

FAIRFIELD COUNTY STREAM MANAGEMENT GUIDE



Sycamore Creek



INTRODUCTION

The Fairfield Soil and Water Conservation District (SWCD) has assembled this stream management guide to assist interested landowners in protecting their stream banks and corridors against erosion and degradation.

Streams are ever moving. Natural stream channel stability is achieved by allowing the stream to develop a stable dimension, pattern, and profile such that over time, channel features are maintained and the stream system neither aggrades or degrades.

Unfortunately, human activities that modify upstream land use often put the stream ecosystem out of balance, and we must use either hard or soft engineering practices to protect the bank and value of our property.

This book will showcase several common stream bank stabilization methods. The detailed drawings are examples and are not specifically sized for any specific site. Any property easements, deed restrictions and zoning regulations should also be investigated prior to construction. The Ohio Department of Natural Resources has detailed fact sheets on many of these options and that can be accessed at:

<https://ohiodnr.gov/wps/portal/gov/odnr/discover-and-learn/safety-conservation/about-ODNR/water-resources/water-inventory-planning/stream-management-guides>

In Ohio, the right of maintaining clean and free-flowing waterways belongs to the property owner.

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ERODING VS. STABLE BANKS

Characteristics	Eroding Bank	Stable Bank
Bank Slope	Often vertical or close to vertical, mass of sod or failed material at toe	Not vertical, may have vegetated berm at toe
Bank Cover	Absence of vegetation	Variety of vegetation on slope
Bank line	Irregular	Relatively uniform or smoothly curving
Sediment	Streambed covered with sediment, sand/stone bars not stabilized	Sediment located in bars which may be partially stabilized with vegetation
Trees	Inside the bank line, leaning toward channel, fallen and obstructing streamflow	Often has trees growing on bank or on toe bed



Unstable Banks



Stable Bank

Pleasant Run and Clear Creek

Scippo Creek

More information: <https://ohiodnr.gov/static/documents/water/WIPP/01%20-%20An%20Introduction%20to%20Stream%20Management.pdf>

TYPES OF STABILIZATION METHODS

Hard Stabilization

These methods utilize hard materials such as stone, metal, or engineered materials. Hard options are expensive and typically take large equipment to install. However, they are very durable if designed and installed correctly.

Examples include:

- ◆ [Stone toe/bank rock](#)
- ◆ [Gabion baskets](#)
- ◆ [Bendway weirs](#)
- ◆ Pilings
- ◆ Lined channels
- ◆ Retaining walls

Please note that broken up or slabs of old concrete is not a good option. The density of concrete can be less than water and pieces may float in large rain events. There are also regulations regarding concrete being placed in a stream.

Please note that any retaining wall requires adequate drainage to allow for soil pressure.

Railroad ties can contain toxic chemicals (depends on the type of treatment) and should be used with caution.

Soft (Green) Stabilization

These methods use greener materials such as trees and provide a natural appearance. Soft options are typically less expensive than hard options, however they can be labor intense depending on the type you choose. Failure rate tends to be higher since the material used isn't as sturdy and can deteriorate over time.

Examples include:

- ◆ [Evergreen revetments](#)
- ◆ [Tree kickers](#)
- ◆ [Live crib walls](#)
- ◆ [Live fascines](#)

TOE ROCK

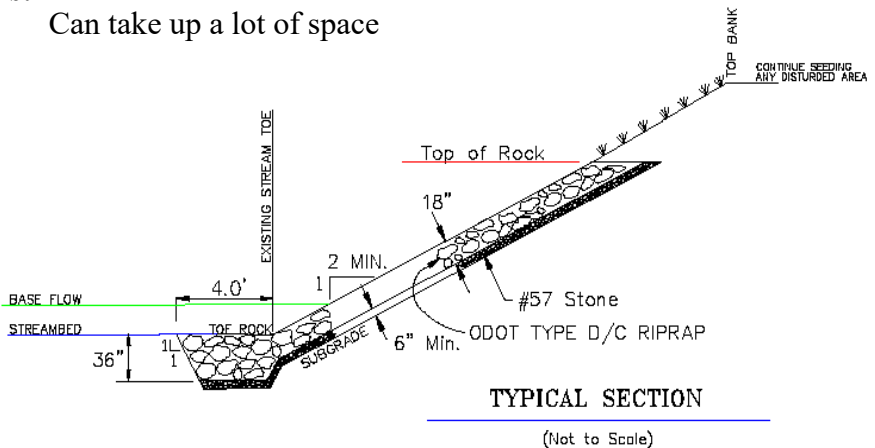
The toe is the break in slope at the foot of a stream bank where the bank meets the bed. Toe Rock is probably the most practical option for most landowners. It does require that stream banks are graded to a stable slope (2:1 for most Fairfield County soils), so it can take up some land depending on the height of the bank. Water tolerant vegetation is recommended above stone (see [live fascines](#)). The size of rock depends on the velocity in the stream; usually an ODOT Type D (3"-12" with 50% over 6") or C (6"-18" with 50% over 12") riprap is required. When placed properly, most of the rock is going to be entrenched into the bank and streambed and is not visible. Dumping rock over the bank is not a good method for long term stability.

Pros:

- More affordable option than other hard materials
- Barely noticeable over time
- Low failure rate

Cons:

- Can take up a lot of space



Toe Rock with mature red osier dogwoods on stream bank above stone. Dogwoods can be trimmed for a more manicured look.

More information: <https://ohiodnr.gov/static/documents/water/WIPP/16%20-%20Riprap%20Revetments.pdf>

TOE ROCK continued



Problem: A tall sheer bank on a sizable stream has become very entrenched. This stream is experiencing considerable degradation and landowner is losing a lot of land.



Solution: Stone size adequate for stream velocity is placed at toe and extends to height of low bank on other side of stream. Water tolerate grass is planted on remainder of bank slope and beyond to act as a field buffer.



Notice how high water now flows toward the center of the stream instead of impacting the bank.

Walnut Creek



Problem: A stream bank is eroding and encroaching upon valuable infrastructure: road, bike path and sports facility. This stream has experienced upstream development that is very flashy (a lot of water comes quickly when it rains).

Solution: Stone size adequate for stream velocity is placed at toe and bank. Grass and native fascines (bundled dogwood cuttings) are planted in bank.



Notice that the low bank is much lower in this example as opposed to the previous page and a lot less stone is needed.

Several years after construction, vegetation is established and stone is less visible, providing a more natural appearance.



GABION BASKETS

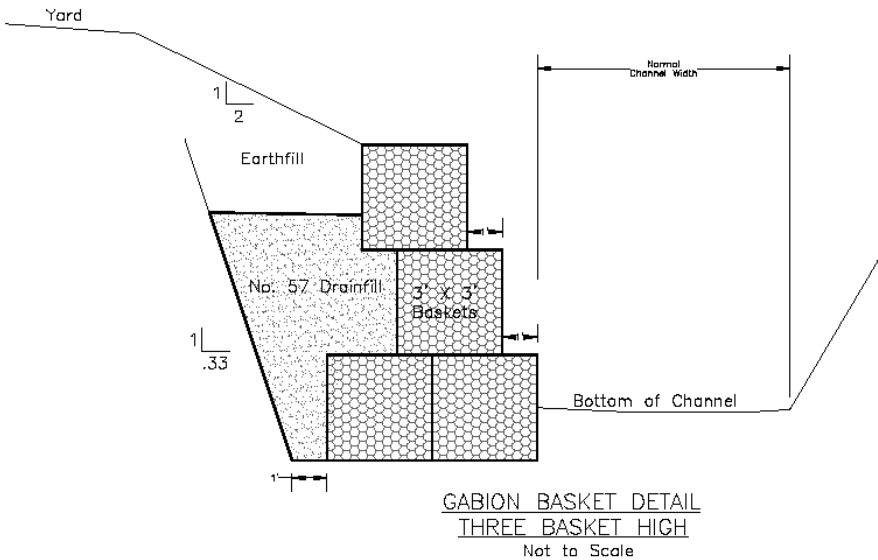
Gabions can be an alternative option to the traditional sheet piling where you have fairly vertical banks. Depending on the space available, they work well in combination with sloped back banks. Local stone quarries sell a gabion gradation of limestone that place well in the baskets.

Pros:

- Visually appealing
- Good for areas with limited space

Cons:

- Expensive
- Labor intensive
- Baskets can settle and collapse if not placed properly
- Engineering required



More information: <https://ohiodnr.gov/static/documents/water/WIPP/15%20-%20Gabion%20Revetments.pdf>



Above: Gabion basket wall with sloped and vegetated bank (before and after site)



Below: Gabion basket wall along a road

Sycamore Creek



BENDWAY WEIRS

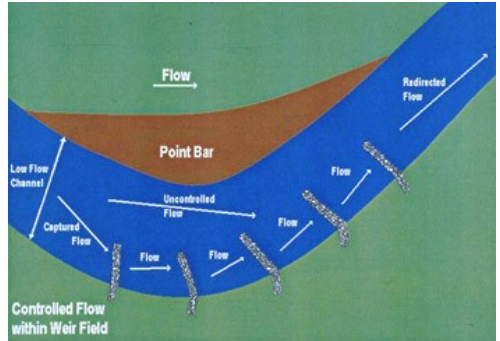
Bendway weirs control stream bank erosion by directing water away from the outer bank of the stream and toward the point bar or center of stream. Weir stone will extend above normal water level, but water will flow over weirs during high water events. Since weirs are installed in series and angled at 15 to 20 degrees upstream, this works best on streams without tight turns. It is normal for sediment to collect on the downstream side of weir near the base. Deep pools tend to develop at end of weir, as well.

Pros:

- Good for high flows
- Create stream habitat
- Less bank disturbance

Cons:

- No tight bends in stream
- Better for larger streams
- Can be costly
- Detail during construction is critical

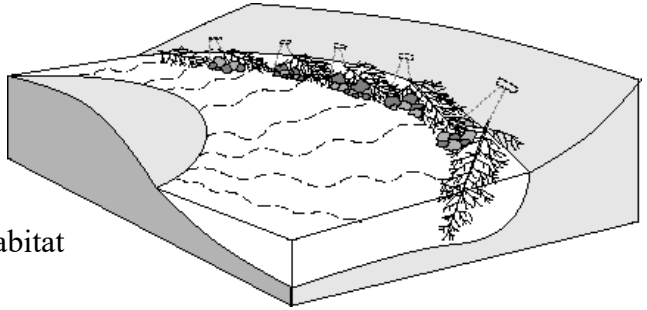


North Fork Paint Creek

More information: <https://ohiodnr.gov/static/documents/water/WIPP/19%20-%20Deflectors.pdf>

EVERGREEN REVETMENTS

Evergreen revetments consist of a wall made from fresh cut cedars or recycled Christmas trees which are anchored into the stream bank. Trees absorb energy from the stream, protecting the bank. More permanent vegetation should be established on the bank, as the trees will eventually decay. Trees should be dense limbed; the longer the better.



Pros:

Economical
Create stream habitat

Cons:

Not good for high velocity streams
Trees deteriorate over time
Can be labor intensive

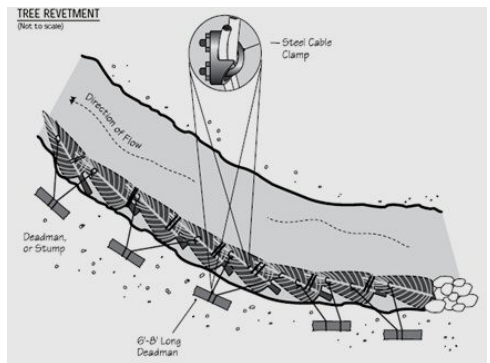


Image courtesy of
Nottawasaga Valley
Conservation

More information: <https://ohiodnr.gov/static/documents/water/WIPP/12%20-%20Evergreen%20Revetments.pdf>

TREE KICKERS

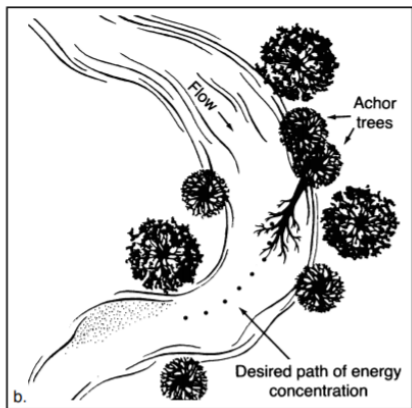
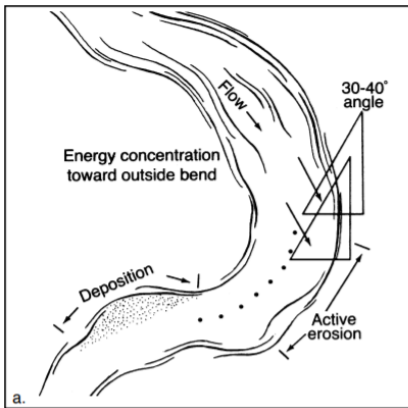
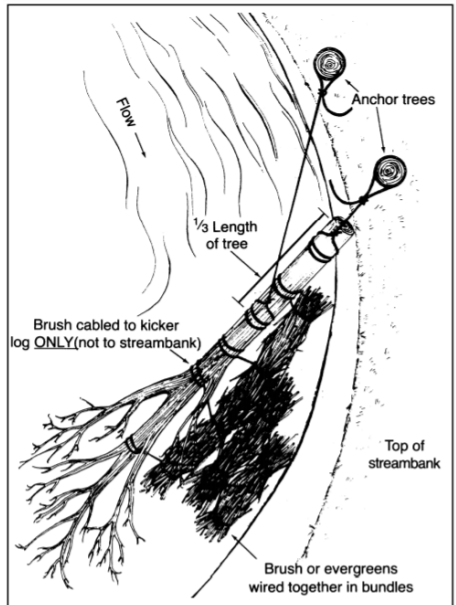
Like the evergreen revetments, trees are anchored against the stream bank except now the trees act as flow deflectors as opposed to a stream bank buffer. The anchoring method uses existing stream corridor trees. Hardwood trees with dense branches should be used, as these will take longer to decay and slow stream flow. Existing material from stream may be used.

Pros:

- Economical materials
- Create stream habitat

Cons:

- Not good for high velocity streams
- Trees deteriorate over time
- Can be labor intensive
- Need anchor trees on existing bank



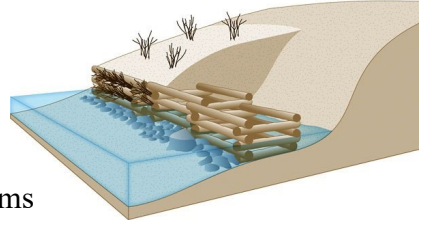
More information: <https://ohiodnr.gov/static/documents/water/WIPP/11%20-%20Tree%20Kickers.pdf>

CRIBWALLS

Cribwalls are log structures build into the stream bank wall and filled with soil, stone and vegetation such as willow or dogwood posts.

Pros:

- Create stream habitat
- Steep slopes

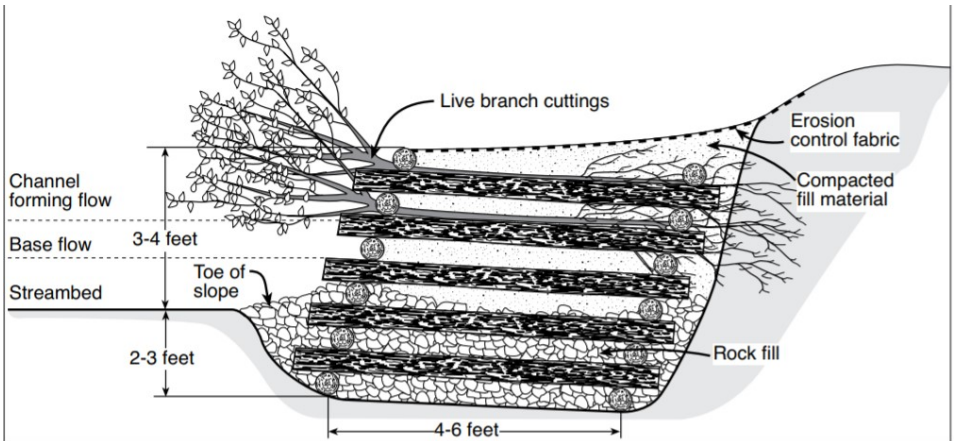


Cons:

- Not good for undercutting streams
- Logs will deteriorate over time
- Can be labor intensive
- Expensive



Photo courtesy of Euclid Creek Watershed Program



Cross section of a live cribwall

More information: <https://ohiodnr.gov/static/documents/water/WIPP/17%20-%20Live%20Cribwalls.pdf>

LIVE FASCINES

Live fascines are long bundles of live woody vegetation buried in a streambank in shallow trenches placed parallel to the flow of the stream. The plant bundles sprout and develop a root mass that will hold the soil in place and protect the streambank from erosion. This method is often coupled with tow rock.

Pros:

- Creates stream habitat
- Good for over-bank run off & stabilizing long slopes
- Protects from slides

Cons:

- Not good for high velocity flow
- Not for steep slopes (no steeper than slope of 1:3)
- May require periodic pruning
- Needs full sunlight



Red osier dogwood fascines are harvested from mature shrubs.



Fascines are first bundled (left) and the laid out and buried along streambank (right).

More information: <https://ohiodnr.gov/static/documents/water/WIPP/14%20-%20Live%20Fascines.pdf>

IMPORTANCE OF RIPARIAN CORRIDORS

The riparian corridor is a unique plant community consisting of vegetation located adjacent to a stream. Forested corridors maintain many important physical, biological and ecological functions.

- ◆ Improve water quality—tree canopies and root systems provide a natural filtration system by filtering excess nutrients from lawns and agriculture.
- ◆ Decrease flooding and reduce storm water runoff by storing and gradually releasing rain water over time. A typical medium sized tree can intercept as much as 2,380 gallons of water per year.
- ◆ Inhibit the movement of sediment.
- ◆ Reduce soil erosion by stabilizing bank with tree roots.
- ◆ Provide fish and wildlife habitat—tree canopies cool water and provide an environment for more aquatic species.

Recommended trees for wet sites closest to stream:

Large/Canopy Trees

Red Maple
Silver Maple
River Birch
Sycamore
Cottonwood
Swamp White Oak
Pin Oak
Bur Oak
Sweetgum

Medium Trees

Box Elder
Black Gum
Black Willow
Beech
Chokecherry

Shrubs/Small Trees

American Hornbeam
Silky Dogwood
Sumac
Buttonbush



Bur oak

Quercus macrocarpa

Recommended trees for well-drained soils along riparian area:

Large/Canopy Trees

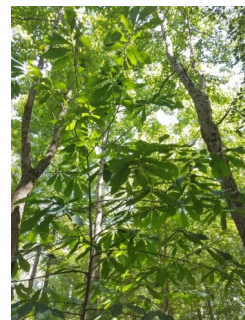
Black Maple
Yellow Birch
Shagbark Hickory
Common Hackberry
Kentucky Coffeetree
Butternut
Black Walnut
Tulip Poplar
Cucumber Magnolia
Wild Black Cherry
Red Oak

Medium Trees

Ohio Buckeye
Black Gum
Quaking Aspen
Eastern Redbud

Shrubs/Small Trees

Allegheny Serviceberry
Pawpaw
Flowering Dogwood
Hazelnut



Pawpaw

Asimina triloba

Woods for Water: A Guide to Planting Riparian Buffers for Healthy Streams
http://cuyahogariver.org/assets/riparian_buffer_guidepages.pdf

INVASIVE VEGETATION CONTROL

According to ODNR, the top ten invasive plants in Ohio include:

Autumn-Olive	Garlic Mustard	Reed Canary Grass
Multiflora Rose	Japanese Knot Weed	Buckthorns
Bush Honeysuckles	Purple Loosestrife	
Japanese Honeysuckle	Common Reed or Phragmites	

On stream banks, invasive plants can outcompete desirable vegetation that anchors floodplain soils and shades streams, encouraging quality wildlife habitat. In Fairfield County, we encourage the physical removal or treatment by chemical means of invasive plants. Below are three plants often found along streams and their floodplain corridors in Fairfield County.



Bush Honeysuckle The best control method is to cut and treat stumps with systemic herbicide. Sprouts from cut stems may be treated with a foliar application of systemic herbicide. Young shrubs are easy to pull or dig up. Be aware there is a native bush honeysuckle in Ohio (*Diervilla lonicera*).



Autumn-Olive Stems may be cut and treated with systemic herbicide. Resprouting will occur, so follow-up control is necessary. A combination of hand-pulling, digging, and herbicide treatments is usually necessary.



Garlic Mustard Light infestations of garlic mustard can be hand pulled before or at flowering time. Plants should be removed from the site after pulling as the seeds may continue to mature. Systemic herbicides can be applied to the rosettes in early spring or late fall.

Plant images courtesy of ODNR

In order to comply with State & Federal laws, only chemicals designated for aquatic use should ever be used along/in the stream. Products to consider include Rodeo, Roundup Custom, Garlon 3A, or equivalent.

More information: <https://www.oipc.info/invasive-plants-of-ohio.html>

COMMON STREAM MAINTENANCE QUESTIONS

CAN I REMOVE LOGJAMS?

A property owner or a separate entity with the property owner's permission may be able to remove logjams from a stream. Contact the US Army Corps of Engineers to explain your method of removal and inquire about whether a permit is needed. Also, contact the [Ohio Division of Natural Resources \(ODNR\) Service Forester](#) with questions on possible uses of the woody material.



Contact the floodplain administrator about where to place removed materials.

CAN I REMOVE FALLEN TREES?

Property owners can remove fallen trees from a river. Removal is highly recommended in cases where the fallen tree lies partially or entirely across the river and blocks flow. This blocked flow can lead to bank and floodplain erosion. If the tree roots are securely anchored in the bank, removing the tree top and leaving the roots will help to stabilize the bank. For removal of a few trees, contact a local tree service or arborist. Contact the floodplain administrator about where to place removed materials.

CAN I REMOVE LIVE TREES ALONG THE CREEKS?

Live trees can be removed from along a stream. However, there may be legal restrictions, in addition to the wildlife habitat loss and water quality benefit reduction. If the tree and its roots are to be removed, contact the [Army Corps of Engineers](#). Call the [local NRCS office](#) to find out if a wetlands determination must be done. If you are interested in harvesting trees for profit, contact your service forester for more information. If you are on non-agriculturally zoned land, check with your [county or township zoning inspector](#) to determine if any restrictions apply. If you remove a tree from the stream bank, leaving the stump and roots is highly advisable to help protect the bank from erosion.

More information: <https://ohiodnr.gov/static/documents/water/WIPP/18%20-%20Stream%20Debris%20and%20Obstruction%20Removal.pdf>

CAN I REMOVE GRAVEL BARS OR OTHER MATERIAL FROM THE RIVER?

Moving or removing material such as sand or gravel bars from a river may require permitting by the [Army Corps of Engineers](#) and/or the [Ohio EPA](#). Contact the Army Corps of Engineers for details on permitting activities in streams. The [Division of Mineral Resources Management](#) must be contacted for a surface mine permit. Contact the Soil and Water Conservation District for technical assistance in assessing the environmental impacts of altering gravel bars.

CAN I PLACE FILL IN THE RIVER?

Placing fill material along a river must be permitted by the [Army Corps of Engineers](#) and the [Ohio EPA](#). This activity is also subject to local floodplain and zoning regulations. Contact the Army Corps of Engineers, your county floodplain administrator, and your township or county zoning inspector for details.

CAN I STABILIZE THE RIVER BANK?

Resource professionals should evaluate bank erosion areas before any type of stabilization practice is attempted. If stabilization is determined to be possible for a site, the stabilization method will dictate what types of approvals are needed. The county floodplain administrator must approve every type of project, and some projects may need [Army Corps of Engineers](#) and [Ohio EPA](#) approval and possible permits.

CAN I CONSTRUCT A PERMANENT CREEK FORD (shallow crossing)?

A permanent creek ford must be permitted by the [Army Corps of Engineers](#) and [Ohio EPA](#). Contact the Army Corps of Engineers for details on what type of permitting is required. The construction method and permanent alteration of the channel may have an adverse impact on the creek. This activity would also be subject to any local floodplain and zoning regulations. There are agricultural exceptions; contact the Fairfield Soil and Water Conservation District or NRCS office at 740-653-8154.



Salt Creek

Watershed Friendly Stream Maintenance
<https://www.euclidcreekwatershed.org/files/resources/streammaintenencemanual2015.pdf>

What Permit Where?

Contacts for Fairfield County:

Floodplain Administrator

(County non-incorporated limits)

[Fairfield County Regional Planning](#)

(740) 652-7110

(City or Village-incorporated limits)

See local directory

[City of Lancaster](#)

(740) 687-6614

[City of Pickerington](#)

(614) 833-2221

[Village of Baltimore](#)

(740) 862-4491

[Village of Bremen](#)

(740) 569-4788

[Village of Buckeye Lake](#)

(740) 928-7100

[City of Canal Winchester](#)

(614) 837-7501

[Village of Millersport](#)

(740) 467-2333

[Village of Sugar Grove](#)

(740) 746-8406

[Violet Township](#)

(614) 382-5973

[ODNR - Floodplain Administrator](#)

(614) 265-6750

[ODNR - Division of Dam Safety](#)

(614) 265-6731

[Natural Resources Conservation Service](#)

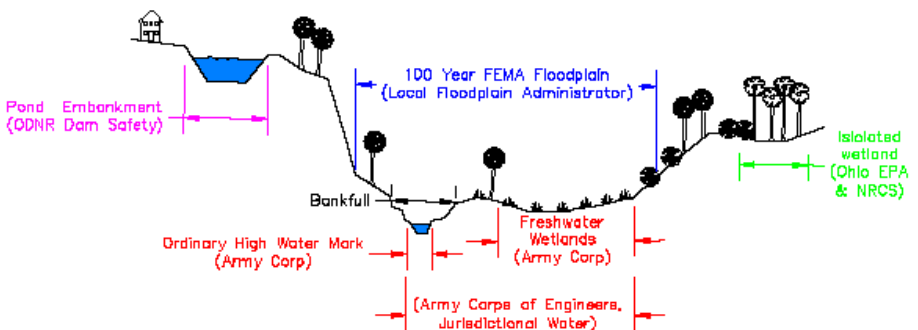
(740) 653-3921

[Ohio EPA, Division of Surface Water, 401 Unit](#)

(614) 644-2001

[US Army Corps of Engineers, Huntington District](#)

(304) 399-5210



Army Corps of Engineers and Ohio Environmental Protection Agency Permits

Stream bank stabilization may be covered under the nationwide permit number 13. In general [Nationwide 13](#) applies if:

- a) No material is placed in excess of the minimum needed for erosion protection.
- b) The activity is no more than 500 feet in length along the bank, unless this criterion is waived in writing by the Army Corp district engineer.
- c) The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plan of the ordinary high water mark of the high tide line, unless this criterion is waived in writing by the Army Corp district engineer.
- d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless this criterion is waived in writing by the Army Corp district engineer.
- e) No material is of the type, or is placed in any location, or in any manner, to impair surface water flow into or out of any water of the United States.
- f) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas).
- g) Native plants appropriate for current site conditions must be used for bio-engineering or vegetative bank stabilization.
- h) The activity is not a stream channelization activity.
- i) The activity must be properly maintained, which may require repairing it after severe storms or erosion events.

Call the Army Corps to see if your situation falls under this permit. If your project requires you to do one or more of the above, an individual permit from the Army Corps will be required. Ohio EPA has concerns depending on the type of stream (warm water habitat, etc.) and the amount of stream disturbance. An OEPA permit may be needed even if your project falls under [Army Corps Nationwide 13 Permit](#).

[The United States Army Corps of Engineers](#)
502 8th Street, Huntington, WV 25701
Phone: (304) 399-5210 Fax: (304) 399-5591

Who Owns Ohio's Streams?

<https://ohiodnr.gov/static/documents/water/WIPP/02%20-%20Who%20Owns%20Ohio's%20Streams.pdf>

Permit Checklist for Stream Modification Projects

<https://ohiodnr.gov/static/documents/water/WIPP/06%20-%20Permit%20Checklist%20for%20Stream%20Modification%20Projects.pdf>



FAIRFIELD SOIL & WATER CONSERVATION DISTRICT

831 College Ave., Suite B
Lancaster, OH 43130

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- Backyard Conservation
- Pond Assistance
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