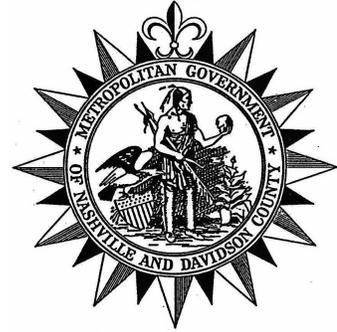
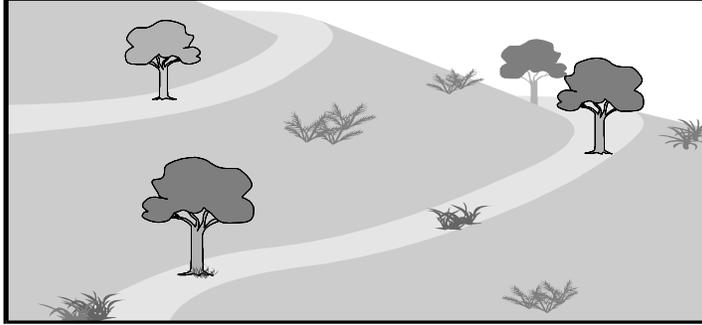


ACTIVITY: Permanent Grass, Vines and Other Vegetation

PESC – 01

**Targeted Constituents**

● Significant Benefit

▸ Partial Benefit

○ Low or Unknown Benefit

● Sediment

○ Heavy Metals

○ Floatable Materials

○ Oxygen Demanding Substances

▸ Nutrients

▸ Toxic Materials

○ Oil & Grease

○ Bacteria & Viruses

○ Construction Wastes

Implementation Requirements

● High

▸ Medium

○ Low

○ Capital Costs

○ O & M Costs

○ Maintenance

● Suitability for Slopes >5%

○ Training

Description

Seeding of grasses and plantings of trees, shrubs, vines and ground covers provide long-term stabilization of soil. The primary function of permanent seeding and planting is to: improve long-term aesthetics, reduce erosion by slowing runoff velocities, enhance infiltration and transpiration, trap sediment and other particulates, protect soil from raindrop impact, and provide habitat for wildlife. This management practice is likely to create a significant reduction in sediment as well as partial reductions in the impacts caused by nutrients and toxic materials.

Suitable Applications

- Appropriate for site stabilization both during construction and post-construction.
- Any graded/cleared areas where construction activities are completed.
- Open space cut and fill areas.
- Steep slopes not requiring more robust permanent stabilization techniques.
- Spoil or stock piles.
- Vegetated swales and ditches.
- Landscape corridors.
- Areas of stream banks with low velocities under most storm conditions.

**Installation/
Application
Criteria**

These systems should be designed by a licensed professional civil engineer. Many of the measures presented in TCP-05: Temporary Seeding, TCP-09: Nets and Mats, and TCP-10: Geotextiles are applicable for establishing, stabilizing and maintaining permanent vegetation.

Application of appropriate vegetation must consider: the seedbed or plantbed, proper seasonal planting times, water requirements, fertilizer requirements and availability of the selected vegetation within the project's region.

Type of vegetation, site and seedbed preparation, planting time, fertilization and water requirements should be considered for each application.

- Seeding and planting should be applied as soon as final grading is done to all graded and cleared areas of the construction site where plant cover is ultimately desired. For example, vegetation may be established along landscaped corridors and buffer zones where they may act as filter strips.
- Vegetated swales, steep and/or rocky slopes and stream banks can also serve as appropriate areas for seeding and plantings.
- Permanent plantings during the construction stage of projects require careful coordination between the local agency inspectors, project managers, construction managers, and landscape contractor. Protocols for coordination and implementation procedures regarding site access, construction staging, and short- and long-term planting areas should be developed prior to the construction bid process. Where possible, these protocols should be established by and remain the responsibility of the site owner.

Grasses

- Grasses, depending on the type, provide short-term soil stabilization during construction or can serve as long-term/ permanent soil stabilization for disturbed areas. In general, grasses provide low maintenance to areas that have been cleared, graded and mechanically stabilized.
- They are generally tolerant of short-term temperature extremes and waterlogged soil conditions.
- Appropriate soil conditions for unreinforced grasses: shallow soil base, good drainage, slope 2:1 (H:V) or flatter.
- Develop well and quickly from seeds.
- Mowing, irrigating, and fertilizing are vital for promoting vigorous grass growth.

Selection:

The selection of the grass type is determined by the climate, irrigation, mowing frequency, maintenance effort and soilbed conditions. Although grasses provide quick germination and rapid growth, they also have a shallow root system and are not as effective in stabilizing deep soils, where trees, shrubs and deep rooted ground covers may be more appropriate. Bluegrass is good on dry, sandy soils that have good drainage. Bermuda grass, on the other hand is well adapted to regions where soils are dry, coarse and heavier. Specific seed mix and/or varieties for each site should be provided by an approved/qualified plant materials specialist.

Planting:

The following steps should be followed to ensure established growth:

1. Select the proper grass for the site.
2. Prepare the seedbed; soil should be fertilized and contain good topsoil or soil at a 2:1 (H:V) or flatter slope, unless stabilized with permanent geotextiles, nets or mats.
3. Broadcast the seedings in the late fall or early spring.
4. Initial irrigation will be required often for most grasses, with follow-up irrigation and fertilization as needed. Light mulching may be required during drought years or to limit seed lost to wind and birds.

Trees and Shrubs

- Soil conditions: select species appropriate for soil, drainage & acidity.
- Other Factors: wind/exposure, temperature extremes, and irrigation needs.

Selection:

Trees and shrubs, when properly selected, are low maintenance plantings that stabilize adjacent soils, moderate the adjacent temperatures, filter air pollutants, and serve as a barrier to wind. Some desirable characteristics to consider in selecting trees and shrubs include: vigor, species, age, size and shape, and use as a wildlife food source and habitat.

The sites for new plantings should be evaluated. Consider the prior use of the land: adverse soil conditions such as poor drainage or acidity; exposure to wind; temperature extremes; location of utilities; paved areas, and security lighting and traffic problems.

Transplanting:

Time of Year – Late fall through winter (November to February) is the preferred time for transplanting.

Preparation – Proper digging of a tree/shrub includes the conservation of as much of the root system as possible. Soil adhering to the roots should be damp when the tree is dug, and kept moist until re-planting. The soil ball should be 12 inches in diameter for each inch of diameter of the trunk.

Site preparation – Refer to landscape plans and specifications for site and soil preparation, and for ability to coordinate construction strategy with permanent vegetation.

Supporting the trunk – Many newly planted trees/shrubs need artificial support to prevent excessive swaying.

Watering – Soil around the tree should be thoroughly watered after the tree is set in place. When the soil becomes dry, the tree should be watered deeply, but not often. Mulching around the base of the tree is helpful in preventing roots from drying out.

Vines and Ground Covers

- Ground preparation: lime and fertilizer preparation.
- Appropriate soil conditions: drainage, acidity, slopes.
- Generally avoid invasive species (Kudzu, etc.).
- Generally avoid species requiring frequent irrigation.

Selection:

Vines, ground covers, and low growing plants, that can quickly spread, come in many types, colors, and growth habits. Some are suitable only as part of a small maintained landscape area, while some can stabilize large areas with little maintenance. Flowers, which provide little long-term erosion control may be planted to add color and varietal appearances.

Site Preparation:

Ground covers are plants that naturally grow very close together, causing severe competition for space, nutrients and water. Soil for ground covers should be well prepared. The entire area should be spaded, disked, or rototilled to a depth of six to eight inches. Two to three inches of organic material, such as good topsoil or peat, should be spread over the entire area.

Planting:

The following steps will help ensure good plant growth.

1. Position the plantings to follow the contours of the land.
2. Dig the holes $\frac{1}{3}$ larger than the plant root ball.
3. Know what depth to place the plants.
4. Use good topsoil or soil mixture with a lot of organic matter.
5. Fill hole $\frac{1}{3}$ to $\frac{1}{2}$ full, shake plants to settle soil among roots, then water.
6. Leave saucer-shaped depression around the plant to hold water.
7. Water thoroughly and regularly.
8. Space plants according to the type of plant and the extent of covering desired.

Materials:

There are many different species of vines and ground covers from which to choose, but care must be taken in their selection. It is essential to select planting materials suited to both the intended use and specific site characteristics. Additional information can be obtained from local nurserymen, landscape architects, and extension agents.

Maintenance

- Grass maintenance should be minimal to none. Irrigation and regular fertilizing may be required for some types of grasses. Mowing is only required in areas where aesthetics or fire hazards are a concern.

- Permanent vegetation may require supplemental irrigation where the natural rainfall is insufficient to establish and/or maintain the selected plant materials. Selecting native plants should be considered where supplemental irrigation is not available. However, even native plants benefit from supplemental irrigation during the establishment period.
- Young trees should receive an inch of water each week for the first two years after planting. The tree should be watered deeply, but not more often than once per week.
- Transplanted trees should be fertilized on an annual basis.
- Proper pruning, watering, and application of fertilizer is necessary to maintain healthy and vigorous shrubs. A heavy layer of mulch applied around the shrubs reduces weeds and retains moisture.
- Trim old growth as needed to improve the appearance of ground covers. Most covers need once-a-year trimming to promote growth..
- See CP-16: Pesticides, Herbicides and Fertilizer Use.

Limitations

If the site is susceptible to erosion, additional control measures may be necessary during the establishment of vegetation.

Caution should be exercised in introducing non-native vegetation because of impacts to native vegetation on adjacent lands. For example, species that may be planted at the construction site can quickly spread and compete with originally undisturbed vegetation.

- Permanent and temporary vegetation establishment may not be appropriate during dry periods without irrigation.
- Over-application of fertilizers, herbicides and pesticides may create stormwater pollution.
- Construction activities are likely to injure or kill trees unless adequate protective measures are taken. Direct contact by equipment is the most obvious problem, but damage is also caused by root stress from filling, excavation, or compacting soil too close to trees.
- Temporary seeding can only be viable when adequate time is available for plants to grow and establish.
- Irrigation source and supply may be limiting or expensive.

Primary References

California Storm Water Best Management Practice Handbooks, Construction Handbook, CDM et.al. for the California SWQTF, 1993.

Caltrans Storm Water Quality Handbooks, CDM et.al. for the California Department of Transportation, 1997.

**Subordinate
References**

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, September 1992.

“Draft-Sedimentation and Erosion Control, An Inventory of Current Practices”, U.S.E.P.A., April, 1990.

Guides for Erosion and Sediment Controls in California, USDA Soils Conservation Service – January 1991.

Kiowa Engineering, Interim Erosion and Sedimentation Control for Construction Activities, Urban Drainage and Flood Control District, Denver, Colorado.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, June 1981.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April, 1992.

Stormwater Management Water for the Puget Sound Basin, Washington State Department of Ecology, The Technical Manual – February 1992, Publication #91-75.

Water Quality management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency – November 1988.