

## Project Planning

Riverbank stabilization planning requires experience and often design engineering. Be sure to contact the Anoka Conservation District with questions or for technical and financial assistance.

### Keys to a Successful Plan

#### Compliance with Regulatory Restrictions

Prior to project planning be sure to understand the necessary permits and associated restrictions.

#### Protect Your Property Value and Ensure Public Safety

A properly designed project will secure your property from the risks of excessive erosion and ensure public safety is not compromised.

#### Balance Desired and Sustainable Property Use

Landowners should understand that projects can be designed to accommodate desired uses in a cost-effective, long-lasting, and successful solution.

#### Improve River and Ecosystem Health

The ultimate goal of a restoration or stabilization project is to improve the quality of the river and the surrounding habitat, thereby improving overall river health.

### The Planning and Installation Process

#### Assessment and Understanding

Evaluation of the issues and understanding the scale of the problem, whether on-site or off-site, are a crucial first step in the planning process.

#### Design Considerations

It is important to ensure the project will remedy the problem, and not just the affected property. This often requires the cooperation of multiple landowners to most effectively treat a section of river.

#### Stabilization Practice Selection

Severity of the problem, site access, finances, desired outcome, and treatment method are all important factors when considering the most effective stabilization practice to employ.

#### Plant Community Selection

This decision must incorporate factors such as soil type, moisture levels, sun exposure, aesthetics, and the potential use of native species.

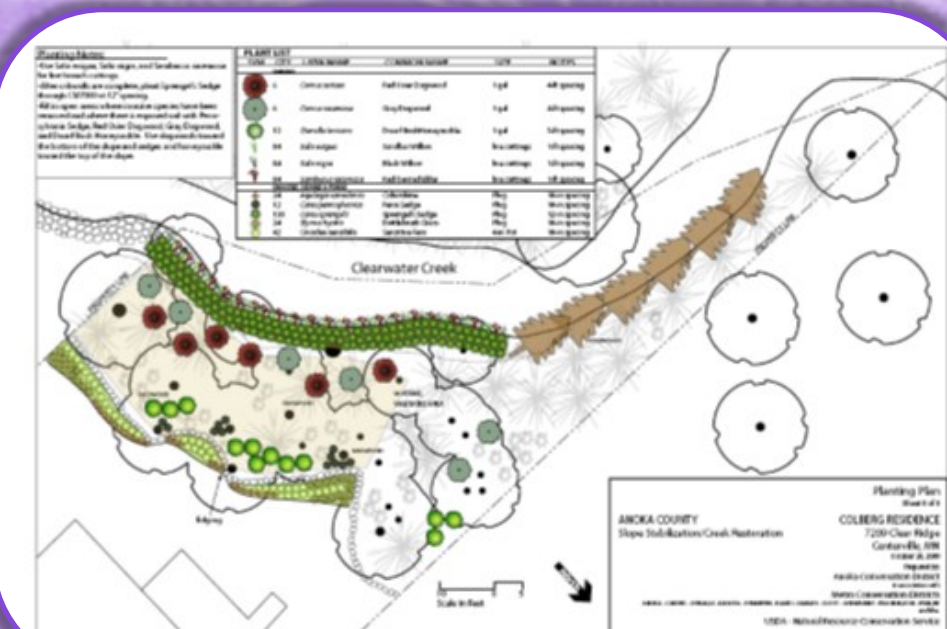
#### Compliance and Installation

Landowners should ensure they are in compliance with regulations and restrictions, determine the funding sources, and coordinate installation.

#### Maintenance

Keep an eye on bank stability and vegetative health and quickly repair minor problems before they can develop into a more serious matter.

Careful planning throughout the process described above will result in an effective, long-lasting solution to the problem.



## Technical Assistance

Expert assistance is available to homeowners interested in determining the best methods for managing their riverbank for stability, fish, wildlife, and water quality. Assistance may include on-site consultations, project design, cost estimation, and guidance throughout project installation and maintenance. Contact the Anoka Conservation District for assistance.

## Financial Assistance

Cost-share grants may be available for restoring riverbanks with native vegetation and correcting or preventing riverbank erosion. Grants may cover 50-75% of the cost for plants and other materials on projects that will provide benefits to the stream or river and the public.

## Regulatory Compliance and Permitting

Federal, state, and local permitting authorities have different permit requirements, fees, and timelines. Federal and state agencies accept a single Joint Notification Form (JNF) application. Local governments often have unique forms, but may accept the JNF as well.

### Some Permitting Authorities

United States Army Corps of Engineers  
Minnesota Department of Natural Resources  
County, City, and Township  
Watershed Management Organization

# RIVERBANK STABILIZATION

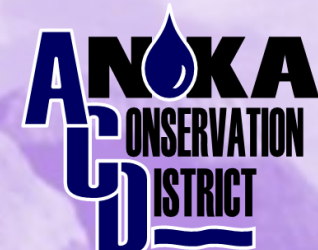
## Understanding Flow & Managing Erosion



Conservation Starts at Home

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## Introduction

This brochure provides a starting point for understanding the potential problems and solutions common to riparian (river margin and bank) landowners. Some problems can be addressed by individual landowners, but many require the assistance of an engineer or local government entity. The root cause and severity of the problem will dictate the best strategy.

## Understanding Rivers

If you live on a river or stream and want to protect your riverbank and the water quality, it is important to understand how rivers work.

### Watersheds

Watersheds are areas that drain rain water through gutters, pipes, ditches, and streams to rivers, lakes, and wetlands. Rain water carries whatever it comes in contact with and delivers it to the receiving water body. Therefore, proper landscape management throughout a watershed is important to maintain surface water quality.



### Flowing Water

Water flowing in a river is among the most powerful forces in nature. River paths naturally meander across the landscape over time because the energy contained within flowing water allows it to erode the banks and bed of the river, transporting sediment downstream. The power of a river is a function of both the velocity and volume of flowing water.

### Erosion

Erosion occurs naturally on the outside banks of river bends (cutbanks) where water flows the fastest. Sandbars are created on the inside bends (depositional banks) where water slows down and can no longer carry the sediment. This natural process causes the course of the river to change as the decades roll by, snaking through the landscape.

### Imbalance

Imbalance occurs when development in the watershed causes more water to flow through the river system faster, speeding up erosion, and eating away not only at the riverbanks, but also the bed of the river causing it to cut deeper into the landscape (down-cutting). This not only threatens your property, but also degrades water quality and habitat.

## On-Site vs. Off-site

Identifying the source of the problem helps determine potential solutions. Problems may originate on-site or off-site. Most properties have a combination of on-site and off-site problems at work.

On-site problems have a root cause on the property and can often be solved by the landowner with fairly simple approaches.

Off-site problems generally relate to increased river erosive forces due to flow amount and speed, ice and recreation. Landowners can treat the symptoms, but the root cause must be dealt with on a larger scale by cities and watershed organizations via stormwater management throughout the watershed.

On-site Problems	Off-site Problems
Overshading	Extreme water level fluctuations and flooding
Foot traffic damage	Down-cutting of riverbed
Diverted flow (within river or in upland areas)	Scouring of riverbank
Vegetation removal	Wave action
Vegetation smothering	Ice damage

Once you've identified whether the problem is on-site or off-site, you can develop a plan that will improve the situation. If you suspect the problem is off-site in nature, you should contact the Anoka Conservation District for technical assistance. On-site problems can be addressed immediately using the methods outlined below.

In all cases, the goal is to decrease erosion and provide long-term riverbank stability. This is achieved through two general approaches:

- Promotion of healthy vegetation that provides root structure to hold soils in place and stems to slow down flowing water, and
- Structural armoring to absorb the river's energy or deflect it away from the streambank.

## Riverbank Property Practices

- Avoid mowing near the edge of the bluff or riverbank. Turf grasses have very shallow root systems, providing little soil stability. Deeper rooted species are also better at filtering out excess nutrients and sediments in runoff.
- Remove fallen trees that can redirect water toward the bank.
- Prune lower branches on trees to increase the amount of light that penetrates to the ground. This will increase plant growth at ground level where the stems, roots, and foliage will help keep soil in place.
- Remove buckthorn, which is an invasive plant that is believed to release a natural herbicide that suppresses nearby plant growth.
- Remove grapevines, which smother trees, shade out understory species, and provide little soil stabilizing benefit.
- Plant desirable species with preference for multi-stemmed plants with deep, dense, fibrous root systems. Be sure to select species that are well-suited to the soil type, moisture level, and available sunlight or they will not thrive.
- Control runoff from downspouts and other hard surfaces to prevent it from flowing over the riverbank. Promote infiltration of rain water into the soil but away from the riverbank where possible or provide a pipe conduit down to the water's edge if necessary.
- Dispose of yard waste properly to avoid smothering riverbank vegetation and contributing nutrients to the river, which commonly occurs when leaves and grass clippings are thrown over the riverbank.

## Bioengineering

Bioengineering is a practice that combines engineering techniques with ecological principles to reinforce and stabilize riverbanks, relying heavily on deep-rooted native plants and a variety of other natural materials. In addition to erosion control and water retention achieved by traditional engineering techniques, bioengineering provides:

- Improved aquatic and terrestrial habitat,
- Increased connectivity among habitats along the riverbank,
- Improved water quality through nutrient uptake in buffer species,
- Improved soil health by rebuilding soil organic matter,
- Decreased water temperatures through shading,
- Enhanced aesthetics by using a natural look.

The relatively low cost, utilization of native species, and ability to self-repair makes bioengineering a functional and long-lasting management strategy. However, bioengineering practices may be inappropriate to treat severe erosion and larger scale structural engineering solutions may be required with assistance from a professional.

## Bioengineering Examples:

### Restoration of Native Vegetation

Vegetated buffers with deep-rooted plants improve soil health and enhance habitat while stabilizing the riverbank.



### Tree Revetments

Red cedar trees secured to the riverbank decrease erosion while promoting sediment accumulation to help rebuild the bank.



### Live Stakings

Dormant tree cuttings interplanted through revetments or rock are an inexpensive method to establish soil stabilizing root structure.



## Structural Examples:

### Riprap

Rock absorbs water energy and creates a smoother shore while becoming incorporated into the riverbank over time.



### Rock Vanes

Submerged rock vanes extend into the river to deflect erosive currents away from the bank, maintain the channel, and enhance habitat.

