

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**STREAMBANK AND SHORELINE PROTECTION**

(Ft)  
CODE 580

**DEFINITION**

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

**PURPOSE**

- To prevent the loss of land or damage to land uses, or facilities adjacent to the banks of streams or constructed channels, shoreline of lakes, or reservoirs including the protection of known historical, archeological, and traditional cultural properties.
- To maintain the flow capacity of streams or channels.
- Reduce the offsite or downstream effects of sediment resulting from bank erosion.
- To improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, and recreation.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to streambanks of natural or constructed channels and shorelines of lakes, or reservoirs where they are susceptible to erosion. It does not apply to erosion problems on main ocean fronts, beaches or similar areas of complexity.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Treatments shall be in accordance with all applicable local, state and federal laws and regulations. The landowner/operator/producer is responsible for securing required permits.

Treatments applied shall seek to avoid adverse effects to endangered, threatened, and candidate species and their habitats, whenever possible.

Treatments applied shall seek to avoid adverse

effects to archaeological, historic, structural, and traditional cultural properties, whenever possible.

An assessment of unstable streambank or shoreline sites shall be conducted in sufficient detail to identify the causes contributing to the instability (e.g livestock access, watershed alterations resulting in significant modifications of discharge or sediment production, in channel modifications such as gravel mining, head cutting, water level fluctuations, boat-generated waves, e.g).

Proposed protective treatments to be applied shall be compatible with improvements being planned or installed by others.

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

End sections of treatment areas shall be adequately anchored to existing treatments, terminate in stable areas, or be otherwise stabilized to prevent flanking of the treatment.

Structural measures may be keyed into the bank at both the upstream and downstream ends, with additional keys along the design reach as needed to prevent flanking. If keys are required they shall extend from the elevation of the anticipated scour depth to the low bank elevation and shall extend into the bank a minimum of 5 feet (as measured perpendicular to the bank slope).

Protective treatments shall be installed that result in stable slopes. Design limitations of the bank or shoreline materials and type of measure installed shall determine steepest permissible slopes.

Designs will provide for protection of installed treatments from overbank flows resulting from upslope runoff and flood return flows.

Internal drainage for bank seepage shall be provided when needed.

Geotextiles or properly designed filter bedding shall be incorporated with structural measures where there is the potential for migration of material from behind the measure.

Treatments shall be designed to account for any anticipated ice action, wave action, and fluctuating water levels.

All disturbed areas around protective treatments 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 site conditions and achieves the intended purpose(s).

In order to ensure plant community establishment and integrity, a vegetative management plan shall be prepared in accordance with NRCS conservation practice standard, Channel Bank Vegetation, Code 322.

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

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

A site assessment shall be performed to determine if the causes of instability are local (*e.g.* poor soils, high water table in banks, alignment, obstructions deflecting flows into bank, *etc.*) or systemic in nature (*e.g.* aggradation due to increased sediment from the watershed, increased runoff due to urban development in the watershed, degradation due to channel modifications, *etc.*). The assessment need only be of the extent and detail necessary to provide a basis for design of the bank treatments and reasonable confidence that the treatments will perform adequately for the design life of the measure.

Changes in channel alignment shall not be made without an assessment of both upstream and downstream fluvial geomorphology that evaluates the affects of the proposed alignment. The current and future discharge-sediment regime shall be based on an assessment of the watershed above the proposed channel alignment.

Bank protection treatment shall not be installed in channel systems undergoing rapid and extensive changes in bottom grade and/or alignment unless treatments are designed to control or accommodate the changes. Bank treatment shall be constructed to a depth at or below the anticipated lowest depth of streambed scour.

If the failure mechanism is a result of the degradation or removal of riparian vegetation, stream corridor restoration shall be implemented, where feasible, (see Additional Criteria for Stream Corridor Improvement) as well as treating the banks.

Toe erosion shall be stabilized by treatments that redirect the stream flow away from the toe or by structural treatments that armor the toe. Additional design guidance is found in the NEH Part 650, Chapter 16, Streambank and Shoreline Protection.

Where toe protection alone is inadequate to stabilize the bank, the upper bank shall be shaped to a stable slope and vegetated, or shall be stabilized with structural or soil-bioengineering treatments.

Channel clearing to remove stumps, fallen trees, debris, and sediment bars shall only be performed when they are causing or could cause unacceptable bank erosion, flow restriction, or damage to structures. Habitat forming elements that provide cover, food, pools, and water turbulence shall be retained or replaced to the extent possible.

Treatments shall be functional and stable for the design flow and sustainable for higher flow conditions.

Treatments shall not induce an increase in natural erosion.

Treatments shall not limit stream flow access to the floodplain.

Where flooding is a concern, the effects of protective treatments shall not increase flow levels above those that existed prior to installation.

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

All revetments, bulkheads or groins are to be no higher than 3 feet above mean high water.

Structural shoreline protective treatments shall be keyed to a depth to prevent scour during low water.

For the design of structural treatments, the site characteristics below the waterline shall be evaluated for a minimum of 50 feet horizontal distance from the shoreline measured at the design water surface.

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.

#### **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. The establishment of vegetation on channel banks and associated areas shall also be in accordance with conservation practice standard Critical Area Planting, Code 342.

Treatments shall be designed to achieve habitat and population objectives for fish and wildlife species or communities of concern as determined by a site-specific assessment or management plan. Objectives shall be 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.

Treatments shall be designed to meet aesthetic objectives as determined by a site-specific assessment or management plan. Aesthetic objectives shall be 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.

Treatments shall be designed to achieve recreation objectives as determined by a site-specific assessment or management plan.

Safety requirements shall be based on type of human use and recreation objectives.

#### **CONSIDERATIONS**

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

Consider utilizing debris removed from the channel or streambank into the treatment design when it is compatible with the intended purpose.

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, and 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.

Select plant materials that provide habitat requirements for desired wildlife and pollinators. The addition of native forbs and legumes to grass mixes will increase the value of plantings for both wildlife and pollinators.

Treatments 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 by including treatments that provide aquatic habitat in the treatment design and that may lower or moderate water temperature and improve water quality.

Consider the need to stabilize side channel inlets and outlets and outlets of tributary streams from erosion.

Consider aquatic habitat when selecting the type of toe stabilization.

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

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

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 treatments, 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.

Consider safety hazards to boaters, swimmers, or people using the shoreline or streambank when designing treatments.

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

Changes in channel alignment may require a permit under Section 404 of the Clean Water Act. The producer should contact the Army Corps of Engineers to determine if a permit is required. Additional criteria may be required by a permit.

## **DRAWINGS 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. Plans shall include treatments to minimize erosion and sediment production during construction and provisions necessary to comply with conditions of any environmental agreements, biological opinions or other terms of applicable permits.

The installation of post and wire revetment for streambank and shoreline protection shall be in accordance with Construction Specification 580F.

The installation of loose rock riprap for streambank and shoreline protection shall be in accordance with Construction Specification 580R.

The installation of wire bound rewrap for streambank and shoreline protection shall be in accordance with Construction Specification 580W.

The installation of small structures for streambank protection shall be in accordance with Construction Specification 580S.

## **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.

The following are some recommendations to help develop a good operation and maintenance program:

- Inspect and repair rock structures after high flow event.
- Check all rock riprap sections for accelerated weathering and displacement. Replace to original grades if necessary.
- Maintain vigorous growth of desirable vegetative coverings. This may include reseeding, fertilization, and controlled application of herbicides. Periodic mowing may also be needed to control height.
- Remove debris that may accumulate at the installed protection section and immediately upstream and downstream of the protection section.
- All settlement or cracks in the soil should be investigated to determine the cause and immediately repaired.

- If fences are installed, they should be maintained to prevent unauthorized human entry or livestock access.
- Control livestock access on unfenced areas.
- Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.
- Immediately repair any vandalism, vehicular, or livestock damage.

#### **REFERENCES**

NEH Part 650, Chapter 16, Streambank and Shoreline Protection