

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**STREAMBANK AND SHORELINE PROTECTION, (FEET)**

**Code 580**

**DEFINITION**

Treatment(s) used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries.

**PURPOSE**

1. To prevent the loss of land or damage to land uses, or other facilities adjacent to the banks, including the protection of known historical, archeological, and traditional cultural properties.
2. To maintain the flow or storage capacity of the water body or to reduce the offsite or downstream effects of sediment resulting from bank erosion.
3. To improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, recreation.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to streambanks of natural or constructed channels and shorelines of lakes, reservoirs, or estuaries where they are susceptible to erosion. It applies to controlling erosion on shorelines where the problem can be solved with relatively simple structural measures, vegetation, or upland erosion control practices and where failure of structural measures will not create a hazard to life or result in serious damage to property. It does not apply to erosion problems on main oceanfronts and similar areas of complexity not normally within the scope of NRCS authority or expertise.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Measures must be installed according to a site-specific plan and in accordance with all applicable local, state, and federal laws and regulations.

Protective measures to be applied shall be compatible with improvements planned or being carried out by others.

Protective measures shall be compatible with the bank or shoreline materials, water chemistry, channel or lake hydraulics, and slope characteristics both above and below the water line.

End sections shall be adequately bonded to existing measures, terminate in stable areas, or be otherwise stabilized.

Protective measures shall be installed on stable slopes. Bank or shoreline materials and type of measure installed shall determine maximum slopes.

Designs will provide for protection from upslope runoff.

Internal drainage for bank seepage shall be provided when needed. Geotextiles or properly designed filter bedding shall be used on structural measures where there is the potential for migration of material from behind the measure.

Measures applied shall not adversely affect threatened and endangered species nor species of special concern as defined by the appropriate state and federal agencies.

Measures shall be designed for anticipated ice action and fluctuating water levels.

All disturbed areas around protective measures shall be protected from erosion.

Disturbed areas that are not to be cultivated shall be protected as soon as practical after construction.

Vegetation shall be selected that is best suited for the soil/moisture regime.

#### **Additional Criteria for Streambanks**

The channel grade shall be stable based on a field assessment before any permanent type of bank protection can be considered feasible, unless the protection can be constructed to a depth below the anticipated lowest depth of streambed scour.

A protective toe shall be provided based on an evaluation of stream bed and bank stability.

Channel clearing to remove stumps, fallen trees, debris, and bars shall only be done when they are causing or could cause detrimental bank erosion or structural failure. Habitat forming elements that provide cover, food, and pools, and water turbulence shall be retained or replaced to the extent possible.

Changes in channel alignment shall not be made unless the changes are based on an evaluation that includes an assessment of both upstream and downstream fluvial geomorphology. The current and future discharge-sediment regime shall be based on an assessment of the watershed above the proposed channel alignment.

Measures shall be functional for the design flow and sustainable for higher flow conditions based on acceptable risk.

Measures shall be designed to avoid an increase in natural erosion downstream.

Measures planned shall not limit stream flow access to the floodplain.

Stream segments to be protected shall be classified according to a system deemed appropriate by the state. Segments that are incised or contain the 5-year return period (20 percent probability) or greater flows shall be evaluated for further degradation or aggradation.

When water surface elevations are a concern, the effects of protective measures shall not

increase flow levels above those that existed prior to installation.

**Streambank Protection Measures.** The following is a partial list of elements that may be included in a plan for streambank protection.

- Removal of fallen trees, stumps, debris, minor ledge outcroppings, and sand and gravel bars that may cause local current turbulence and deflection.
- Removal of trees and brush that adversely affect the growth of desirable bank vegetation.
- Reduction of the slope of streambanks to provide a suitable condition for vegetative protection or for the installation of structural bank protection.
- Placed or dumped heavy stone, properly underlaid with a filter blanket, if necessary, to provide armor protection for streambanks.
- Deflectors constructed of posts, piling, fencing, rock, brush, or other materials that project into the stream to protect banks at curves and reaches subjected to impingement by high velocity currents.
- Pervious or impervious structures built on or parallel to the stream to prevent scouring streamflow velocities adjacent to the streambank.
- Artificial obstructions, such as fences, to protect vegetation needed for streambank protection or to protect critical areas from damage from stock trails or vehicular traffic.

#### **Additional Criteria for Shorelines**

All revetments, bulkheads, or groins are to be no higher than 3 feet (1 meter) above mean high tide, or mean high water in non-tidal areas.

Structural Shoreline protective measures shall be keyed to a depth to prevent scour during low water.

For the design of structural measures, the site characteristics below the waterline shall be

evaluated for a minimum of 50 feet (15 meters) horizontal distance from the shoreline measured at the design water surface. Treatment depends on soil type and the slope characteristics both above and below the waterline.

The height of the protection shall be based on the design water surface plus the computed wave height and freeboard. The design water surface in tidal areas shall be mean high tide.

When vegetation is selected as the protective treatment, a temporary breakwater shall be used during establishment when wave run up would damage the vegetation.

**Shoreline Protection Measures.** The following is a partial list of protection measures that may be used.

- Bulkheads (timber, concrete, concrete block)
- Revetments (prefabricated slope protection blocks, riprap, soil cement).
- Groin systems (timber or concrete).
- Vegetation of the type that will grown across or along the waterline.

**Additional Criteria for Stream Corridor Improvement**

Stream corridor vegetative components shall be established as necessary for ecosystem functioning and stability. The appropriate composition of vegetative components is a key element in preventing excess long-term channel migration in re-established stream corridors.

Measures shall be designed to achieve any habitat and population objectives for fish and wildlife species or communities of concern as determined by a site-specific assessment or management plan. Objectives are based on the survival and reproductive needs of populations and communities, which include habitat diversity, habitat linkages, daily and seasonal habitat ranges, limiting factors and native plant communities. The type, amount, and distribution of vegetation shall be based on the requirements of the fish and wildlife

species or communities of concern to the extent possible.

Measures shall be designed to meet any aesthetic objectives as determined by a site-specific assessment or management plan. Aesthetic objectives are based on human needs, including visual quality, noise control, and microclimate control. Construction materials, grading practices, and other site development elements shall be selected and designed to be compatible with adjacent land uses.

Measures shall be designed to achieve any recreation objectives as determined by a site-specific assessment or management plan. Recreation objectives are based on type of human use and safety requirements.

**CONSIDERATIONS**

An assessment of streambank or shoreline protection needs should be made in sufficient detail to identify the causes contributing to the instability (e.g. watershed alterations resulting in significant modifications of discharge or sediment production). Due to the complexity of such an assessment an interdisciplinary team should be utilized.

When designing protective measures, consider the changes that may occur in the watershed hydrology and sedimentation over the design life of the measure.

Consider utilizing debris removed from the channel or streambank into the treatment design.

Use construction materials, grading practices, vegetation, and other site development elements that minimize visual impacts and maintain or complement existing landscape uses such as pedestrian paths, climate controls, buffers, etc. Avoid excessive disturbance and compaction of the site during installation.

Utilize vegetative species that are native and/or compatible with local ecosystems. Avoid introduced or exotic species that could become nuisances. Consider species that have multiple values such as those suited for

biomass, nuts, fruit, browse, nesting, aesthetics and tolerance to locally used herbicides. Avoid species that may be alternate hosts to disease or undesirable pests. Species diversity should be considered to avoid loss of function due to species-specific pests. Species on noxious plant lists should not be used.

Livestock exclusion should be considered during establishment of vegetative measures and appropriate grazing practices applied after establishment to maintain plant community integrity. Wildlife may also need to be controlled during establishment of vegetative measures. Temporary and local population control methods should be used with caution and within state and local regulations.

Measures that promote beneficial sediment deposition and the filtering of sediment, sediment-attached, and dissolved substances should be considered.

Consider maintaining or improving the habitat value for fish and wildlife, including lowering or moderating water temperature, and improving water quality.

Consideration should be given to protecting side channel inlets and outlets from erosion.

Toe rock should be large enough to provide a stable base and graded to provide aquatic habitat.

Consider maximizing adjacent wetland functions and values with the project design and minimize adverse effects to existing wetland functions and values.

When appropriate, establish a buffer strip and/or diversion at the top of the bank or shoreline protection zone to help maintain and protect installed measures, improve their function, filter out sediments, nutrients, and pollutants from runoff, and provide additional wildlife habitat.

Consider conservation and stabilization of archeological, historic, structural and traditional cultural properties when applicable.

Measures should be designed to minimize safety hazards to boaters, swimmers, or people using the shoreline or streambank.

Protective measures should be self-sustaining or require minimum maintenance.

## **PLANS AND SPECIFICATIONS**

Plans and specifications for streambank and shoreline protection shall be prepared for specific field sites and based on this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

## **OPERATION AND MAINTENANCE**

An operation and maintenance plan shall be prepared for use by the owner or others responsible for operating and maintaining the system. The plan shall provide specific instructions for operating and maintaining the system to insure that it functions properly. It shall also provide for periodic inspections and prompt repair or replacement of damaged components or erosion.