

**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.

PURPOSES

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).

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.

To improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, and recreation.

To enhance the recreational attributes of the river or stream.

To protect threatened and/or endangered species.

To maintain the functions and values of adjacent wetlands.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to streambanks of natural (rivers or streams) or constructed channels and shorelines of lakes, reservoirs, or wetlands where they are susceptible to erosion. It applies to controlling erosion where the problem can be solved with relatively simple structural measures, vegetation, or upland erosion control practices

CRITERIA

General Criteria Applicable to All Purposes

This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

The owner is responsible for securing necessary permits, complying with all laws and regulations, and meeting legal requirements applicable to the installation and operation and maintenance of this conservation practice and associated structures

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 terminate in stable areas or be otherwise stabilized.

Protective measures shall be installed on stable slopes. Bank or shoreline materials and the 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.

If a sand-gravel filter is specified, the filter gradation shall be designed in accordance with Chapter 26 in National Engineering Handbook (NEH) Part 633, Soil Engineering.

The geotextile will meet the requirements for a non-woven, Class II, geotextile. The requirements are a tensile strength greater than 120 pounds (American Society for Testing and Materials [ASTM] D 4632 [grab test]), a bursting strength of 210 psi (ASTM D 3786 [diaphragm test]), an elongation at failure greater than or equal to 50 percent (ASTM D 4632), a puncture force greater than 60 pounds (ASTM D 4833), an apparent opening size that is a maximum of a No. 40 sieve (ASTM D 4751), and a permittivity greater than 0.70 sec^{-1} (ASTM D 491).

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 established to permanent vegetation as soon as practical after construction according to Conservation Practice Standard 342, Critical Area Planting. Vegetation shall be selected that is best suited for the soil/moisture regime.

Additional Criteria for Streambanks

The channel grade of the streambed shall be stable, based on a field assessment (for example Stream Visual Assessment Protocol) before any permanent type of bank protection can be considered feasible.

The streambed and bank stability shall be evaluated to determine if the toe requires protection. The toe is the lower edge of the bank protection. Bank protection must be constructed to a depth below the anticipated lowest depth of streambed scour.

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, pools, and water turbulence shall be retained or replaced to the extent possible. Guidance can be found in the publication, Stream Obstruction Removal Guidelines, published in 1983 by the American Fisheries Society.

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. The checklist, "Measurable Attributes for Describing Conditions in the Stream Corridor," in Chapter 4 of NEH Part 653, "Stream Corridor Restoration: Principles, Processes, and Practices," shall be used to document the current and future condition of the stream and watershed.

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 flood plain.

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.

The stream shall be classified according to either the Schumm channel evolution model or the Rosgen stream channel classification system. These are explained in Chapter 7 of NEH Part 653.

When water surface elevations are a concern, the effects of protective measures shall not increase flow levels above those that existed prior to installation.

Bank stabilization for wetlands adjoining streams must be evaluated for wetland functions and values using the riverine hydrogeomorphic (HGM) model.

Additional Criteria for Shorelines

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 horizontal distance from the shoreline measured at the normal water surface elevation.

The height of the protection shall be based on the design water surface plus the computed wave height and freeboard.

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

Shoreline stabilization for wetlands must be evaluated for wetland functions and values using the riverine HGM model.

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 the 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 (for example, 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 (for example, Proper Functioning Condition Assessment).

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 should be applied after establishment to maintain the desired 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 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.

Rock to be placed at the toe of the bank protection 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.

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, 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 ensure that it functions properly. It shall also provide for periodic inspections and prompt repair or replacement of damaged components or erosion.