NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

CRITICAL AREA PLANTING

(Ac.)

CODE 342

DEFINITION

Establishing permanent vegetation on sites that have, or are expected to have, high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices.

PURPOSE

Stabilize stream and channel banks, and shorelines.

Stabilize areas with existing or expected high rates of soil erosion.

Rehabilitate and revegetate degraded sites that cannot be stabilized using normal establishment techniques.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to highly disturbed areas such as:

- active or abandoned mined lands;
- urban conservation sites;
- road construction areas;
- conservation practice construction sites;
- areas needing stabilization before or after natural disasters such as floods, hurricanes, tornados and wildfires;
- eroded banks of natural channels, banks of newly constructed channels, and lake shorelines;
- other areas degraded by human activities or natural events.

CRITERIA

General Criteria Applicable To All Purposes

Site Preparation: A site investigation shall be conducted to identify any physical, chemical, or biological conditions that could affect the successful establishment of vegetation.

Areas to be planted will be cleared of unwanted materials and smoothed or shaped, if needed, to meet planting and landscaping purposes. Plan minimal shaping and filling that allows maintenance needed to meet the designated purpose.

Stockpile a minimum of 3” of topsoil (surface soil) when cut exceeds eight inches. Redistribute topsoil after shaping.

A suitable seedbed shall be planned for all seeded species. Compacted layers will be ripped and the soil re-firmed prior to seedbed preparation.

Drainage Area Above the Treatment Area (not applicable to flood plains, shorelines or channels)

Percent Slope of Drainage Area	Maximum Drainage Area (ac)
0-5	8
5-8	4
8-20	2
20-35	1

Note: to reduce drainage area excess water may be diverted or otherwise controlled.

Species Selection: Species selected for seeding or planting shall be suited to current site conditions and intended uses, and be resistant to diseases or insects common to the site or location. See "Plant Material Adaptation" guide and Tables 1 – 4.

Selected species will have the capacity to achieve adequate density and vigor to stabilize the site within an appropriate period.

Use native species when appropriate for the site. No plants on the Federal or state noxious weeds list shall be planted.

Establishment of Vegetation: Seeds will be planted using the method or methods best suited to site and soil conditions.

Sod placement shall be limited to areas that can naturally supply needed moisture or sites that can be irrigated during the establishment period.

Sod will be placed and anchored using techniques to ensure that it remains in place until established.

Species, rates of seeding or planting, minimum quality of planting stock (e.g. pure live seed (PLS) or stem caliper), method of seedbed preparation, and method of establishment shall be specified before application. Only viable, high quality seed or planting stock will be used.

Seeding or planting shall be done at a time and in a manner that best ensures establishment and growth of the selected species. What constitutes successful establishment (e.g. minimum percent ground/canopy cover, percent survival, stand density) shall be specified before application.

Planting shall be done during approved times for the species to be used.

Apply soil amendments (e.g. lime, fertilizer, compost) according to the requirements in the local Field Office Technical Guide.

Plantings shall be mulched as necessary to ensure establishment. Other disturbed areas shall be mulched as necessary to prevent erosion. Establish a temporary cover crop or mulch the area with 100% coverage if seeding dates are not conducive to seeding perennial vegetation. Crimping in mulch or lightly disking mulch will aid in stabilizing mulch. Mulch at planting should cover 70% of the surface. Typically 1.5 tons (75 bales) of straw mulch is applied per acre. Hydroseeding or mulch blankets are also acceptable forms of mulch. Surfaces with more than 70 percent gravel may be seeded without tillage and/or mulch.
See Mulch standard.

In areas where normal farm equipment will not operate, consider using low maintenance vegetation such as pines and shrubs.

Plan vegetation that is adapted to the site south and west facing slopes are typically droughty and north and east facing slopes are typically moist.

Seeding on fresh dozer tracks is an excellent seeding media. After a rain, tracks require tillage prior to seeding. When broadcasting seed, sow half rate in one direction, and then seed the other half using another pattern.

To scarify steep areas, a harrow or a cedar tree can be cabled between two tractors to manipulate the placement of the harrow.

Apply all nutrients at time of seeding cover crop. A soil test or recommended rates in Table 1 may be applied. Split N applied when more than 60 pounds of N is recommended. In the absence of a soil test, apply 2 tons/acre at establishment and 1 ton/acre every 5 years.

Additional Criteria to Stabilize Stream and Channel Banks and Shorelines

When slopes are modified for seeding, topsoil will be stockpiled and spread over areas to be planted as needed to meet planting and landscaping needs.

Bank and Channel Slopes: Channel side slopes shall be shaped so that they are stable and allow establishment and maintenance of desired vegetation.

Slopes steeper than 2:1 shall not be stabilized using vegetation alone. A combination of vegetative and structural measures will be used on these slopes to ensure adequate stability.

Species Selection: Plant material used for this purpose shall:

- be adapted to the hydrologic zone (see Fig. 1) into which they will be planted.
- be adapted and proven in the regions in which they will be used.
- when mature, produce plant communities that are compatible with those in the area.
- protect the channel banks but not restrict channel capacity.

See tables 1 – 4 and Critical Area Plant Materials

Establishment of Vegetation: The species used, planting rates, spacing, and methods and dates of planting shall be based on plant materials program trials or other technical guidance, such as local planting guides or technical notes.

Identify, mark, and protect desirable existing vegetation during practice installation.

A combination of vegetative and structural measures using living and inert material shall be used when flow velocities, soils, and bank stability preclude stabilization by vegetative establishment alone.

If the existing vegetation on a site will compete with species to be established (e.g. bare-root, containerized, ball-and-burlap, potted), it will be controlled in a manner that ensures the successful establishment of the planted species.

Site Protection and Access Control: Grazing animal access to planted areas will be controlled for a minimum of two growing seasons during the establishment period.

All areas to be grazed will have a grazing plan that meets the criteria in the local Field Office Technical Guide.

Grazing shall be permanently excluded on high hazard sites, such as cut banks, areas of seepage or other potentially unstable areas.

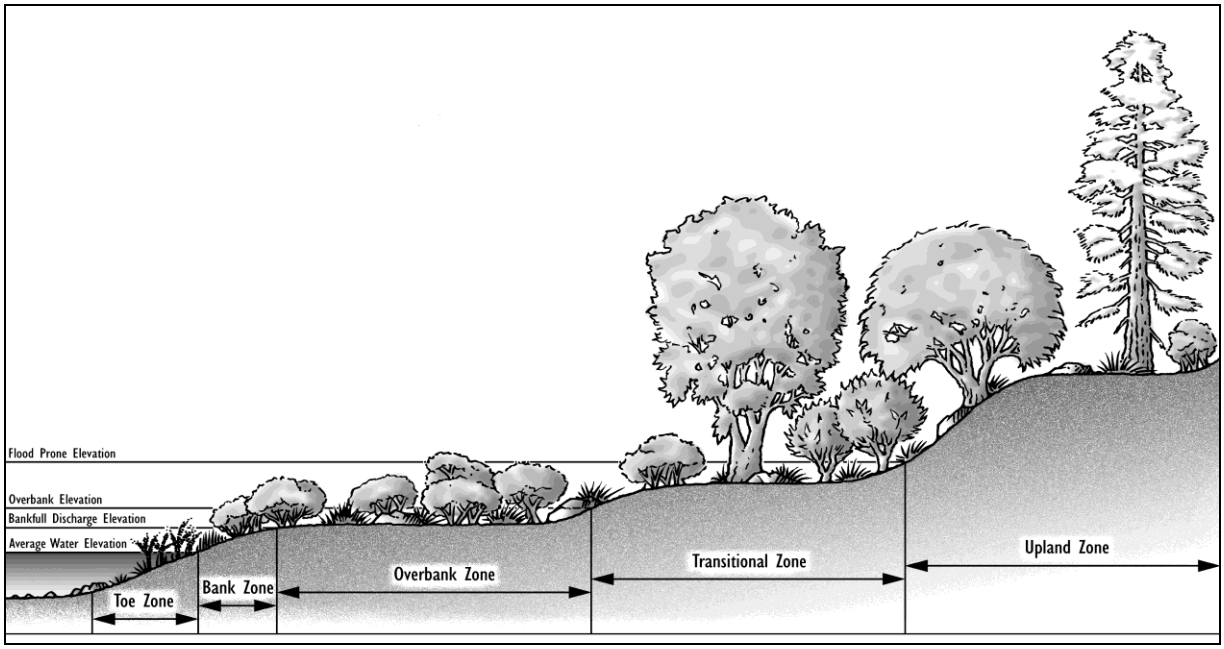

Figure 1. Location of hydrologic zones along a channel or shoreline.

Definitions and descriptions of hydrologic zones used for channels and shorelines:

Bankfull Discharge Elevation - In natural streams, it is the elevation at which water fills the channel without overflowing onto the flood plain.

Bank Zone - The area above the Toe Zone located between the average water level and the bankfull discharge elevation. Vegetation may be herbaceous or woody, and is characterized by flexible stems and rhizomatous root systems.

Overbank Zone - The area located above the bankfull discharge elevation continuing upslope to an elevation equal to two thirds of the flood prone depth. Vegetation is generally small to medium shrub species.

Toe Zone - The portion of the bank that is between the average water level and the bottom of the channel, at the toe of the bank. Vegetation is generally herbaceous emergent aquatic species, tolerant of long periods of inundation.

Transitional Zone - The area located between the overbank zone, and the flood prone width elevation. Vegetation is usually larger shrub and tree species.

Upland Zone – The area above the Transitional Zone; this area is seldom if ever saturated.

Note: some channels or shorelines have fewer than four hydrologic zones because of differences in soils, topography, entrenchment and/or moisture regime.

Additional Criteria to Rehabilitate and Revegetate Degraded Sites that Cannot Be Stabilized through Normal Farming Practices.

If gullies or deep rills are present, they will be filled and leveled as necessary to allow equipment operation and ensure proper site and seedbed preparation.

Based on a soil test and other appropriate site evaluations, soil amendments will be added as necessary to ameliorate or eliminate physical or chemical conditions that inhibit plant establishment and growth.

CONSIDERATIONS

Soil, Moisture (available water), Slope, Aspect, Timing, Plant Species, Concentrated flow, and Nutrients all should be considered when evaluating the site.

Species or mixes that are adapted to the site and have multiple values should be considered. To benefit pollinators and other wildlife, flowering shrubs and wildflowers with tough root systems and good soil holding capacity also should be considered for incorporation as a small percentage of a larger grass-dominated planting. Where appropriate consider a diverse mixture of legumes and forbs to support pollinator habitat.

Avoid species that may harbor pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

Planning and installation of other conservation practices such as Diversion (code 362), Obstruction Removal (code 500), Subsurface Drain (code 606), or Underground Outlet (code 620) may be necessary to prepare the area or ensure vegetative establishment.

Areas of vegetation established with this practice can create habitat for various type of wildlife. Maintenance activities, such as mowing or spraying, can have detrimental effects on certain species. Perform management activities at the times and in a manner that causes the least disruption to wildlife.

Consider not planting pines on the south side of roads due to ice accumulation on road and persistence.

Avoid mowing during nesting periods April 15 through August 15.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or management unit according to the criteria and operation and maintenance sections of this standard. Record practice specifications using approved specification sheets, job sheets or other acceptable documentation.

The following elements shall be addressed in the plan, as applicable, to meet the intended purpose.

- Site preparation
- Topsoil requirements
- Fertilizer application
- Seedbed/planting area preparation
- Methods of seeding/planting
- Time of seeding/planting
- Selection of species
- Seed/plant source
- Seed analysis
- Seeding rate/plant spacing

- Mulching
- Supplemental water needed for establishment
- Protection of plantings

OPERATION AND MAINTENANCE

Use of the area shall be managed as long as necessary to ensure the site remains stabile.

Plantings shall be protected from pests (e.g. weeds, insects, diseases, livestock, or wildlife) as necessary to ensure long-term survival.

Inspections, reseeding or replanting, and fertilization may be needed to ensure that this practice functions as intended throughout its expected life. Observation of establishment progress and success should be performed at regular intervals until the practice has met the criteria for successful establishment and implementation.

Replanting should be done where needed within one year after original planting. If serious erosion persists mulching may also be needed after initial planting. If the area fails initially to establish well consider planting a more adapted species on part or the entire area.

If rills or small gullies developed during establishment, but surrounding vegetation is well established, disk edge of the gully so sod falls in the gully and walk the sod in with tires. Hand placement of sod prior to walking it in is beneficial.

REFERENCES

Federal Interagency Stream Restoration Working Group. 1998. Stream corridor restoration: principles, processes, and practices. National Engineering Handbook, Part 653.

USDA-NRCS. 2007. National Engineering Handbook, Part 654. Stream restoration guide.

USDA-NRCS. 2010. The PLANTS Database (http://plants.usda.gov, checked September 2010). National Plant Data Center.

Table 1
Typical Perennial Seeding Recommendation

PERENNIAL SEEDING RECOMMENDATION SPECIES	Planting Date	Seeding Rate/ Acre	Lime* and Fertilizer	Topdress with Nitrogen	Maintenance Fertilizer	Remarks
Bermudagrass Seed (hulled)	Acceptable: 4/15-7/1 Optimum 5/1-6/20	10 lbs with 15 lbs. on steep banks.	60-120-120 topdress with 45 lbs. of N 2 months after seeding	After seeding 45 lbs. every 30 days to 60 days as needed.	60-60-60	Excellent erosion control. Poor wildlife habitat. Aggressive. Fertility management is important for longevity.
Bermudagrass Sprigs or Clippings with Vaughn's No. 1	Acceptable: 4/15-7/1 Optimum: 5/1-6/20	50 cu. ft.	60-120-120 topdress with 45 lbs. of N 2 months after sprigging	After established 45 lbs every 30 days to 60 days as needed.	60-60-60	Excellent erosion control. Poor Wildlife habitat. Aggressive
Native Grass Mix (Big Bluestem, Little Bluestem, and Indiangrass	Acceptable: 4/15-7/1 Optimum: 4/15-5/30 Dormant Plantings: 12/1-2/15 (planted with full rate "alone rate" of winter annual)	12 lbs. (4 lbs. of each)	0-60-60	After weed competition is controlled and 1 or more plants are present per 2.5 sq. ft. topdress with 30 to 45 lbs. of nitrogen.	45-45-45	Avoid slopes greater than 8% in West TN. Avoid slopes greater than 12% in East and Middle TN. Avoid areas of concentrated flow. Excellent wildlife cover. Adding 4 lb of Virginia wildrye will improve diversity and winter cover.
Creeping Red Fescue Virginia Wildrye Deer tounge Annual lespedeza	Acceptable: 2/1-4/1	20 lbs 15 lbs 5 lbs 8 lbs	60-120-120	45 lbs. N following growing season 3/1, 4/15, or 9/1. as needed.	45-45-45	Excellent erosion control. Good wildlife cover.
Lathco flatpea Tall fescue	Acceptable: 8/15-10/15 2/20-4/1 Optimum 8/15-9/15	30 lbs 25 lbs	30-120-120	30 lbs. following growing season 3/1, 4/15, or 9/1. as needed.	0-45-45	Excellent erosion control. Aggressive climbs 5' high.

Table 1
Typical Perennial Seeding Recommendation (continued)

PERENNIAL SEEDING RECOMMENDATION SPECIES	Planting Date	Seeding Rate/ Acre	Lime* and Fertilizer	Topdress with Nitrogen	Maintenance Fertilizer	Remarks
Sericea with Tall Fescue Acceptable: 3/15-6/1 Optimum for mix:	Acceptable: 3/15-5/15. Optimum: plant sericea first 3/15-6/1 and tall fescue following fall 9/15-10/15	40 lbs. sericea plus 20 lbs. tall fescue	30-120-120	45 lbs. following growing season 3/1, 4/15, or 9/1. Repeat as needed. Sericea does not provide nitrogen for the associative grass.	30-60-60	Tolerant of low fertility. Excellent erosion control. Aggressive, choose alternative species where practical.
Switchgrass Kobe or Korean Lespedeza	Acceptable: 4/15 to 7/1 Optimum: 4/15-5/30 Dormant Plantings: 12/1-2/15 (planted with full rate "alone rate" of winter annual)	10 lbs. 8 lbs.	0-60-60	45 lbs of N after established.	45-45-45	After weed competition is controlled and one or more plants are present per 2.5 sq. ft., topdress with 30 to 45 lbs. of nitrogen.
Tall Fescue	Acceptable: 8/15-10/15 2/20-4/1 Optimum 8/15-9/15	50 lbs.	60-120-120	45 lbs. following growing season 3/1, 4/15, or 9/1. Repeat as needed.	45-45-45	Excellent erosion control. Poor wildlife habitat
Tall Fescue White Clover	Acceptable: 8/15-10/15 2/20-4/1 Optimum 8/15-9/15	40 lbs. 2 lbs.	30-120-120	30 lbs. following growing season 3/1, 4/15, or 9/1. as needed.	0-45-45	Excellent erosion control. Poor wildlife habitat

Table 1
Typical Perennial Seeding Recommendation (continued)

PERENNIAL SEEDING RECOMMENDATION SPECIES	Planting Date	Planting Rate/ Acre	Lime* and Fertilizer	Topdress with Nitrogen	Maintenance Fertilizer	Remarks
Trees (Black Locust, Loblolly, Virginia, White, or Shortleaf) Acceptable: 11/1-4/1 Optimum:	Trees (Black Locust, Loblolly, Virginia, White, or Shortleaf) Acceptable: 11/1-4/1 Optimum: 2/15-4/1	6' x 6' spacing (1,210 plants/ acre)	0-60-60	0	If trees are yellow and stunted, apply 50-50-50.	Protect area from fire and grazing. Do not prune trees. White pine may be used at elevations above 2,500 feet. Do not plant shortleaf pine on clayey sites. Plant trees 2 or 3 feet back from edge of a steep gully wall. Loblolly pine is preferred for planting on sites where silting can be expected. Roots should be planted straight down, not twisted, balled, or J-shaped. Pack soil firmly around the planted seedlings to remove air pockets.
Streambank planting: three or more adapted shrubs toe and bank zone (see ; Grasses: Switchgrass, Virginia wildrye, Annual lespedeza	Acceptable: 11/1-4/1 Optimum: 2/15-4/1	**Shrubs: 3' x 3' spacing or closer (4840 pl/ac)**	0-60-60	**0**	**If stunted or yellow 50-50-50**	Roots should be planted straight down, not twisted, balled, or J-shaped. Pack soil firmly around the planted cuttings/seedlings to remove air pockets.

* In the absence of a soil test, apply 2 tons/acre at establishment and 1 ton/acre every 5 years.

Table 2

Typical Planting Recommendation Dependent on Date of Planting and Purpose

Purpose: **Erosion control (e.g. Dam or construction site)**

Date	Species	Planting Rate/Acre	Lime and Fertilizer	Mulch	Notes
August - October	Tall fescue White clover Or Bermudagrass sod overseeded with no more than 5 lb of annual ryegrass	40 lb./ac. 2 lb./ac.	30-120-120	At minimum mulch cut slopes and concentrated flow areas	If concentrated flow area omit clover and increase tall fescue to 50 lb./ac. Adding 5 lb. bermudagrass in hull to spillway area may improve vegetation in future.
November - January	Tall fescue White clover Bermudagrass unhulled Wheat	40 lb./ac. 2 lb/ac 10 lb/ac 15 lb/ac	30-120-120	Mulch entire area	Another alternative is Bermudagrass sod overseeded with no more than 5 lb of annual ryegrass
February - April	Tall fescue White clover	40 lb./ac. 2 lb./ac.	30-120-120	At minimum mulch cut slopes and concentrated flow areas	If concentrated flow area omit clover and increase tall fescue to 50 lb./ac. Bermudagrass sod overseeded with no more than 5 lb of annual ryegrass
May - July	Bermudagrass hulled Foxtail millet	10 lbs with 15 lbs. on steep banks. 5 lb./ac.	60-120-120 topdress with 45 lbs. of N 2 months after seeding	At minimum mulch cut slopes and concentrated flow areas	Planting success after June is very dependent on moisture. Bermudagrass sod overseeded with 5 lb of foxtail or brown millet

* In the absence of a soil test, apply 2 tons/acre at establishment and 1 ton/acre every 5 years.

Table 3 Typical Planting Recommendation Dependent on Date of Planting and Purpose Purpose: Erosion control (e.g. **Streambank**, may have rock rip rap at toe of slope)					
Date	Species	Planting Rate/Acre	Lime and Fertilizer	Mulch	Notes
August - October	Creeping red fescue Virginia wildrye White clover (optional) Nov – April planting shrubs on toe and bank with tall trees 6' back from top of bank	20 lb/ac. 15 lb./ac. 2 lb./ac. 3' x 3' spacing 6' x 6' or wider	30-120-120	At minimum mulch cut slopes and concentrated flow areas	If concentrated flow area omit clover and increase tall fescue to 50 lb./ac. Adding 5 lb. bermudagrass in hull may improve vegetation in future.
November - January	Creeping red fescue Virginia wildrye White clover (optional) Planting shrubs on toe and bank with tall trees 6' back from top of bank	20 lb/ac. 15 lb./ac. 2 lb./ac. 3' x 3' spacing 6' x 6' or wider	30-120-120	Mulch entire area	Switchgrass 5 lb/ac could be added to mix as a dormant planting Another alternative is Bermudagrass sod overseeded with no more than 5 lb of annual ryegrass
February - April	Creeping red fescue Virginia wildrye White clover (optional) Annual lespedeza (optional) Planting shrubs on toe	20 lb/ac. 15 lb./ac. 2 lb./ac. 8 lb/ac 3' x 3'	30-120-120	At minimum mulch cut slopes	Switchgrass 5 lb/ac could be added to mix as a dormant planting Bermudagrass sod overseeded with no more than 5 lb of annual ryegrass

	and bank with oaks 6' back from top of bank	spacing 6' x 6' or wider			
May - July	Switchgrass Annual lespedeza (optional) or Foxtail millet (optional)	10 lbs with 15 lbs. on steep banks. 8 lb/ac. 5 lb./ac.	0-120-120	At minimum mulch cut slopes	Planting success after June is very dependent on moisture. Alternative: Bermudagrass sod overseeded with 5 lb of foxtail millet

* In the absence of a soil test, apply 2 tons/acre at establishment and 1 ton/acre every 5 years.

Table 4
Temporary Seeding Recommendations
(Seedings alone are only to adjust seeding date or provide mulch for later perennial seedings)

Species Planting	Date	Seeding Rate/Acre	Lime* and Fertilizer
Wheat	9/1-11/10	Alone 3 bushels In mix ¼ bushel	45-45-45
Rye	8/15-11/10	Alone 2 bushels In mix ¼ bushel	45-45-45
Ryegrass (do not increase seeding rate)	8/15-10/10	Alone 40 lbs. Do not use over 5 lb in seeding mixtures.	45-45-45
Barley	9/1-10/1	Alone 3 bushels In mix ¼ bushel	45-45-45
Oats 9/1-10/1	2/20-3/15	Alone 4 bushels In mix 1/3 bushel	45-45-45
German Millet (Foxtail)	5/1- 7/15	Alone 40 lbs. In mix 5 lbs.	60-60-60
Browntop Millet	5/1-7/15	Alone 40 lbs. In mix 5 lbs.	60-60-60
Pearl Millet	5/1-7/15	Alone 20 lbs. In mix 5 lbs.	60-60-60
Sorghums	4/20-7/15	Alone 45 lbs. In mix 5 lbs.	60-60-60
• Lower P2O5 and K2O fertilizer for perennial seeding accordingly			