

4.0 Revegetation

Definition: Revegetation is the establishment of annual and perennial plant material for temporary and/or long term soil stabilization.

Purpose: To stabilize soil, reduce raindrop impact, reduce the velocity of surface runoff, prevent erosion by wind and water, and enhance and/or restore natural attractiveness. Stable vegetation generates natural mulch and provides organic matter for soil nutrient cycling. Revegetation practices also improve infiltration and transpiration and can trap sediment and other particulates.

Applicability: This BMP is applicable to cleared, graded, or disturbed areas where vegetation has been removed. Revegetation is applicable only after areas have been mechanically stabilized. Once a slope has been stabilized, revegetation practices should be implemented to further stabilize loose soil and provide for attractive, sustainable sediment control.

Advantages:

1. Offers long term, sustainable soil stability.
2. Increases soil infiltration.
3. Protects against erosion by wind and water.
4. Enhances natural beauty.

Disadvantages:

1. Nutrient poor soils and a short growing season make establishing a sustainable vegetative community in the Tahoe Basin difficult.
2. Low summer precipitation may hinder establishment of vegetation.

3. Some areas may not be accessible to irrigation equipment.
4. Extensive monitoring and maintenance may be required to ensure revegetation success.

Planning Considerations: Revegetation is often the most cost effective form of source control. Once vegetation is established, it prevents soil detachment by raindrop impact and limits soil transport by overland flow. Healthy root mass associated with stable vegetation also helps stabilize loose sediment and improves infiltration capacity. While many BMP efforts focus on treating displaced sediment, revegetation offers effective source control by keeping sediment and nutrients in place. As such, revegetation is a preferred BMP that should be implemented wherever conditions permit.

In addition, revegetation should be an important component of other source control measures described in following chapters (retaining walls, riprap, etc.). If there is insufficient funding, consider scaling back other aspects of the project to allow for comprehensive revegetation. In addition to providing sustainable source control, revegetation helps restore the natural appearance of disturbed areas.

Grading and other earthmoving activities required for revegetation should be timed to expose the smallest land area for the shortest time possible.

UC Davis and CalTrans are currently developing updated revegetation protocols and success criteria as part of the CalTrans Development and Demonstration program. These documents will be included as they become available.

Tips for Installation:

The following revegetation tips summarize more complete guidelines authored for the Nevada Tahoe Bond Act Technical Advisory Committee.

1. Preparation of a revegetation plan should be performed by a qualified revegetation specialist. The specialist should have experience working in the Tahoe Basin or other high altitude (>4000 feet) areas.
2. Initial and potential project outcome should be clearly defined. The outcome of the project should create a stable, sustainable vegetated community capable of controlling erosion.
3. Site specificity is a critical planning consideration.
4. Consider the project on a landscape scale, taking into account geologic and topographic features.
5. Determine the soil properties. Disturbed often have lost the nutrient rich topsoil and mulch layers needed to sustain vegetation. As such, an important component of any revegetation plan is the evaluation and remediation of soil conditions, as needed. Soil amendments must meet TRPA guidelines. A qualified soil scientist should evaluate soil texture, organic matter, pH, and available nutrients. Pre-project soil monitoring should also include lab tests to measure mineralizable nitrogen, which is strongly correlated with sustainable plant cover.
6. Use native species when feasible; plant material should come from as close to the project site as possible. Avoid non-natives as they may discourage native species germination and inhibit natural plant succession. Natives are readily available and provide successful results. Non-native grasses that will not cross-pollinate may be used to establish cover quicker and build up the soil. If non-natives are chosen, they must be on TRPA's recommended plant list. Non-natives should not be used in SEZ areas. TRPA's recommended plant list is included as Appendix IV.
7. A long lasting mulch material should be used. A native mulch of pine and/or fir needles is preferred (see Mulches, Chapter 6.3) Straw is **NOT** recommended as mulch.
8. Avoid over fertilization. Excess mineral fertilizer can impair surface and ground water quality. Organic amendments and slow release fertilizers are preferred.
9. A maintenance and monitoring plan must be included.
10. Consult complete guidelines for further direction.

Seeding Methods

Hydroseeding distributes seed in a wet slurry that includes seed and mulch along with, in some cases, fertilizer and a mulch tackifier. Hydroseeding is frequently chosen for its ease of application, but is not always successful. Seed mixes often dry to a solid crust resulting in poor seed/soil contact. In addition, agitators in the hydroseeding tank can destroy seed. As such, hydroseeding may not be a good option when using expensive native seed. Hydroseeding is

most successful when adequate mulch is used.

Broadcast seeding consists of even seed distribution, either by hand or by machine onto a prepared soil surface. Seed is then covered with soil, usually by raking with hand tools. Fertilizer and other amendments can be incorporated as the seed is covered. This method is applicable to any slope and works well in areas inaccessible to other equipment.

Drill seeding has proven effective on gentle slopes. This method provides quality seed/soil contact and drilling equipment acts to incorporate seed and soil amendments.

Seeding methods, like all aspects of revegetation, are highly site specific. Consult a qualified revegetation specialist to determine the most appropriate seeding method for your project.

Maintenance: Depending on climate and site conditions, revegetated areas may require irrigation to ensure establishment of a healthy vegetative community. If needed, newly revegetated areas should be irrigated for the first two years. Some revegetation specialists have expressed concern regarding plant dependence on artificial irrigation. Watering regimes are being evaluated in the CalTrans Development and Demonstration Program. Avoid irrigation methods that can cause erosion; use sprinklers that distribute a fine spray. Drip irrigation is preferred. New vegetation should also be regularly inspected for success or failure; areas of poor cover should be re-seeded and/or re-planted and soil amendments added as needed. For projects funded through a grant, it is critical that the grant fund the initial maintenance period (typically two

years). A photo monitoring plan is recommended to evaluate revegetation success and to help direct future maintenance efforts.

Where to Use: Revegetation is applicable to any cleared, graded, or disturbed areas where vegetation has been removed.

Where NOT to Use: Revegetation should not be attempted on slopes that have not been stabilized or slopes greater than 2:1 without rock slope stabilization.

Field Experience:

- Projects that remained well vegetated after several years had higher amounts of total nitrogen at the site (Michael Hogan).
- Tendency to add high amounts of fertilizers and other amendments may create water quality problems.
- Problems with revegetation have resulted from inadequate soil testing and inappropriate use of fertilizers.
- Poor long term (3-5 year) revegetation has resulted from reliance on short term treatments that may provide good initial cover but do nothing to improve soil the soil conditions (nutrients and organic matter) required for long term revegetation success.

4.1 Turf Reinforcement Mats

Description: Turf Reinforcement Mats (TRMs) combine vegetative growth and synthetic materials to form a high-strength mat that helps to prevent soil erosion in drainage areas and on steep slopes. TRMs are generally composed of interwoven layers

of non-degradable geosynthetic materials stitched together to form a three dimensional matrix. They are thick and porous enough to allow for soil filling and are designed to enhance vegetative development (EPA Fact Sheet 832-F-99-002).

Applicability: Turf reinforcement technologies can be used for surface erosion control on steep slopes, as part of vegetated conveyance systems, for temporary sediment control at construction sites, and to prevent scouring of storm water treatment basins. TRMs are particularly applicable for re-establishing vegetation on slopes where vegetation has been disturbed or removed.

Advantages:

- Cost effectiveness.
- TRMs provide long-term water quality benefits by allowing for the growth of vegetation in disturbed areas or areas where impervious conveyance systems would otherwise be used.
- Aesthetically pleasing alternative to rock or concrete stabilization.

Disadvantages:

- Cannot prevent deep-seated slope failure.
- Some hydraulic conditions are beyond the limits of TRMs.
- Plastic persists over time. Without adequate cover, TRMs may prove unattractive and/or dangerous to wildlife.

Field Experience:

Field experience is limited. Since they are generally made of synthetic materials, TRMs may prove unsightly if vegetation is unsuccessful.

Contact Information: There are many vendors who offer turf reinforcement mat products.

Reference to the following specific product manufacturers does not constitute an endorsement. Any criticism or support is neither implied nor intended.

North American Green
www.nagreen.com
14649 Highway 41 North
Evansville, IN 47725
Tel: (800) 772-2040
Fax: (812) 867-0247

Synthetic Industries, Inc.
www.fixsoil.com
4019 Industry Drive
Chattanooga, TN 37416
Tel: (423) 899-0444
Fax: (423) 899-7619

Native Plant Farm
Pre-vegetated Erosion Control Blankets
5005 Old Hwy 395 North
Washoe Valley, NV 89704
(775) 690-5439