

# Erosion Control and Pond Bank Stabilization Methods

## Fundamentals

The ponds in St. James can be used for fishing, attracting birds and other wildlife, or just enjoying the serenity of having a pond in your backyard. Unlike creeks and streams that flow, ponds are primarily stationary bodies of water. With heavy rain, water becomes a moving force as it takes the path of least resistance by running downhill and carrying loose soil with it. If the banks of your pond are not stabilized, they can become casualties of erosion. The bottom of a pond bank slope is the most vulnerable area. When this area is sufficiently weakened, the soil on the bank above it becomes unstable and the bank may collapse. **See picture below.**



## What causes shoreline erosion?

In addition to rainwater, the most significant erosional force at the shoreline is also the subtlest. Simple wind and wave action can cause loosening of saturated soils over time. Much of this occurs below the water line. Therefore, much of the bank erosion is occurring below the water level where it goes unseen until the exposed part of the bank slumps. Most of our ponds are susceptible to fluctuations in water level due to heavy rains or drought as we have seen this year (2019). The rise and fall of water levels exacerbate erosive effects.

Another cause of erosion is water entering ponds through pipes that convey water from the paved surfaces in the community. The inlets where these pipes discharge into the pond are subjected to concentrated flow that can erode deep gullies and holes and affect the adjacent banks. Finally, many ponds are designed to receive surface flow from grassy swales between houses. These swales receive water from roads and other impervious surfaces and direct it through the swale to the pond. These shallow swales concentrate sheet flow, which can create gullies and depressions as the water flows down the pond bank slope.

## **Erosion Control Methods**

### **Grasses and Grass-like Plants**

Turf grass is the least effective type of grass for stabilizing a pond bank slope. When a lawn extends all the way to a pond's shoreline, the presence of vegetation at the water's edge gives a sense that it's holding the soil in place. However, turf grass roots do not like saturated soils. In addition, turf grass roots do not penetrate the soil very deeply below the water's surface, which is the area that needs protecting the most. Grassy aquatic plants and ornamental grasses, particularly those that have rhizomes which form extensive root systems that bind the soil together are a better means of stabilizing shorelines.

### **Using Plants for Pond Bank Stabilization**

Wetland plants established on the shoreline are a preferred method for stabilizing pond banks. The deep, robust root systems of these plants bind soils in the area where most of the erosion is occurring, just below the water surface. Unlike turf grass, these plants thrive in saturated soils. The advantage of planting shoreline plants is they provide other benefits such as filtering pollutants in runoff, absorbing nutrients that create algae, trapping sediment and yard debris, deterring nuisance wildlife such as geese, providing cover and forage for fish and invertebrates, and dampening wind and wave energy.

Above the shoreline on the pond bank, native plants provide more stabilization and buffer against unwanted nutrients entering the pond with their root systems holding potentially eroding soils together. There are numerous native perennials and shrubs suitable for this task.

## Why Native Plants?

Native plants tend to thrive in our local environment. Overall, they require less care, will survive at a higher rate even in drought-like conditions, and attract pollinators, butterflies and other insects. In turn, a variety of birds will be attracted to the planted areas.

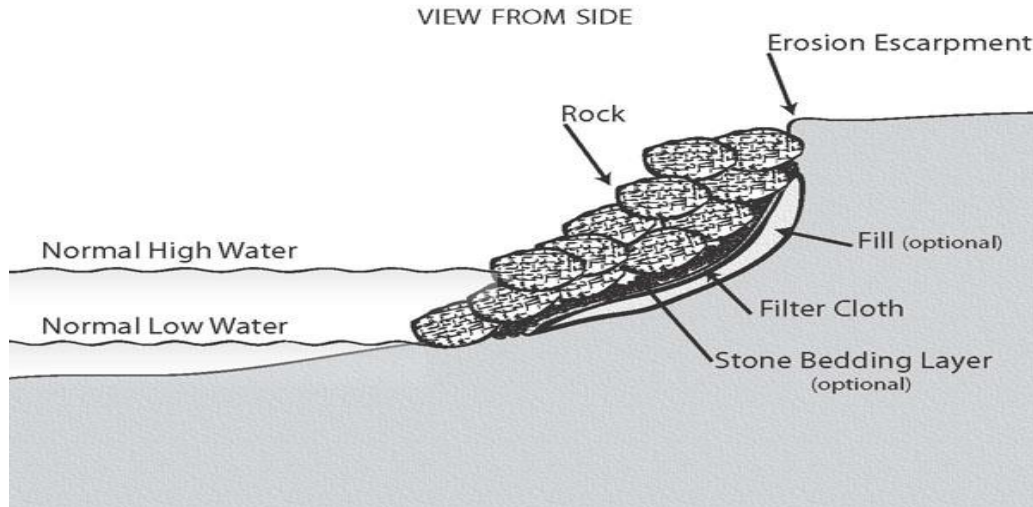
**More information on plants can be found on the POA Ponds Committee web site, including a recommended Pond Buffer Zone Native Plant List.**

## Riprap and Root Trap

Riprap is a slope stabilization method that uses rocks to anchor soil in place. A filter blanket (see below) covers the bare soil, and rocks hold down the blanket. Commonly, riprap is used at the bottom of a slope, but sometimes it covers the wall of the slope, too.

Root trap is a more effective stabilization method. It is like riprap except for one key difference. Root-trap involves filling in the voids around the rocks with topsoil and planting plants. As the plants grow between the rocks, their roots help keep the rocks in place and provide for a more stable bank.

## Riprap Revetment



## **Slope Stabilization**

On slopes that are being actively eroding slowing surface water runoff is important. To accomplish this, installation of simple engineered devices is more effective. These devices come in two different forms: erosion control blankets and fiber rolls.

### **Erosion Control Blankets**

Erosion control blankets are usually made from woven material and are meant to slow down the speed at which water moves across the surface. The material chosen is usually something with many ridges and obstructions to slow down water flow. There are many different types of erosion control blankets, some that are synthetic fiber and some that are natural. There are even a few that are both synthetic and natural. These blankets can be made out of straw, coconut fiber, aspen fiber, jute, and polypropylene (plastic). Most of these blankets can be bought in various sizes. These rolls can be cut into widths ranging from 3 to 8 feet wide.

### **Straw Single Synthetic Blankets (See Below)**

(Left) This netting is made from straw and held together by a single layer of synthetic netting.

(Center) Made from ordinary straw, this is held together by a double layer of jute netting.

(Right) Made from ordinary straw it is held together by a double layer of synthetic netting.



### **Coir Blankets (See Below)**

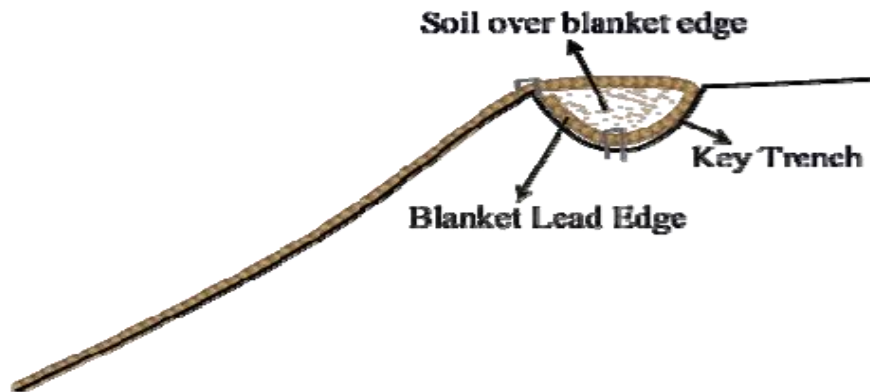
(Left) Coir Double Jute Blanket

(Right) Coir Double Synthetic Blanket -- Made from coconut fiber it is held together by a double layer of jute netting.



## **Installation of Erosion Control Blankets**

Erosion control blankets are relatively easy to install. The main concern is making sure the water moves over the top of the blankets. To do this you need to 'key' the blanket into the slope by digging a small trench on the top of the slope. The top end of the material is then laid into the trench to line it. The edge is folded underneath itself and secured using staples. The trench is then filled in up to the level of the surrounding ground. The end result is pictured below.



## **Fiber Rolls (Coir Logs)**

Fiber rolls are another type of erosion control method. These are usually made of the same materials used in erosion control blankets but are rolled into large diameter "logs." These logs can be made to just about any diameter and encased in netting. The purpose of these logs is to pool and slow down water run-off long enough for any sediment that is in the water to settle out. The three major materials used in fiber rolls are coconut fiber (most common), rice wattle and wheat wattle. The concept behind the fiber roll is the same regardless of the material. A fiber roll is pictured below and is also known as a coir log.



## **Silt Fencing**

Temporary silt fencing may be used to create physical barriers which block surface water flow and allow sediment to settle out. Temporary silt fences are usually meant to catch runoff from construction projects, but they can be used to control erosion until a slope re-establishes itself enough to stop any runoff. Once this is accomplished, removal of the fences is required.

## **Bulkheads or Retaining Walls**

To control erosion on steep slopes you may need to construct a bulkhead or retaining wall to provide adequate erosion control. See pictures below:



- It is important to note that any bulkhead or retaining wall construction requires approval of the POA's Architectural Control Committee (ACC).
- It is also most likely that construction of a bulkhead will require easements and/or rights-of-way on adjoining properties. **The Ponds Committee does not recommend bulkheads/retaining walls except as a last resort option.**

## **References for Further Information:**

### **Erosion Control Supply Vendors**

- 1) ACF Environmental  
2013 N. Kerr Ave, Wilmington, NC 28405  
[www.acfenvironmental.com](http://www.acfenvironmental.com)
- 2) Loews Home Store  
5084 Southport-Supply Rd SE, Southport, NC 28461  
[www.loews.com](http://www.loews.com)
- 3) Green Resource LLC  
2407 Ocean Hwy. W.  
Shalotte, NC 28470  
[www.green-resource.com](http://www.green-resource.com)

### **Erosion Control Product Installers**

- 1) Carolina Pondscapes  
173 Paul Pope Rd.  
Thomasville, NC 27360  
<http://carolinapondscapes.com>
- 2) Dragonfly (The Lake Doctors) Pond Works  
PO Box 1089, Apex NC 2750  
<http://www.dragonflypondworks.com>
- 3) Carolina Pond and Stormwater  
10206 Hawkeswater Blvd.  
Leland, NC 28451  
[www.carolinapondandstormwater.com](http://www.carolinapondandstormwater.com)

## **Plant Suppliers**

Carolina Wetland Services, Inc.  
550 E. Westinghouse Blvd.  
Charlotte, NC 28237  
[www.cws-inc.net](http://www.cws-inc.net)

Charleston Aquatic Nurseries  
3095 Canal Bridge Rd.  
John's Island, SC 29455  
[www.charlestonaquatic.com](http://www.charlestonaquatic.com)

Taylor's Nursery, Inc.  
3705 New Bern Ave.  
Raleigh, NC 27610  
[www.taylorasnursery.com](http://www.taylorasnursery.com)

Wetland Plants, Inc.  
812 Drummonds Point Rd.  
Edenton, NC 27932  
[www.wetlandplantsinc.com](http://www.wetlandplantsinc.com)

Mellow Marsh Farms  
1312 Woody Store Rd.  
Siler City, NC 27344  
[www.mellowmarshfarm.com](http://www.mellowmarshfarm.com)

Lumbar River Native Plants  
7000 Gibson Rd.  
P.O. Box 42, Gibson, NC 28343  
[www.ncnativeplants.com](http://www.ncnativeplants.com)

**Disclaimer:** *This document has been prepared by the St. James POA Ponds Committee. It is intended to provide **general guidance** on erosion control methods applicable to stormwater ponds in St. James. **It is not intended to be a detailed instruction manual.***

*This document also provides guidance regarding sources of materials, installation contractors and plant vendors. The Ponds Committee does not endorse any of the vendors, material suppliers or installers listed. Research could yield additional vendors not listed above. Residents should understand web sites, phone numbers and email addresses can and do change over time. Contact suppliers directly to verify availability of plants, materials and installers.*