NATURAL RESOURCES CONSERVATION SERVICE

SPECIFICATION GUIDE SHEET

CRITICAL AREA PLANTING

(Ac.)

CODE 342

SCOPE

The work shall consist of establishing permanent vegetation on sites that have or are expected to have high erosion rates, and on sited that have physical, chemical, or biological conditions that prevent the establishment of vegetation with normal practices.

Treatment specifications are included for the following critical area situations:

1. Permanent seeding of grass and legume species on sediment producing areas.
2. Revegetation of sand and gravel borrow areas.
3. Sod establishment on sediment producing areas.
4. Woody vegetation and ground cover establishment on sediment producing areas.
5. Revegetation of bare spots in blueberry fields.
6. Coastal/Dunes

SECTION 1. PERMANENT SEEDING OF GRASS AND LEGUME SPECIES ON SEDIMENT PRODUCING AREAS

DESIGN CRITERIA AND SPECIFICATIONS:

Site Preparation

Install needed surface water control measures prior to planting.

Where practical, grade to permit use of conventional equipment for seedbed preparation. Slopes should be 2:1 or flatter.

Provide adequate drainage where internal water movement, especially at toes of slopes, may cause seeps of slippage before seeding is well established.

Seedbed Preparation

As practical, perform all cultural operations at right angles to the slope.

Provide the best conditions possible for seeding.

The best soil textures are sandy loam, loam and silt loam. Where sands or clay are encountered, consider modifying them with hauled-in materials. Replace topsoil, when available after grading.

Where possible, the seedbed immediately before seeding should be firm but not so compact as to prohibit covering seed or root penetration. Tillage implements used shall provide a minimum 3" depth of firm but friable soil free from clods or stones.

Lime and Fertilizer

Soils must be tested, and lime and fertilizer recommendations followed.

In extreme situations where soil tests are not available before seeding:

- Apply ground limestone at a rate of 2 tons per acre. (93 lbs. per 1,000 sq. ft)
- Apply 400 lbs. of 10-20-20 (N-P205-

K20) fertilizer or equivalent per acre (9.2 lbs/1,000 sq.ft.)

Where practical, work lime and fertilizer into the soil to a depth of 4" either before or during final seedbed preparation.

Plant Selection, Seeding Rates, and Seeding Dates

Select seeding mixture (Table 2) for the purpose and management desired (Table 1). Recommended varieties are listed in Table 3.

Apply seed uniformly at rates indicated in Table 2 by broadcasting, drilling, or hydroseeding.

Permanent seedings should be made 45 days or more prior to the first killing frost or as a dormant seeding after the first killing frost. Legumes shall not be seeded between June 15 – August 15 unless mulched.

Mulching

Mulching is an important step in establishing vegetation on critical areas. A mulch will help hold moisture, protect soil from erosion, hold seed in place, and keep soil temperatures more constant. See *Mulching (484)* standard and specification for specific mulching recommendations.

Nurse Crops

Nurse crops may be used if clipped back before detrimental shading of new seeding occurs.

Maintenance

Planted areas should be protected from damage by grazing, fire, traffic, and undesirable weed and wood growth as applicable.

Visual inspections may be used as a fertility needs assessment. If warranted, soil test should be taken every 5 years to determine lime and fertilizer needs.

Visual inspections may be used to identify fertility problems. Where warranted, soil test should be taken and lime and fertilizer applied accordingly.

TABLE 1
SEEDINGS FOR PERMANENT COVER
(SEE TABLE 2 FOR SEED MIXTURES AND TABLE 3 FOR RECOMMENDED CULTIVARS)

KIND OF AREA	MOWING DESIRED	MOWING NOT REQUIRED
Borrow areas, roadsides*, dikes, levees, pond banks and other slopes and banks:		
A) Well or excessively drained	1,2,3,4,5,6 8	5,6,7,8,9,10 11,12,13,16,22
B) Somewhat poorly drained	2,5,6	2,5,6
C) Variable drainage	2,5,6	2,5,6,11
Drainage ditch and channel banks:		
A) Well or excessively drained	1,2,3,4	9,10,11,12
B) Somewhat poorly drained	2	2
C) Variable drainage	2	2
Diversions:		
A) Well or excessively drained	2,3,4,	9,10,11
B) Somewhat poorly drained	2	2
C) Variable drainage	2	2
Effluent disposal	2,3,4,5,6	2,3,4,5,6
Gravel pits		See page 7
Gullied and eroded area		3,4,5,8,10 11,12
Minespoil & waste, and other spoil banks (if toxic substances & physical properties not limiting		15,16,17,18
Shorelines (Fluctuating water levels)	5,6	19
Ski slopes	24	4,10,24
Sod waterways and spillways	2	2
General recreation seedings picnic and playgrounds or driving and archery ranges (not shaded) camping and parking (shaded)	1,2,23 19,20,21,23	
Sand Dunes (Blowing sand)		25
Woodland roads, winter roads, skid trails, and landings	open	shaded
- moderately well to poorly drained soils	4,6	19
- moderately well to excessively well	3,9,10,12	21,22
Woodland road, trail, landing – burned over,	2,9,16	21,22
High Elevation Plantings	24	24

* If deer may be a problem, select a mix not having a legume.

TABLE 2
SEED MIXTURES FOR PERMANENT SEEDINGS

Mixture (see Table 3 for recommended cultivars)		Lbs/Acre	Lbs/1000 Sq.ft.
1.	Kentucky Bluegrass	20	.46
	Creeping red fescue	20	.46
	Perennial ryegrass	5	.11
		Total 45	1.03
2.	Creeping red fescue	20	.46
	Redtop	2	.05
	Tall fescue	20	.46
		Total 42	.97
3.	Creeping red fescue	20	.46
	Birdsfoot trefoil 1/	8	.18
	Tall fescue	20	.46
		Total 48	1.10
4.	Creeping red fescue Or Tall fescue	20	.46
	Redtop	2	.05
	Birdsfoot trefoil 1/	8	.18
		Total 30	.69
5.	Reed Canarygrass	20	.46
	Redtop	5	.11
		Total 25	.57
6.	Reed canary grass	15	.34
	Redtop	5	.11
	Birdsfoot trefoil 1/	10	.23
		Total 30	.68
7.	Tall Fescue	15	.34
	Perennial ryegrass	5	.11
	Birdsfoot trefoil 1/	10	.23
		Total 30	.68
8.	Switchgrass	10 (PLS) 2/	.23
	Weeping lovegrass	3	.07
	Little bluestem	10 (PLS) 2/	.23
		Total 23	.53
9.	Creeping red fescue	10	.23
	Crownvetch 1/ or	15	.34
	Flat pea	(30)	(.69)
	Tall fescue	15	.34
	Redtop	2	.05
		Total 42-(57)	.96-(1.31)

TABLE 2 Continued

Mixture (See Table 3 for recommended varieties)		Lbs/Acre	Lbs/1000 Sq. Ft.
10.	Creeping red fescue	20	.45
	Redtop	2	.05
	Crownvetch 1/ or	15	.34
	Flat pea	(30)	(.69)
		Total 37-(52)	.85-(1.20)
11.	Birdsfoot trefoil 1/	8	.8
	Crownvetch 1/	15	.34
	Creeping red fescue Or Tall fescue	20	.46
		Total 43	.98
12.	Tall fescue	15	.34
	Switchgrass	10 (PLS) 2/	.23
	Perennial ryegrass	5	.11
	Crownvetch 1/	15	.34
		Total 45	1.02
13.	Crownvetch 1/ or	10	.23
	Flat Pea	(30)	(.69)
	Switchgrass	5 (PLS) 2/	.11
	Perennial ryegrass	5	.11
		Total 20-(40)	.45-(.91)
14.	Crownvetch 1/ or	15	.34
	Flat Pea	(30)	(.69)
	Perennial ryegrass	10	.23
		Total 25-(40)	.57-(1.03)
15.	Switchgrass	2 (PLS) 2/	.05
	Big Bluestem	4 (PLS) 2/	.09
	Coastal Panicgrass	2	.05
	Caucasian Bluestem	2	.05
	Little Bluestem	2 (PLS) 2/	.05
		Total 12	.29
16.	Tall fescue	20	.46
	Flat Pea	30	.69
		Total 50	1.15
17.	Deertongue	10 (PLS) 2/	.23
	Birdsfoot trefoil 1/	8	.18
	Perennial ryegrass	3	.07
		Total 21	.48

TABLE 2 Continued

Mixture (See Table 3 for the recommended varieties)		Lbs/Acre	Lbs/1000 Sq.ft.
18.	Deertongue	10 (PLS) 2/	.23
	Crownvetch 1/	15	.34
	Perennial ryegrass	3	.07
		Total 28	.64
Shady Sites			
19.	Creeping red fescue	50	1.15
	Canada bluegrass or	50	.15
	Kentucky bluegrass	total 100	2.30
20.	Creeping red fescue	100	2.30
21.	Creeping red fescue	50	1.15
	Tall fescue	30	.69
		Total 80	1.84
22.	Creeping red fescue	20	.46
	Flat pea	30	.69
		Total 50	1.15
23.	Tall fescue	150	3.44
High Elevation Cover			
24.	Hard fescue	15	0.34
	Chewings fescue	10	0.23
	Creeping red fescue	10	0.23
	Creeping bentgrass	10	0.23
	Redtop	4	0.09
	Birdsfoot trefoil	8	0.18
	White clover (ladino type)	2	0.05
		Total 59	1.35
Dunes		Culms/acre	Culms/1000 sq.ft.
25.	American beachgrass *	58,500	1,343

1/ Inoculate legume seeds, use four times recommended rate/of Inoculate when hydroseeding.
2/0 (PLS) Pure Live Seed

$$\text{Pounds of seed needed} = \frac{\text{seeding rate required in pure live seed (PLS)}}{\text{PLS factor}}$$

$$\text{PLS Factor} = \frac{\%\ \text{Germination} \times \%\ \text{Purity}}{}$$

* Also see Coastal Dune Plants, eFOTG, Section I, Plant Materials

TABLE 3
RECOMMENDED VARIETIES OR CULTIVARS

American beachgrass (Cape),
Big bluestem (Niagra)
Birdsfoot trefoil (Empire)
Chewings fescue (Koket or Rudax)
Coastal Panicgrass (Atlantic)
Creeping bentgrass (Highland)
Creeping red fescue (Pennlawn, Ensylva, Wintergreen) (high elevation cover: Claudia or Fortress)
Crownvetch (Penngift, Chemung)
Deertongue (Tioga)
Flat Pea (Lathco)
Hard fescue (Biljart or Serra)
Little bluestem (Blaze, Aldous, Camper),
Perennial ryegrass (Norlea, Manhattan)
Redtop (Streaker or Barracuda)
Reed canarygrass (Palaton, Venture) use low alkaloid varieties like these
Switchgrass (Blackwell, Shelter)
Tall fescue (Endophyte – free varieties. Avoid Kentucky – 31)
Winter Rye (Aroostook for inland areas, Wintergrazer for coastal areas)

SECTION 2. SAND AND GRAVEL BORROW AREA REVEGETATION

Site Preparation

Steep sides should be reduced to 2:1 or preferably 3:1 which will allow for improved stability and better grading process. Large rocks should be buried during the grading process.

Planting Date

Plant as early in the spring as possible. In Maine, this is shortly after snow is off the site. The cutoff is May 31. Recommendations for seed mixtures are given in Table 4. Mixture #3 can also be planted in late summer from August 15 to September 15.

Fertility Amendments at Planting

Apply soil amendments needed according to a soil test. If soil test are not available, follow recommendations given in Maine NRCS Fact Sheet "Revegetating Sand and Gravel Borrow Pit in Maine" at **http://efotg.nrcs.usda.gov/references/public/me/revetatingsandgravel.pdf**

Seed Procurement

Seed for mixes 1 and 2 take longer to obtain because these species are not stocked by local businesses. One to three months advanced planning is necessary is to have these on hand at time of planting.

Incorporation

Broadcast: After broadcasting the amendments and seed and spreading mulch (where needed to control blowing or washing) the site should be immediately "tracked" with a bulldozer. The dozer cleats should be at least 1.25 inches long. The operator drives back and forth over the site, offsetting each pass by track width so as to totally cover the surface with tracks. Where a tracked vehicles is not available, a rubber-tired machine with deep lugs and/or tire chains (such as a skidder) is second choice. For further guidance, consult Maine NRCS Fact Sheet "Revegetating Sand and Gravel Borrow Pits in Maine".

Mulching

Mix 1 (Table 4) is best planted without mulch. Warm season grass seedlings do not like shading. Mix 2 will benefit from a heavy (2 ton/ac) mulch of straw or hay. Mix 3 will benefit from a moderate mulch (1 ton/ac) of straw, hay or wood fiber mulch.

TABLE 4
SAND AND GRAVEL BORROW AREA REVEGETATION

Seed Mixtures

A. Where percent fines (by weight passed 200 mesh sieve) are less than 15.

MIX #1 Species 8/	Varieties (select one) 4/	PLS per acre 5/
Switchgrass	Blackwell, Shelter, Cave in rock	4.0
Big Bluestem	Niagara, Kaw	4.0
Little Bluestem	Camper, Aldous, Blaze	2.0
Sand lovegrass	NE-27, Bend	1.5

B. Where percent fines are between 15 and 20. Use Mix #1 or:

MIX #2 Species	Varieties (select one) 4/	Lb. per acre 6/
Flat pea 7/	Lathco	10.0
Perennial pea 7/	Lancer	2.0
Crownvetch 7/	Penngift, Chemung	10.0
Tall fescue	Rebel, Ken-Hi	10.0

C. Where percent fines are above 20. Use Mixes #1, #2 or:

MIX #3 Species	Varieties (select one) 4/	Lb. per acre 6/
Orchardgrass	Pennlate, Kay, Potomac	5.0
Tall fescue		10.0
Redtop	Streeker or Common	2.0
Birdsfoot Trefoil	Viking, Empire	5.0

4/ Varieties are listed in preferential order.

5/ Warm season grass is sold and planted on the basis of pure live seed (PLS). An adjustment is made to the bulk pounds of seed to compensate for inert material and dead seed. See footnote 2 at bottom of Page 6.

6/ Legume and cool season grass seed is sold and planted on a bulk basis, the weight is not compensated for dead seed and inert material.

7/ Inoculate with correct inoculate immediately prior to planting.

8/ Warm season grasses should not be planted on North Aspects of Zones 4a and 3. The issue on such sites is not winter hardiness but lack of heat units to promote acceptable warm season grass growth.

Section 3. SOD ESTABLISHMENT ON SEDIMENT PRODUCING AREAS

DESIGN CRITERIA AND SPECIFICATIONS:

Site Preparation

Install needed surface water control measures prior to laying sod.

Grade slopes 2:1 or flatter.

Before laying sod, provide adequate draining where internal water movement, especially at the toes of slopes, may cause seeps or soil slippage.

Seedbed Preparation

Provide the best possible soil condition for sodding. The desirable soil textures include sandy loam, loam, and silt loam. Where droughty or clayey soils are encountered, consider modifying them with additions of hauled-in-materials. Replace topsoil when available after grading.

Fill areas must be compacted enough to prevent uneven settling. The entire surface to be sodded shall be free from large clods, stones, or other debris. At this stage incorporate lime and fertilizer uniformly into the surface soil as needed. Immediately before sodding, the soil shall be loosened to a depth of 1" and thoroughly dampened, if not already moist. The last tillage operation should be performed across the slope whenever practical.

Loosened to a depth of 1" and thoroughly dampened, if not already moist. The last tillage operation should be performed across the slope whenever practical.

Lime and Fertilizer

Soils must be tested, and lime and fertilizer recommendations followed to ensure success.

- Apply 2 tons of ground limestone per acre (92 lbs. per 1,000 sq. ft.).

- Apply 400 lbs. of 10-20-20 (N-P205-K20) or equivalent fertilizer per acre (9.2 lbs. per 1,000 sq. ft.)

Lime and fertilizer should be worked into the top 4" of soil where feasible.

Selection of Sod

Select sod grown from seed of adapted species and varieties best suited for the sites to be stabilized. Sod should be free of any serious thatch, weed, insect, disease, or other pest problems.

Select sod at least 1 year old and preferably no older than 3 years. Cultivated turfgrass is usually considered ready for harvest when a cut portion of sod 3' in length and from 1 to 1-1/2" in width will support its own weight when suspended vertically from a firm grasp on the upper 10 percent of the section. The most common age of sod when cut is 15 to 24 months. No area stripped of sod should be left without adequate protection from erosion.

Select sod cuts of a width and length suited to the equipment and job. Generally, sod cuts are from 12 to 24" wide with 12" being the most common width. Lengths of cuts vary from 4 to 8'. Sod may be cut and rolled or folded in the middle and stacked on pallets. Folded sod is cut shorter than rolled sod – about 3 to 4' in length. Sod should be cut with a ½ to 1" layer of soil. About 80 percent of all rhizomes are in the top ¾" of soil. The thinner the sod is cut (1/2 to 3/4"), the more quickly it will knit to the site soil. Edges should be cut straight and smooth.

Deliver sod to the site as soon as practical after lifting. During hot weather, delivery should be made within 6 hours and may be extended to 48 hours during cool seasons. It is generally unwise to move sod during July and August. If moved during this period, sod may need to be cut 1-1/4" thick, and it will require intensive care, including shading and frequent moistening.

Establishment

Lay strips of sod at right angles to direction of slope or flow of water starting at the lowest elevation. Wedge the edges and ends of the sod strips together and tamp or roll. Stagger joints. Make the top of the sod strips flush with the top of the undisturbed ground.

Use wire staples, fine mesh wire, or wood pints and binder twine on very steep slopes to hold sod in place until secured by plant growth.

Irrigate sodded area immediately after installation. If unfavorable weather or other conditions prevail, additional watering will be subsequently be required. It may also be desirable to irrigate the area from which sod is to be removed prior to lifting.

Maintenance

Watering when necessary during the first growing season is critical.

Lime and fertilize according to soil test.

Mow once or twice a year to reduce undesirable growth. Kentucky bluegrass and red fescue should be mowed to a height of 1-1/2 – 2". Other grass sods should not be mowed closer than 3-4"

SECTION 4. ESTABLISHING GROUND COVERS, VINES, SHRUBS, AND TREES ON CRITICAL AREAS SUBJECT TO EROSION

Ground covers, vines, shrubs, and trees may be utilized on many critical areas subject to erosion where a permanent, long-lived vegetative cover other than turf is desired.

A partial listing has been made of some plants known to be suitable for erosion control and possessing aesthetic value. See Table 1. These lists are neither inclusive nor exclusive. The lists include plants which establish easily on difficult sites as well as plants which will require some site improvements and special attention before they will grow satisfactorily.

These plants cannot be expected to provide an erosion control cover and prevent soil slippage on sites that are not stable due to soil texture and structure, water movement, or excessive slope.

Ground covers are not necessarily low-maintenance plants, although some of them are. In general, they are more difficult to establish than turf. Plants included in this list respond favorably to careful treatment during the period of establishment.

Planting Time

Early spring. This allows for the maximum root and top development to check erosion and to allow the plant to become established before winter.

Soil Preparation

For short slopes, small areas, and mass plantings of close spacing, apply a commercial granular fertilizer, such a 5-10-10, and organic supplement, such as composted cow manure, peat, or well-rotted sawdust, and work into soil prior to planting. Fertilizer rate: 3 to 5 lbs. per 100 sq. ft. The organic material needed will depend upon the soil and plant being used. Plants such as pachysandra require a high rate of organic material, about a 2" layer worked into the root zone. Depending on the soil type and steepness of slope, the depth of soil working will vary from 4 to 6".

For steep slopes and large area plantings, working up the entire planting area would be impractical and would probably induce erosion. Center hole planting, a hole dug for each plant, would be more desirable. If the soil on the slope is poorly suited to the species being planted, incorporate organic material into the planting hole. Whether organic material is needed or not, fertilize each plant at the rate of one ounce per plant of some complete fertilizer, such as 10-10-10. Mix fertilizer with soil below the roots of the plants.

Another alternative is to add to the planting hole a sandy loam soil mixed with peat, composed cow manure or well-rotted sawdust at a rate of 1:1 or 2:1.

The entire planted slope should be covered with a protective mulch, such as wood chips, straw, or wood pulp fiber to conserve moisture and control erosion. Weeds should be controlled by pulling or other acceptable means. Where fresh wood chips, wood shavings, or sawdust are used as mulches or to add organic material to planting bed, a slow release fertilizer, such as 7-40-6, 38-0-0, or organic forms should be used.

Where erosion hazard is very high, heavy jute matting stapled to the slope will provide excellent erosion control, as will landscape mats of fiberglass.

Where individual plants are planted, a temporary cover crop of annuals may be used to provide ground cover until planted material offers protective cover.

Maintenance

Some watering, weeding, re-mulching, and fertilizing may be required of a new planting during the period of establishment.

Cultivation is not recommended. This will encourage erosion and cause root injury. Competing weeds should be controlled.

If a controlled release fertilizer was used at time of planting, additional fertilizing will not be necessary for several years. Otherwise, fertilize plantings the spring of the second growing season and thereafter as needed.

Planting of Trees, Shrubs, Vines and Ground Cover

A partial listing of species to consider can be found in Table 5. A more comprehensive guide is the Conservation Tree and Shrub Database **http://efotg.nrcs.usda.gov/references/public/me/copyoftreeshrubattributesme_2_27_08.xls**. Refer to Tree/Shrub Establishment (612) and Tree/Shrub Site Preparation (490) standard and specification guide sheet for information on how to prepare the site and plant trees and shrubs.

Additional guidance for specific-purpose plantings may be found in the standards and specification guide sheets for practices such as *Windbreak/Shelterbelt Establishment (380), Riparian Forest Buffer (391), Upland Wildlife Habitat Management (645), and Early Successional Habitat Development/Management (647)*.

TABLE 5

GUIDE TO TREES, SHRUBS, VINES, AND GROUND COVER FOR CRITICAL AREAS*

Kind of Area	Species to Consider (Not all Inclusive)
Borrow areas, road-sides, banks, gullied and eroding areas, and other slopes.	American Bittersweet, Virginia creeper, creeping, juniper, nannyberry, American cranberry bush
Sandy or gravely areas, spp., including pits	'Arnot' Bristly locust, sweetfern, sumac red pine, Eastern white pine, black alder, tamarack, jack pine
Dunes and shifting sands	Bayberry, Virginia creeper, beach plum, rugosa rose, 'Emerald Sea' seashore juniper, jackpine, red pine
Streambanks and shorelines	'Ruby' red osier dogwood, 'Streamco" purpleosier willow, 'Bankers' dwarf willow, silky dogwood
Windbreaks and screens	Eastern white pine, red pine, northern white cedar, Eastern red-cedar, Austrian pine, white spruce, hybrid poplar, dogwoods spp., nannyberry, American cranberry bush.

- This is a very general guide, and specific details for particular species and situations should be obtained from.

http://efotg.nrcs.usda.gov/references/public/me/copyoftreeshrubattributesme_27_08.xls

SECTION 5. REVEGETATING BARE SPOTS IN BLUEBERRY FIELDS

When herbicides are used on blueberry fields, bare spots may occur on slopes that are subject to erosion. Other bare spots soon become infested with a new generation of weeds. Bare spots should be revegetated and maintained according to the guidance in UMCE Fact Sheet #221 (UMCE #2057) titled "Filling Bare Spots in Blueberry Fields" at **http://www.wildblueberries.maine.edu/factsheets/production/221.html**.

SECTION 6. COASTAL AREAS/DUNES

For information on plants appropriate to revegetating dunes and coastal areas, see information located at: eFOTG, Section I, Reference Files, Plant Materials, Coastal/Dunes Plants.