

CARE & MAINTENANCE of SMALL STREAMS AND OTHER DRAINAGE CHANNELS

There are many things that you, the home owner, can do to help maintain the stream channel so that it flows freely and minimizes erosion along its banks. When properly maintained, a stream channel can be an attractive addition to your property's landscape and will provide habitat for local bird populations. Although there are some stabilization methods that require permits from state and county agencies, the information provided here can be performed by anyone for little or no cost.

1. Regular Maintenance

- A. Stream banks should be maintained with 100% vegetative coverage, preferably a combination of woody shrubs and herbaceous plants. Attached is a list of plants and shrubs which are known to provide excellent soil stabilizing characteristics. The use of turf grasses along stream banks should be discouraged as they provide no resistance to erosion.
- B. Vegetation should be mowed no more than two to three times per year. Minimum height of vegetation when mown shall be four (4") inches.
- C. Any erosion, slumping or other soil disturbances that are noted should be immediately repaired. Repairs may be made using river rock or compacted soil immediately re-vegetated with recommended herbaceous species. If the area is larger than 1000 square feet, local and county permits may be necessary.
- D. All trash and debris shall be removed when such materials are observed. In particular, any object that might form an obstruction in the channel should be removed.
- E. Grass clippings and other lawn debris shall not be disposed of within stream channel or along the banks of same.

2. Routine Maintenance

- A. Vegetation shall be inspected at the beginning of each growing season and replaced or supplemented as needed.
- B. Herbaceous plants may be installed above the water line without the need for permits if the slope of the banks are to remain the same. Refer to attached list for recommended erosion resistant species.
- C. Woody shrubs may be installed above the water line without the need for permits if the slope of the banks are to remain the same. Live stakes may be installed anywhere on the banks. The recommended species on the attached list will root from cuttings of the branches and may be used to supply live stakes for other areas. Attached are instructions for the harvesting, storing, and installing of live stakes from existing plants.

HERBACEOUS PLANTS

<u>BOTANICAL NAME</u>	<u>COMMON NAME</u>	<u>PLANTING ZONE</u> (as measured from water surface)	<u>SHADE TOLERANCE</u>	<u>VALUES</u>
Aster novae-angliae	New England Aster	> 1 ½ ft		
Carex stricta	Tussock Sedge	0 - 1 ½ ft	partial to full shade	Forms strong hummocks
Eupatorium purpureum	Joe-Pye Weed	1 ½ - 3 ft		
Iris versicolor and pseudacorus	Blue and Yellow Flag	0 – 1 ½ ft	Full sun	Showy blue/yellow flowers
Hybiscus moscheutos	Swamp Mallow	0 – 1 ½ ft	Partial shade	Showy pink or white flower, hummingbird food source
Juncus effuses	Soft Rush	0 – 1 ½ ft	Prefers full sun, will tolerate partial shade	Food/habitat for small mammals and birds
Lobelia cardinalis	Cardinal Flower	0 – 3 ft	Partial shade	Bright scarlet flower, hummingbird food source
Lobelia siphilitica	Great Blue Lobelia	0 – 3 ft	Partial shade	Showy blue flower
Panicum virgatum	Switch Grass	> 1 ½ ft	Full to partial sun	Nesting habitat for small mammals and birds
Asclepias incarnate	Swamp milkweed	0 – 1 ½ ft	Full sun	Pink flowers, good butterfly plant

WOODY PLANTS & SHRUBS

<u>BOTANICAL NAME</u>	<u>COMMON NAME</u>	<u>PLANTING ZONE</u> (as measured from water surface)	<u>SHADE TOLERANCE</u>	<u>VALUES</u>
Salix purpurea	Streamco basket willow	Any	Full sun, tolerates partial shade	Provides habitat for small mammals and birds
Salix x cottetii	Bankers dwarf willow	0 – 1 ½ ft	Full sun, tolerates partial shade	Provides habitat for small mammals and birds
Salix discolor	Pussy willow	0 – 1 ½ ft	Partial shade	habitat for small mammals and birds, attractive landscape species
Cornus stolonifera	Red twig dogwood	0 – 3 ft	Partial shade	Bright red winter twigs, white berries in fall
Cornus amomum	Silky dogwood	1 ½ - 3 ft	Partial shade	fall and winter forage for small mammals and birds
Cephalanthus occidentalis	Buttonbush	0 - 1 ½ ft	Partial to full sun	Flood tolerant, provides forage for wildlife
Forsyhis sp.	Forsythia (many varieties)	> 3 ft	Full sun	Bright early spring flowers
Ilex verticillata*	Winterberry*	1 ½ - 3 ft	Partial shade	Bright red berries in winter, winter food source
Viburnum dentatum*	Arrowwood viburnum*	1 ½ - 3 ft	Partial shade	Good late summer fruit

*plant stock only. Does not root well from cuttings.

HARVESTING AND HANDLING OF WOODY CUTTINGS

A large portion of bioengineered stabilization techniques involve the use of woody species of plants that form adventitious roots from cuttings. Live cut plant material can be taken from existing, healthy, native growing sites or from healthy specimens of previously planted material or may be purchased from nursery stock. A mixture of species should be harvested whenever possible; preferable species for bioengineered stabilization include 'Streamco' purple osier willow, 'Bankers' dwarf willow, and 'Ruby' red osier dogwood which are easy to clone and produce roots readily from cuttings.

Plant Selection

When choosing live plant material for erosion control applications, young wood (less than 1 year old) or suckers will often sprout the easiest. However older wood (2 to 5 years old) has greater energy reserves which is necessary to consistently sprout, and it is much stronger. For cases where the cuttings will be bundled or grouped, best results come from mixing younger wood with older wood keeping the majority of the wood in the 2-5 year old range. There are two types of cuttings:

1. Stakes: $\frac{3}{4}$ to 2 inches in diameter, 16-36 inches in length, side branches should be cleanly removed, but bark remain intact
2. Branch cuttings: can have smaller diameter branches ($\frac{3}{8}$ inch) combined with medium diameter branches (1 inch), branch length can be 3-9 feet long depending upon the intended application, use for fascine bundles or brush mattress

Timing

Timing is an important consideration in harvesting cuttings. It is preferable to install the cuttings within one week of harvesting, although this time frame may be extended if the cuttings are handled properly. Also, there must be sufficient soil moisture to insure satisfactory root formation once it is planted. The optimum time to plant live cuttings for south-eastern Pennsylvania is in October and November which provides a longer period of time for the roots to establish before the dry summer months.

Harvesting Cuttings

Harvest should be taken from live wood at least 2 years old, with smooth bark that is not deeply furrowed and is relatively straight. Cuttings should be taken from inside the crown of the plant and should be spread throughout the stand to minimize visual impact. In general, one should avoid thinning more than $\frac{2}{3}$ of the donor plant to avoid harming it. If performed carefully, pruning will not harm the shrub and will often invigorate the plant to produce an abundance of whips for harvest in a couple of years.

Cuttings for live stakes should be trimmed of all side branches, however some side branches may be left on branch cuttings intended for fascines and/or brush mattresses. Terminal bud (the bud growing at the tip) should be trimmed so the plant energy will be rerouted to the lateral buds and adventitious tissue.

Soaking and Storage

Cuttings should never be allowed to dry out or be left in direct sunlight. They may be stored in a cool, humid, dark place for up to 6 months if the conditions remain stable. Cuttings should be soaked in water for a minimum of 24 hours prior to installation, preferably 5 to 7 days. Soaking will stimulate the rooting process, but the cuttings should be removed before the root tips emerge (typically in 7-9 days). Once removed from the water, the cuttings should be immediately transported to the site and planted.

Requirements for Woody Cuttings:

Sunlight and Exposure: Willows and other plants dependent upon direct sunlight for proper growth will thrive on a south or west facing slope. Materials which prefer partial shade would do better on north or east facing slopes. It should be noted, however, that even if the cuttings do not thrive, they may provide sufficient stabilization to allow native species to take hold and grow. See plant specifications for sun/shade preferences.

Soil Moisture: As with any plants, woody cuttings require adequate soil moisture. If planted too late or not deep enough, a cutting will not develop sufficient roots to survive the dry season by tapping into ground water or the capillary fringe. On the other hand, if it is planted in a saturation zone (below ground water), the plant will not have sufficient aerated pore spaces and it will drown. (See plant specifications for bank placement.) Live stakes, for example, should be of sufficient length that the basal end of the stake is at or near ground water, with approximately 6 inches exposed on the surface. Where the stake is installed closer to the water surface this length may be much shorter than for a stake that is installed near the top of the bank.