawning area</li> </ul>	<ul style="list-style-type: none"> <li>Clean, inorganic sand or gravel, free of pollutants and nutrients</li> <li>No more than 6 inches thick, 50 feet wide along the shore, or one-half the width of the lot (whichever is less), and no more than 10 feet waterward of the OHWL.</li> <li>Installation of sand or gravel may only be repeated once at same location, not exceeding same amount and dimensions of the original sand blanket</li> </ul>
<b>Building a dock</b>	City/county to check on local zoning regulations	<p>If...</p> <ul style="list-style-type: none"> <li>The dock is within posted fish spawning areas</li> <li>The dock will be wider than 8 feet</li> <li>If you will be removing aquatic vegetation during installation of the dock</li> </ul>	<ul style="list-style-type: none"> <li>Should not obstruct navigation or create a safety hazard</li> <li>Should not harm fish and wildlife habitat</li> <li>Must allow water to flow freely beneath</li> <li>Cannot be a boat house or human habitation masquerading as a dock</li> </ul>

# Common Scenarios Guide

Project Type	Who to Contact	When is a DNR Permit Required?	Additional Regulations
<p><b>House addition</b></p>	<p>City/county zoning admin</p>	<p>N/A, but you will likely need a building permit</p>	<ul style="list-style-type: none"> <li>• You will need to meet minimum setback requirements (St. Croix Riverway bluff and OHWL setbacks, city/county/watershed shoreline setbacks)</li> <li>• There may be buffer rules that prohibit you from removing trees or other vegetation to build the addition</li> <li>• You cannot exceed impervious surface percentage limits (i.e. 20% for St. Croix Riverway)</li> <li>• You may be required to include raingardens or other features to mitigate increased runoff</li> </ul>
<p><b>Building a fire ring</b></p>	<p>City/county and watershed district if the fire ring will create new impervious surfaces near shoreline or require extensive vegetation clearing</p>	<p>N/A</p>	<p>N/A</p>

# Are Permits Required for Your Shoreland Project?

If you answer yes to any of the four following questions, you may need a permit.

1. Will your project involve herbicide use in or near the water?

No  Yes

If yes, contact the MN DNR Division of Waters – Fisheries serving the area where your shoreline property is located. Find the list here: <https://www.dnr.state.mn.us/areas/fisheries/index.html>

2. Will your project involve planting or removing plants *below* the Ordinary High Water Level?

No  Yes

If yes, contact the MN DNR Division of Fisheries – Aquatic Plant Management Program. Check out their website here: <https://www.dnr.state.mn.us/apm/index.html>. They want to make sure that you are not removing beneficial plants. They will also want to know what you are planting and where you are getting the plants from. They want to ensure that native plants are planted, not invasive non-natives.

3. Will your project involve altering the shoreland (i.e. moving dirt, filling, regrading the slope) *below* the Ordinary High Water Level?

No  Yes

If yes, contact MN DNR Division of Waters- Area Hydrologist: [https://files.dnr.state.mn.us/waters/area\\_hydros.pdf](https://files.dnr.state.mn.us/waters/area_hydros.pdf)

4. Will your project involve altering the shore (i.e. moving dirt, filling, regrading the slope) *above* the Ordinary High Water Level?

No  Yes

If yes, contact your local units of government. You will probably need to submit your plan for review. Upon review, it will be determined whether or not your project will need to be permitted.



# Project Types

There are many projects you can undertake on your property that can have a positive impact on water quality and your shoreline. Choosing which project to tackle will be informed by many factors including the current state of your shoreline, your budget, timeline, and project goals. Remember, this project does not need to be the complete solution to restoring your landscape, it can just be the first step.

## Shoreline Restoration

Projects that intend to revive your shoreline to a natural state are considered shoreline restorations. Restored shorelines use a diversity of native plants to stabilize existing shoreline, capture and filter runoff, and create vital habitat for fish and wildlife. Shoreline restorations have incredible benefits on the health of our water bodies. Restored shorelines are better able to infiltrate runoff before it reaches the lake, resulting in better water quality and clarity. Restored shorelines also maintain existing shore by protecting against wave and ice erosion. Shoreline restoration projects often involve work below the Ordinary High Water Level and are subject to permitting and regulations. A complete shoreline restoration may even involve planting in the water. Because of the complexity of these projects, you will need to be in communication with your local government units. We highly recommend working with an experienced contractor.



*Photo: Dakota Soil and Water Conservation District*



*Photo: Metro Blooms Design+Build*

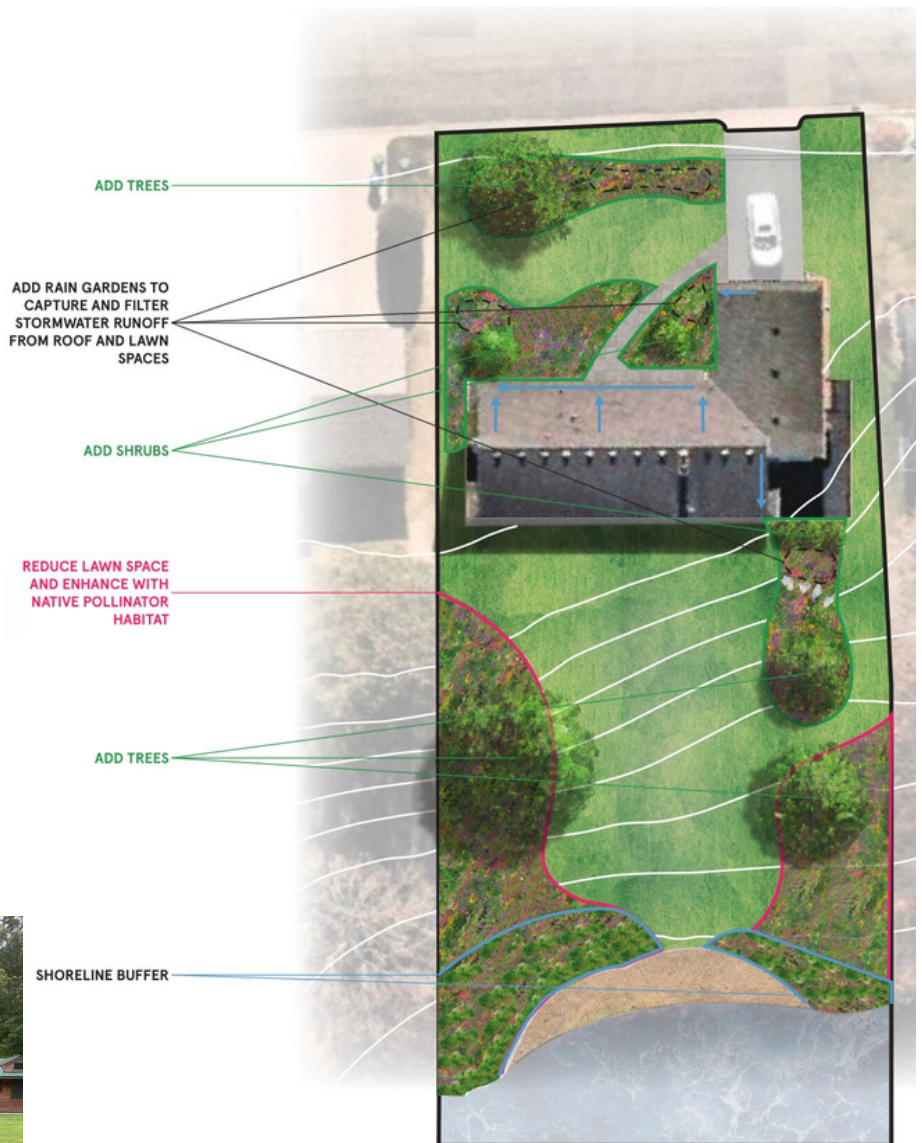
## Buffers

Another project option for your shoreline is to add a buffer planting. Buffers are simply a strip of native vegetation between developed land, like your yard, and the water's edge. Wider buffers create larger areas of native vegetation for pollinators and birds to use and have a larger capacity for infiltrating stormwater runoff. Large buffers can extend above and below the Ordinary High Water Level.

# Project Types

For areas below the Ordinary High Water Level, planting a buffer will be subject to appropriate permitting. Planting a buffer above the OHWL, however, often doesn't require a permit and can be accomplished as a DIY project. Buffer projects above the OHWL can include planting a new buffer or increasing the depth of an existing buffer!

When planting a buffer, diversity is key. You can choose to plant your entire buffer with native flowers, grasses, sedges, and rushes with a low enough growth height not to obstruct your view of the lake. But, including native trees and shrubs will be the most beneficial for restoring habitat and promoting clean water. Regardless of the specific plant species you choose, an important maintenance goal of a buffer is to prevent mowing all the way down to the lake. This doesn't mean losing access to the water completely! Instead, think about incorporating your water access paths into your buffer, having them wind through your planting so you can appreciate the beauty of the water and the beauty of your buffer.



*Photo and Illustration: Metro Blooms Design+Build*

# What are Your Project Goals?

**Question 1:** Check off the items you would like to include in your project:

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> pollinator garden       | <input type="checkbox"/> sunny spot               | <input type="checkbox"/> dock for fishing or swimming                                 |
| <input type="checkbox"/> flower garden           | <input type="checkbox"/> shady spot               | <input type="checkbox"/> a place to store the dock and boat-lift in winter            |
| <input type="checkbox"/> vegetable garden        | <input type="checkbox"/> privacy                  | <input type="checkbox"/> a place to store a canoe / boat in winter                    |
| <input type="checkbox"/> less lawn / less mowing | <input type="checkbox"/> view of lake from house  | <input type="checkbox"/> vehicle access to lakeshore (boat launch and/or maintenance) |
| <input type="checkbox"/> lawn for recreation     | <input type="checkbox"/> a path to the lake       | <input type="checkbox"/> other needs:   |
| <input type="checkbox"/> more trees              | <input type="checkbox"/> swimming beach           |   |
| <input type="checkbox"/> a quiet place to sit    | <input type="checkbox"/> deter geese              |   |
| <input type="checkbox"/> fire pit / grill        | <input type="checkbox"/> remedy drainage problems |   |
| <input type="checkbox"/> pet area                | <input type="checkbox"/> fix erosion problem      |   |

**Question 2:** Compare how you currently spend your time in your yard with how you would like to spend your time. Put a ✓ by your current activities, and a ★ by those you hope to do in the future.

- |   |  |
|---|--|
| <input type="checkbox"/> Fishing          | <input type="checkbox"/> Mowing                    |
| <input type="checkbox"/> Wildlife viewing | <input type="checkbox"/> "Weeding" your shoreline  |
| <input type="checkbox"/> Swimming         | <input type="checkbox"/> Relaxation / viewing lake |
| <input type="checkbox"/> Boating          | <input type="checkbox"/> Other:                    |

**Question 3:** Consider:

Do you have a preferred landscape style? Are you looking for a more wild or manicured garden?

---

What is your desired viewscape? What views do you wish to preserve or create?

---

What features do you want to highlight?

---

What areas need a visual screen?

---

Do you have any future building or site alteration plans?

---

What structures (docks, paths, steps, fences, beach etc.) need to be relocated or removed to accomplish project goals?

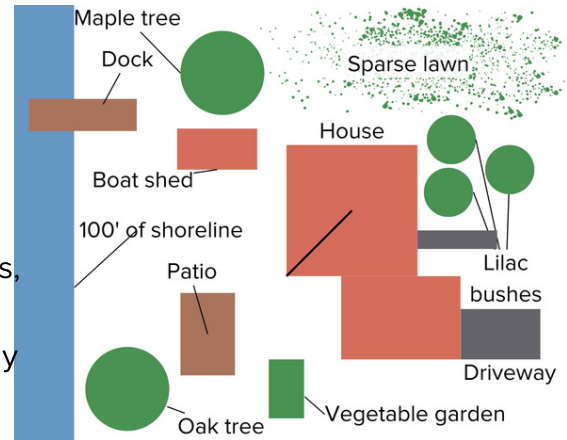
---

# Project Design: Sketch Your Site

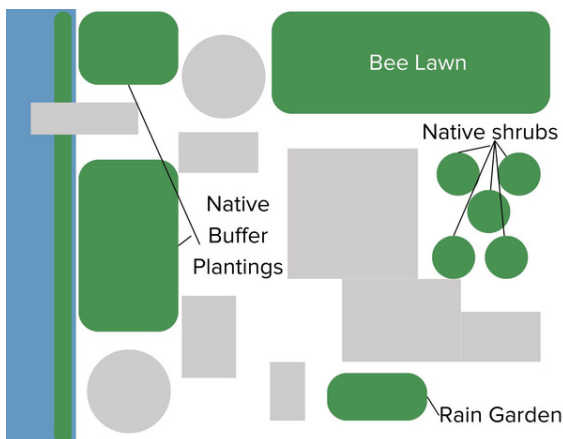
## Step 1: Start with a site sketch!

Include existing site conditions and measurements. House plans or plat maps may be helpful to get started. Include all major existing features such as:

- House and sheds
- Patio/deck
- Property lines
- Shoreline
- Existing beach/access area/dock
- Existing vegetation – trees, shrubs, gardens, etc.
- Recreation areas – swimming, play
- Other



## Step 2: Draw “bubbles” incorporating your project goals



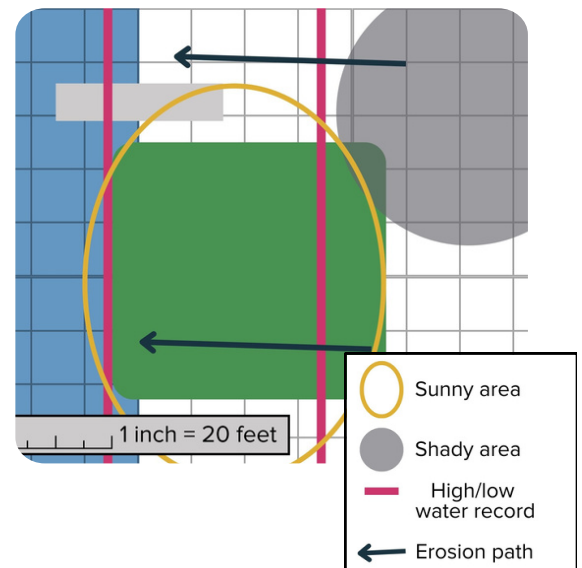
“Bubble in” features you would like to add based on your project goals. Remember to highlight areas for preservation, identify the buffer setback zone, screening and other preferences and project goals.

Some people use a garden hose or rope to mark off different areas. Doing this may help you visualize the actual size and shape of your plans so you can sketch it in.

## Step 3: Transfer your site sketch into a “to scale” base map on graph paper. Use a convenient scale like 1” = 10’

Consider including the following important features defined on your site assessment to keep in mind as you plan:

- Water level history – Ordinary High Water Level (OHWL) and record high/low water lines
- Shoreline zones (aquatic, transitional, and upland)
- Soil type (sand, clay, loam) in aquatic, transitional, and upland zones
- Soil moisture (areas excessively wet or excessively dry)
- Existing vegetation (trees, shrubs, grasses, wildflowers, invasive species)
- Sun exposure – sunny and shady areas
- Potential buffer setback (25’ from shore)
- Slopes, drainage patterns, eroding areas





# Project Design: Plant Selection

## Step 4: Design Your Planting

Height, color, bloom time, soil type, sun exposure - there are so many things to consider when designing your garden that it can be overwhelming. A good place to start is with existing design templates or shoreline plant lists, including the ones in this workbook and more on the Blue Thumb website: <https://bluethumb.org/public-resources/>.

The types of plants you use will impact the number of plants you need to fill your space. A good rule of thumb for most shoreline plants is to use a plant spacing of about 18 inches. To estimate the number of plants needed, multiply your desired planting square footage by 0.5.

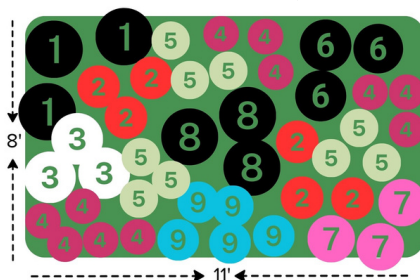
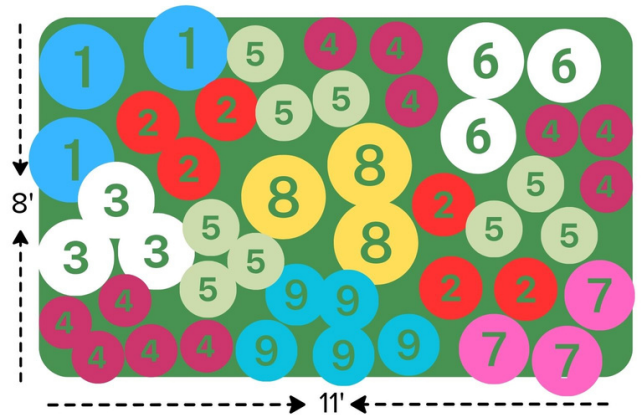
Most plants are 2-4' tall, but consider height as you plan and put the taller plants in the back or middle and shorter plants on the edges. Think about placing colorful and showy flowers where they will be most visible, and place hardier sedges and grasses behind, where their strong, fibrous root systems can work to stabilize the shore.

### Create your own plant design

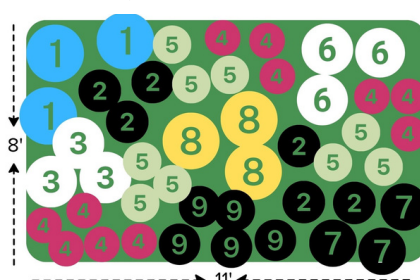
1. Use tracing paper to draw the free-form shapes of each plant grouping.
2. Divide the shapes up into different times of bloom. Consider using separate sheets of paper to create layers for each season of blooms. One layer will be spring blooming plants, the next summer blooming and another for fall blooming plants.
3. Color in the shape with the bloom color. Number the shape and create a key with the plant species corresponding to each number.

### Sample: Shady Native Plant Garden

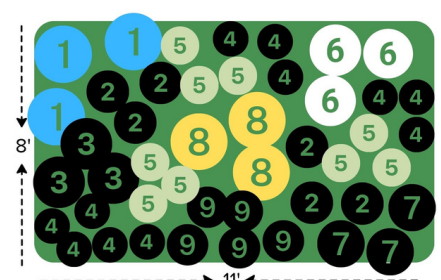
1. Big-leaved Aster (*Aster macrophyllus*)
2. Columbine (*Aquilegia canadensis*)
3. Tall thimbleweed (*Anemone virginiana*)
4. Wild Ginger (*Asarum canadense*)
5. Bottlebrush Grass (*Elymus hystrix*)
6. White Turtlehead (*Chelone gabra*)
7. Wild Geranium (*Geranium maculatum*)
8. Zig Zag Goldenrod (*Solidago flexicaulis*)
9. Jacob's Ladder (*Polemonium reptans*)



Spring Bloomers



Summer Bloomers



Fall Bloomers

# Site Preparation

Properly preparing a site supports plant survival, reduces the amount of weeding needed later on, and sets your new shoreline planting up for success. Site preparation, planting, and maintenance are significantly different for **DIY buffer projects** and **shoreline restoration projects**.

**This section will focus on DIY buffer projects**, with a brief explanation of some methods that may be utilized in a permitted shoreline restoration. Site preparation consists of several steps: marking out your project area, clearing existing vegetation, and adding erosion control mechanisms. Grab some friends, gather your tools, and get started!

## Marking It Out

Start by marking the outlines of your design, like the buffer edge. A **tape measure** and a **rope** or **garden hose** can be used to transfer the lines from the plan onto the ground. You can also use **spray paint**, **flagging** or **stakes** and **twine**. When it is time for planting, these markings will help you place the plants within the appropriate zone.



Depending on the complexity of the planting plan, you may want to mark additional areas. For example, if you have designated a path or seating area, mark it on the ground so you do not accidentally plant within that area. In a more formally designed buffer, you can mark areas of plant groupings. Remember to mark off and protect areas that you've identified as existing native plant communities. In some cases you may find just a few remaining native plants that you want to flag and protect.

## Locating Utilities

A crucial step to marking out your project is identifying underground utilities, pipes, electrical lines, and anything else that might be impacted by your project. Doing this at the beginning of your project will keep you and anyone working on the project safe, and protect you from costly and dangerous mistakes.

**Call 811 (Gopher State One Call) for an accurate marking of underground utilities.** Privately-owned underground lines will not be marked by 811, so it's important for you to identify whether there are any other underground lines: common private lines are heating systems for pools, electricity for outbuildings and garages, invisible fences, septic systems, fiber optic lines, and satellite dishes. If you think you might have any of these and don't know where they are, contact a private utility locator. **Once your utilities have been marked, respect the marks! Only use hand tools to dig within 24 inches of marked utilities.**

# Site Preparation

## Getting Rid of Unwanted Vegetation

Site preparation begins with eliminating non-natives and lawn in the areas where you are going to plant. Thoroughness and patience are essential for success. You can prepare the site in several ways: remove lawn with a **sod kicker**, solarize with **clear plastic**, or sheet mulch with **cardboard**. In difficult situations, you may need to consult with a professional about using herbicides. Avoid using heavy equipment because it will compact the soil and make it difficult for new plants to grow.

### Suggested supplies:

- sod kicker
- shovel
- clear, UV stable plastic (4 or 6 mil)
- cardboard
- mulch
- gas-powered sod cutter

- **Sod removal** helps clear the space for planting, and can also help remove weed roots and seeds. For smaller areas, **sod kickers** and **shovels** should be sufficient – for larger areas, you can rent a **gas-powered sod cutter**.
- **Solarization** uses **clear, UV-stable plastic (4 or 6 mil)** to raise the soil temperature high enough to kill weed seeds. The weather must be sunny and hot for this method to be effective. It is best to start one growing season prior to planting. After 5-6 months, it will be possible to plant directly through the dead sod, which can help control erosion. Do not cultivate or till deeper than 1-2 inches with this method to avoid bringing up weed seeds that will compete with the native plants.
- **Sheet Mulching** layers **cardboard** and **mulch** to smother existing vegetation and weed seeds. It is no-till and low-disturbance. It should be started in late fall for spring planting or early spring for fall planting.
- **Herbicides:** Herbicides should be used only under consultation with your local SWCD, or local government unit. You will need a permit if you are planning on applying herbicide below the OHWL.



*Example of Sheet Mulching*

## Soil Amendments

Soil amendments are generally **not necessary** for native plants. Native plants evolved in the soils of our region, adapting to harsh growing conditions and various soil types. Over time, native plant roots naturally improve the soil through decompaction and supporting vast networks of soil microorganisms. You can support soil microorganisms by adding organic matter in the form of **weed-free compost or mulch**.

## Site Alterations

If your buffer project includes re-contouring the slope of your hillside or increasing impervious surfaces, you need to check with your local government about permit requirements. Re-contouring the site may include adding fill to erosion gullies and reshaping. Installation of hardscapes may include paths, patios, borders, edging, terraces, fire pits, irrigation or lighting systems. In cases of very slight erosion, recontouring is not necessary; the plantings should stabilize the shore.

## Mulching the Upland

We recommend mulching all new projects to increase success for the planting. Mulch holds moisture, helps control weeds and gives a more landscaped look for those who may have concerned neighbors. Landscape fabric is **not** recommended because it decreases soil aeration and may be detrimental to the new planting.

On upland, flat areas or shallow slopes you can directly apply a thick layer of mulch over solarized turf. Double shredded hardwood mulch is preferred as it does not float like regular wood chips. Avoid using manure and compost as mulch alternatives since they can deposit nutrients into the lake. You only need to maintain the mulch until the plants mature to fill in the space, typically in 2-3 growing



seasons. The mulch depth will depend on plant height – use 2 inches for small seedlings and up to 4 inches in depth for larger shrubs and trees. Apply after planting trees and shrubs and before planting plugs. Move mulch aside before digging each hole and replace mulch around plant when finished.

# Planting

Plant upland species in spring or fall during cooler weather. Summer plantings can be successful if regularly watered.

When planting large areas, a 12 volt or higher cordless drill equipped with a bulb auger can make the job easier and quicker. For each plant, simply clear away the mulch and drill a hole into the soil similar in depth to the plant plug. It works well to have one person do the drilling and others follow along and plant the plugs. Bulb augers can be purchased at your local nursery supply or hardware store. If you don't have a drill, a hand trowel works well too.



## Plugs & Containerized Plants

Native plants are often grown in packs. Keep plants watered and in the shade until planted. Soak thoroughly before removing from the container to plant. After planting, dry roots tend to reject water. Tap container upside down to remove plant, and then gently pry the roots apart.

**Correct Planting Depth:** Place plants at the correct depth in the soil so that the top of the root ball is level with the soil surface.

**Labeling:** Label a few of each species to avoid mistaking them later for weeds.

**Signage:** Signs educating neighbors about the benefits of your restoration may encourage people to respect the project and consider their own shoreline restoration. Some shoreline restorations post a sign on their dock to reach neighboring boaters.



**Watering:** Deep soaking is necessary to reach the root system. During the first year, make sure your plants get at least 1 inch of water per week, either from rain or supplemental watering. Set up a rain gauge near the planting to track rainfall. A good soaking (sprinkler for an hour) is better than frequent watering for briefer times. After plants mature, you should only need to water during times of drought.

# Caring for Your Project

A natural shoreline reduces maintenance time and costs when compared to conventional methods. However, maintenance for the first several years until well established is crucial for a successful project. During the first year, set a regular time to weed your planting and stick to it. If left untended, invasive non-natives generally establish a foothold or take over.

## Anticipated maintenance tasks:

Maintenance Item	Year 1	Year 2	Year 3
<b>Watering (transitional and upland plants)</b>	Daily - weekly, aiming for 1"/week	Only if drought	Only if drought
<b>Fertilizing</b>	None: this only encourages problem plants	None: this only encourages problem plants	None: this only encourages problem plants
<b>Weed control</b>	Weekly - monthly	Monthly	Spot weed monthly
<b>Plant replacement</b>	NA	Spring or fall as necessary	Spring or fall as necessary
<b>Erosion control structure repair</b>	Ongoing inspection, repair as necessary	Inspect after storm, repair as necessary	Inspect after storm, repair as necessary
<b>Wavebreak repair and removal</b>	Ongoing inspection, request repair as necessary	Ongoing inspection, request repair as necessary.	Structures should be removed.
<b>Fencing/exclosure</b>	Critical if geese are a problem	Use as necessary	Use as necessary
<b>Tree &amp; shrub pruning</b>	None	Remove dead/diseased branches in late winter	Remove dead/diseased branches in late winter, prune to shape

# Native Plants for a Shoreline Buffer

The following section includes a list of Minnesota native plants that would do well in a shoreline buffer planting. This list is by no means exhaustive and we encourage you to explore the Blue Thumb Plant Finder, DNR Native Plant Encyclopedia, and the Blue Thumb Resources page to find additional plant lists and design templates!

These plant lists focus on plants for a shoreline buffer, but aquatic plants are also crucial for a healthy shoreline and good water quality. Native aquatic plants are not weeds, and provide critical support for lake ecosystems. They stabilize the sediment on the lake bottom, calm waves, and provide habitat for fish, insects, birds, amphibians, and other living organisms in the lake. If your shoreline doesn't have aquatic plants, work with your local government agency and a local contractor to learn how you can improve aquatic plant growth along your shoreline. They will also have plant recommendations depending on your region and shoreline situation. Remember that you need a DNR permit to plant or remove any aquatic vegetation below the Ordinary High Water Line.



*Joe Pye Weed, Metro Blooms Design+Build*



*Blue Lobelia, Metro Blooms Design+Build*



*Canada Anemone, Metro Blooms Design+Build*

## Native Flowers and Grasses

Common Name	Botanical Name	Soil			Height (ft)	Bloom Period			Sunlight			
		Wet	Med	Dry		Apr-May	Jun-Aug	Sep-Oct	Full	Part	Shade	
Bebbs Sedge	<i>Carex bebbii</i>		X		1	X	X		X			
Big Bluestem	<i>Andropogon gerardii</i>			X	6		X	X	X		X	
Blue Flag Iris	<i>Iris versicolor</i>		X		3		X		X		X	
Blue Lobelia	<i>Lobelia siphilitica</i>		X		3	X	X	X	X		X	
Blue Vervain	<i>Verbena hastata</i>		X		3-4		X	X	X		X	
Boneset	<i>Eupatorium perfoliatum</i>		X		3		X		X		X	
Bottle Gentian	<i>Gentiana andrewsii</i>		X		2		X	X	X		X	
Canada Anemone	<i>Anemone canadensis</i>	X	X		1-2	X	X		X		X	
Cardinal Flower	<i>Lobelia carinalis</i>		X		3	X	X	X	X		X	
Dense Blazing Star	<i>Liatris spicata</i>		X		3-6		X	X	X			
Flat Topped Aster	<i>Doellingeria umbellata</i>		X		4		X	X	X		X	
Fox Sedge	<i>Carex vulpinoidea</i>	X			3	X			X		X	
Fringed Sedge	<i>Carex crinita</i>		X		3		X		X		X	X
Giant Blue Hyssop	<i>Agastache scrophulariaefolia</i>		X		4		X		X			
Golden Alexander	<i>Zizia aurea</i>		X	X	3	X	X		X		X	
Green-headed Coneflower	<i>Rudbeckia laciniata</i>	X	X	X	4-6		X		X		X	
Indian Grass	<i>Sorghastrum nutans</i>		X	X	5		X		X		X	
Jack-in-the-Pulpit	<i>Arisaema triphyllum</i>		X		2	X	X				X	X
Joe-Pye Weed	<i>Eupatorium maculatum</i>		X		5-6		X				X	
Kalm's Brome	<i>Bromus kalmii</i>			X	3		X	X	X		X	



Common Name	Botanical Name	Soil			Height (ft)	Bloom Period			Sunlight			
		Wet	Med	Dry		Apr-May	Jun-Aug	Sep-Oct	Full	Part	Shade	
Long-beaked Sedge	<i>Carex sprengelii</i>		X		1-2		X			X	X	X
Marsh Marigold	<i>Caltha palustris</i>		X		1-2	X	X		X	X	X	X
Marsh Milkweed	<i>Asclepias incarnata</i>		X		3-4		X					
Meadow Blazing Star	<i>Liatris ligulistylis</i>		X		3-5		X		X	X	X	
New England Aster	<i>Symphotrichum novae-angliae</i>		X		3-6				X	X	X	
Ox Eye Sunflower	<i>Heliopsis helianthoides</i>			X	3-4				X	X	X	
Prairie Cordgrass	<i>Spartina pectinata</i>		X		6				X	X	X	
Sensitive Fern	<i>Onoclea sensibilis</i>		X		2-4		X		X	X	X	X
Soft Rush	<i>Juncus effusus</i>		X		3				X	X	X	
Spotted Bee Balm	<i>Monarda punctata</i>			X	2-3				X	X	X	
Stiff Goldenrod	<i>Solidago rigida</i>		X		4-5				X	X	X	
Switchgrass	<i>Panicum virgatum</i>		X		3-6				X	X	X	
Virginia Mountain Mint	<i>Pycnanthemum virginianum</i>		X		3				X	X	X	
Wild Bergamot	<i>Monarda fistulosa</i>		X		3-4				X	X	X	

Common Name	Botanical Name	Soil			Height (ft)	Spacing (ft)	Bloom Period		Sunlight		
		Dry	Med	Wet			Apr-May	Jun-Aug	Full	Part	Shade
Basswood	<i>Tilia americana</i>	x	x		60 - 80 ft	20 - 40 ft			x	x	x
Black spruce	<i>Picea mariana</i>			x	30 - 70 ft	10 - 30 ft			x	x	
Downy Serviceberry	<i>Amelanchier arborea</i>	x	x		20 - 30 ft	10 - 30 ft	x		x	x	x
Elderberry	<i>Sambucus canadensis var. canadensis</i>		s	s	3 - 12 ft	8 ft		x	x	x	x
False Indigo	<i>Amorpha fruticosa</i>		x	x	6 - 12 ft	2 - 5 ft	x		x	x	x
Green Alder	<i>Alnus viridis ssp. crispa</i>		x	x	5 - 10 ft	10 ft			x	x	
Hackberry	<i>Celtis occidentalis</i>		x		60 - 80 ft	20 - 40 ft			x	x	
High Bush cranberry	<i>Viburnum trilobum</i>		x	x	5 - 15 ft	5 - 10 ft		x	x	x	
Nannyberry	<i>Viburnum lentago</i>		x		10 - 20 ft	10 ft	x		x	x	
Red Osier Dogwood	<i>Cornus sericea</i>	x	x	x	5 - 12 ft	8 - 15 ft	x	x	x	x	x
Speckled Alder	<i>Alnus incana ssp. rugosa</i>		x	x	10 - 25 ft	10 ft			x	x	
Swamp White Oak	<i>Quercus bicolor</i>		x	x	50 - 70 ft	30 - 50 ft			x	x	
Tamarack	<i>Larix laricina</i>		x	x	40 - 80 ft	20 - 50 ft			x		
Wild Plum	<i>Prunus americana</i>	x	x		10 - 15 ft	6 - 10 ft	x		x		
Willow species	<i>Salix sp.</i>			x	5 - 50 ft	3 - 50 ft				x	
Yellow Birch	<i>Betula alleghaniensis</i>		x	x	60 - 80 ft	20 - 40 ft			x	x	

# Beyond DIY Projects

This section aims to give you an introduction to the site preparation, planting, and maintenance practices that are often part of a permitted shoreline restoration. Any of these activities should be done with the guidance and expertise of local government partners and/or experienced shoreline restoration organizations. Check out the **shoreline business directory** on the Blue Thumb Shoreline Stabilization page for an updated list of Minnesota nurseries and shoreline contractors, including Blue Thumb Partners: <https://bluethumb.org/shoreline-stabilization>.

## Erosion Control

Controlling erosion is vital for saving and maintaining shoreline. Natural shorelines control erosion through strong networks of roots. Where shores have lost native plant cover, erosion is often controlled by rip rap and seawalls or retaining walls. It is never recommended to replace native shoreline with rip rap. If your shoreline is already experiencing severe erosion and you or your contractor think rip rap should be installed to mitigate it, you should consult your DNR Area Hydrologist.

Any area with exposed soil is at a high risk for eroding into your lake. Where old plantings or structures have been removed and new plantings are establishing, there should be protection from run-off and wave erosion. For shoreland projects, always use blankets and stakes that are completely biodegradable. Here are several recommended products to control erosion while your planting matures:

**Coconut fiber/Coir rolls:** These are a “soft armor” erosion control structure that is effective in areas of low to moderate shoreland erosion. They are a dense “log” of coconut fiber wrapped in a coarse jute net and /or burlap. They come in 8”, 12” and 20” diameter rolls. When a roll is secured along the toe of an undercut/eroding shore, it provides protection from further wave erosion.

**Fiber blankets** are a “soft armor” fabric that can be made from many different materials and of different weaves. Choose a 100% biodegradable material suited for the characteristics of your site (steepness, amount of runoff, etc.).



Coconut Fiber Roll



Erosion Control Blanket

# Beyond DIY Projects

**Coconut fiber/Coir blankets:** Coconut fiber is known for its longevity. For shoreline projects, there are two types that are more commonly used and that work in all three shoreline zones:

- **A loosely packed blanket of coir fibers within a biodegradable natural fiber net:** works especially well within the transitional zone. Plants can be easily installed through the fabric.
- **Coir fiber twine:** looks like woven netting. It is better for steeper slopes, stream banks and more severe conditions. It will stay in place for a longer period of time.

**Jute, wood fiber and straw blankets:**

- **Wood fiber blankets** are made of curled strands of wood fiber placed between photodegradable or biodegradable netting. These are good to use in stabilizing upland slopes that have been seeded. Wood fiber blankets are available in different weights and are generally less expensive than coir, but degrade faster.
- **Straw blankets** are used for short-term needs. They should be used in upland situations, for example over a seeded slope.

## Protection Structure: Protect Plantings from Wave and Critter Damage

**Wavebreaks:** Newly installed aquatic plants are easily uprooted by wind and boat-induced wave action. A wavebreak provides a calm, protected area for the plants to take root. Brush bundles, coconut fiber rolls, plastic fencing and plywood are commonly used as wavebreaks. Remember, a DNR permit may be required to install wave breaks.



Wavebreak

Wavebreaks are placed in the water beyond the aquatic planting area. The wavebreak should be installed from the bottom of the lake extending above the water, ideally above the maximum wave height. It should be removed after 1-2 growing seasons. Wavebreaks are often removed for the winter to prevent damage from ice.

**Exclosures:** An “exclosure” is a fence placed around new plantings in the transition/upland areas to protect plants from critter damage until they become well established.

Fences can be temporary or permanent, but should be placed around a new planting to channel foot traffic around a planting or along designated paths.

# Good Neighbor Guide

**Follow these guidelines to be a good neighbor and steward your local waters.**

## On land:

- Don't dump leaves or grass clippings in lakes, rivers or wetlands.
- Reduce fertilizer use.
- Pick up pet waste.
- Reduce salt use, both on paved surfaces in the winter and in water softening. Check out this article from the Minnesota DNR for tips on how you can "hold the salt":

<https://www.dnr.state.mn.us/mcvmagazine/issues/2020/jan-feb/chloride.html>. Or, take this Salt Mini-Course from the city of Minneapolis:

<https://www.minneapolismn.gov/government/programs-initiatives/environmental-programs/salt-mini-course/>.

- Pay attention to above and below ground care of your land:
  - Maintain septic systems.
  - Seal abandoned wells.
  - Inspect underground storage tanks.



## In the water:

- Go slow and reduce your wake to reduce wave impact & erosion.
- Protect Minnesota's lakes and rivers from Aquatic Invasive Species (AIS)!
- AIS are aquatic plants and animals that have been introduced into waterways in which they do not live naturally.
  - Common AIS in MN include Eurasian Water Milfoil, Curlyleaf Pondweed, Starry Stonewort, Zebra Mussels, and Common Carp.
- **Clean your boat before entering new waters to stop the spread of AIS**
  - Clean in and clean out.
  - Clean: remove visible aquatic plants and animals from all gear and equipment.
  - Drain/Dry: keep drain plugs out (it's the law!) and allow equipment to fully dry between uses.
  - Dispose: throw away unused bait. It is illegal to release bait into a waterbody.



**Check out the Good Neighbor Guide from Blue Thumb Partner Vadnais Lake Area Water Management Organization (VLAWMO) for more helpful tips:**

<https://www.vlawmo.org/news/introducing-good-neighbor-guide/>

# Additional Resources

<p><b>Cities, Counties, SWCDs and Watershed Districts</b></p>	<p>Many local government units – cities, counties, soil and water conservation districts (SWCDs) and watershed districts – have <b>grant programs</b> for shoreline restoration. You don't have to do your project alone! Check in with your local government to find out what support is available.</p>
<p><b>Northern Waters Land Trust</b></p>	<p>Interested in permanently protecting your shoreland? The Northern Waters Land Trust, a Blue Thumb Partner, supports landowners in establishing conservation easements or land transfers to permanently steward critical shoreland habitat.</p> <ul style="list-style-type: none"> <li>• Check out their website and their resources for landowners: <a href="https://northernwaterslandtrust.org/landowner-options/land-owners/">https://northernwaterslandtrust.org/landowner-options/land-owners/</a></li> </ul>
<p><b>Plant Identification</b></p>	<ul style="list-style-type: none"> <li>• Blue Thumb Plant Finder: <a href="https://bluethumb.org/plants/">https://bluethumb.org/plants/</a></li> <li>• A Guide to Aquatic Plants, Minnesota DNR: <a href="http://www.dnr.state.mn.us/shorelandmgmt/apg/index.html">http://www.dnr.state.mn.us/shorelandmgmt/apg/index.html</a></li> <li>• Invasive Terrestrial Plants, Minnesota DNR: <a href="https://www.dnr.state.mn.us/invasives/terrestrialplants/index.html">https://www.dnr.state.mn.us/invasives/terrestrialplants/index.html</a></li> </ul>
<p><b>Lake Information</b></p>	<p>The DNR “Lake Finder” can help you to access specific information about your lake: <a href="http://www.dnr.state.mn.us/lakefind/index.html">http://www.dnr.state.mn.us/lakefind/index.html</a></p>
<p><b>General Shoreline Restoration</b></p>	<ul style="list-style-type: none"> <li>• Blue Thumb Shoreline Stabilization Homepage: <a href="https://bluethumb.org/shoreline-stabilization/">https://bluethumb.org/shoreline-stabilization/</a></li> <li>• The DNR’s Restore Your Shore website is full of information about shoreline restoration: <a href="https://www.dnr.state.mn.us/rys/index.html">https://www.dnr.state.mn.us/rys/index.html</a></li> <li>• Minnesota’s Vanishing Natural Shorelines: A Loss That Contributes to Degraded Lake Quality. Minnesota Natural Shoreline Partnership. <a href="https://bit.ly/MNshorelinepartnershipreport">https://bit.ly/MNshorelinepartnershipreport</a></li> <li>• “What to ask your lakeshore landscape contractor”: <a href="https://bit.ly/askshorelinecontractor">https://bit.ly/askshorelinecontractor</a></li> </ul>
<p><b>Shoreland Habitat Restoration Project Sign</b></p>	<p>Download an example of the sign art to use in creating signs for your projects: <a href="https://www.dnr.state.mn.us/rys/st/designprocess.html">https://www.dnr.state.mn.us/rys/st/designprocess.html</a></p>

BlueThumb.org

