Stormwater Best Management Practice

Permanent Seeding

Minimum Measure: Construction Site Stormwater Runoff Control
Subcategory: Erosion Control

Description

Seeding establishes perennial vegetative cover, which helps control soil erosion on disturbed areas. It reduces erosion and sediment loss by protecting bare soil surfaces from displacement by raindrop impacts, reducing stormwater flow rates and volumes, and providing permanent stabilization. This practice is economical, is adaptable to different site conditions, and allows selection of a variety of plant materials.

Applicability

Seeding is well-suited to areas where permanent, long-lived vegetative cover is the most practical or most effective method of stabilizing the soil. These include roughly graded areas that construction staff will not regrade for at least a year. Seeding's advantages over other means of establishing plants include lower initial costs and labor needs.

Siting and Design Considerations

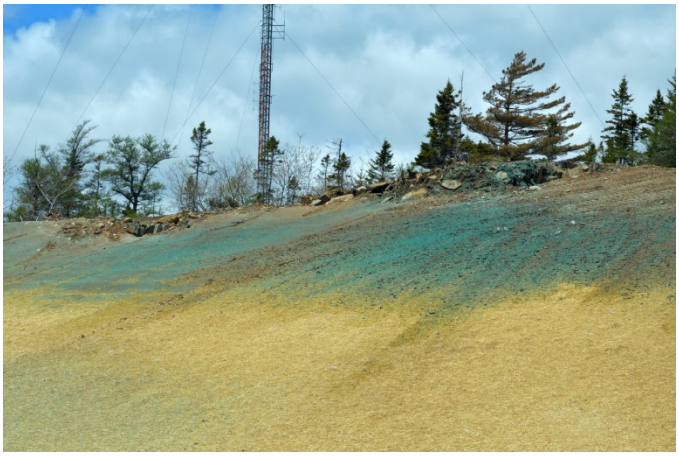
Some states require or at least recommend that construction staff seed or plant areas they intend to stabilize with permanent vegetation within 15 working days or 90 calendar days after reaching final grade, unless they apply temporary stabilization (Smolen et al. 2013).

Design engineers and construction staff can maximize successful vegetation establishment by:

- Careful planning
- Considering soil characteristics
- Selecting plant materials that are suitable for the site
- Planting at appropriate times
- Providing regular maintenance

Major factors that dictate the suitability of plants for a site include climate, soils and topography. Design engineers should consult state or local resources for recommendations on native, low-maintenance and low-water plant species.

Before seeding, construction staff should prepare and amend the soil on a disturbed site to provide sufficient nutrients for seed germination and seedling growth. This includes loosening the soil surface to allow for water



Hay and hydroseed can be used on a slope to establish vegetative cover.

infiltration and root penetration. If soils are too acidic, it also includes increasing the pH to between 6.0 and 6.5 with lime or choosing plants that are appropriate for acidic soils. Construction staff should apply seeds uniformly using hydroseeding, dry seeding, cultipacker seeding or manual seeding. They should protect seeds with mulch to retain moisture, regulate soil temperatures and prevent erosion during seedling establishment.

Grasses should emerge within 4–28 days and legumes 5–28 days after seeding, with legumes following grasses. A successful stand, or an area of continuous plantings, has the following characteristics:

- Vigorous dark green or bluish green (not yellow) seedlings
- Uniform density, with nurse plants, legumes and grasses well intermixed
- Green leaves that remain green throughout the summer—at least at the plant bases

Limitations

Limits on the effectiveness of seeding can include high erosion during establishment, the need to reseed areas that fail to establish, limited planting seasons, or unstable soil temperature and soil moisture content during germination and early growth. Seeding does not immediately stabilize soils; therefore, construction staff should use temporary erosion and sediment control

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measures to prevent pollutants from disturbed areas from being transported off the site.

Maintenance Considerations

Maintenance for seeded areas will depend on the type of vegetation and level of use expected. Long-lived, fine-leaved grass perennials that form a tight sod are suitable for areas that receive extensive use, such as homes, industrial parks, schools, churches and recreational areas. Less robust species may need frequent replanting. Native species that have adapted to local weather and soil conditions will reduce water and fertilizer requirements, thus reducing overall maintenance needs. This is especially important in arid areas, where irrigation requirements can be high. In these areas, using drought-adapted non-grass species (a major part of xeriscaping) can reduce or eliminate the need for watering.

Design engineers can also use seeding in low-maintenance areas that are mowed rarely or not at all and do not receive lime or fertilizer regularly. In these areas, plants should be able to persist with minimal maintenance over long periods. Design engineers should use grass and legume mixtures for these sites because legumes fix nitrogen from the atmosphere. Sites suitable for low-maintenance vegetation include steep slopes, stream or channel banks, some commercial properties, and “utility” turf areas such as road banks.

Construction staff should inspect seeded areas for failure and, if needed, reseed and repair them as soon as possible. If a stand has inadequate cover, they should reevaluate the choice of plant materials and quantities of lime and fertilizer. Depending on the condition of the stand, they should repair by overseeding or reseeding. Staff should perform complete seedbed preparation prior to reseeding the stand. If timing is bad, they can overseed with rye grain or German millet to thicken the stand until the time is right for seeding perennials. If the season is not appropriate for permanent seeding, construction staff can use temporary, annual species. If vegetation fails to grow, construction staff should test the soil to determine if low pH or nutrient imbalances are responsible.

On a typical disturbed site, full plant establishment usually requires refertilization in the second growing season. Construction staff can use soil tests to determine if they need to add more fertilizer. In most locations, construction staff should not fertilize cool season grasses in late May through July. Grass that looks yellow might be nitrogen deficient. Construction staff should not use nitrogen fertilizer if the stand contains more than 20 percent legumes.

Effectiveness

The effectiveness of seeding depends on a number of factors including site slopes, soils and vegetation health. Still, when properly implemented, permanent seeding often reduces soil loss by up to 99 percent (5C, 2012).

Cost Considerations

The cost of permanent seeding varies depending on many factors—availability and proximity of materials, application method, time of year, prevailing wage rates, and regional cost trends, to name a few. It is therefore difficult to develop cost estimates that apply nationwide and year-round. As a general example, seeding bluegrass with hydroseeding generally costs around $50 to $100 per thousand square feet (RSMeans, 2020).

Additional Information

Additional information on related practices and the Phase II MS4 program can be found at EPA’s National Menu of Best Management Practices (BMPs) for Stormwater website

References

Five Counties Salmonid Conservation Program (5C) (2012). *5C Roads Workshop Presentation, Understanding Erosion with the Revised Universal Soil Loss Equation.*

RSMeans. (2020). Seeding data from Gordian [Online data file].

Smolen, M. D., Miller, D. W., Wyatt, L. C., Lichthardt, J., & Lanier, A. L. (2013). Erosion and sediment control planning and design manual. North Carolina Sedimentation Control Commission; North Carolina Department of Environment and Natural Resources; North Carolina Agricultural Extension Service.