

**NATURAL RESOURCES CONSERVATION SERVICE  
WASHINGTON PRACTICE SPECIFICATION GUIDESHEET  
CRITICAL AREA PLANTING – 342**

Definition and Purpose

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. This practice applies to highly disturbed areas such as active or abandoned mined lands; road construction areas; conservation practice construction sites; and areas needing stabilization before or after natural disasters, e.g. floods, tornados, wildfires, etc. This practice also applies to eroded banks of natural channels, banks of newly constructed channels, lake shorelines, and other areas degraded by human activities or natural events.

The purpose of this practice is to stabilize stream and channel banks, and shorelines; stabilize areas with existing or expected high rates of soil erosion by wind or water; rehabilitate and revegetate degraded sites that cannot be stabilized using normal establishment techniques; and stabilize coastal areas, such as sand dunes and riparian areas.

Site Preparation/Establishment of Vegetation

A site investigation shall be conducted to identify any physical (soil texture, soil compaction, slope steepness, potential water movement, etc.), chemical (soil ph, soil nutrients, residual herbicides, etc.), or biological (weed competition, herbivores, rodents, etc.) conditions that could affect the successful establishment of vegetation.

Important principles and practices for critical area planting site preparation and seeding are:

- Good water management measures
- Elimination of competition
- Preparation of a good seedbed
- Quality seed of adapted species
- Seed at the proper season, rate, and depth
- If necessary fertilize, mulch, and protect until cover is fully established

See [Plant Materials Technical Note 6, Seedbed Preparation and Seed to Soil Contact](#) in efortg under *Section 1/Reference Lists/Technical Notes by Discipline/Plant Materials* for information on these principles and other site preparation information.

Slopes – each kind of disturbed material has its own angle of repose both in its original state, as in cuts, or when loose, as in fill. For most disturbed loose or compacted cuts and fills in soil, a 3:1 slope should be the maximum. A good rule of thumb is “make the slope 10-degrees less steep than the angle of repose” (also, see Mulching below).

Streambank and channel 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. A combination of vegetation and structural measures shall also be used when flow velocities, soils, and bank stability preclude stabilization by vegetative establishment alone. Work with an engineer to determine appropriate stabilization measures (also, see Mulching below).

Areas to be planted will be cleared of unwanted materials and smoothed or shaped, if practical, to meet planting and landscaping purposes. Undesirable vegetation needs to be eliminated or controlled. (Refer to *Herbaceous Weed Control 315 Practice Standard*). A suitable seedbed shall be prepared for all seeded species. Compacted layers will be ripped and the soil re-firmed prior to seedbed preparation. A seedbed is considered firm when the boot heel imprint of an average person leaves a maximum impression in the soil

of not more than one-half inch. Broadcast seeding (fall only) should be on freshly roughened soil surfaces. The horizontal indentations left by tracked equipment may provide a suitable broadcast surface on steep slopes. On slopes, after seeding and mulching, consider track walking with a crawler tractor to push mulch into soil surface and to improve seed to soil contact.

Chemical weed control may be substituted for one or all of the tillage operations when preparing a seedbed. In accordance with NRCS policy, NRCS personnel are not authorized to provide recommendations for herbicide use. Landowners should contact local Cooperative Extension Service, chemical company representative or an agricultural consultant for specific recommendations. NRCS personnel will evaluate environmental risk associated with herbicide recommendations relative to planting site conditions and potential for herbicide to result in significant environmental impacts (ie. Run WINPST).

Available soil should be identified, salvaged, and stored by layers prior to construction. Caution should be exercised so as not to uncover or re-distribute on-site toxic materials. Topsoil should not be stored longer than two years to maintain biological attributes. Sites that are unsuitable for vegetative establishment should be covered with a minimum of four inches of topsoil, or if not available, whatever topsoil is available. Topsoil should be spread evenly over the subsoil. If particle sizes are significantly different between subsoil and topsoil surface interfaces, mixing should occur to facilitate water infiltration, percolation, and root penetration.

In general, reseeding after wildfires is limited to severely burned sites. Wildfires remove the ground vegetation and the duff layer leaving an exposed mineral soil bed, often favorable for seeding. The ground should be evaluated first to determine if the surface is hydrophobic. This commonly occurs after fires. Reseeding burned sites is designed to decrease the likelihood of erosion and sediment movement down slope, to reduce noxious weed invasion or spread, and to fulfill management objectives.

Sod will be placed and anchored using techniques to ensure that it remains in place until established. Place sod mats together in a bricklaying fashion on the soil surface of the prepared site. Do not leave gaps between the sod mats (NEDC, 1998). Secure sod mats with wooden stakes.

#### Stabilize Critically Eroding Areas

Treatment of adjoining or upstream sites may be required prior to establishment of vegetation on critically eroding areas and topsoil may need to be brought in for areas lacking topsoil. Use WEQ or RUSLE2 to determine the amount of established vegetation cover needed to reduce erosion within the soil loss tolerance (T), or other planned soil loss objective. Calculations shall account for the effects of other practices in the conservation management system.

Areas such as gullies, mined lands, or headcuts should first be stabilized utilizing other conservation practices. Water control practices will be installed as needed to control surface runoff and break up existing erosion patterns.

#### Mulching

Refer to *Mulching 484 Practice Standard* - Mulches are recommended on slopes steeper than 2:1 or which have a critical erosion concern. These slopes should be prepared, prior to mulching, to a roughened state to leave a loosened surface with divots and mini-basins for broadcast seed catchment.

Straw mulch – When straw is used it needs to be uniformly applied no deeper than two inches and effectively anchored with equipment such as cultipackers and crimpers or by track walking a crawler tractor. Tackifiers, woven netting, and other covers can be used to anchor mulch when slopes are too steep to use equipment on the site. Wheat straw deteriorates less rapidly and results in less volunteer growth compared to barley straw. Use clean straw to minimize spread of noxious weeds. Consider applying ten pounds of actual nitrogen per ton of straw to balance the Carbon:Nitrogen ratio and avoid a Nitrogen deficiency during organic mineralization.

Hydro mulch – When hydro mulching apply seed and mulch in separate operations. Seed and, if required, fertilizer should be applied first to optimize seed to soil contact and then the hydro-mulch applied over the seed.

### Species Selection

Species selected for seeding or planting shall be suited to current site conditions and intended uses, and resistant to diseases or insects common to the site or location. Selected species will have the capacity to achieve adequate density and vigor to stabilize the site within an appropriate period. In general, sod forming and rhizomatous species are better at controlling erosion than are cespitose species. Use certified seed and recommended cultivars whenever possible.

Plant species and their cultivars shall be selected based upon:

1. Climatic conditions, such as annual rainfall, seasonal rainfall patterns, growing season length, humidity levels, day length, radiation, heat, wind, temperature extremes, USDA Plant Hardiness Zones, Ecological Sites, or Major Land Resource Areas (MLRA's)
2. Soil condition and position attributes such as pH, available water holding capacity, texture, aspect, slope, drainage class, fertility level, salinity, sodicity, depth, flooding and ponding, and levels of toxic elements that may be present.
3. Resistance to disease and insects common to the site or location.
4. Desired plant characteristics relative to site and objectives including tolerance to flooding, regrowth ability, root system, relative stand life, drought tolerance, palatability for livestock and wildlife, tolerance to grazing, and soil protection characteristics.
5. No plants on the Federal or state noxious weeds list shall be planted. Go to the *Washington State Noxious Weed Control Board* website for a current list of noxious weeds.
6. Sod placement shall be limited to areas that can naturally supply needed moisture or sites that can be irrigated during the establishment period. Note: Anchor sod to ensure that it remains in place until established.

To find species suitable to your site condition, in *efotg*, go to *Plant Materials Technical Note 1 Seeding Guide* in *Section 1* under *Reference Lists/Technical Notes by Discipline/Plant Materials*. The Seeding Guide contains an interactive seed mixture data base (Microsoft Access 2007 required) and links to documents covering:

- Range and Pasture Seedings, Planning-Installation-Evaluation
- Seedbed Preparation
- Seed Quality, Technology, and Drill Calibrations
- Plant Identification and Information
- Pasture Species Selection
- ForageZones of Western Washington
- Grasses of Western Washington
- Pasture and Hayland Renovation for Western Washington and Oregon
- Precipitation Maps for Eastern Oregon and Eastern Washington
- USDA Plants Database

The above information can also be found in *efotg Section 1/Reference Lists/Technical Notes by Discipline* in the *Pasture, Plant Materials* and *Range* folders. Precipitation maps can be found in *efotg Section 1* in the *Maps* folder. The *USDA Plants Database* is available via the internet.

Seeding Rates

Seeding rates will be calculated based on a Pure Live Seed (PLS) basis. Use tables in the *Washington Plant Materials Technical Note No. 1, Seeding Rates and Recommended Cultivars*, or equivalent, to determine normal seeding rate (pounds of PLS) required for a pure stand or full seeding. For Critical Area Plantings double the normal seeding rate.

If possible, when broadcast seeding, seed on a roughened seedbed, and then roll with a packer or culti-packer.

The minimum quality of planting stock (e.g. pure live seed (PLS) or stem diameter) shall be specified before application. Minimum PLS standards for grasses can be found by typing "WAC Grass seed standards" into your web browser. Information on appropriate stem diameters can be found in *efotg Section 1 /Reference Lists/Technical Notes by Discipline/ in the Plant Materials folder (see Tech Note 10 Riparian Revegetation Plants)*.

Seeding Depth and Row Spacing

Plant to proper depth ensuring seed or planting material will contact soil moisture uniformly (seed to soil contact). Small grass, forbs, and legume seeds will be planted no deeper than 1/4-inch. Large grass seed will be planted no deeper than 1/2-inch. All species will be planted in 14 inches or less row spacing. Where slopes are greater than 5 percent, planting will be completed on the contour or across the general slope of the land.

Planting Dates and Methods

Planting shall be scheduled during periods when soil moisture is adequate for germination and establishment. Rule-of-thumb: Dormant fall seedings-have the seed in the ground late enough (soils are cold) so seed does not germinate until spring. For spring seedings (*not for areas receiving less than 16 inches of annual precipitation*), seed as early as you can get on the ground with seeding equipment. Spring seedings will be completed by May 1. Seedings are allowed after May 1 only when there is a minimum of two feet of moist soil. The soil must also be moist to within two inches of the surface. Another good rule of thumb, if the soil is wet enough to stick to the coulters, it is too wet to plant.

Dormant fall seedings can be made after November 1 or when soil temperatures two inches below the soil surface remains at 40° F. or less for ten or more days.

Species with a high percentage of dormant seed must be planted as a dormant fall seeding unless germination by standard seed test is greater than 50 percent. If dormant species are a minor component of a mixture; spring seeding is acceptable. When irrigation is provided, planting may be completed at any time during the growing season that allows adequate root system development prior to a killing frost (45 days).

For chaffy grass seed planting should be done at three to five miles per hour. The fluffier the seed, the slower the drill speed. Rice hulls or other carriers may be required for adequate flow through the drill box. Recommended amounts for rice hull or other carriers can be found in *Plant Materials Technical Note-7, Seed Quality, Seed Technology, and Drill Calibration*. This document can be found in *efotg* in *Section 1* under *Reference Lists/Technical Notes by Discipline/Plant Materials*.

legume seed shall be inoculated with the proper species of viable Rhizobium before planting. If using coated seed, recalibrate the planting equipment to deliver the same number of seed per area as would be applied with non-coated seed.

Companion or nurse crops (usually small grains) compete for soil moisture, light and nutrients and reduce seedling vigor and growth. Many years of research has shown that nurse crops are usually a bad idea in dryland situations. It's better to increase the seeding rates of the desired vegetation, or use a temporary cover.

Woody Planting

When considering bioengineering techniques for protecting critical areas refer to the National Engineering Handbook (NEH), part 650, Chapter 18, Soil Bioengineering for Upland Slope Protection and Erosion Reduction. For streambank situations also refer to part 654, Stream Restoration Design, of the NEH. Refer also to Practice Standards *Channel Bank Vegetation 322, Tree/shrub Establishment 612, and Riparian Forest Buffer 391*.

Information on appropriate species to plant can be found in efotg Section I/References Lists/Technical Notes by Discipline folders.

Fertilizer

Refer to *Nutrient Management 590 Practice Standard* - Fertilizer and soil amendment recommendations shall be based on results from a current soil test. Application shall be appropriately placed and timed to be effective. Nitrogen fertilizer broadcast before seeding will promote weed growth more than it aids the establishment of grass. If the soil test shows a nitrogen (N) deficiency – a minimal amount of N – less than 20 pounds actual, can be applied after the vegetation is established and acquired a minimum of the 3 leaf stage.. Phosphorus is particularly beneficial to legume stand establishment and maintenance. When soils are coarse, sandy, gravelly or granitic, or when water quality will be adversely affected, reduce fertilizer rates. Follow-up applications of fertilizer will be applied when needed and will be based on a soil test.

Irrigation

Refer to *Irrigation Water Management 449 Practice Standard* - When plantings are to be irrigated, use non-erosive methods to maintain adequate moisture in at least the upper six inches of soil during the first four weeks of the growing season and then in the upper 12 inches until the end of the growing season. Caution – excessive irrigation may hinder the establishment.

Planning and Monitoring

The collection of benchmark and post planting data is required to determine the effectiveness of the conservation practice. Minimum data collected will include photos, vegetation cover values, and documentation recording the plant community as a response to the planting. What constitutes successful establishment (e.g. minimum percent ground/canopy cover, percent survival, stand density) shall be specified before application (see *Range Tech Note 101 in efotg*). Other methods may be desired depending on the planting objectives.

REQUIRED DOCUMENTATION (Benchmark and Post-Planting)

1. Location map and map or sketch of the area to be planted.
2. Acres planned and applied.
3. Date (Spring, Fall Dormant, Other with timing considerations) practice scheduled and applied.
4. Seedbed preparation.
5. Seeding method and depth of seeding.
6. Erosion prediction before and after.
7. Seed Tag/Seed Analysis
8. Mixture and seeding rate (PLS), including selected cultivars.
9. Seed inoculation or treatment, if used.
10. Soil Test results (if fertilized) and actual application rates and timing.
11. Erosion control measures and protection provided during establishment period.

OPERATION AND MAINTENANCE

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

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.

Growth of seedlings or sprigs should be monitored for water stress. Water stress may require reducing weeds, irrigating when possible, or replanting failed stands.

Insects and diseases shall be controlled when an infestation threatens stand survival.