



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

4.2.6.11 Vegetation and Landscaping: Permanent



Source: TDEC

Definition and Purpose

Establishing perennial plant cover, such as grasses, shrubs, trees, and legumes, on disturbed or exposed areas to achieve long-term soil stabilization plays a crucial role in reducing the velocity of stormwater runoff, maintaining sheet flow, and promoting filtration and infiltration, which helps prevent sediment loss and soil displacement caused by raindrop impact and surface water movement. By creating a protective cover, permanent vegetation minimizes erosion, enhances site aesthetics, and contributes to improved wildlife habitat.

Appropriate Applications

Permanent vegetation is most applicable where long-term soil stabilization is necessary and where vegetative cover is the most practical or effective solution. It is particularly suited for areas that require durable erosion control. The use of permanent vegetation offers advantages such as lower initial costs and reduced labor compared to other stabilization methods. To ensure effective stabilization, seeding or planting should occur within 14 days of final grading activities or within seven days on slopes exceeding 35%.



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

Limitations and Maintenance

One of the key advantages of seeding over other planting methods is its cost-effectiveness, flexibility, and lower labor input. However, it comes with challenges such as erosion risk during establishment, seasonal planting limitations, potential weather-related setbacks, and the potential to amend the soil if in-situ soils do not possess desirable qualities. Additionally, some areas may require reseeding if the vegetation fails to establish adequately.

Regular inspections should be conducted to identify areas where vegetation has not taken hold, and corrective measures such as overseeding, reseeding, and re-mulching should be implemented when necessary. Permanent vegetation requires germination and active growth that produces 70% uniform coverage over the disturbed area. When 70% uniform coverage is not obtained, additional seeding, fertilization, or complete replanting following proper seedbed preparation is required, depending on the severity of damaged areas. Soil testing is recommended prior to seeding, as it is a simple test that can aid successful establishment of vegetation. Soil deficiencies, such as improper pH, lack of macro- and micro-nutrients, and low organic matter content, are common issues when vegetation struggles to grow.

Watering is particularly important in dry conditions or during late-season plantings to help vegetation establish a strong root system. In areas with high erosion potential, temporary EPSC measures should be in place until the vegetation is fully established. Fertilization is often required in the second growing season, particularly for turf grasses, and should be applied based on soil test recommendations. However, fertilization may not be required for native species and may increase weed competition. Additionally, vegetated areas should be protected from excessive foot or vehicle traffic, grazing, or other disturbances during the establishment period, with temporary barriers installed if necessary.

A well-defined maintenance plan is essential to ensure the long-term success of permanent vegetation. This plan should address site-specific conditions such as irrigation, mulch replacement, invasive species control, mowing, and corrective actions for vegetation failure.

Planning and Design Considerations

To maximize the probability of successful vegetation establishment, site specific planning is essential. Factors such as soil type, geographic region, and climate, vegetation management requirements, and plant tolerance to site conditions must be evaluated before selecting the appropriate plant species. Refer to the Seed Mix Appendix (Appendix D) for discussion on these topics and example seed mixes.



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

Site bed preparation is also critically important for vegetation establishment. For introduced species of grass, including turf grasses, the following is recommended for soil preparation:

1. With proper site conditions, stockpile topsoil at the beginning of construction following guidance in Section 4.2.6.10;
2. If feasible, conduct soil tests when the site is ready for vegetation;
3. Using soil test results as well as guidance herein and the Seed Mix Appendix, amend the soil;
4. Rip and/or disk to a minimum depth of 12 inches before applying stockpiled soil. This practice is also advisable on construction sites where no soil material has been stockpiled;
5. Consider engineered soil amendments, biotic soil media, or compost when no topsoil is available;
6. Select a site specific seed mix following guidance from the Seed Mix Appendix;
7. Apply dry mulch at the prescribed rate, hydraulically applied erosion control products, RECPs, or other methods to prevent erosion and seed displacement. Non-plastic erosion control blankets are preferable as they are more environmentally- and wildlife- friendly;
8. Water as necessary if rainfall is not sufficient; and
9. Reapply seed, fertilize, or replant as necessary until 70% uniform coverage of active growth is achieved. Employing no till drill or hydraulic seeding techniques are best practices.

Often soil composition is the reason for difficulty in establishing vegetation at a site. Soil amendments and conditioners can be used to achieve the ideal pH, range of available nutrients, and soil composition. However, topsoiling (Section 4.2.6.10) may be more ideal and cost-effective than applying soil amendments to achieve desirable planting conditions. Care should be taken to minimize the height of topsoil stockpiles to maintain soil health and viability of microorganisms. All candidate topsoil should be tested and in compliance of ASTM D5268 – “Topsoil Used for Landscaping and Construction Purposes”. Another alternative is the use of engineered soil amendments, as determined by ASTM D5268.

When topsoil is to be used to aid permanent vegetation, it is essential to properly prepare the subgrade. The subsoil should be disked or scarified to a depth of at least two inches to enhance bonding between the subsoil and topsoil layers. Poor bonding may result in uneven water infiltration and reduced vegetation establishment (KTC, 2015; VDEQ, 2024). Uniform spreading of topsoil to a minimum compacted depth of four inches is recommended for flatter slopes, while two inches may suffice on steeper slopes. Required volumes of topsoil based on spread depth are provided in Table 4.2.6.9-A, which may further assist in cost



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

comparisons. Topsoil compaction should be light to maintain soil strength and stability without inhibiting root development or increasing runoff.

Table 4.2.6.11-A: Required topsoil volumes per spread depth.

Depth to Spread (inch)	Cubic Yards per 1,000 square feet	Cubic Yards per Acre
1	3.1	134
2	6.2	268
3	9.3	403
4	12.4	537
5	15.5	672
6	18.6	806

Final grading should ensure smooth transitions and eliminate surface irregularities that may impede drainage or contribute to erosion. Following topsoil application, temporary or permanent vegetation should be established promptly to stabilize the soil. Care should be taken to avoid excessive mixing of topsoil and subsoil, as this can compromise soil structure and nutrient availability.

If topsoil is not used, carry out grading according to the approved plan before amending the soil and seeding. Roughen the graded surfaces according to Section 4.3.8.

Soil acidity directly impacts nutrient availability, and most plants thrive in a pH range of six to seven (ALSWCC, 2018; VDEQ, 2024). If soils are too acidic, liming materials such as slow-release agricultural or quick-release micronized limestone or Selma chalk can be applied to raise pH levels. Agricultural limestone should have a calcium carbonate equivalent of at least 90%, and application rates should be determined through soil testing. It is essential to evenly distribute and incorporate lime into at least the top four inches of soil using mechanical means such as disking or chiseling to ensure proper effectiveness (NCDEQ, 2013). Lime typically takes two to three years to fully react with soil, but benefits can appear within a few months. Thus, schedule lime application accordingly. How long those benefits last depends on the type of lime, soil acidity, organic matter, clay content, and how the land is managed (MSU, 2011). However, lime should not be applied to alkaline soils, as excessive alkalinity can hinder plant growth and nutrient absorption. Alkaline soils should be treated with elemental sulfur, gypsum or acidifiers to lower pH.

Where soils lack proper nutrients, ideal N-P-K ratio fertilizers or compost mixes are essential to plant establishment. N-P-K ratios specify the percentage of each nutrient in the fertilizer



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

where N is nitrogen for green color and growth, P (P_2O_5) is phosphorus for establishment and rooting, and K (K_2O) is potassium to enhance pest and environmental stress tolerance (NCDEQ, 2013). Soil testing provides precise recommendations for nutrient amendments based on plant requirements. If soil tests are impractical, refer to the manufacturer's specifications for application rates. Natural or organic fertilizers derived from composted manure, biosolids, and recycled plant materials may be utilized to improve soil fertility while reducing environmental impact. In sandy soils, which tend to have lower nutrient retention, fertilizer application rates can be increased by 20% to compensate for nutrient leaching (NCDEQ, 2013). This may be more applicable in West Tennessee. Trace elements, such as sulfur, manganese, zinc, boron, chlorine, and molybdenum (and potentially others), are also required for plant prosperity. If these elements are not already included in base fertilizers, they can be obtained individually (NCDEQ, 2013). Similar to pH additives, it is essential to evenly distribute and incorporate fertilizers into at least the top four inches of soil.

Peat, sand, animal manure, rotted sawdust, porous ceramics, biochar, or biosolids can be incorporated into the soil to modify soil texture, structure, and drainage characteristics. Natural amendments, including peat, composted animal manure, and biosolids, increase soil organic matter content and improve nutrient-holding capacity. Fully composted manure and biosolids must meet industry regulations (such as the US Composting Council Seal of Testing Assurance program) before application to prevent environmental contamination. Rotted sawdust and stabilized wood waste can be incorporated, though extra nitrogen may be needed to counteract high carbon-to-nitrogen ratios. In areas with poor drainage or compaction, sand or porous ceramics can be used to improve permeability but must be applied in large volumes to be effective. Proper incorporation of these amendments into at least the top four inches of soil ensures that they provide long-term benefits for vegetation establishment and site stabilization.

After seeding, mulching (Section 4.2.6.9) to protect the seed and the underlying soil is recommended to assist in establishing vegetation. Furthermore, hydroseeding (Section 4.2.6.5), dry seeding, or cultipacker seeding methods may be necessary in conjunction with mulching to retain soil moisture, regulate soil temperature, and minimize erosion during unfavorable weather conditions.

Unlike grasses, the establishment of native seedlings takes several seasons and therefore may require nurse crops in the seed mixes planted and different bed preparation techniques. Notes for the establishment of natives include:

- Select native plant species to match the existing site conditions;



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

- Ensure all weed competition is controlled before planting the natives. *Proper weed control is the most crucial step in planting native species from seed.* When using herbicides follow all labeled recommendations;
- If using straw mulch on seeded areas straw is to be oats or wheat straw certified to be free from weed seeds. Foreign matter detrimental to plant life and hay, or chopped cornstalks, are not acceptable. Take special care to spread an evenly distributed, thin layer of straw mulch, ensuring no clumps or pieces of bales are not spread;
- If using erosion control blankets, avoid overly dense mats, which may slow or prevent germination;
- Avoid RECPs with plastic netting that can entangle wildlife and lead to the release of microplastics into the environment. Use biodegradable nettings or hydraulically applied erosion control products listed by the US Fish and Wildlife Service as “wildlife friendly” whenever possible; and
- Do not use lime or fertilizer to improve soil conditions if within normal ranges (i.e., no off-the-charts measurements such as found on contamination sites).

In the first growing season, mowing may be needed to prevent undesirable plants from overshadowing the new seedlings. If undesirable species are present, mow the vegetation no lower than six inches or just above the native seedlings. Spot treat all noxious and invasive plant species within the planting area with appropriate herbicides or hand-rogue individual unwanted plants.

Example Application

No formal design or quantities are required for this measure and therefore are not presented here.

References

- ALSWCC. (2018). *Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas.*
- KTC. (2015). *Best Management Practices (BMPs) for Controlling Erosion, Sediment, and Pollutant Runoff from Construction Sites.*
- MSU. (2011). *Facts About Soil Acidity and Lime.*
- NCDEQ. (2013). *Erosion and Sediment Control Planning and Design Manual.*
- USEPA. (2021). *Stormwater Best Management Practices: Permanent Seeding.*
- VDEQ. (2024). *Virginia Stormwater Management Handbook.*